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# Butterfly Diversity of NBRI (National Botanical Research Institute), Lucknow, Uttar Pradesh, India

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**Abstract:- A study on butterfly was carried out in National Botanical Research Institute, Lucknow, Uttar Pradesh, India from January 2023 to April 2023. A total of 30 species belonging to five families were recorded during the study period. Nymphalidae was the richest family that comprised (14 and 47%) of the total species followed by Pieridae (6 and 20%), Lycanidae (5and 13%), Papilionidae (4 species) and Hesperiidae (1 and 3%) were the lowest. All the species recorded in the IUCN list as listed in the least concern, not evaluated, not rare, common category of the IUCN. Therefore, a large variety of butterflies inhabit the research area, and more study may be conducted to understand more about this richness and gather data for butterfly parks and conservation initiatives. The identification of endangered butterfly species, their preservation, and awareness-raising initiatives among school and college students should all be prioritized. By enhancing butterfly variety and abundance, the establishment of butterfly gardens will help to preserve species that could otherwise go extinct or become rare.**

***Keywords:-*** *Butterfly Diversity, NBRI, IUCN, Butterfly Garden, Conservation Initiatives.*

## I. INTRODUCTION

Butterflies are classified in the order Lepidoptera of the phylum Arthropoda, which is a large collection of insects. The name refers to a defining feature of mature butterflies (the little scales that cover, the wings), and it is derived from the Greek words lepido "scale" and ptera "wings". Butterflies come in a huge variety of sizes, hues, and shapes. They can be found everywhere on Earth, excluding very close to the poles. Lepidoptera are an estimated 200.000 species strong, 10% of which are butterflies. They are divided into six families based on their anatomical characteristics: the Pieridae, also known as whites and sulphurs; the Papilionidae, or swallowtails; the Nymphalidae, which includes morphos, the owl butterfly, and the long wings; the Hesperidae, or skippers; and the Libytheidae, or snout butterflies. In addition to being useful for developing conservation strategies, butterflies are excellent indicators of climatic conditions, seasonal, and ecological changes. The majority of conservation scientists and decision-makers have, however, ignored them. As a result, butterflies are essential to ecosystem health and their co-evolutionary relationship with plants and interconnected lives (Ghazanfar et al., 2016) demonstrate this.

According to Kunte et al. (2012), 285 species of butterfly may be found in southern India out of the total 1504 species that India is home to, making up 8.74% of the butterfly species worldwide. 351 and 334 species, respectively, are present in peninsular India and the Western Ghats. Butterflies are well adapted to their surroundings and respond swiftly to any change in their habitat brought on by human-caused activities like intensifying logging and farming (Mora et al., 2011). Climate change has an impact on species diversity and is predicted to worsen ecosystems (Scott and Lemieux, 2005). It is necessary to take into account variations in temperature, rainfall patterns, and extreme weather events like heat waves, protracted droughts, or excessive rains. Direct mortality and migratory behaviour are caused by nectar depletion and the desiccation of host plants. Butterflies are a good model organism to examine since they are exothermic, highly sensitive to climatic fluctuation, and have a rapid generation rate. According to Vu (2009), forest edges have greater diversity of butterflies and more exposure to the open forest.

## II. STUDY AREA

NBRI Botanical Garden, also known as the CSIR-National Botanical Research Institute, is located in Lucknow. It is a botanic garden located at 26.8563° N and 80.9499° E in Lucknow, Uttar Pradesh, India. The garden was renamed "Government Horticultural Garden" and "National Botanic Garden" in the years that followed. Spanning 65 acres in size, the garden contains more than 6000 significant plant species and variations that were gathered from various locations in India and overseas. It is a historic garden that was built in the year 1789. The garden of National Botanical Research Institute (NBRI) has been preserved to provide for the long-term use of plants with educational, recreational, taxonomic, decorative, horticultural, biological, and ecological purposes. It contains more than 6000 significant plant species and variations that were gathered from various locations in India and overseas. Every day, more than a thousand people go for morning walks. Meditation and relaxation are made possible by the peaceful environment created by the enormous Banyan tree.

