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Study of diversity of butterfly in Kanchanpur District of Nepal

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Abstract

The study of biodiversity in Western Nepal, especially in Kanchanpur district is lacking. So, a study was conducted to explore the families and species of butterflies in the district. Home survey method was deployed for the study. Photographing and video making were major interventions to record the insect diversity. Website named Butterflies of India was visited to confirm butterfly species. A total 25 species (4.78% of Nepal) belonging to five families were reported from the study area. Among them, 56% of species were from family Nymphalidae, followed by 16%, 16%, 8% and 4% of species from family Lycaenidae, Pieridae, Hesperidae, and Papilionoidea respectively. This evidence reflects the basic information for butterflies' diversity in Kanchanpur district.

Keywords: Biodiversity, butterflies, families, species

1. Introduction

Butterflies are the most gorgeous and colorful creatures on the earth and have a great aesthetic value. Butterflies belongs to a single superfamily Papilionidae; physically, morphologically, and behaviorally uniform compared to other insect groups (Ehrlich and Raven, 1964) [8]. There are more than 28,000 species of butterflies worldwide which has a key role in the ecosystem acts as a pollinator, prey, and biological pest control (Ghazanfar *et al.*, 2016) [10]. More than 17000 species of butterfly are found all over world of these India is home to about 1501 species of butterfly which makes up to 65% of total Indian fauna.

Nepal is the mountainous country situated between India and China; at the junction of Indo-Malayan and Palearctic biogeographic realms. It occupies about one third of Hindu Kush Himalayan region (Paudel *et al.*, 2012) [19], have wide range of climatic variability (i.e. microclimate) and topographic variation (Subedi *et al.*, 2020) [30], that provides habitats for unique biodiversity (Paudel *et al.*, 2012) [19] including 693 species of butterflies including 29 subspecies (Sapkota *et al.*, 2020) [23] within a very small geographic area. Large species of butterfly are still under study.

Due to its wide ecological role as well as economic importance (Kasambe, 2018) [12], butterflies are the highly studied insect in the world (Dahal, 2017) [7]. However, very few studies on butterflies had been conducted in Western part of Nepal (Smith, 1977; Smith, 1980; Khanal, 1999; Shrestha *et al.*, 1999; Khanal, 2009; Paudel, 2020; Suwal *et al.*, 2019a; Suwal *et al.*, 2019b) [29, 28, 14, 25, 15, 18, 32, 32] including Kanchanpur district of Nepal. Therefore, the study is carried to explore the diversity of butterfly present in the district.

2. Materials and Methods**2.1 Study site**

The study was carried in Kanchanpur district during August-September 2024. Dominant land cover in the study area was agriculture and forest. In, Southern side of study point there (i.e., Shuklaphanat National Park) was a small patch of *Shorea robusta* forest, in the North and East side, area was covered by crops including Finger millet (*Eleusine coracana*), Turmeric (*Curcuma longa*) and Horsegram (*Macrotyloma uniflorum*). The floral species present in the study location were Sal (*Shorea robusta*), Bhimal (*Grewia optiva*), Belauti (*Psidium guajava*), Mango (*Mangifera indica*), Pipal (*Ficus religiosa*), Simal (*Bombax ceiba*), Ruino (*Mallotus philippensis*), Tiju (*Diospyros melanoxylon*), Timilo (*Ficus auriculata*) etc. Golden Jackel (*Canis aureus*), etc. Study was conducted in such habitats of butterfly.



Fig 1: Map of Study area

2.2 Methods

The common method of surveying butterflies is pollard line survey (Pollard, 1977) [21], however other methods such as random survey were also applied in the past (Singh and Chib, 2014) [26]. This research was conducted through home point survey method. Similar kind of methodology was deployed by (Chaudhary, 2020) [4] for wildlife survey.

