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A brief study on butterfly diversity in Kaptanganj block, Basti, Uttar Pradesh, India

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Abstract
The present study was administered to know the butterfly diversity in Kaptanganj block, Basti, Uttar Pradesh, India from April 2020 to June 2021. A complete of 47 species of butterflies belonging to 5 families were recorded. From the observed butterflies, Nymphalidae was the foremost dominant among the five families with 18 species, followed by Lycaenidae comprising of 12 species, Pieridae with 11 species, Papilionidae with 4 species and Hesperiidae with composition of 2 species. Among these 47 species, 3 species were found to be protected under the Indian Wildlife (Protection) Act, (1972). This study adding the valuable information on diversity of butterfly fauna and can contribute in planning of effective conservation measures in Basti district of Uttar Pradesh, India. None of the butterfly harmed or killed during sampling.

Keywords: biology, brinjal, *Leucinodes orbonalis*, morphometry

1. Introduction
Butterflies are one among the simplest taxonomically studied group of insects [1]. Data shows that, there are quite 28,000 species of butterflies, with about 80 percent found in tropical regions. The Indian subcontinent having a various terrain, climate and diverse host flora for about 1,504 species of butterflies [2]. Butterflies play an important role in ecosystem through their role in pollination and also serving as key part in organic phenomenon components. Being a possible pollinator of their nectar host plants also as indicators of healthy ecosystem the exploration and conservation of butterfly fauna thus becomes crucial in identifying and preserving potential habitats under threat [3-6].
The present study aims to look at the range and distribution of butterflies across three different habitats, namely, dry deciduous, open scrub, and farmland habitats in Kaptanganj block of Basti district, Uttar Pradesh. An observation checklist of butterfly species is provided.

2. Material and Methods
The findings presented here are supported random surveys administered from May, 2020 - June, 2021. The Basti district of Uttar Pradesh province situated at 26.8140° N, 82.7630° E of geographical coordinates with the typical climate as annual rainfall of 1166 mm, temperature range 9- 440C and humidity level above 70% (Figure 1). Every habitat in Kaptanganj was covered by random observations also as opportunistic sampling during walking through the roads, village path, agricultural lands, flowering garden, residential vegetation etc. within the field, photographs of the specimens were crazy mobile camera (Samsung Galaxy A50) from morning 9 AM till 5 PM within the afternoon. Butterflies were photographed from different angles the maximum amount as possible to get sufficient photographs to enable accurate identification of species. Butterflies were identified directly with the assistance of an organisation, Butterflies of India (BOI) through the web submission of single sample copy of every species photograph [13]. Collection was restricted to those species that would not be ready to capture photograph due to their very sensitive nature [7-10]. All scientific names followed within the present study are in accordance with Varshney (1983) [11] and customary English names follow Wynter-Blyth (1957) [10]. The flight seasonality decided using random presence-absence observation and thereafter occurrence was calculated to work out the status. The observed butterflies were categorized in five categories on the idea of their abundance as VC-very common (> 100 sightings), C-common (50-100 sightings), NR–not rare (15-50

sightings), R–rare (2-15 sightings), VR-very rare (1-2 sightings) [12].

3. Result and Discussion

Forty-seven species of butterflies representing five families are recorded during the study as mentioned in Table 1. the images of all observed butterflies are shown in figure 3. Nymphalidae showed the utmost species richness, comprising of 18 species (38%), followed by Lycaenidae (12 species, 26%), Pieridae (11 species, 23%), Papilionidae (4 species, 9%) and Hesperiidae (2 species, 4%) (Figure 2A). Among the observed 47 species, 4 (8%) were rare, 10 (21 %) weren't rare, 21 (45 %) were commonly occurring and 12 (26 %) were quite common (Figure 2B). it had been also observed that the majority of the species are found altogether seasons except few which were abundant in winter season. Among 47 species as observed, 14 species were found in high frequencies. The seasonal presence of butterfly species was also monitored. it had been observed that, most of butterfly species were present during Summer, Monsoon and Post monsoon season however, only a few species found in winter season (Table 1).

