International Journal of Entomology Research
www.entomologyjournals.com
ISSN: 2455-4758
Received: 16-07-2024, Accepted: 15-08-2024, Published: 30-08-2024
Volume 9, Issue 8, 2024, Page No. 226-229

Diversity and abundance of butterflies at Barkatullah University campus, Madhya Pradesh, India

Ritu Sharma
Assistant Professor, Department of Zoology, Government Autonomous Post Graduate College, Chhindwara, Madhya Pradesh, India

Abstract
A survey was conducted to record the diversity and abundance of butterfly fauna on the campus of Barkatullah University, Bhopal, Madhya Pradesh, India, from March 2024 to July 2024. A total of thirty-six species of butterflies belonging to four families were recorded. Nymphalidae comprised the highest number of species, followed by Pieridae, Papilionidae, and Lycaenidae, respectively. Family-wise occurrence of the species was Papilionidae–05, Pieridae–09, Nymphalidae–18, and Lycaenidae–04. The alpha diversity indices were calculated for the study site with the help of Microsoft Excel, 2016.

Keywords: Butterfly, diversity, abundance, species, India

Introduction

Moths and butterflies are members of the class Insecta and order Lepidoptera, which are essential herbivores and pollinators in the insect world, as stated by Kunte (2000) [8]. According to Gaonkar (1996) [4] and Kunte (2000) [8], there are about 17,200 butterfly species worldwide. India boasts 1,800 species and subspecies of butterflies, as per Kunte *et al*. (2018) [9]. Butterfly diversity serves as a reliable indicator of ecosystem health, as noted by Padhye *et al*. (2012) [11], and can be useful in determining conservation priorities for biodiversity management (Gaonkar, 1996 [4]; Kunte, 2000 [8] & 2008 [10]; Kehimkar, 2008) [6]. Butterfly diversity in a specific area reflects the overall plant diversity and the availability of suitable habitats (Kakati, 2006) [5]. Therefore, it is vital to investigate the structure of butterfly communities in various locations to assess whether modifying natural habitats affects butterfly diversity and distribution.

The campus of Barkatullah University, located in Bhopal, Madhya Pradesh, India, is surrounded by lush green fields teeming with a diverse array of flora and fauna. However, the state has access to the literature on butterfly diversity and abundance (Tiple, 2012 [19]; Bhowate *et al*., 2020 [1]; Shukla *et al*., 2015 [13]; Singh *et al*., (1977 &1998) [16, 17, 18], Chandra *et al*., (2002 & 2007) [2, 3]; Siddiqui *et al*., 2004) [14], the richness and abundance of pollinator butterfly species in the aforementioned area have not previously been considered. The current study aimed to record the species richness, evenness, abundance, and diversity of butterflies on the campus of Barkatullah University, Bhopal. Furthermore, a pictorial checklist of the identified butterfly species at the research site is provided.

Materials and methods

Barkatullah University campus covering an area of approximately 400 acres of land is located along the Narmadapuram highway at a distance of about 3 kilometers from Rani Kamlapati Railway Station. The University campus area is rich in forest vegetation including herbs, shrubs, trees & climbers, provides diverse habitats, fosters a wide range of butterfly species and is home to a vast collection of medicinal plants.

The present study was conducted to study the diversity of butterfly fauna from March 2024 to July 2024. Observations were made in the morning from 9.00 am to 11.00 am. Photographs were taken with the help of a mobile phone camera (Samsung Galaxy M51), and butterflies were identified by a field guide (Kunte, 2000) [8]. Specimen collection was strictly avoided. The taxonomic status of butterflies is adopted from Kunte (2000) [8]. Statistical analyses of alpha diversity indices were done by applying Microsoft Excel, 2016. Margalef's Index for Richness, Pielous Evenness Index, Simpsons Index of Dominance and Shannon Weiner Index were calculated.