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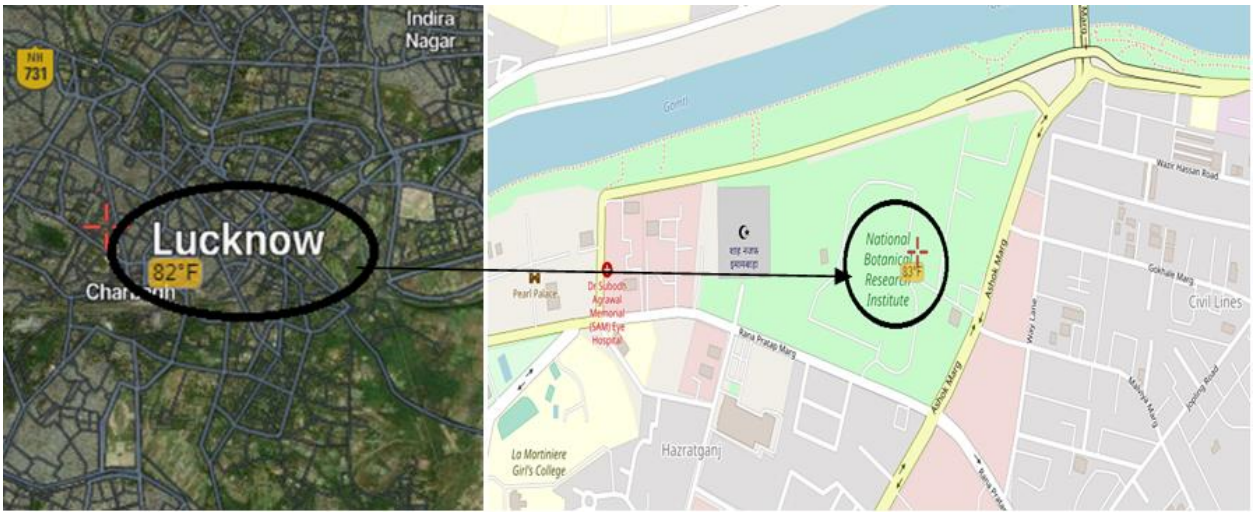



Map 1: Satellite map of National Botanical Research Institute (NBRI), Lucknow

## III. MATERIALS AND METHODS

The field surveys on butterflies were carried out in the study areafor a period of four months, from January to April 2023. The surveywas conducted in the study region three times each week in the morning (from 8 a.m. to 10 a.m.) and in the evening(from 2 p.m. to 5 p.m.). Random observations were made while walking through the selected area based on habitat present in the study area. To study the **diversity of butterflies line transect method** was followed.

*A. Identification of the species of butterfly*

Butterflies were photographed by **Canon** EOS **100D.** The photographs of butterflies were used for the identification of the species of butterfly. Colour patterns, sizes and shapes as well as their designs were considered in identification of the species of butterfly with the help of entomologist expert and relevant available literature as well as photographs described by (Sunil et al., 2016) and (Kumar et al., 2016)**.**

## IV. RESULT AND DISCUSSION

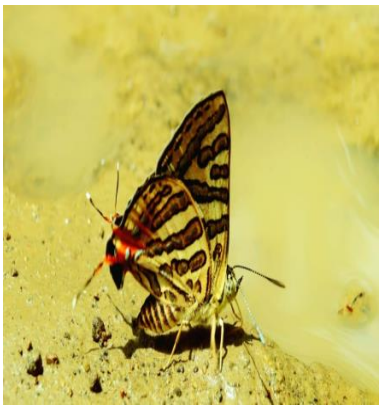
The checklist of butterfly species spotted in the study area as shown in (Tables 1). During the study period, a total of 30 species belonging to 24 different genera of butterfly were recorded. Taxonomically, it covers 5 different families, representing the biodiversity of butterfly. Among the butterfly families, Nymphalidae was the richest family in the study area that comprised (14 and 47%), followed by Pieridae with (6 and 20%) species, Lycanidae with (5 and 16.3%), Papilionidae and Hesperiidae with (4 and 13.3%), 1and 3.3%) species were the lowest as shown in (Tables 2).

