

Diversity of butterflies in the Gulbarga University main campus, Kalaburagi, Karnataka, India

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Abstract

Butterflies form a key component in knowing about biodiversity and ecological balance of any ecosystem because they serve as best bio-indicators. They also play a major role in maintaining food chain as they are food to many other animals. The present study mainly focuses on the diversity of butterfly species found on the main campus of Gulbarga University in Kalaburagi, which is situated in the semi-arid area of northern Karnataka. The research was conducted for a period of 1 year through scientific butterfly surveys and documentations. A total of 31 species belonging to 25 genera and 5 families were documented in 6 study sites in the main campus.

Keywords: Gulbarga University, butterfly, semi-arid area

Introduction

Butterflies, belonging to order Lepidoptera, class Insecta and phylum Arthropoda are one of the most studied insects in the animal kingdom. As pollinators, prey species, and bio-indicators of environmental health that represent the condition of their habitats, they are very much essential to ecosystems. They are also food to many animals like birds, lizards, spiders etc..(Aneesh *et al.*, 2013) ^[1]. Due to their ecological significance and aesthetic appeal, these tiny creatures tend to attract the interest of researchers (Bonebrake *et al.*, 2010) ^[2] hence they are best taxonomically studied insect group (sameer kumar, 2017) Butterflies are dependable markers for tracking biodiversity and ecological stability because they are sensitive species that react strongly to environmental changes, such as habitat loss, pollution, and climate change (Kumar *et al.*, 2022) ^[4]. The environmental factors like plant type, temperature, and humidity have a significant impact on the variety and abundance of butterflies and have a direct impact on their life cycle and the availability of food sources (Sarkar *et al.*, 2021) ^[7].

There are more than 20,000 kinds of butterflies in the world, and a large percentage of them are found in tropical areas (Braby, 2018) ^[3]. India is home to over 1500 species of butterflies which is 7.5% of world's total butterfly population (Singh *et al.*, 2020) ^[8]. But in recent years there is a serious trend of declining population of butterflies in urban landscapes due to various reasons like industrialization, urbanization, deforestation and decrease in the green spaces which form the lung of many urban cities (Thakur & Rana, 2020) ^[9].

University campuses are vital havens for biodiversity, including butterflies, in urban and semi-urban settings because of their distinctive fusion of natural and groomed settings. A variety of native and alien plant species may be found in these green areas, resulting in a variety of microhabitats that are home to different types of butterflies. These green spaces tend to improve the quality of urban ecosystems (Saini *et al.*, 2017) ^[6]. The importance of these areas in supporting butterfly diversity has been emphasized by a number of studies carried out on university campuses across the world. These studies have provided information

on habitat preferences, species interactions, and the effects of urbanization on local fauna. The main aim of this study is to evaluate the variety of butterflies seen on Gulbarga University's main campus in Kalaburagi. This study will offer important insights into how university campuses function as reservoirs of biodiversity in semi-arid areas by recording species richness and abundance. Additionally, it will add to the increasing amount of study on how, in spite of the stresses of human growth, urban green areas may sustain butterfly populations and other types of biodiversity.

Materials and methods

1. Study area

Kalaburagi (formerly known as Gulbarga) is located in the northeastern part of Karnataka, India. The district is situated between 300 and 750 meters above sea level on the Deccan Plateau. The region is agriculturally significant due to the flow of two large rivers, the Krishna and Bhima. This is especially true for the production of pigeon peas, also known as toor dal, of which Kalaburagi is one of Karnataka's top producers. The Upper Krishna Project and the area's black soil both enhance its irrigation potential. Kalaburagi's climate is categorized as semi-arid, with pleasant winters and scorching summers that can reach 45 degrees Celsius. Both the Kharif and Rabi agricultural seasons are supported by the region's 750 mm of annual rainfall, which mostly falls during the monsoon season from June to September.

Gulbarga University, Kalaburagi was selected as the main study area for our butterfly survey in the city of Kalaburagi. Gulbarga University was established on 10th September 1980 as the state University by act of State Government of Karnataka Under section 3 of Karnataka state University Act 1976 substituted by KSU Act 2000. The main campus is situated on an 860 acre 6 km east of Gulbarga city. Geographically, University well connected by Air, Rail and Road. The Latitude and Longitude of Gulbarga University main campus is 17.3104°N to 76.873°E. The climate of study area is characterized by hot summer with maximum, temperature 45^o C during April, May and December is the coldest month and average rainfall is 702 mm.

