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## Check-list of butterflies (Lepidoptera) in Agra District of Uttar Pradesh

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#### Abstract

Butterflies, renowned for their stunning colors, hold significant importance in preserving ecosystems and serving as indicators of climate change. This study aimed to investigate the diversity of butterflies in the Agra District of Uttar Pradesh within the Sudurpaschim Province. The present study was carried out from Agra District of Uttar Pradesh India during 2018-2020. According to this checklist, the total number of 05 families and 40 species of butterfly were recorded, 18 species are belonging to the family Nymphalidae, 10 species to Pieridae, 03 species to Papilionidae, 07 species to Lycaenidae, and 02 species of Hesperidae. The highest numbers of butterflies were recorded during the summer in the months of March to June. The present study provides a preliminary report on the butterfly diversity of Agra District of Uttar Pradesh which in turn may generate awareness among the local people and government, the importance of this study is essential for pollinators and their conservation.

**Keywords:** Butterfly species, check list, conservation pollinator and Uttar Pradesh

#### Introduction

Lepidoptera represents an insect order encompassing both butterflies and moths, commonly referred to as scaly-winged insects or lepidopterans. Within this order, butterflies belong to the sub-order Rhopalocera. There are approximately 255,000 to 265,000 documented species across 126 families of Lepidoptera worldwide, with butterflies accounting for 7.5% of these species (Saini P, 2021) [23]. Kunte (2001) [26] conducted a study on butterfly diversity in Pune city, analyzing variations along a human impact gradient. Additionally, Singh AP and Panday R (2004) [18] proposed a model to estimate butterfly species richness across the Indian subcontinent, using the Papilionidae family as an indicator. Paul M. and Sultana A. (2020) [16] conducted research on butterfly diversity in different urban landscapes of Delhi, India. Butterflies are valuable model organisms for studying evolution, genetics, mimicry, and biodiversity conservation. They also serve as indicators of a healthy environment. The conservation of butterflies has broader implications for wildlife and the well-being of current and future generations. Butterflies belong to the group of insects that have undergone extensive taxonomic research, and their coloration and patterns can function as indicators of the environment (Mayur *et al.*, 2013) [15].

In Uttar Pradesh, research on butterflies is still in its early stages, with limited work conducted by various researchers in different regions of the state. Notably, no previous studies on butterfly populations have been conducted in the Agra district. This research involves morning butterfly sampling, observation, photography, and the creation of a checklist based on the collected photographs, as detailed in this paper.

#### Materials and Methods

##### a) Study area

The study area was carried out in Agra, District of Uttar Pradesh. Agra is one of the most populous cities in Uttar Pradesh and the 24th most populous city in India. Agra district is a part of the Agra division. It is situated on the bank's river bank of Yamuna in the northern state of Uttar Pradesh, India. It geographically lies between 27°18' North of Latitude and 78°02' East of Longitude. Its Altitude is 169 meters above sea level. On the North it is bounded by Mathura District, On the South, it is bounded by Dhaulpur District, Rajasthan. On the East, it is bounded by Firozabad District and On the West, it is bounded by Bharatpur. The total area of the Agra district is 4027 Km<sup>2</sup> and the total population according to the 2011 census has a 4,418,797+2.01%. It is 378 kilometres west of the state capital, Lucknow, and 206 kilometers south of the national capital New Delhi.

**b) Methodology**

In each forest range, five study sites were randomly selected by leaving three to four kilometre distance between them, so that it could cover possible different vegetation types and topography of each range as per . Butterflies were observed during 6.00 to 10.00 hours and 15.00 to 18.00 hours as per the method of by traversing slowly with a phase of 30 minutes per transect by visual counting within three meter radius of the observer as per [30-32]. Field photographed butterflies were identified with the help of field guides as per [13, 33-35]. Since, capturing of butterflies is strictly prohibited in NNP as per Wildlife Act, (1972), fast flying butterflies were not considered during the present investigation. Statistical Analysis: The collected data was compiled and the checklists of the butterflies were prepared. The density and abundance was calculated as per. Percentage compositions of the different families at different locations of Agra district were calculated by following standard methods and the data were graphically plotted. For identification of butterflies, we looked for a reference book "Butterflies of Begnas and Rupa Watershed area" (Smith *et al.*, 2016) [21] and some reputed internet websites like Butterflies of India (<https://www.ifoundbutterflies.org/>) was visited.