Photographs were taken every day in all sites using Canon EOS 80D (35-135 mm) camera and not a single butterfly were affected during the survey period. And for identification, website named Butterflies of India (<https://www.ifoundbutterflies.org/>) was visited and for confirmation, Godavari Butterflies (Conniff and Limbu, 2014) [6],

Table 1: List of butterflies from study area with their common, scientific, and family name

No.	Common Name	Scientific Name	Family
1	Bevan Swift	Borbo bevani (Moore, 1878)	Hesperiidae
2	Common Gem	Poritia hewitsoni (Moore, 1866)	Lycaenidae
3	Common Grass Yellow	Eurema hecabe (Linnaeus, 1758)	Pieridae
4	Common Indian Crow	Euploea core (Cramer, 1780)	Nymphalidae
5	Common Palmfly	Elymnias hypermnestra (Linnaeus, 1763)	Nymphalidae
6	Common Tiger	Danaus genutia (Cramer, 1779)	Nymphalidae
7	Dark Branded Bush Brown	Mycalesis mineus (Linnaeus, 1758)	Nymphalidae
8	Glassy Tiger	Parantica aglea (Stoll, 1782)	Nymphalidae
9	Grey Pansy	Junonia atlites (Linnaeus, 1763)	Nymphalidae
10	Indian Cupid	Everes lacturnus (Godart, 1824)	Lycaenidae
11	Indian Oakblue	Arhopala atrax (Hewitson, 1862)	Lycaenidae
12	Indian Red Admiral	Vanessa indica (Herbst, 1784)	Nymphalidae
13	Indian Tortoiseshell	Aglais caschmirensis (Kollar, 1844)	Nymphalidae
14	Asian Cabbage White	Pieris canidia (Linnaeus, 1768)	Pieridae
15	Indigo Flash	Rapala varuna (Horsfield, 1829)	Lycaenidae
16	Jungle Brown	Orsotriaena medus (Fabricius, 1775)	Nymphalidae
17	Lemon Emigrant	Catopsilia pomona (Fabricius, 1775)	Pieridae
18	Lemon Pansy	Junonia lemonias (Linnaeus, 1758)	Nymphalidae
19	Lilacine Bush Brown	Mycalesis francisca (Stoll, 1780)	Nymphalidae
20	Lime Swallowtail	Papilio demoleus (Linnaeus, 1758)	Papilionidae
21	Plain Tiger	Danaus chrysippus (Linnaeus, 1758)	Nymphalidae
22	Red Base Jezebel	Delias pasithoe (Linnaeus, 1767)	Pieridae
23	Rustic	Cupha erymanthis (Drury, 1773)	Nymphalidae
24	Straight Swift	Parnara guttata mangala (Moore, 1865)	Hesperiidae
25	Yellow Pansy	Junonia hierta (Fabricius, 1798)	Nymphalidae

