BUTTERFLY SPECIES RICHNESS AND DIVERSITY IN SELECTED AREAS OF THOOTHA, PALAKKAD DISTRICT, KERALA, INDIA

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Abstract: A preliminary study on the diversity of butterflies was carried out in Thootha village Palakkad district Kerala, India from September 2020 to January 2021. A number of 26 butterfly species that belong to 5 families were recorded through visual observations of their wing patterns, color and also referring to field guides. The family Nymphalidae was the dominant among the five families with 12 (46 %) species followed by family Lycanidae comprising of 6 (23 %) species. The family Pieridae comprised of 4 (15 %) species and both family Papilionidae and family Hesperiidae with 2 (8%) species each. Common grass yellow (*Eurema hecabe*) and Psyche (*Leptosia nina*) are the most observed butterfly followed by common four ring (*Ypthima huebneri*). Some rare butterflies such as Plain tiger (*Danaus chrysippus*) and Spotless grass yellow (*Eurema laeta*) were observed with a minimum count.

***Index Terms* - Butterfly, Species richness, Bioindicators, Biodiversity.**

I. INTRODUCTION

Insects comprises of more than half of earth's species diversity (May, 1992). Butterflies are the foremost tantalizing and delightful creatures among the insect group, they are an often regarded as 'Flagship species' (Gowda *et al*., 2011). Butterflies come under the order Lepidoptera, which belongs to phylum Arthropoda and the class Insecta. The word Lepidoptera means `Scale wings`. They are one among the foremost beautiful and striking species of insect on the earth and they are playing a very crucial role in the ecosystem as well as human health. They are commonly mentioned as "insects of the sun" because of their eye-catching color and delicate charisma (Haroon, 2016).

Butterflies are most commonly and widely appreciated for their aesthetic value and are important as ecological indicators (Chakravarthy *et al*., 1997) and "flagship taxa" in biodiversity inventories (Lawton *et al*., 1998). Butterflies are good biological indicators of habitat quality and also general environmental health (Larsen, 1988; Kocher and Williams, 2000; Sawchik and Dufrence, 2005). They often respond to disturbances and changes within the habitat quality and landscape structure variations. They may severely suffer by the environmental variations and changes within the forest structure, as they are closely hooked into plants (Pollard, 1991; Blair, 1999). Healthy biological communities depend on insects as herbivores, pollinators, seed dispersal, predators and prey and butterflies are one of them (Tiple *et al*., 2009). Butterflies show a broad variety of all species compared to the other invertebrates. As a prey to birds, bats and other insectivorous animals, they play a significant part in the food chain (Dwari *et al*., 2017).

Butterflies can also be used as umbrella species (the species whose protection serves to protect many co-occurring species) for conservation planning and management (Betrus *et al*., 2005). Butterflies accomplish pollination, a key stone ecological process in natural sustainability throughout the planet. As both adults and larvae depend on vegetation for development, they involve themselves in complex feeding relationships with green plants. Adult butterflies require a succession of adequate nectar resources. Nectar provides energy for flight, which is significant to find mates and to disperse the species. Butterfly larvae are typically host specific and often show a "Botanical instinct". Closely related butterfly species choose closely related plants. Butterflies prove to be the best rapid indicators of habit quality and they are also considered as the sensitive indicators of climatic change (Venkata Ramana, 2010).

II. MATERIALS AND METHODS

2.1 Study area

Present study on Buterfly diversity was carried out in Thootha, Palakkad (Dis), Kerala. Thootha is a beautiful village that includes the natural beauty of Palakkad and Malappuram, and is located near the Thootha River which flows across the two districts. The geographical location of this study area is 10° 54.92333'N and 76°17.77833' E .This study area is near to the Thoothapuzha and is surrounded by different types of vegetation and small forest patches.

2.2 Sampling

A weekly random survey on butterfly diversity was carried out from September 2020 to January 2021. The study was carried out either from 8:00 AM to 11 AM or 3:00 PM to 5:00 PM. Every habitat in and around of this area was covered by random observations as well as opportunistic sampling during walking through the roads village path, agricultural lands, residential vegetation etc. Butterflies were observed, captured, photographed, identified and released immediately at the spot of capture. The photographs were taken by using mobile phone, Vivo 1811. In difficult cases the specimen were collected using an aerial sweep net and transferred to plastic bottle and brought back to the home for detailed identification.

