

Species Richness Of Nymphalid Butterflies In Different Habitat Types At Pachamalai Hills, Eastern Ghats, Tamil Nadu, India.

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ABSTRACT: *Butterflies in an area is a signal that the ecosystem is thriving and undertaking baseline studies is essential in conservation of biodiversity and protecting the environment. The present study was undertaken on species richness on nymphalid butterflies at Thuraiyur range of Pachamalai hills in the Eastern Ghats in Tamil Nadu, India. The survey was carried out in six reserve forests (RF) in three different forest types including tropical thorn forests, deciduous forests and evergreen forests using transect or Pollard walk method. A total of 35 species of nymphalids were recorded in Pachamalai hills with 15 of them were recorded in all the three forests and eleven very rare species. The highest species richness and total population was recorded in evergreen forest with more of very rare species and eight exclusive species. The tropical thorn forest had the lowest species richness and population with more of common species. Tropical thorn forest had on exclusive species - blue oakleaf and deciduous forest had also one exclusive species - the common nawab.*

Keywords: *Nymphalid butterflies, Pachamalai, habitat, species richness*

1. INTRODUCTION

Butterflies the most colourful, conspicuous and beautiful creature has been a creature of fascination among the artists as well as scientists. One fifth (1501 species) of the world's total butterflies are available in India (Gaonkar, 1996). In the Western Ghats there are 341 species and nearly 150 species in the Eastern Ghats (Gunathilagaraj *et al.*, 1998). The richness of butterflies in an area is a signal that the ecosystem is thriving. Butterfly diversity, is usually lower in natural forests, higher in disturbed forests, and highest in moderately disturbed forests (Fermon *et al.*, 2005). Further there are few butterfly species in habitats with thick forest canopy and more butterfly species in the less forest canopy habitats (Warren, 1985).

2. SIGNIFICANCE OF THE STUDY

The diversity of butterfly communities has been studied in different habitat types in different parts of the world. However, there have not been many studies on the diversity of butterfly communities in tropical forests within different habitat in the forest. Studies on medicinal

plants (Kolar and Basha, 2013) and flora (Kanagaraj et al., 2016) and butterflies in the Eastern Ghats were done (Gunathilagaraj et al., 1998, Venkataramana, 2010). However, there are not many studies on the diversity of butterfly communities in tropical forests within different habitat types except for diversity, status and frequency of Butterflies at Pachamalai Hills (Carlton et al., 2020). As butterflies are included in biodiversity studies and biodiversity conservation prioritization programmes (Gadgil 1996) and the justification of longitudinal migrating swarms of danaiids from Western Ghats to Eastern Ghats (Johnson 1969; Williams 1958) indicates the significance and the need of further exploration of this region. Henceforth, the present study was undertaken in this region to identify and study the diversity of nymphalid butterflies in different habitats at Thuraiyur range of Pachamalai hills in the Eastern Ghats of India and evolve strategies of conservation.

AIM

To determine the diversity of nymphalid butterflies at Thuraiyur range of Pachamalai hills in the Eastern Ghats of India.

OBJECTIVES

- To find the richness of the butterflies in tropical thorn forest
- To determine the richness of the butterflies in deciduous forest
- To find the richness of the butterflies in evergreen forest

THE STUDY AREA

The Pachamalai hills with latitudes 11° 09' 00'' to 11° 27' 00'' N and longitudes of 78° 28' 00'' to 78° 49' 00'' E are situated at the central region of Tamil Nadu, India, (Fig. 1). The vegetated area is distributed into 35 Reserved Forests covering 19075.96 ha. The Pachamalai hills enjoy a sub-tropical climate with temperatures varying from 25°C to 31° C and annual rainfall ranging from 800 to 900 mm. Maximum amount of rainfall is received during North East monsoon. The area is underlain by the crystalline rocks of the Archaean age comprising gneisses, charnockites and granites with soil cover being red loamy and black. The alluvium is found in narrow patches along the river courses (Pullaiah and Muralidharan, 2002). Practically all these forests are classified under three types as below:

1. Tropical Thorn Forest (TTF) – up to 400m (foot hills)
2. Deciduous forest (DF) – 300 to 900m (slopes)
3. Evergreen forest (EGF) – 800 to 1300m (Plateau)

The present study was carried out in six reserve forests (RF) covering the three habitats in Pachamalai hills. Tropical Thorn Forest - Sengattupatti RF (F1-281m AMSL) and Melur RF (F6-219m AMSL); Deciduous forests - Sengattupatti Extension RF (F2-347m AMSL) and Manaloodai RF (F5-628m AMSL) and Evergreen forests - Solaimathi RF (F3-842m AMSL) and Kannimar Solai RF (F4-706m AMSL)

