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FAUNAL-DIVERSITY OF BUTTERFLIES IN DISTRICT REWARI, HARYANA, INDIA

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Abstract: A survey was conducted to document butterfly diversity in the district Rewari, a semi-arid region in Haryana, India from March 2021 to November 2022. A total of forty-two species of butterflies belonging to thirty genera and five families were identified. The expedition revealed that the diversity of the family Pieridae (40.47%) is maximum followed by Lycaenidae (28.57%), Nymphalidae (16.66%), Hesperiidae (9.52%) and Papilionidae (4.76%). It has also been observed that the species *Euchrysop cnejus cnejus*, *Lampides boeticus* and *Melanitis zitenius* are mentioned in Schedule II of the Indian Wildlife (Protection) Act, 1972. However, other species are mentioned in Schedule I and II.

Keywords: Butterflies, Lepidoptera, Rewari, Southern Haryana.

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INTRODUCTION

The presence of life imparts uniqueness and simultaneously its diversity is a special feature that adds to the distinctiveness of Earth. It is estimated that approximately 10 to 15 million species of plants, animals, protists, and fungi inhabit the earth of which only 1.2 million species have been documented while 86% have not yet been described (Stork, 1999; Mora *et al.,* 2011). Rich biodiversity has an important contribution to cultural and socio-economic values in humans as well as to the ecology of the associated concerned area but is under threat of loss and degradation due to anthropogenic intervention including pollution (Ashok, 2016; Prakash and Verma, 2022; Singh *et al.,* 2023). Ecological balance is needed for the maintence of biodiversity, which is necessary for human survival (Verma, 2017; Kumar, 2018). Many nations raised the concern at the first international Earth Summit on June 3, 1992, convened to address alarming problems of environmental protection and socio-economic development.

The Lepidoptera is one of the holometabolous orders of winged insects and is represented by 1,80,000 described species that share approximately 10% of the total described living organisms and chiefly contain butterflies and moths (Unyal, 2013). Over billions of years, they have evolved various shapes and sizes of wing

patterns ranging from drab in moths to brightly colored in butterflies. Butterflies splendidly vary in shape, size and colour and are found in tropical and temperate habitats around the world except close to poles (Kumari *et al.,* 2023). They belong to order Lepidoptera, class Insecta and phylum Arthropoda. Insecta is the largest class and Arthropoda is the largest phylum of Kingdom Animalia (Verma and Prakash, 2020).

Despite their important role in pollination along with honey bees to maintain ecosystem balance, most tropical Lepidoptera are poorly studied and documented. They have an excellent key role in the assessment of the quality of the environment of terrestrial ecosystems (Ghazoul, 2002). The existence of these in a particular area functions as a marker of habitat quality and supports the survival of vegetation of the same. Hence, a serious effort was made to explore and document the heterogeneity of one of the superfamily Papilionoidea that contains butterflies in the district Rewari of Haryana state.

A systematic study has been ongoing on butterfly fauna worldwide since the early 18th century. Pinkert *et al*. (2022) have recorded about 19,327 butterfly species from different places of the world. Till the current century, this figure has been continuing increasing and many ecologists imparted a lot of contribution via exploring various terrestrial ecosystems and diversity hot spots of India (Wynter-Blyth, 1956; Harsh, 2014; Ansari *et al.,* 2015; Kumar, 2017; Kasambe, 2018; Arya *et al.,* 2020; Hedge *et al.,* 2020; Irungban *et al.,* 2020; Tiwari *et al.,* 2020). Gumber (2022) has made a good effort to search butterfly faunal diversity of Mandi Dabwali in western Haryana. However, there is no such remarkable work regarding the diversity of butterfly fauna in the other parts of Rewari.

MATERIALS AND METHODS

The district Rewari (Altitude: 28° 10' 59.9952" N; Latitude: 76° 37' 0.0084" E) also known as brass-city (fig. 1), is located at a distance of about 90 km from the Indian capital, New Delhi. It is very hot in summer and remarkably cold in winter with varying temperatures between 2°C to 46°C. The climatic condition of the district is semi-arid to arid so the chief vegetation is deserted flora.