Result and Discussion

During the entire study period, a total of 36 species of butterflies belonging to four different families were observed (Fig 1, Table 1). The family Nymphalidae had the highest species richness, accounting for 18 species (50%), followed by Pieridae with 9 species (25%), Lycaenidae with 4 species (11%), and Papilionidae with 5 species (14%) (Fig 2). Table 2 shows the different alpha diversity indices calculated for the study site. Similar results have been reported by various researchers, including Keshre and Upadhya (2023) [7], Tiple (2012) [19], Bhowate *et al*. (2020) [1], and Shukla *et al*. (2015) [13], as well as Singh *et al*. (1977, 1998) [16, 17, 18] and Chandra *et al*. (2002, 2007) [2, 3] (Siddiqui *et al*. 2004) [14]. Singh and Koshta (2007) [15] documented 135 butterfly species and recorded 48 species from central India for the first time. Chandra *et al*. (2007) [2, 3] conducted a study on butterflies from various districts and conservation areas of Vidarbha, M. P., and listed 174 species of butterflies belonging to 100 genera and 8 families. Tiple (2012) [19] investigated the diversity, relative abundance, and status of butterflies in the Tropical Forest Research Institute, Jabalpur, Madhya Pradesh, Central India, and recorded 66 species of butterflies belonging to 47 genera and five families.

The variety of butterflies found on the Barkatullah University campus suggests a diverse array of floral species and healthy climatic conditions. Butterflies serve as indicators of ecological change in their environment, and their abundance and species diversity are closely linked to

the availability of food plants in the area (Kunte, 2000) [8]. Butterflies have long been regarded as symbols of beauty and grace in nature (Rafi *et al*., 2000) [12], and they play a crucial role as pollinators for both wild and cultivated plants (Tiple *et al*., 2006) [19]. However, many native butterflies are rapidly disappearing due to habitat destruction caused by urban development and unscientific natural resource management. These factors threaten the survival of butterflies and the ecosystem services they provide. To address this issue, it is necessary to implement long-term monitoring programs and adopt measures to enhance urban greening to protect and conserve butterfly diversit.