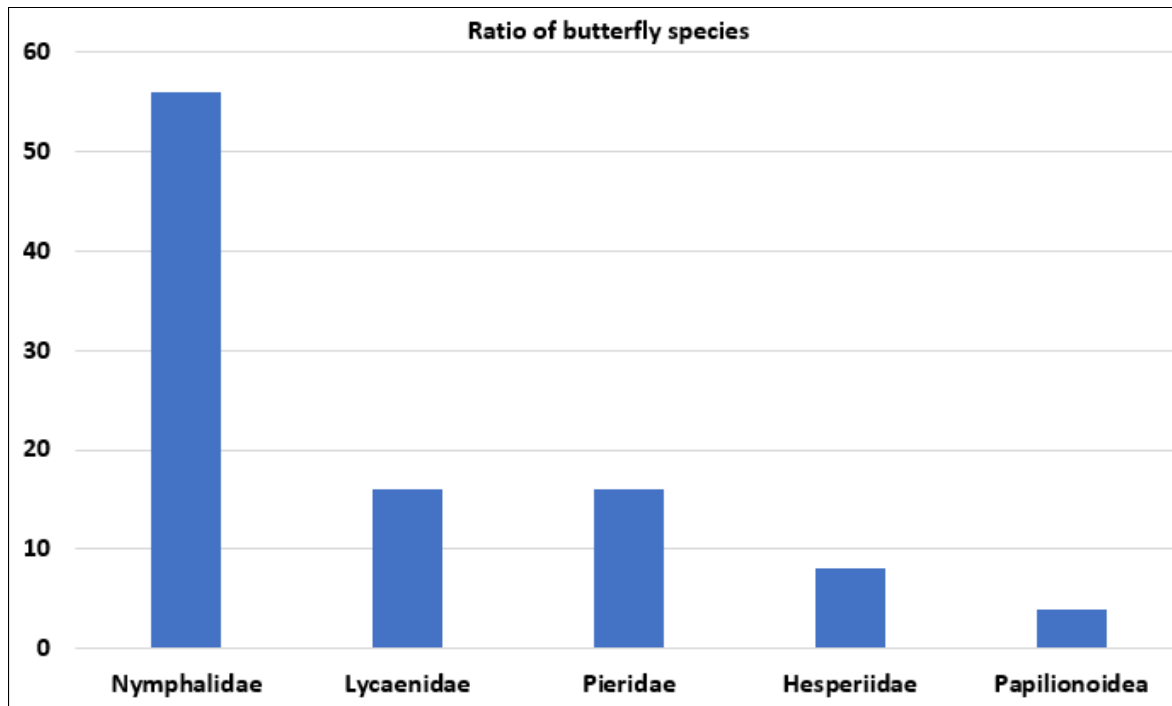


Fig 2: Diversity of butterfly families

Butterflies of Begnas and Rupa Watershed area (Smith *et al.*, 2016) [27], and Butterflies of Western Ghats (Kasambe, 2018) [12] were reviewed and analyzed.

The data were collected, and Excel spread sheet 2013 used for recording and analysis was carried out by using R (v. 4.0.3) software.

3. Results

Total 25 species of butterfly's belongings to the 5 different families were observed and identified from the study area as provided below (Table 1). Within five families, highest number of species were reported from family Nymphalidae (14 species), followed by family Lycaenidae (4 species), Pieridae (4 species), Hesperidae (2 species), and Papilionoidea (1 species) respectively (Table 1). Also, individual numbers of the butterflies were dominated by family Nymphalidae, i.e. 56%, and lowest by family Papilionoidea, i.e. 4% (Figure 2).

4. Discussion

From the study of butterflies in Kanchanpur district, altogether 25 species were observed and recorded. Khanal (2009) [19] had also collected and documented 85 species of butterflies from lowland district of western Nepal, with 52 species only from the Surkhet district during his study from 1988 to 2003. Likewise, it was observed that some researchers from Rara National Park (RNP), Mugu recorded 64 species of butterflies (Cited by Suwal *et al.*, 2019b) [32]. A study conducted in RNP, 44 species of butterflies were documented including rare Nepal Comma *Polygonialbum agnicula* (Moore, 1872) (Suwal, 2018; Suwal *et al.*, 2019b) [33, 32]. From Humla District Argus *Paralasa nepalica* (Paulus, 1983) butterfly were reported (Suwal *et al.*, 2019a) [31].

Paudel (2020) [18] reported 27 species of butterfly From Western Lowland of Terai district, Thakurdhwara and Babai valley of Bardiya district. According to research conducted by Acharya and Paudel (2020) [18], more than 200 species are residing in Western part of Nepal including two

vulnerable and five susceptible species. Family Nymphalidae (i.e., 14 species) seemed to be the dominant in the study area. Nymphalidae is one of the largest family in terms of species richness and regarded as heavy diversity in ecosystem (Pena and Espeland, 2015; Khyade *et al.*, 2018) [20, 16]; which might be the reason behind dominance of Nymphalidae family. This finding coincides with previous studies that family Nymphalidae contain highest number of species in different parts of Western Nepal (Bhusal and Khanal, 2009; Smith *et al.*, 2016; Nepali *et al.*, 2018; Shrestha *et al.*, 2018; Paudel, 2020; Subedi *et al.*, 2020) [2, 27, 17, 24, 18, 30], but result was contradicting to Khanal (2009) [19] and Khanal *et al.* (2012) [13], as they found family Lycaenidae with higher species diversity. While Prajapati *et al.* (2000) [22] mention family Nymphalidae and Lycaenidae shares similar ratio species diversity in Daman area of Makawanpur district, Nepal.

5. Conclusion

In this study, a total 25 species (4.78% of Nepal) belonging to five families were reported from the research area, Kanchanpur district of Nepal. Among them, 56% of species were from family Nymphalidae, followed by 16%, 16%, 8% and 4% of species from family Lycaenidae, Pieridae, Hesperidae, and Papilionoidea respectively. This evidence reflects the basic information for butterflies' diversity in Kanchanpur district. In addition, detailed molecular study is required to detect new species of butterfly in the region.

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