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A preliminary study of butterflies in Theerthamalai, Tamil Nadu

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Abstract

The diversity of butterflies were recorded in Theerthamalai, Dharmapuri District, Tamilnadu. A total of 264 butterflies were observed during the study period from October 2019 to January 2020. A total of 22 species of butterflies were recorded and the most dominant family was Nymphalidae (45.45%) followed by Pieridae (31.82%), Papilionidae (13.64%), and Lycaenidae (9.1%). During the study period butterflies grouped under the family Nymphalidae was witnessed with maximum number of butterflies when compared to other families. During November the total number of butterfly counts were high when compared to other months. The presence and absence of butterflies were also recorded as Common (C), Occasional (O), Rare (R), and Very Rare (VR), with common species (72.7 percent) being the most common, followed by occasional (4.5 percent), rare (18.18 percent), and very rare (VR) (4.5 percent). The month of November had the most diversity, while the month of January had the least.

Keywords: butterflies, diversity, abundance, species

Introduction

Butterflies are the most beautiful, colourful and important group of insects in the world. These are very good pollinators as well as they play a role as predators, pests and weed killers^[3]. Butterflies (as pollinators) contribute significantly to the growth, the maintenance, and an expansion of flora in tropical regions where these insects are abundant and diverse^[2]. Furthermore, butterflies are so sensitive to environmental changes^[4] and have been found as bio indicators, capable of indicating the environment's general health^[5]. So far, 1501 species of butterflies have been recorded from the Indian region^[13], with 350 species from Peninsular India, 331 species from the Western Ghats, and 313 species from South India^[7]. The major forest areas in Tamil Nadu are divided into the Western and Eastern Ghats. When compared to the Western Ghats, the Eastern Ghats face intense pressure from all sides from people for fuel wood, fodder, medicinal plants, and illegal felling, causing it to lose forest cover at an unprecedented rate^[11]. The diversity is a measure of how individuals in an ecological community are distributed among the species. The number and available niches in the environment will be represented by the measure of fauna diversity. If niche heterogeneity is high, it will support a more diverse fauna, resulting in a higher co-efficient or index of the diversification.

Many species are becoming increasingly rare, and some are on the verge of extinction, as a result of factors such as increased urbanisation, including roads and buildings, habitat destruction, fire, pesticide use, and an illegal trade. Butterflies, as one of the most studied insect groups, have been meticulously documented since the 18th century^[9]. India has a diverse range of butterfly species due to its rich and varied topographical, climate, and vegetative conditions, as well as forming a large portion of the Indo-Malayan bio geographical zone.

Though many studies have been conducted with respect to the diversity of butterflies in various regions in Tamil Nadu^[21, 20, 16, 24], the butterfly fauna of Theerthamalai has not been studied before. As a result, the current study made a preliminary attempt to investigate the diversity of butterflies.

Materials and Methods

A preliminary butterfly study was carried out in Theerthamalai, Dharmapuri, Tamilnadu (N

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12° 6' 7.0488", E 78° 35' 27.3264"), from October 2019 to January 2020, observations were made in the morning between 8.00 am to 11.30 am when the butterflies were most active and also the insect density was high. The study area is predominantly covered by Agriculture.

The standard "Pollard walk"^[18] method was used for field survey. Transects of approximately 1000 metres in length, divided into five segments of 200 metre. Each transect was observed twice, and the number of individuals per species from all five segments were recorded. The butterflies were spotted within 2.5 metres of the left and right sides, as well as five metres in front of the observer.

The butterflies were collected using a variety of techniques, including netting and handpicking. All the butterflies sighted were discovered in the field during the day. Some species were photographed after being collected with sweeping nets. Various field guides and identification tools were used to identify the butterflies^[23,13,12].

The Shannon-Wiener diversity index was used to calculate relative abundance. Simpson's Index was used to calculate the diversity indices. The evenness of the species was calculated using the Evenness Index $E = H/\ln S$, where H is the diversity index. $\ln S$ denotes the total number of species. Species richness was also calculated, which represents the number of species per sample as a measure of richness^[14].

Results

The results of the present study revealed a total of 22 species of butterflies belonging to 4 families. Family wise diversity of butterfly was dominated by Nymphalidae (45.45%) followed by Pieridae (31.82%), Papilionidae (13.64%), and Lycaenidae (9.1%) (Fig 1).

The number of butterfly species recorded in four different

families is shown in Table 1. There were about ten species in the Nymphalidae family. From which eight species were found frequently, and each of the species was found occasionally and rarely. The Pieridae are followed by the Nymphalidae, which has seven species. Four species were found to be common, while the remaining three were found to be rare. Papilionidae and Lycaenidae had the fewest insects during the study period. Four species from both the families were found to be common, while one species from the Papilionidae family was found to be extremely rare. The presence and absence of butterflies were also recorded as Common (C), Occasional (O), Rare (R), and Very Rare (VR), with common species (72.7 percent) being the most common, followed by occasional (4.5 percent), rare (18.18 percent), and very rare (VR) (4.5 percent).