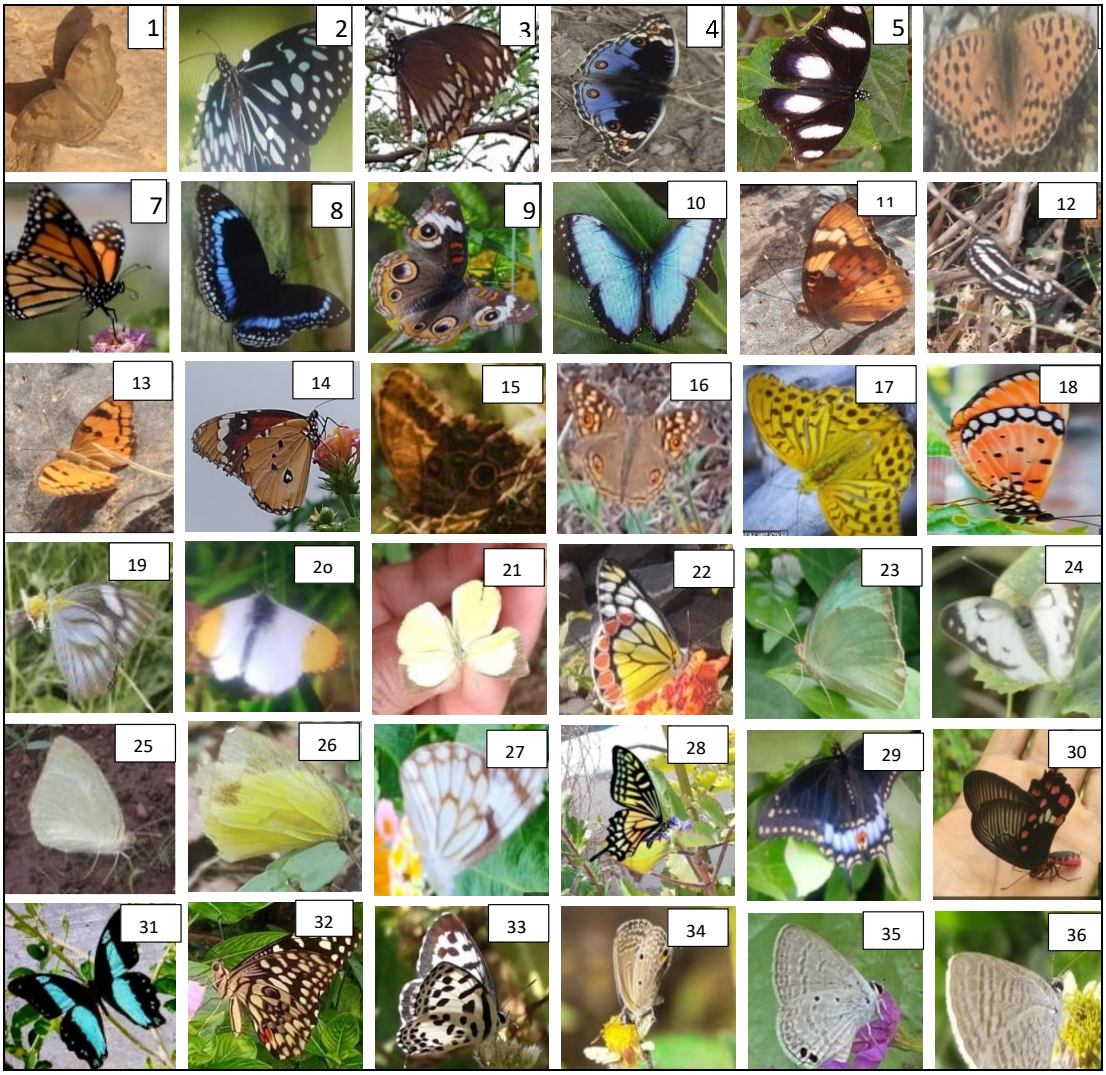

Fig 1: The representative butterfly species encountered in the present study

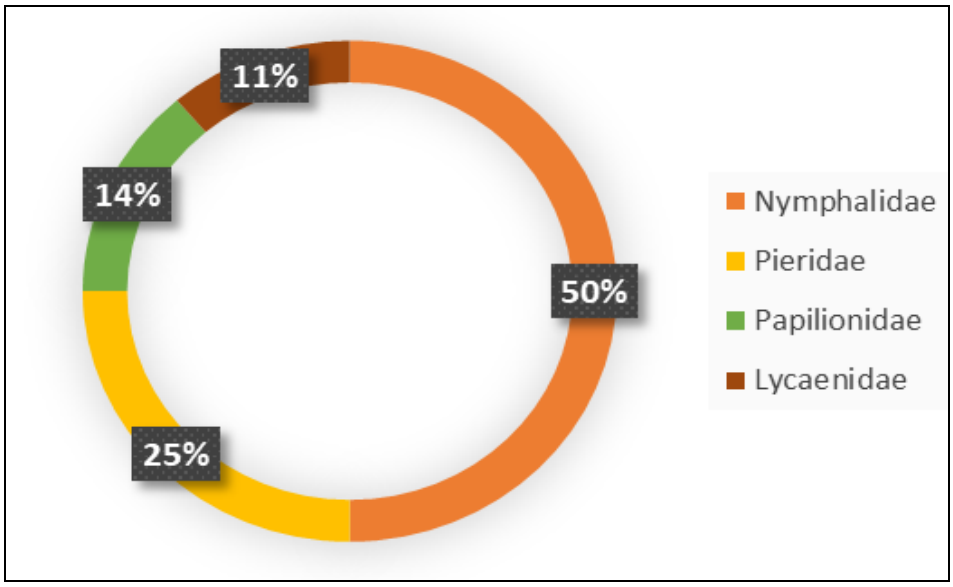

Fig 2: Family-wise occurrence of butterfly species at Barkatullah University Campus.