**c) Vegetation and Habitat Area**

Many butterflies are localized or restricted to specific habitat types. For this survey, the butterflies were collected from different habitats. Habitat was diverse vegetation. It consists of grasslands, cultivated lands, bushes woodlands, and human

settlements, i.e., urban parks areas, agriculture areas, agroforestry areas, orchards, roads, houses, factories, etc.








**Results and Discussion**

A total of 52 butterfly species were identified, with the Nymphalidae family being the most prevalent. The prevalence of the Nymphalidae family can be attributed to its status as one of the largest families in terms of species diversity and its wide distribution in nature (Khyade *et al.*, 2018) [10]. This dominance is likely a result of their ecological adaptability and strong dispersal capabilities. It was observed that butterfly diversity and distribution decrease as human disturbances, habitat fragmentation, and forest fires increase (Khanal *et al.*, 2013) [12]. Since butterflies serve as ecological indicators, a declining population can signal habitat degradation (Bourn & Thomas, 2002) [4]. Throughout the study, it became evident that further exploratory work is needed to estimate the population size and abundance of these insects. The region's abundant flora provides an ideal environment and location for biodiversity. A total number of 05 families and 40 species of butterfly are recorded, 18 species are belonging to the family Nymphalidae, 10 species to Pieridine, 03 species to Papilionidae, 07 species to Lycaenidae, and 02 species to Hesperidae. Were recorded in the Agra district. The highest number of butterflies is recorded during the summer in the months of March to June. The diagnostic characters, distribution, and ecology of butterflies species were observed.