The survey was conducted from March 2021 to November 2022 in various seasons. To study the diversity of butterflies, the standard Pollard walk method was adopted. The butterflies were carefully observed and photographed from various angles. Taking into account no harm to living beings, the individual butterflies were only observed and photographed with a Nikon camera, and the observed species were identified using standard keys (Kunte, 2000; Devries, 2010; Gupta and Majumdar, 2012; Smertacek, 2017). The help of e-photograph keys from websites http://www.flutters.org and https://www.ifoundbutterflies.org were followed for further confirmation.

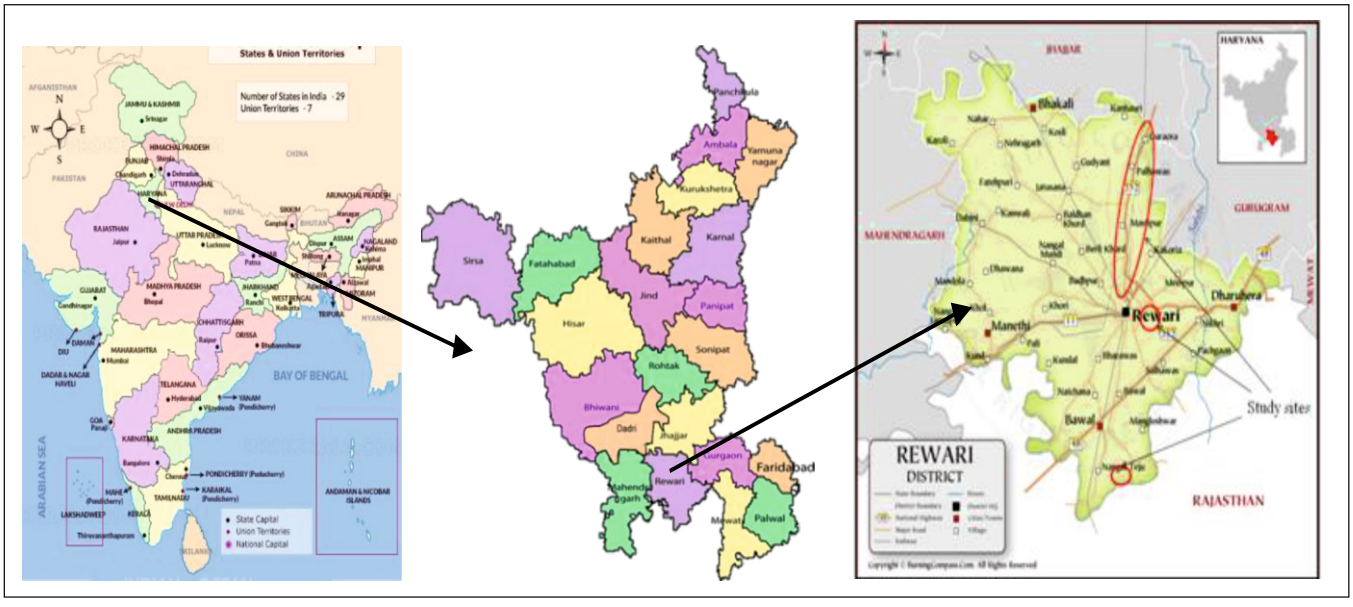

Fig. 1: Map of study site in district Rewari, Haryana (India).

RESULTS AND DISCUSSION

A total of 42 species belonging to five families have been reported and documented during the survey (Table 1; Fig. 2).

Table 1: Records of species of butterflies of different families in Rewari, Haryana.