A total of 4 species of butterflies from the study area are designated rare, encouraging for strict monitoring and conservation measures. One species, Common pierrot documented to Schedule I, Long- banded silverline and Gram blue belong to Schedule II of the Indian Wildlife (Protection) Act, 1972.

The abundance of butterflies during a particular habitat is related to the presence of larval and nectar host plants. The rich diversity of butterflies, especially the Nymphalids and Lycaenids in Kaptanganj suggests a varied assemblage of floral species. The flora in Kaptanganj may be a mixed type with herbs and shrubs dominating the vegetation. the range and abundance of butterflies varies with season. the foremost of species are abundant for less than a couple of optimum months and rare or absent during other months of the year [8]. it's identified that two seasons as optimum for many of the species, March-April and October for butterfly abundance in India [10]. the precise environmental conditions like summer, high ratio and rainfall affects the butterfly species during a particular geographical location. during this study, it had been found that the majority of species peaked during summer, Monsoon and post-monsoon season (late March to October). The species abundance was less during winter season.

In addition, to being one among the foremost important biodiversity indicators, butterflies also act as frontline gardener for his or her dependence on indigenous flora of a specific location for completion of the life cycle. Therefore, an abundance of butterflies usually indicates a healthier ecosystem. Butterflies also function leading pollinators of both wild and cultivated plants. With the increasing need of developmental comfortabilities of the growing human population in India, natural habitats of the butterflies diluting simultaneously.

The loss of natural habitats is that the serious threat to all or any wildlife organisms including butterflies. Additionally, a spread of threats increasing with time like human recreational activities, trampling, litter deposition, heavy use of pesticide and herbicides and evasive weeds are common factors which affect butterfly populations. this work suggesting the immediate need for the right monitoring and conservation measures to be sustained. this may confirm that a minimum of the common species won't continue to the way of extinction.

Table 1: List of butterflies recorded from Kaptanganj together with status and flight period. *Listed in Indian Wildlife (Protection) Act, 1972 VC-Very Common (> 100 sightings), C-Common (50-100 sightings), NR–Not Rare (15- 50 sightings), R–Rare (2-15 sightings), VR-Very Rare (1-2 sightings) S-Summer, M-Monsoon, PM-Post Monsoon, W-Winter.

Sl. No.	Scientific name	Common name	Abundance	Observed season
Family: Lycaenidae (12)				
1	*Castalius rosimon*	Common pierrot	VC	S, M, PM, W
2	*Chilades lajus*	Lime blue	VC	S, M, PM
3	*Euchrysops cnejus**	Gram blue	C	S, PM
4	*Lampides boeticus*	Pea blue	NR	S
5	*Leptotes Plinius*	Zebra blue	C	S
6	*Pseudozizeeria maha*	Pale grass blue	VC	S, M
7	*Taracus spp.*	Pierrot spp.	VC	S, M, PM, W
8	*Zizeeria karsandra*	Dark grass blue	C	S, PM
9	*Rapala varuna*	Indigo flash	NR	S, M, PM, W
10	*Verachola isocrates*	Common guava blue	R	S, M
11	*Tajuria cippus*	Peacock royal	R	M
12	*Spindasis vulcanus* (Fabricius, 1775) *	Indian common silverline	R	S
Family: Nymphalidae (18)				
13	*Ariadne merione*	Common caster	C	M, PM
14	*Danaus chrysippus*	Plain tiger	VC	S, M
15	*Danaus genutia*	Striped tiger	VC	S, M
16	*Euploea core core*	Common crow	C	S, M, PM, W
17	*Phalanta phalantha*	Common leopard	C	M, PM
18	*Euthalia aconthea*	Common baron	C	M, PM
19	*Hypolimnas bolina*	Great egg-fly	NR	PM, W
20	*Junonia almanac*	Peacock pansy	C	M, PM
21	*Junonia iphita*	Chocolate pansy	NR	M, PM
22	*Junonia orithya*	Blue pansy	C	M, PM
23	*Junonia atlitis*	Gray pansy	C	M, PM
24	*Venessa cardui*	Painted lady	NR	S
25	*Melanitis leda*	Common evening brown	C	S, M
26	*Lethe Europa*	Bamboo tree brown	C	M, PM
27	*Yepthima huebneri*	Common four ring	C	M, PM