In Gulbarga University main campus 6-sampling sites were selected for present study.

They are

1. Zoology Department garden.
2. ADM garden, GUK
3. Botanical garden, GUK
4. University Guest House garden
5. Buddha Vihar garden
6. Small pond adjacent to Botanical garden

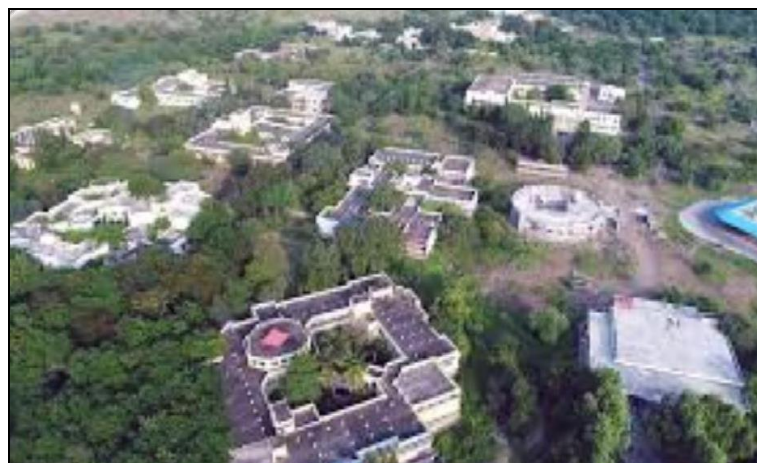




Image showing the six different study sites selected for butterfly monitoring in the Gulbarga University main campus, Kalaburagi

Methodology

Butterfly survey was carried out at 6 different sites of the Gulbarga University campus. The butterflies are more active at the time of 9.00 am to 5.00 pm. We photographed and collected the butterflies at two different time slots (10:00 am to 12.00 pm) and (4.00 pm to 5.30 pm) two days in a week. We used different methods to collect butterfly and understand their biodiversity. Some of them were Sweep Net method, Bait method, all search out method and Line Transect method and visual observation were taken during the day light hours. Nikon d5100, Sony HX 400V and IQOO Z6 mobile camera were used to photograph the butterflies. There are various different methods to monitor the butterflies. Some of these are as follows,

1. Line Transect method

- 2. Bait method
- 3. Sweep Net method
- 4. All search out method

The adult butterflies were carefully collected, killed and preserved by the standard method and stored in the insect cabinet boxes. Naphthalene balls were used as repellent to prevent secondary infection to the stored specimens. The butterflies photographed and collected were identified using 2 field guides:

- Butterflies of Western Ghats by Milind Bhakre and Hemant Ogle
- Butterflies of Haliyal Forest Division by Karnataka Forest Department.

Table 1: Showing Family wise distribution of butterfly diversity observed in the study area, Gulbarga University Campus, Kalaburagi

Serial Number	Scientific name	Common name
Family: Hesperidae		
1	<i>Hasora chromus</i>	Common banded awl
Family: Papilionidae		
2	<i>Pachliopta hector</i>	Crimson rose *
3	<i>Papilio demoleus</i>	Lime butterfly
4	<i>Graphium Agamemnon</i>	Tailed jay
Family: Lycaenidae		
5	<i>Catochrysops Strabo</i>	Forget me not
6	<i>Tarucus nara</i>	Striped pierrot
7	<i>Azanus ubaldus</i>	Bright babul blue
8	<i>Zizeeria karsandra</i>	Dark grass blue
9	<i>Freyeria trochylus</i>	Oriental grass jewel
10	<i>Tarucus plinius</i>	Zebra blue
11	<i>Castalius rosimon</i>	Common pierrot
12	<i>Zizula hylax</i>	Tiny grass blue
Family: Pieridae		
13	<i>Belenois aurora</i>	Pioneer
14	<i>Ixias Marianne</i>	White orange tip
15	<i>Ixias pyrene</i>	Yellow orange tip
16	<i>Colotis aurora</i>	Plain orange tip