Families	Name of Species	Common/Vernacular Name
Hesperiidae	*Arnetta atkinsoni* (Moore, 1878)	Black-tufted Bob
	Arnetta vindhiana (Moore, 1884)	Vindhyan Bob
	Pelopidas mathias mathias (Fabricius, 1798)	Small Branded Swift
	Hasora chromus (Cramer, 1780)	Common Banded Awl
Lycaenidae	*Acytolepis puspa* (Horsefield, 1828)	Common Hedge Blue
	Catochrysops strabo (Fabricius,1793)	Forget-me-not
	Chiladess pandava (Horsfield, 1829)	Plains cupid
	Euchrysop cnejus cnejus (Fabricius,1798)	Gram blue
	Freyeria putli (Kollar,1844)	Black-spotted Grass Jewel
	Pseudozizeeria maha maha (Kollar,1844)	Pale Grass Blue
	Tarucus nara (Kollar, 1848)	Striped Pierrot
	Tarucus sp.	Pierrot spp.
	Zizeeria karsandra (Moore, 1865)	Dark Grass Blue
	Zizina otis (Fabricius, 1787)	Lesser Grass Blue
	Leptotes plinius (Fabricius, 1793)	Zebra Blue
	Lampides boeticus (Linnaeus, 1767)	Pea Blue
Nymphalidae	*Danaus chrysippus* (Linnaeus, 1758)	Plain Tiger
	Hypolimnas bolina jacintha (Drury, 1773)	Great Egg fly
	Hypolimnas misippus (Linnaeus, 1764)	Danaid Egg fly
	Junonia almana (Linnaeus, 1758)	Peacock Pansy
	Junonia hierta (Fabricius, 1798)	Yellow Pansy
	Junonia orithya ocyale (Hubner, 1816)	Blue Pansy
	Melanitis zitenius (Herbst, 1796)	Great Evening Brown
Papilionidae	*Papilio demoleus* (Linnaeus, 1758)	Lime Swallowtail
	Pachliopta aristolochiae (Fabricius, 1775)	Common rose
Pieridae	*Eurema laeta laeta* (Boisduval,1836)	Spoteless Grass Yellow
	Appias albina (Boisduval, 1836)	Common Albatross
	Belenois aurota (Fabricius, 1793)	Pioneer
	Catopsilia pyranthe (Linnaeus, 1758)	Mottled Emigrant
	Catopsilia pomona (Fabricius, 1775)	Lemon Emigrant
	Cepora nerissa nerissa (Fabricius, 1775)	Common Gull
	Colias fieldii (Ménétriès, 1855)	Dark Clouded Yellow
	Colias nilagiriensis (C. & R. Felder, 1859)	Nilgiri Clouded Yellow
	Colotis fausta (Olivier, 1804)	Large Salmon Arab
	Eurema andersonii (Moore, 1886)	One-spot Grass Yellow
	Eurema hecabe (Linnaeus, 1758)	Common Grass Yellow
	Hebomoia glaucippe australis (Butler, 1898)	Sahyadri Great Orange-tip
	Ixias marianne (Cramer, 1779)	White Orange-tip
	Ixias pyrene (Linnaeus, 1764)	Yellow Orange-tip
	Pieris brassicae (Linnaeus, 1758)	Large Cabbage White
	Pieris canidia indica (Evans, 1926)	Himalayan Cabbage White
	Pieris deota (de Niceville, 1884)	Dusky White