2.3 Identification

Butterflies were primarily identified directly in the field and photo documented. Species identity was done with the assistance of the field guides by Kunte (2000) and Kehimkar (2008). Taxonomy and nomenclature that was updated by Kunte *et al*., (2011) was very useful for identification. The field guide - Butterflies of Western Ghats by Raju Kasambe, (2018) also helped in the identification of butterfly species in the present study.

2.4 Data analysis

The butterflies observed in each survey were identified upto species level and tabulated. The occurrence status was decided on number of encounters of species in the study sites: rare (R) - 1 to 2 sightings; Occasional (O) - 5 to 10 sightings; Common (C) -11 to 16 sightings in the study area.

III. RESULTS AND DISCUSSION

Butterflies are referred to as 'flying jewels' in nature and are considered as charismatic species with multiple functional roles, and colours and many of which are recognized as ecosystem services for the well being of human beings (Kurtz *et al.*, 2001; Nelson, 2007; Guiney and Oberhauser, 2008). Results of Butterfly diversity was depicted in the Table 1 & Fig 1 to 26. From the results of the present study, a total of 26 butterfly species belonging to 5 families were recorded through visual observations of their wing color, patterns and also referring to field guides. The family Nymphalidae was the dominant among the five families with 12 (46 %) species (Fig 1 to 12) followed by family Lycanidae comprising of 6 (23 %) species (Fig 13 to 18). The family Pieridae comprised of 4 (15 %) species (Fig 19 to 22) and both family Papilionidae (Fig 23 & 24) and family Hesperiidae with 2 (8%) species (Fig 25 & 26) each.

Table 1: Butterfly Diversity in the Selected Study Site

Sl. No	Scientific name	Common name	Family	Occurrence
1	*Danaus chrysippus*	Plain tiger	Nymphalidae	R
2	*Orsotriaena medus*	Nigger	Nymphalidae	C
3	*Melanitis leda*	Common evening brown	Nymphalidae	C
4	*Mycalesis perseus*	Common bush brown	Nymphalidae	C
5	*Mycalesis patnia*	Glad-eye bushbrown	Nymphalidae	C
6	*Neptis hylas*	Common sailor	Nymphalidae	C
7	*Hypolimnas bolina*	Blue moon butterfly	Nymphalidae	O
8	*Junonia iphita*	Chocolate pansy	Nymphalidae	C
9	*Tirumala limniace*	Blue tiger	Nymphalidae	O
10	*Ypthima huebneri*	Common Four-ring	Nymphalidae	C
11	*Ypthima baldus*	Common five-ring	Nymphalidae	C
12	*Euploea core*	Common crow	Nymphalidae	C
13	*Cigaritis vulcanus*	Common silverline	Lycaenidae	O
14	*Jamides celeno*	common cerulean	Lycaenidae	C
15	*Loxura atymnus*	Yamfly	Lycaenidae	R
16	*Talicada nyseus*	Red Pierrot	Lycaenidae	R
17	*Castalius rosimon*	Common Pierrot	Lycaenidae	C
18	*Zizeeria karsandra*	Dark grass blue	Lycaenidae	C
19	*Catopsilia pomona*	Common emigrant	Pieridae	C
20	*Eurema hecabe*	Common grass yellow	Pieridae	C
21	*Eurema laeta*	Spotless grass yellow	Pieridae	R
22	*Leptosia nina*	Psyche	Pieridae	C
23	*Graphium sarpedon*	Common bluebottle	Papilionidae	O
24	*Papilio polytes*	Common mormon	Papilionidae	O
25	*Suastus gremius*	Indian palm bob	Hesperiidae	O
26	*Oriens goloides*	Ceylon dartlet	Hesperiidae	R