Table 1: Checklist of Butterflies recorded in the Study Area

| S.No. | Family | Common Name | Zoological name |
|---|---|---|---|
| **1** | **Hesperiidae** | Rice swift | ***Borbo cinnara*** |
| **2** | **Lycanidae** | Plains cupid | ***Chilades pandava*** |
| **3** | | Yamfly | ***Loxura atymnus*** |
| **4** | | Common silverline | ***Spindasis vulcanus*** |
| **5** | | Common pierrot | ***Castalius rosimon*** |
| **6** | | Common hedge blue | ***Acytolepis puspa*** |
| **7** | **Nymphalidae** | Common tiger | ***Danaus genutia*** |
| **8** | | Plain tiger | ***Danaus chrysippus*** |
| **9** | | Common evening brown | ***Melanitis leda*** |
| **10** | | Common castor | ***Ariadne merione*** |
| **11** | | Tawny castor | ***Acraea terpiscore*** |
| **12** | | Common baron | ***Euthalia aconthea*** |
| **13** | | Danaid eggfly | ***Hypolimnas misippus*** |
| **14** | | Peacock pansy | ***Junonia almana*** |
| **15** | | Lemon pansy | ***Junonia lemonias*** |
| **16** | | Blue pansy | ***Junonia orithya*** |
| **17** | | Chocolate pansy | ***Junonia iphita*** |
| **18** | | Common lascar | ***Pantoporia hordonia*** |
| **19** | | Common fivering | ***Ypthima baldus*** |
| **20** | | Commander | ***Moduza procris*** |
| **21** | **Papilionidae** | Common raven | ***Papilio castor*** |

| | | | |
|---|---|---|---|
| **22** | | Lime butterfly | ***Papilio demoleus*** |
| **23** | | Common mormon | ***Papilio polytes*** |
| **24** | | Tailed jay | ***Graphium agamemmnon*** |
| **25** | **Pieridae** | Pionner | ***Belenois aurota*** |
| **26** | | Common jezbel | ***Delias eucharis*** |
| **27** | | Common emigrant | ***Catopsilia promona*** |
| **28** | | Common grass yellow | ***Eurema hecabe*** |
| **29** | | Common gull | ***Cepora nerissa*** |
| **30** | | Common wanderer | ***Pareronia valeria*** |

Table 2: Photographs of the species of butterfly observed in the study area

| | | |
|---|---|---|
|  **Rice swift** |  **Plains cupid** |  **Yamfly** |
|  **Common pierrot** |  **Common hedge blue** |  **Common silverline** |
|  **Plain tiger** |  **Common tiger** |  **Common castor** |

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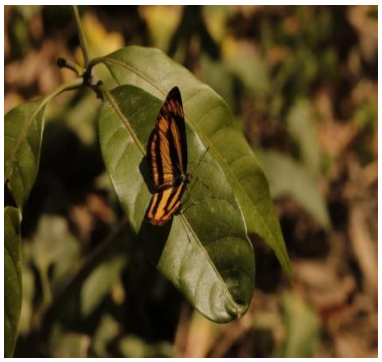
| | | |
|---|---|---|
|  **Tawny castor** |  **Common evening brown** |  **Common baron** |
|  **Commander** |  **Danaid eggfly** |  **Common lascar** |
|  **Common fivering** |  **Peacock pansy** |  **Blue pansy** |
|  **Lemon pansy** |  **Chocolate pansy** |  **Common raven** |