17	<i>Calotis danae</i>	Crimson tip
18	<i>Eurema hecabe</i>	Common grass yellow
19	<i>Catopsilia Pomona</i>	Common emigrant
20	<i>Catopsilia pyranthe</i>	Mottled emigrant
21	<i>Cepora nerissa</i>	Common gull
Family: Nymphalidae		
22	<i>Danaus chrysippus</i>	Plain tiger
23	<i>Tirumala limniace</i>	Blue tiger
24	<i>Byblia ilithyia</i>	Joker
25	<i>Junonia orithya</i>	Blue pancy
26	<i>Junonia lemonias</i>	Lemon pancy
27	<i>Euploea core</i>	Common crow
28	<i>Phalanta phalantha</i>	Common leopard
29	<i>Hypolimnas bolina</i>	Great egg fly
30	<i>Hypolimnas missipus</i>	Danaid eggfly
31	<i>Melanitis leda</i>	Common evening brown

Table 2: Showing the number of species in each family recorded at 6 different study sites

Sl. No.	Name of the Family	Total number of species recorded in each family
1	Family - Hesperidae	1
2	Family - Papilionidae	3
3	Family - Lycaenidae	8
4	Family - Pieridae	9
5	Family - Nymphalidae	10
	Total – Five families	31

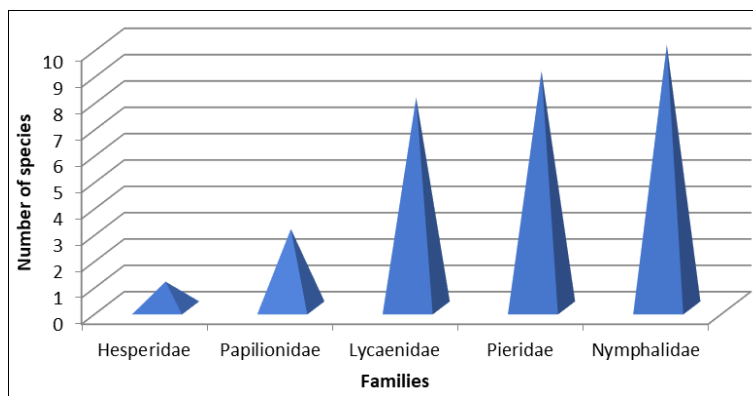


Fig 1: Showing the number of species in each family recorded at 6 different study sites

Table 3: Showing butterfly families along with the number of Genera recorded in Study Sites

Sl. No.	Name of the Family	Total number of genus recorded in each family
1	Family - Hesperidae	1
2	Family - Papilionidae	3
3	Family - Lycaenidae	7
4	Family - Pieridae	6
5	Family - Nymphalidae	8
	Total – Five families	25

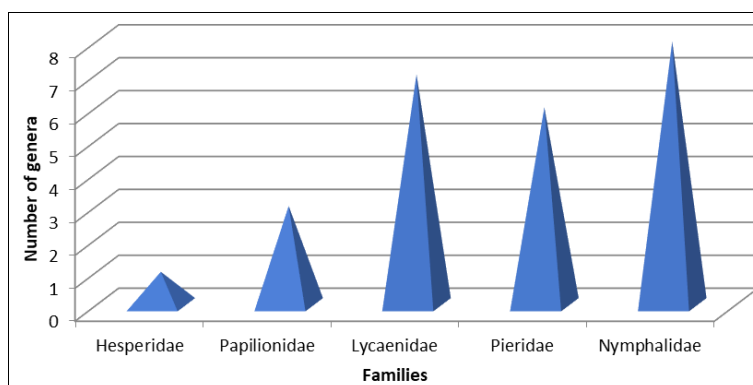


Fig 2: Showing the number of species in each family recorded at 6 different study sites

Table 4: Showing Relative abundance of butterflies GUK campus during the study Period

Sl.No.	Family	No. of Genera	Relative Abundance (%)	No. of Species	Relative Abundance (%)
1	Hesperidae	1	4	1	3.22
2	Papilionidae	3	12	3	9.67
3	Lycaenidae	7	28	8	25.80
4	Pieridae	6	24	9	29.03
5	Nymphalidae	8	32	10	32.25
	Total	25	100.00	31	100.00