Figure 2 depicts the total number of butterflies recorded from all four families from October 2019 to January 2020. The total number of insects recorded in November 2019 was high. In the other three months, there was a decrease in counts.

Figure 3 depicts the total number of different species of butterflies from all four families. When compared to other months, there was an increase in the number of different species observed during the month of November '19. It was observed in the following order: November '19, October '19, December '19, and January '20.

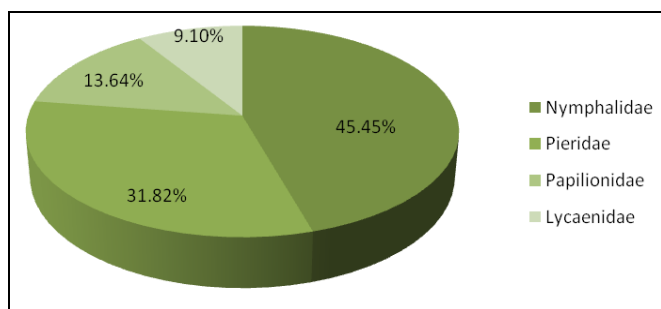
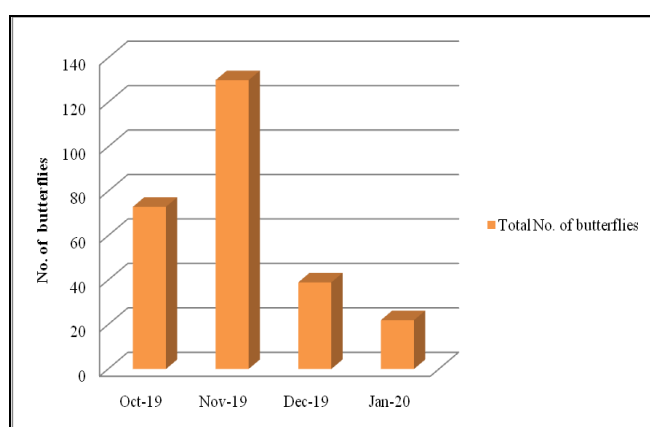
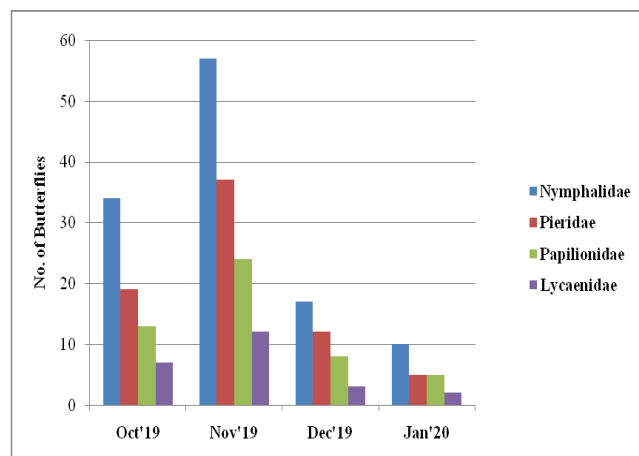
Butterfly species diversity indices such as Shannon's Weiner Index, Simpson Index of Diversity, Species Richness, and Evenness were computed by month wise from October to January (Table 2). The month of November had the most diversity, while the month of January had the least, with only a few species seen. A greater diversity of species was observed in the month of November. This could be due to the effect of temperature, rainfall, and humidity.

Table 1: Butterfly species observed in Theerthamalai from October 2019 - January 2020

Sl. No.	Scientific Name	Common Name	Occurrence			
Nymphalidae						
1	<i>Acraea violae</i> (Fabricius)	Tawny coster	Common			
2	<i>Ariadne ariadne</i> (Linnaeus)	Angled castor	Common			
3	<i>Byblia lithyia</i> (Drury)	Joker			Rare	
4	<i>Danaus chrysippus</i> (Linnaeus)	Plain tiger	Common			
5	<i>Euploea core</i> (Cramer)	Common crow	Common			
6	<i>Hypolimnas bolina</i> (Linnaeus)	Great eggfly	Common			
7	<i>Junonia hierta</i> (Fabricius)	Yellow pansy		Occasional		
8	<i>Junonia lemonias</i> (Linnaeus)	Lemon pansy	Common			
9	<i>Neptis hylas</i> (Linnaeus)	Common sailer	Common			
10	<i>Tirumala limniace</i> (Cramer)	Blue tiger	Common			
Pieridae						
11	<i>Appias albina</i> (Boisduval)	Common albatross			Rare	
12	<i>Appias libythea</i> (Fabricius)	Striped albatross			Rare	
13	<i>Catopsilia pomona</i> (Fabricius)	Common emigrant	Common			
14	<i>Cepora nerissa</i> (Fabricius)	Common gull	Common			
15	<i>Colotis eucharis</i> (Cramer)	Plain Orange Tip			Rare	
16	<i>Eurema brigitta</i> (Cramer)	Small grass yellow	Common			
17	<i>Leptosia nina</i> (Fabricius)	Psyche	Common			
Papilionidae						
18	<i>Papilio crino</i> (Fabricius)	Common banded peacock				Very rare
19	<i>Papilio demoleus</i> (Linnaeus)	Common lime butterfly	Common			
20	<i>Papilio polytes</i> (Linnaeus)	Common Mormon	Common			
Lycaenidae						
21	<i>Castalius rosimon</i> (Fabricius)	Common pierrot	Common			
22	<i>Euchrysops cnejus</i> (Fabricius)	Gram blue	Common			