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Lime butterfly


Common mormon


Tailed jay


Pioneer


Common jezbel


Common emigrant


Common grass yellow


Common gull


Common wanderer

Table 3: Showing Relative Abundance of genus and species of Butterfly in NBRI

| S.N. | Family | No. of Species | No. of Genus |
|---|---|---|---|
| 1. | Hesperiidae | 1(3.3%) | 1 (4.16%) |
| 2. | Lycanidae | 5(16.3%) | 5(20.8%) |
| 3. | Nymphalidae | 14 (47%) | 10 (41.6%) |
| 4. | Papilionidae | 4 (13.3%) | 2 (8.3%) |
| 5. | Pieridae | 6 (20%) | 6 (25%) |

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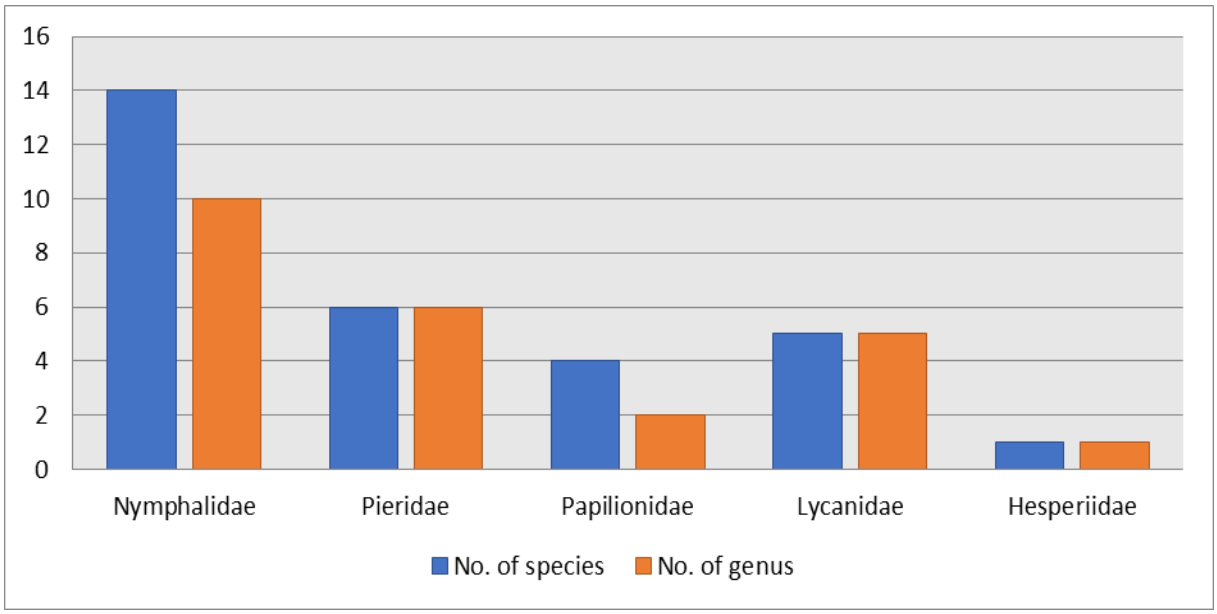
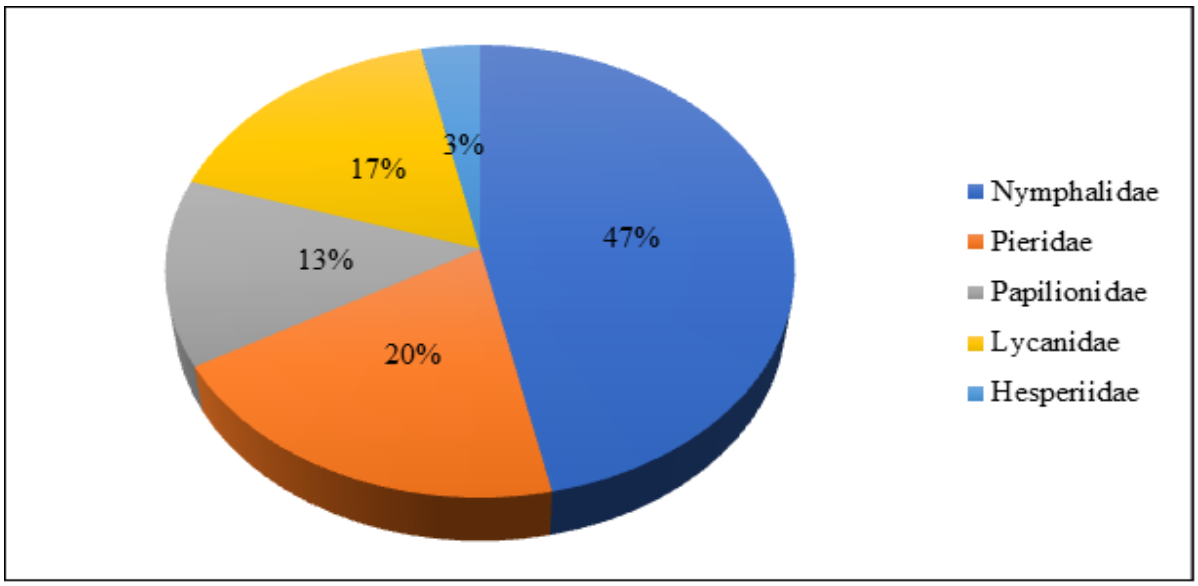
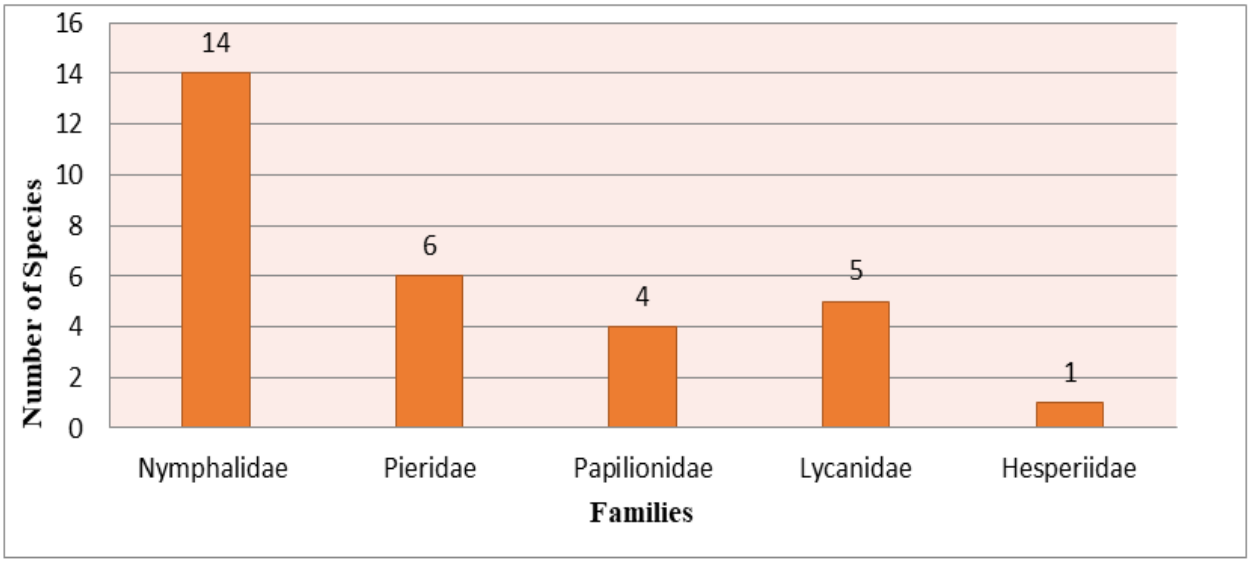



Graph 1: Showing Relative Abundance of genus and species of Butterfly in NBRI




Graph 2: Family wise % composition of the species of Butterfly in NBRI




Graph 3: Family-wise composistion of the No. of the Butterfly Species in the Study Area

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## V. CONCLUSION

The study of butterflies in and around NBRI Botanical Garden included a total of 30 species, which were detected during a period of 4 months, from January to April, 2023. These butterfly species belonged to 24 different genera including 5 families. This is because NBRI has a wide variety of plants i.e., trees, herbs, shrubs including different flowers, the family Nymphlidae has the highest species abundance, with a total of 14 species accounting 47%of all the species. Therefore, it is concluded that the study area is rich in butterfly diversity and further research could be conducted to obtain details and documentation on butterfly diversity for the conservation and butterfly parks.