28	*Mycalesis perseus*	Common bush brown	C	M, PM
29	*Mycalesis spp.*	Bush brown spp.	C	M
30	*Acraea terpsicore* (Linnaeus, 1758)	Towny caster	NR	M
Family: Papilionidae (4)				
31	*Papilio demoleus*	Lime sallowtail	C	M, PM
32	*Papilio polytes*	Common Mormon	NR	S, M
33	*Papilio helenus* Linnaeus, 1758	Red helen	R	M
34	*Graphium doson*	Common jay	NR	M
Family: Pieridae (11)				
35	*Catopsilia pomona*	Lemon emigrant	C	M
36	*Catopsilia pyranthe*	Mottled emigrant	C	M
37	*Eurema hecabe*	Common grass yellow	VC	M
38	*Liptosia nina*	Psyche	NR	M, PM, W
39	*Pareronia hippa*	Indian wanderer	NR	M, PM
40	*Belenois aurota*	Pioneer	VC	S, M
41	*Cepora Nerissa*	Common gull	VC	S, M
42	*Delias eucharis*	Indian jezebel	VC	M, PM, W
43	*Pieris brassicae*	Large cabbage white	VC	S
44	*Pieris canidia*	Asian cabbage white	VC	S
45	*Pontia daplidice*	Bath white	C	S
Family: Hesperiidae (2)				
46	*Parnara spp.*	Parnara swift spp.	C	S, M
47	*Spilia galba*	Asian grizzled skipper	C	S, M

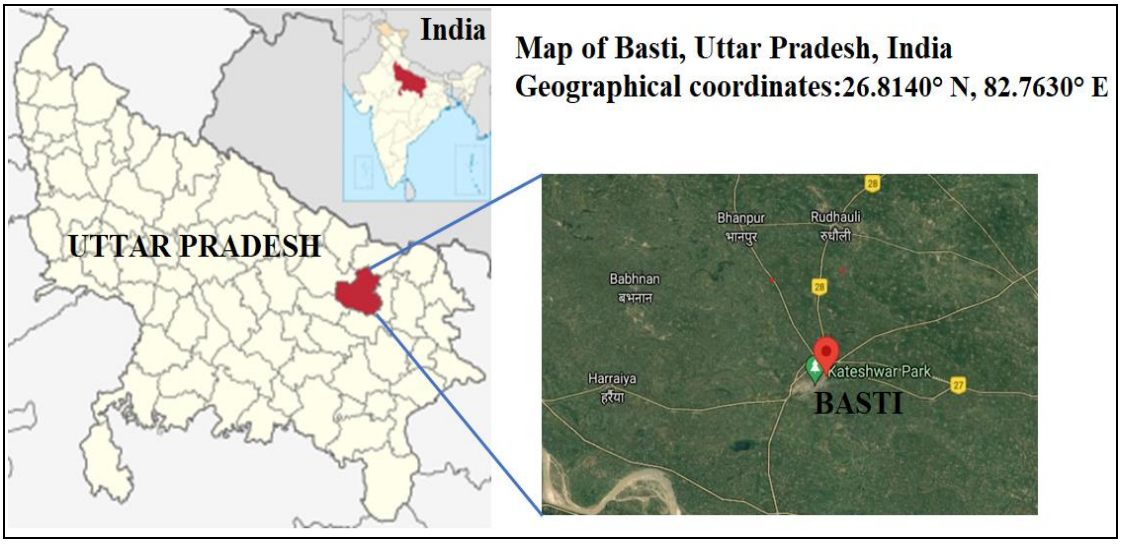

Fig 1: Location map of Basti, Uttar Pradesh, India.