Fig 1: *Danaus chrysippus*

Fig 2: *Orsotriaena medus*

Fig 3: *Melanitis leda*

Fig 4: *Mycalesis perseus*

Fig 5: *Mycalesis patina*

Fig 6: *Neptis hylas*

Fig 7: *Hypolimnas bolina*

Fig 8: *Junonia iphita*

Fig 9: *Tirumala limniace*

Fig 10: *Ypthima huebneri*

Fig 11: *Ypthima baldus*

Fig 12: *Euploea core*

Fig 13: *Cigaritis vulcanus*

Fig 14: *Jamides celeno*

Fig 15: *Loxura atymnus*

Fig 16: *Talicada nyseus*

Fig 17: *Castalius rosimon*

Fig 18: *Zizeeria karsandra*

Fig 19: *Catopsilia pomona*

Fig 20: *Eurema hecabe*

Fog 21: *Eurema laeta*

Fig 22: *Leptosia nina*

Fig 23: *Graphium sarpedon*

Fig 24: *Papilio polytes*

Fig 25: *Suastus gremius*

Fig 26: *Oriens goloides*

According to the results of the present study it was found that Nymphalidae and Lycaenidae were the most frequently sighted groups during this survey. Status of all species is categorized depending on the direct sightings during the survey, which showed that 15 species out of 26 species were common, 6 species were occasional and 5 species were rare. In four months duration from September 2020 to January 2021, Common grass yellow (*Eurema hecabe*) and Psyche (*Leptosia nina*) are the most observed butterfly followed by common four ring (*Ypthima huebneri*). Some rare butterflies such as Plain tiger (*Danaus chrysippus*) and Spotless grass yellow (*Eurema laeta*) were observed with a minimum count. This variation in the counts is mainly due to seasonality, availability of host plants and adaptability character of the butterflies.

Butterflies are considered as indicators of ecosystem change and are used to predict various environmental alterations (Chettri, 2010; Rakosy and Schmit, 2011). Pahari, (2018) revealed on the study of butterfly diversity in Haldia industrial zone that shows few numbers of butterfly species, less diversity and evenness indices when compared with the adjacent rural belt. And also recommend that industrialized areas are harmful places to the butterflies. Leon-Cortes, (2019) reported that the most diverse species of butterfly in the study area were belonging to Nymphalidae family with (31) species followed by Hesperidae (12), Pieridae (19) and Lycaenidae (16) respectively. One of the groups of animals with diverse species richness is insects which represent over 50% of terrestrial biodiversity. The butterflies are playing vital roles in the assaying of the environmental quality for a specific biotope (Kunte, 2000). Observations on the butterfly diversity provide information about the abundance shaped by the vegetation along the landscape and also the variations in the species richness (Harrington and Stork, 1995; Ockinger and Smith, 2006; Ockinger *et al*., 2006, 2009) and the species interactions.

In the present study family Nymphalidae was the dominant family comprising 12 species, and it constituted (46%) of total butterfly species. Nymphalidae was the most dominant butterfly family in terms of species composition (total of 12 species, 46%) followed by Lycaenidae, Pieridae, Papilionidae and Hesperiidae. A study similar to the present study was carried out by Guptha *et al*., (2012) that explored 50 species of butterflies under five families by photographic documents of Sesha chalam Biosphere Reserve in Eastern Ghats of Andhra Pradesh in India. The families Lycaenidae and Nymphalidae were found to be dominant with 12 species and 20 species respectively. Six species such as *Amblypodia anita, Euchrysops cnefus, Euploea core, Hypolimnas bolina, Lampides boeticus* and *Pachliopta hector* were observed. In the present study the family Nymphalidae was the dominant among the five families with 12 (46 %) species.

In the present study the areas with less human activity was found to have high species richness than the roadside plantations. This might be because of the degree of disturbance being more prominent in roadside plantation in term of human interference. The results of the present study may be due to occurrence of generalized and widespread herb and shrub species such as *Lantana camara* etc. which are considered to be the rich source of nectar for butterflies. Similarly, Tiple *et al*., (2007) also have reported that occurrence of butterfly species is influenced by the presence of rich source of nectar plant species. The secondary vegetation mainly *Lantana camera, Eupatorium odoratum, Mikania* spp, etc are known to be very good nectar food for many butterfly species. This observation of present study is quite significant and it emphasizes the importance of the conservation of biological diversity of a region.

IV. CONCLUSION

The present study revealed that Family Nymphalidae showed maximum species richness comprising of 12 species, followed by Lycanidae, Pieridae and least in Papilonidae and Hesperidae. Maximum butterfly species was observed in the month of September and least in January. It is a preliminary study and a lot of research is necessary in this regard and further collections are essential for getting a detailed record of the butterfly diversity. Development of standard monitoring procedures for assessing the environmental stability in this area is needed. Butterflies are indicators of a healthy environment and healthy ecosystems.

Due to lack of suitable management, unsustainable utilization of natural resources, deforestation and urbanization, uncontrolled use of pesticides, in-organic manures, environmental pollution leads to the destruction of host plant might be adversely affect the existence of both insects and floral diversity of the area. Planting of endemic trees and plants supporting the local wildlife will help to protect at least the common species from not going on to the verge of extinction. In addition, further research will be needed for documentation of butterfly species which will help in future conservation of butterflies in the area.

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