Table 1: List of butterfly species reported in the present study Pi value = Individual Probability, n_i = Number of Individual species, N = Total number of Individuals

S.No.	Common Name	Scientific Name	Family	Number of Individuals	Pi = n_i /N	Pi^2
01	Chocolate pancy	*Junonia iphita*	Nymphalidae	36	0.082	0.006724
02	Blue tiger	*Tirumala limniace*	Nymphalidae	15	0.034	0.001156
03	Common crow	*Euploea core*	Nymphalidae	41	0.093	0.008649
04	Blue pancy	*Junonia orithya*	Nymphalidae	33	0.075	0.005625
05	Danaid eggfly	*Hypolimnas misippus*	Nymphalidae	18	0.040	0.0016
06	Pallas fritillary	*Argynnis laodice*	Nymphalidae	1	0.002	0.000004
07	Monarch butterfly	*Danaus plexippus*	Nymphalidae	17	0.038	0.001444
08	Blue-banded eggfly	*Hypolimnas alimena*	Nymphalidae	3	0.006	0.000036
09	Common buckeye	*Junonia coenia*	Nymphalidae	2	0.004	0.000016
10	Peleides blue morpho	*Morpho peleides*	Nymphalidae	2	0.004	0.000016
11	Baronet	*Euthalia nais*	Nymphalidae	11	0.024	0.000576
12	Common sailor	*Neptis hylas*	Nymphalidae	35	0.079	0.006241
13	Brush-footed butterfly	*Symphaedra nais*	Nymphalidae	3	0.006	0.000036
14	Plain tiger	*Danaus chrysippus*	Nymphalidae	46	0.103	0.010609
15	Owl butterflies	*Caligo Martia*	Nymphalidae	2	0.004	0.000016
16	Lemon pancy	*Junonia lemonias*	Nymphalidae	13	0.029	0.000841
17	Silver-washed fritillary	*Argynnis paphia*	Nymphalidae	1	0.002	0.000004
18	Tawny coaster	*Acraea terpsicore*	Nymphalidae	39	0.088	0.007744
19	Striped albatross	*Appias libythea*	Pieridae	9	0.020	0.0004
20	Orange-tip	*Anthocharis cardamines*	Pieridae	2	0.004	0.000016
21	Mexican yellow	*Eurema Mexicana*	Pieridae	11	0.024	0.000576
22	Common Jezebel	*Delias eucharis*	Pieridae	2	0.004	0.000016
23	Mottled emigrant	*Catopsilia pyranthe*	Pieridae	8	0.018	0.000324
24	Common gull	*Cepora Nerissa*	Pieridae	7	0.015	0.000225
25	African migrant	*Catopsilia Florella*	Pieridae	2	0.004	0.000016
26	Mimosa yellow	*Pyrisitia nise*	Pieridae	9	0.020	0.0004
27	Pioneer white	*Belenois aurota*	Pieridae	5	0.011	0.000121
28	Asian swallowtail	*Papilio Xuthus*	Papilionidae	2	0.004	0.000016
29	American swallowtail	*Papilio polyxenes*	Papilionidae	3	0.006	0.000036
30	Common rose swallowtail	*Pachliopta aristolochiae*	Papilionidae	2	0.004	0.000016
31	African blue banded swallowtail	*Papilio nireus*	Papilionidae	1	0.002	0.000004
32	Citrus swallowtail	*Papilio demodocus*	Papilionidae	20	0.045	0.002025
33	Common pierrot	*Castalius rosimon*	Lycaenidae	9	0.020	0.0004
34	Plains cupid	*Luthrodes Pandava*	Lycaenidae	12	0.027	0.000729
35	Forget-me-not	*Catochrysops Strabo*	Lycaenidae	13	0.029	0.000841
36	Pea Blue	*Lampides boeticus*	Lycaenidae	8	0.018	0.000324

Table 2: Table showing Alpha diversity indices of butterflies recorded in the study area.

Total number of Individuals (N)	**443**
Total number of species (S)	36
Margalef's Richness Index [(S-1) / ln(n)]	5.75
Pielou's Evenness Index [H/lnS]	0.87
Simpsons index of Dominance (D) [D= Σ (n_i/N)2] n_i = number of individual species	0.058
Shannon Weaner Index (H) [H=-Σpi ln pi]	3.102

Conclusion

The findings of the current study indicate that the Nymphalidae family is characterized by the highest number of species among all families. This conclusion is based on the rich biodiversity of the study area. Given that butterflies are highly sensitive to environmental changes, it is essential to closely monitor human activities and climatic conditions. To ensure that the aforementioned list remains up-to-date, additional research focusing on newly discovered butterfly species is necessary.