Table 2: Diversity Indices of Butterfly Species Recorded in the study site

Month	Abundance	Shannon's Weiner Index	Simpson Diversity	Species Richness	Evenness
October	73	1.290	0.351	5.00	0.882
November	130	1.390	0.324	5.50	0.919
December	39	1.351	0.320	5.50	0.899
January	22	1.133	0.370	3.75	0.942

**Fig 1:** Percentage of Butterfly Species in different Families observed during the study period**Fig 2:** Total Numbers of Butterflies recorded at the Study Site**Fig 3:** Month wise occurrence of butterflies from different families

Discussion

Butterflies are among the most perceptible insects, and they are especially useful in monitoring changes in both ecological and economic terms. Butterflies also serve as pollinators [21]. Butterflies are an excellent choice for biodiversity studies as indicator organisms. They are very attractive, easy to observe, and can be reliably identified in the field without killing. The diversity and composition of the community are dependent on the diversity and composition of the plants, as their caterpillars are strictly dependent on specific host plants. Because of their dual fundamental role, they contribute more

to local diversity as they metamorphose than monomorphic organisms. Butterflies are common for only a few months of the year and rare or absent the rest of the year [13]. The distribution and abundance of butterflies are influenced by the changes in habitat and climate, because butterflies are very sensitive in nature [26].

Butterfly diversity in Tamil Nadu is studied in a variety of locations, primarily from the The Nilgiri Mountains are located in the Western Ghats. In the present study 22 species were recorded. Similar study was carried out by number of workers. Gunathilagaraj *et al.*, [8] reported 174 species of butterflies from Palani Hills and 85 butterfly species from Thengumarahada in the Nilgiris [23]. Jothimani *et al.*, [10] reported about 27 species from Maruthamalai Hills of Southern Western Ghats. There are about 71 species were recorded from Pachamalai hills of the Eastern Ghats of Tamil Nadu. Prabakaran *et al.*, [16] reported 97 species in Tiruvallur District. In a recent study by Pavithra and Ananthi Rachel [17] have identified 56 species in Kanchipuram District of Tamilnadu.

In the present study the family Nymphalids were dominant which has 10 species with 118 individuals followed by Pieridae (7 species with 73 numbers), Papilionidae (3 species with 50 numbers), and Lycaenidae (2 species with 24 numbers). Our study is supported by the work of Kalaivani and Gunasekaran [11] who have reported that Nymphalids were dominating followed by Pieridae and Papilionidae.

The present study also reveals that the occurrence of butterflies during the study period. About 72.2 percent were being commonly observed and the least of 4.5 percent were being recorded as very rare occurrence. This is supported by the findings of Evangeline and Santhi [6], who has reported 43.3 percent as a common occurrence and 16.2 percent as extremely rare.

The study area's diversity indices were calculated on a monthly basis. Each month, the abundance, richness, and evenness were varied. The highest abundance was recorded in November (139) followed by October (73), December (39) and lowest recorded in January (22). This is in evident that there was an increase in the abundance during early monsoon [1] and the maximum number of abundance was recorded in July by Evangeline and Santhi [6]

Diversity indices like Shannon's Weiner Index were calculated and it ranges between 1.39 to 1.13, similarly Simpson Diversity showed a variation between 0.37 to 0.32. Species richness and evenness also showed little variation. In a short period of our study recorded a difference in the diversity. This is also evidenced by the studies of Rajagopal *et al.*, [20] Malar Meenakshi and Thatheyus [15], Evangeline and Santhi [6].

Conclusion

According to the findings of this study, the Nymphalidae was the most dominant family in terms of the number of species, followed by the Pieridae, Papilionidae, and Lycaenidae. Further a systematic study is required to understand more about the species of butterflies. It requires a detailed further

study to throughout the year. This information will help in future for species specific work on butterflies. The present list is not conclusive a future exploration is needed.

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