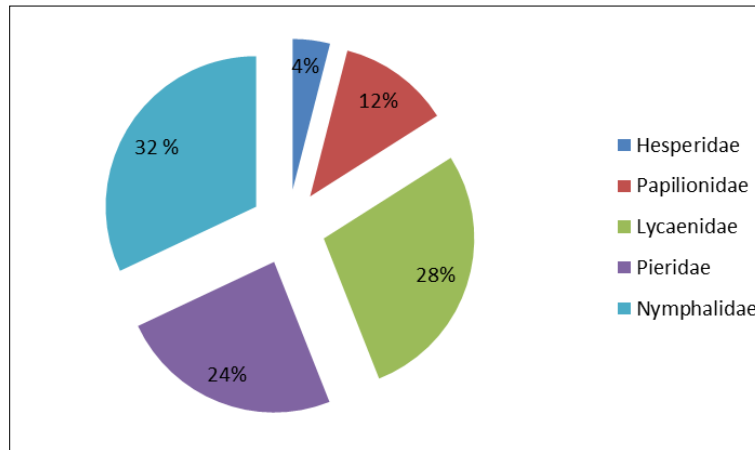


Fig 3: Showing the relative abundance of different genera of butterflies in the study area

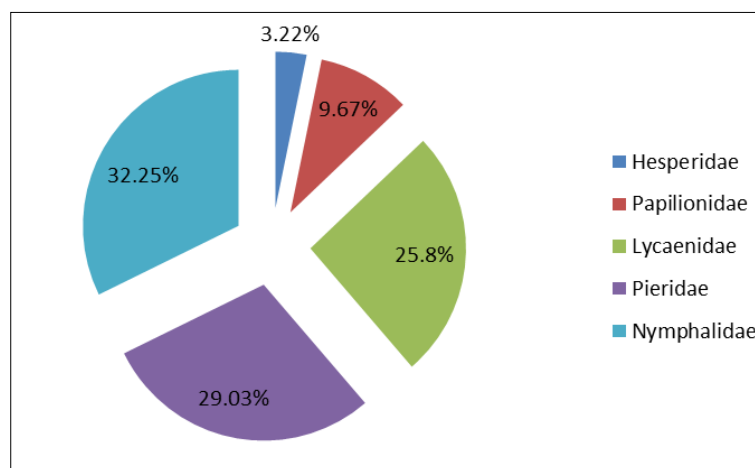


Fig 4: Showing the relative abundance of different species of butterflies in the study area

Results

The butterfly survey was conducted for a period of 1 year from September 2023 to August 2024. During the study period, a total of 31 species belonging to 5 families and 25 genera were documented in the Gulbarga University main campus. Family Nymphalidae is the most dominant and richest family in the study area, comprises (10) species, followed by family Pieridae with (9) species, family Lycaenidae with (8) species, Papilionidae with (3) species and family Hesperidae with (1) species. In terms of genera, Nymphalidae family showed highest number (8 genera) whereas family Hesperidae showed lowest number of genus composition (1genera). When the relative abundance of all the identified species was calculated, Family Nymphalidae was the richest i.e. 32.25%, followed by family Pieridae with 29.03%, family Lycaenidae with 25.80%, family Papilionidae with 9.67% and the family Hesperidae with just 3.22%. Among 31 species documented, 2 species *Hypolimnas missipus* (Danaid eggfly) and *Pachliopta hector* (Crimson rose) are listed in Schedule 2 of Indian Wildlife

(Protection) Act – 1972. This is accordingly to the recently amended Indian Wildlife Act in 2022.

Discussion and conclusion

Based on the results obtained from the study area during butterfly survey, it is concluded that, the members of family Pieridae and Nymphalidae were found maximum in number and percentage of species of butterfly among all the families, Hesperidae family exhibits crepuscular habit, they are rare in the study area. The growth of natural trees is main reason for species richness & diversity of butterflies & vegetation type plays an important role in diversity pattern of butterfly community. Therefore, it is concluded that the study area is rich in butterfly diversity as well as the vegetation. Further research has to be done to understand the relationship between the diversity of butterflies and the host plants as well as nectar plants. The control of grazing green landscapes, controlling the cutting of host plants of butterflies, may be first step to maintain the diversity of butterflies in the study area. The presence of 2 Scheduled

species is our university shows that the habitat and environment here is very much supportive for the life of butterflies keeping this in mind, we urge the honorable Vice-Chancellor to establish a Butterfly park on the University campus which will help in conserving butterflies and boost the ecological studies in the campus.

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