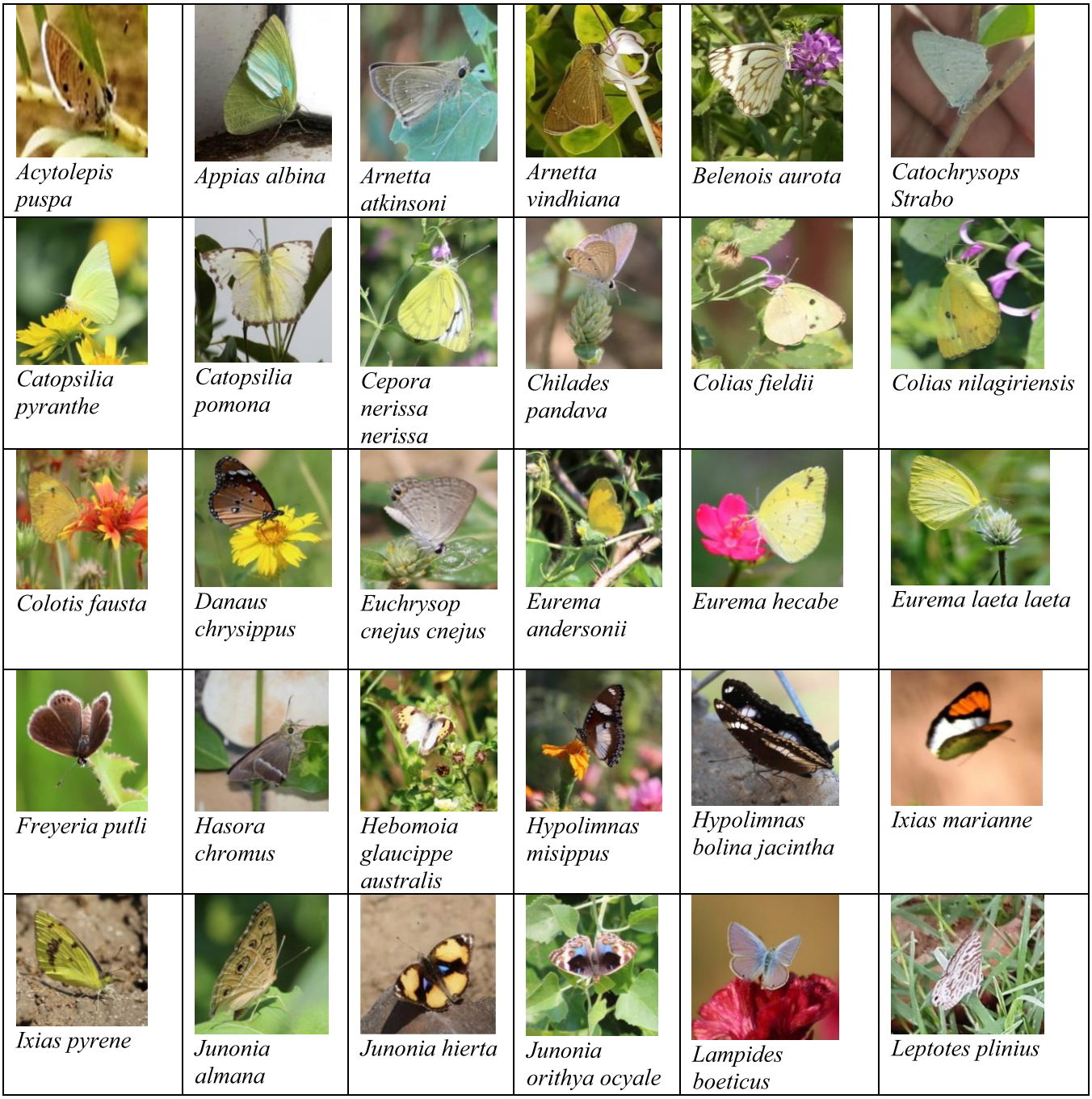

Fig. 2: Photographs of some identified butterflies from study site.

Authors found that the family Pieridae is dominating in the region with a representation of 17 species (40.47%), followed by Lycaenidae with 12 species (28.57%), Nymphalidae with 7 species (16.66%), Hesperiidae with 4 species (9.52%) and with 2 species Papilionidae (4.76%). The survey also revealed the fact that among the identified forty two species, three species *Euchrysop cnejus cnejus* (Fabricius,1798), *Lampides boeticus* (Linnaeus, 1767) and *Melanitis zitenius* (Herbst, 1796) are mentioned in Schedule II of the Indian Wildlife (Protection) Act, 1972. However, one species *Hypolimnas misippus* (Linnaeus, 1764) is mentioned in Schedule I and II.

It has been evidenced that pollution from traffic and vast industrial areas as well as anthropogenic activities like soil excavations, grazing and burnings and other activities have adverse effects on their host plant and their distribution as these prefer good quality habitats to complete their life cycle (Choudhary and Chishty, 2020).

During the survey, it was observed that the

highest numbers of butterflies were spotted in July, August and September months; may be because of humidity, rainfall, and blossoming (Sharma and Sharma, 2013; Priya and Krishnaraj, 2017). However, *Pieris* spp. were found predominant from February to April, while *Pseudozizeeria maha maha* (Kollar, 1844) and *Zizeeria karsandra* (Moore, 1865) were found in large numbers throughout the study period except winter season. It was observed that the dominance of the Pieridae family during the study period may be attributed to their polyphagous nature, for which they stay in all habitats, and their active flying nature that enables them to search a greater area for resources (Bala *et al*., 2014). In the present study, the highest number of butterflies was observed in the hedge areas, which may be due to the availability of larval host plants and adult nectar plant sites.

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