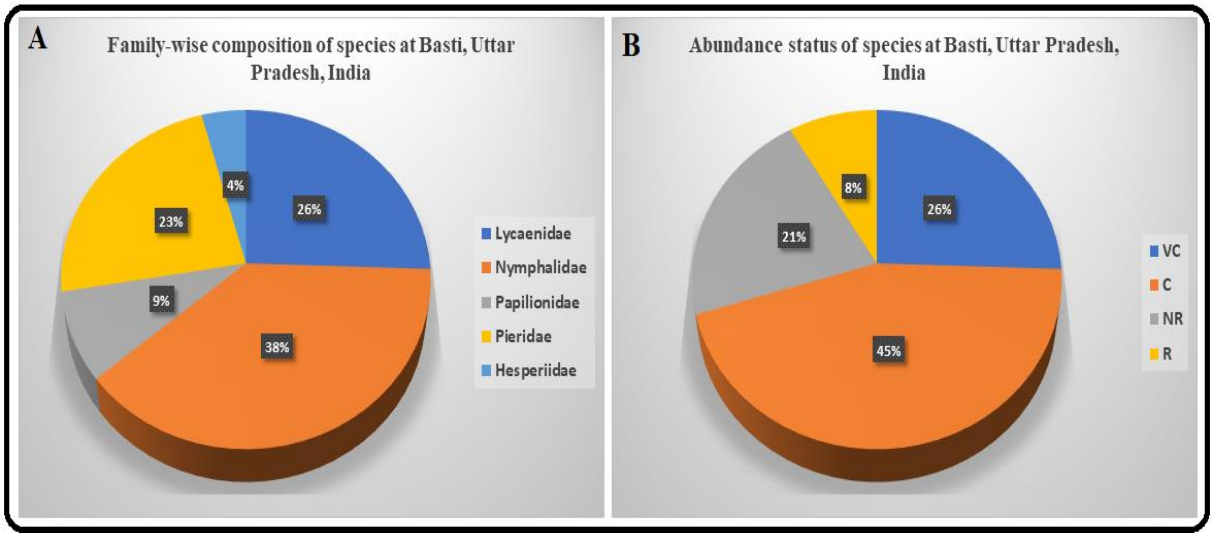

Fig 2: Family wise composition and abundance status of the butterfly species in Kaptanganj, Basti, Uttar Pradesh, India.

Fig 3: Plate of photographs of the butterfly species observed in Kaptanganj, Basti, Uttar Pradesh, India

4. Conclusion

The outcome of this study indicates the presence of the various butterfly species (47) at Kaptanganj block which was unreported till now in Basti, Uttar Pradesh, India. The increased urbanization and human developmental activities posing a significant threat on the biodiversity of butterfly fauna at study location. Besides from the urbanization, the utilization of harmful pesticides and herbicides in farmlands to eliminate the scrubs and insects, one among the foremost important explanation for extinction of some species of butterflies and a few are becoming endangered. to take care of the range of the butterfly at studied location, the landscaping and maintenance of gardens and controlled use of pesticides and herbicides should be carefully planned which will provide an upscale land for butterfly conservation also as for research. In future in continuation, this study also will investigate the more detailed study on diversity and nature of mutualistic interaction between butterflies and flora that's required for continuity of butterfly ecosystem. this is often the primary effort in exploring the butterfly diversity at Kaptanganj. The presented list of butterfly species during this study isn't conclusive and future exploration are going to be continued to update this checklist.

5. Acknowledgement

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6. Conflict of Interest

The authors declare that there is no conflict of interest.

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