**Table 1:** Checklist of Butterflies in Agra

Family	Sub-family	Tribes	Scientific Name	Common Name	Author, Year	Relative Abundance%
I). Nymphalidae	Biblidinae	Biblidini	<i>Ariadne merione</i>	Common Castor	Cramer,1777	3.38
	Danaina	Danaini	<i>Danaus genutia</i>	Striped Tiger	Cramer, 1779	1.88
			<i>Danaus chrysippus</i>	Plain Tiger	Linnaeus, 1758	3.76
			<i>Euploea core</i>	Indian Common Crow	Cramer, 1780	1.50
			<i>Acraea terpsicore</i>	Tawny Coster	Linnaeus, 1758	1.50
	Heliconiinae	Acraeini	<i>Acraea terpsicore</i>	Tawny Coster	Linnaeus, 1758	1.50
		Vagrantini	<i>Phalanta phalantha</i>	Common Leopard	Drury, 1773	3.57
	Limenitidinae	Neptini	<i>Neptis hylas</i>	Common Sailer	Linnaeus, 1758	0.94
			<i>Junonia lemonias</i>	Lemon Pansy	Linnaeus, 1758	2.44
	Nymphalinae	Junoniini	<i>Junonia almana</i>	Peacock Pansy	Linnaeus, 1758	3.95
			<i>Junonia atlites atlites</i>	Oriental Grey Pansy	Linnaeus, 1763	1.12
			<i>Junonia iphita</i>	Chocolate Pansy	Cramer, 1779	0.94
			<i>Hypolimnas anomala</i>	Anomalous Eggfly	Wallace, 1869	0.75
			<i>Vanessa cardui</i>	Painted Lady	Linnaeus, 1758	0.75
			<i>Hypolimnas misippus</i>	Danaid Eggfly	Linnaeus, 1764	1.31
			<i>Hypolimnas bolina</i>	Great Eggfly	Linnaeus, 1758	2.63
			<i>Junonia hierta</i>	Yellow Pansy	Fabricius, 1798	0.75
	Satyriinae	Elymniini	<i>Elymnias hypermnestra</i>	Common Palmfly	Linnaeus, 1763	0.94
Melanitini		<i>Melanitis leda</i>	Common Evening Brown	Linnaeus, 1758	2.07	
II). Pieridae	Coliadinae		<i>Catopsilia pomona</i>	Lemon Emigrant	Fabricius, 1775	2.63
			<i>Eurema hecabe</i>	Common Grass Yellow	Linnaeus, 1758	6.96
	Pierinae	Nepheroniini	<i>Pareronia hippia</i>	Indian Wanderer	Fabricius, 1787	3.20
			<i>Cepora nerissa</i>	Common Gull	Fabricius, 1775	8.47
		Pierini	<i>Pieris brassicae</i>	Large Cabbage White	Gray, 1846	1.31
			<i>Pieris canidia</i>	Asian Cabbage White	Linnaeus, 1768	8.47
			<i>Delias eucharis</i>	Indian Jezebel	Drury, 1773	1.88
			<i>Colotis fausta</i>	Large Salmon Arab	Olivier, 1804	0.56
		Teracolini	<i>Colotis vestalis</i>	White Arab	Butler, 1876	0.75
			<i>Colotis amata</i>	Small Salmon Arab	Fabricius, 1775	1.69
III). Papilionidae	Papilioninae	Leptocircini	<i>Graphium doson</i>	Common Jay	Fruhstorfe 1907	2.07
		Papilionini	<i>Papilio polytes</i>	Common Mormon	Cramer, 1775	1.88
			<i>Papilio demoleus</i>	Lime Swallowtail	Linnaeus, 1758	7.15
IV). Lycaenidae	Polyommatae	Polyommataini	<i>Acytolepis puspa</i>	Common Hedge Blue	Horsfield, 1828	0.56
			<i>Pseudozizeeria maha</i>	Pale Grass Blue	Kollar, 1844	3.38
			<i>Chilades pandava</i>	Plains Cupid	Horsfield, 1829	3.76
			<i>Chilades lajus</i>	Indian Lime Blue	Stoll, 1780	3.38
			<i>Catochrysops panormus</i>	Silver Forget-me-not	C. Felder, 1860	0.56
			<i>Leptotes plinius</i>	Zebra Blue	Fabricius, 1793	1.88
			<i>Zizeeria karsandra</i>	Dark Grass Blue	Moore, 1865	3.01
V). Hesperidae	Hesperinae	Taractrocerini	<i>Potanthus omaha</i>	Lesser Dart Skipper	E.Edwards, 1863	0.56
	Pyrginae	Carcharodini	<i>Spialia galba</i>	Asian Grizzled Skipper	Fabricius, 1793	1.50

**Photo plates of butterflies listed at Agra district of U.P.**

				
Common Castor	Striped Tiger	Plain Tiger	Indian Common Crow	Tawny Coster
				
Common Leopard	Common Sailer	Lemon Pansy	Peacock Pansy	Oriental Grey Pansy
				
Chocolate Pansy	Anomalous Egg fly	Painted Lady	Danaid Egg fly	Great Egg fly
				
Common Palm fly	Common Evening Brown	Lemon Emigrant	Common Grass Yellow	Indian Wanderer
				
Common Gull	Large Cabbage White	Asian Cabbage White	Indian Jezebel	Large Salmon Arab
				
White Arab	Small Salmon Arab	Common Jay	Common Mormon	Lime Swallowtail



### Conclusion

The current butterfly checklist is not comprehensive, and ongoing research will keep it up to date. This research aims to promote conservation efforts and raise awareness about the endangered Central East forest habitats threatened by extensive development. The density, abundance, and seasonal presence of existing butterfly species differ significantly across various forest areas, offering a foundation for more extensive conservation research in the future.

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