References

1. Bhowate S, Kumar P. Species diversity, relative abundance and status of butterflies of Betul district, Madhya Pradesh. Journal of Entomology and Zoology studies,2020:8(3):1054-1057.
2. Chandra K, Chaudhary LK, Singh RK, Koshta ML. Butterflies of Pench Tiger Reserve, Madhya Pradesh. Zoos' Print Journal,2002:17(10):908-909.
3. Chandra K, Sharma RM, Singh A, Singh RK. A checklist of butterflies of Madhya Pradesh and Chhattisgarh states, India. Zoos' Print Journal,2007:22(8):2790-2798.
4. Gaonkar H. Butterflies of Western Ghats, India including Sri Lanka: A biodiversity assessment of threatened mountain system. A report submitted to Centre for Ecological Sciences IISc, Bangalore, 1996, 86.
5. Kakati M. Diversity, Distribution & Ecology of Nymphalidae Butterflies in Rani- Garbhanga Reserve Forest, Kamrup, Assam. Ph.D. Thesis. Submitted to Gauhati University, 2006, 172.
6. Kehimkar I. The book of Indian butterflies. Bombay Natural History Society, Mumbai, 2008, 497.

7. Keshre V, Upadhya V. Preliminary studies on butterfly fauna of Narmada Nagar town, Dist. Khandwa M.P. Journal of Entomology and Zoology Studies 2023:11(1):149-153
8. Kunte K. "Butterflies of Peninsular India". Universities Press (Hyderabad) and Indian Academy of Sciences (Bangalore), 2000, 254.
9. Kunte K, Sondhi S, Roy P (Eds.). Butterflies of India, Indian Foundation for Butterflies, 2018. v,2.39 http://www. ifoundbuterfies.org/ Accessed 8 August 2024.
10. Kunte K. The Wildlife (Protection) Act and conservation prioritization of butterflies of the Western Ghats, southwestern India. *Current Science*,2008:94(6):729.
11. Padhye A, Shelke S, Dahanukar N. Distribution and composition of butterfly species along the latitudinal and habitat gradients of the Western Ghats of India. *Check List*,2012:8(6):1196–1215.
12. Rafi MA, Khan MR, Irshad M. Papilionid (swallowtails) butterflies of Pakistan. Gul Awan Printers, Islamabad, Pakistan, 2000, 1-33.
13. Shukla A, Maini H. "Species Diversity of Butterfly with Their Relative Status in Southeast Region of Narmada Valley Jabalpur (M.P.)" International Journal of Current Advanced Research,2015:4(9):368-370.
14. Siddiqui A, Singh SP. A checklist of the butterfly diversity of Panna forest (M.P.) National Journal of Life Sciences,2004:1(2):103-106.
15. Singh RK, Koshta M L. Fauna of Madhya Pradesh (Including Chhattisgarh), State fauna series, Zoological Survey of India Kolkata,2007:15:301-345.
16. Singh RK, Kostha ML. On a collection of butterflies (Lepidoptera: Rhopalocera) from Kanha National Park, Madhya Pradesh, India. Records of the Zoological Survey of India,1998:96(1-4):15-23.
17. Singh RK. On a collection of butterflies from Bastar district, Madhya Pradesh. News Letter Zoological Survey of India,1977:3:323-326.
18. Singh RK. Report on a collection of butterflies (Lepidoptera: Rhopalocera) from Shivpuri National Park, Madhya Pradesh. News Letter Zoological Survey of India,1977:3:23-24.
19. Tiple AD. Butterfly species diversity, relative abundance and status in Tropical Forest Research Institute, Jabalpur, Madhya Pradesh, Central India. Journal of Threatened Taxa,2012:4(7):2713-2717.
20. Tiple AD, Deshmukh VP, Dennis RLH. Factors influencing nectar plant resource visits by butterflies on a university campus: implications for conservation. Nota Lepidopterologica,2006:28(3/4):213-224.