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## REFERENCES

[1.] Espeland, M., Breinholt, J., Willmott, K. R., Warren, A. D., Vila, R., Toussaint, E. F. A., Kawahara, A. Y. (2018). A Comprehensive and Dated Phylogenomic Analysis of Butterflies. Current Biology, 28(5), 770–778.

[2.] Gupta, I. J., & Mondal, D. K. (2005). Red Data Book (PART-2) Butterflies of India. Zoological Survey of India.

[3.] Haribal, M. (1992). The Butterflies of Sikkim Himalaya and their natural history. Sikkim. Nature Conservation Foundation, Gangtok.

[4.] Jennersten, O. (1984). Flower visitation and pollination efficiency of some North European butterflies. Oecologia.

[5.] Kehimkar, I. (2008). The book of indian Butterflies. Bombay Natural History Society, Mumbai.

[6.] Kehimkar, I. (2016). Butterflies of India. Bombay Natural History Society, Mumbai. pp xii + 528.

[7.] Kunte, K. (2000). Butterflies of Peninsular India. - A Lifescape.

[8.] Kunte, K. J. (1997). Seasonal patterns in butterfly abundance and species diversity in four tropical habitats in northern Western Ghats. Journal of Biosciences, 22(5), 593–603. https://doi.org/10.1007/BF02703397.

[9.] Menken, S.B.J., Boomsmas, J.J. and Van, N.J. (2012). Large scale evolutionary patterns of host plant associations in the Lepidoptera: Evolution, 64: 1098-1119.

[10.] Mohammed Abdullahi, Amit Larkin, Ashwani Kumar, Hemant Kumar and Adam Lawan Idris. (2019). A study on butterfly diversity in Prayagraj district of Uttar Pradesh, India. Int. J. Adv. Res. Biol. Sci. 6(8): 112-119.

[11.] Parasharya, B., & Jani, J. (2007). Butterflies of Gujarat. Anand Agriculture University, Anand, India.

[12.] Proctor, M., Yeo, P., & Lack, A. (1996). THE NATURAL HISTORY OF POLLINATION. Timber Press, Portland, 479.

[13.] Samways, M. J. (1994). Insect Conservation Biology (Conservation Biology, No 2). Springer Science & Business Media.

[14.] Scott, D. and Lemieux, C. (2005). Climate change and protection area policy and planning in Canada. The Forestry Chronicle, 81: 696-763.

[15.] Sharma, M., & Sharma, N. (2013). Nectar resource use by Butterflies in Gir Wildlife Sanctuary, Sasan , Gujarat, 5(2), 56–63.

[16.] Spitzer K, Jaros J., Havelka J., Leps J. (1997). Effect of small-scale disturbance on butterfly communities of an Indochinese montane rainforest. Biol Conserv 80:9–15.

[17.] Varshney, R. K., & Smetacek, P. (2015). A Synoptic Catalogue of the Butterflies of India. Butterfly Research Centre, Bhimtal and Indinov Publishing, New Delhi, ii + 261 pp., 8 pl.

[18.] Vu, L.V. (2009). Diversity and similarity of butterfly's communities in five different habitat types at Tom Dao National Park Vietnam. Journal of Zoology, 2(7): 15-22.

[19.] Vu, L.V. and Vu, C.Q. (2011). Diversity pattern of butterfly communities (Lepidoptera, Papilionoidae) in different habitat types in a tropical rainforest of southern Vietnam. Journal of Zoology, Article ID818545: 8pp.