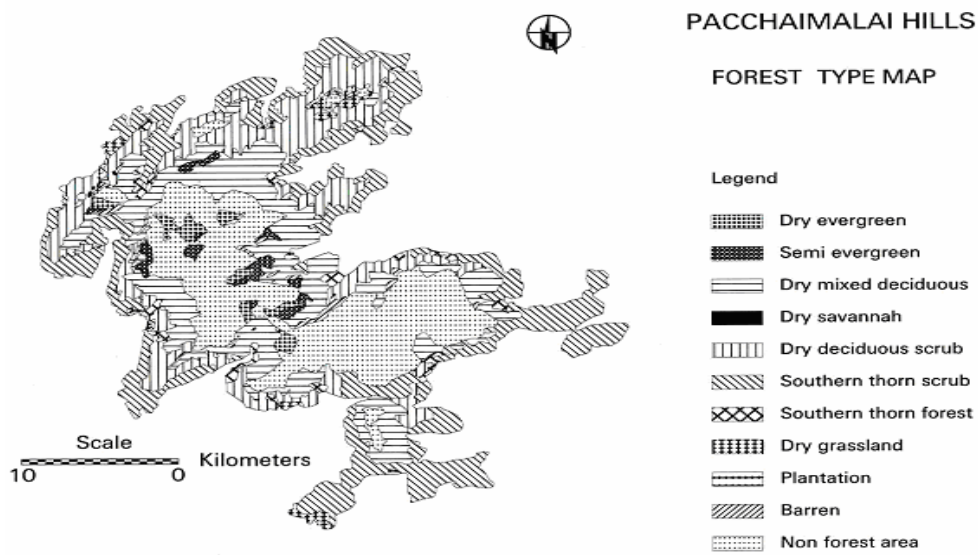


Figure 1: Map of different forest types in Pachchaimalai hills

3. METHDOLOGY

The butterflies were surveyed following transect method. Observations were made in the morning between 8-30a.m. to 11-30 a.m. when the butterflies were most active (Kunte, 1997). Butterflies were identified in the field or photographed and identified later referring standard field guides including Kehimkar (2008), Kunte (2000), Gunathilagaraj et al., (2015), Mary et al., (2013) and www.ifoundbutterflies.org.

Transect Method

One permanent transect line was set up at each site of 200 m in length. The census routes incorporated both open and closed habitats as well as degraded and pristine environments. The data were collected using a fixed-width transect count method, in which recorders count individual adult butterflies along the set routes (Pollard 1977; Pollard & Yates 1993).

4. RESULTS AND DISCUSSION

THE RICHNESS OF BUTTERFLIES IN DIFFERENT FOREST TYPES

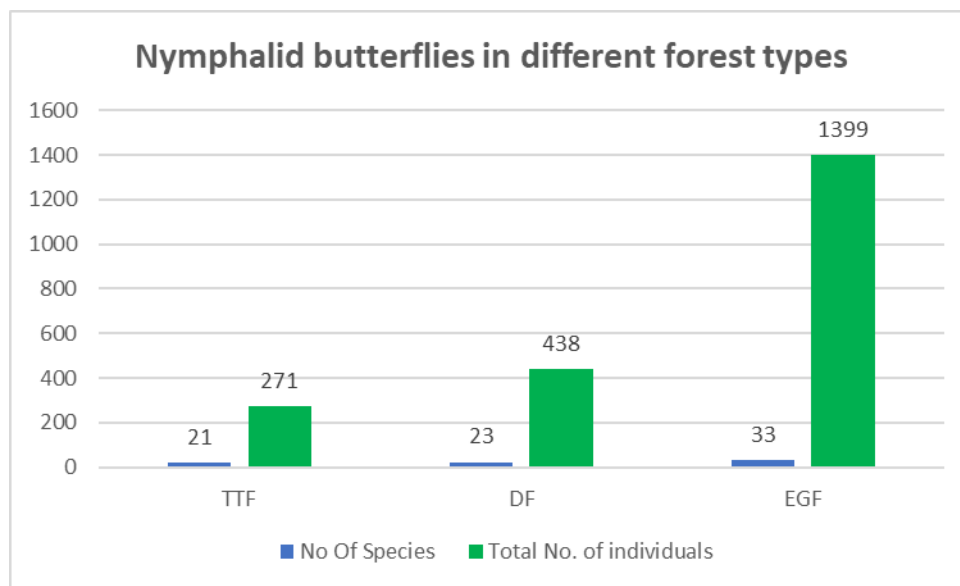


Figure 2: Nymphalid butterflies in different forests

TTF - Tropical Thorn forest; DF - Deciduous forest; EGF - Evergreen forest

The figure 2 illustrates the total population and number of species of nymphalids (brush footed butterflies) in different forests including thorn, deciduous and evergreen forest. The evergreen forest recorded the highest number of species (33), while the tropical thorn forest recorded the least number (21) and the deciduous forest had 23 species. Similarly, the total population of the butterflies were found to be in the same trend.


The highest species richness and total population was recorded in evergreen forest indicating the most favourable environmental conditions of temperature, relative humidity, wind speed, rainfall, microclimate and nectar and host plants. Closed canopy forests are richer in abundance of rare species and this decreases with increasing habitat opening levels (from evergreen to deciduous to thorn forest) (Vu and Vu, 2011). Eleven very rare species (common beak, club beak, glassy tiger, common tree brown, common nawab, clear sailer, short banded sailer, common baron, joker, peacock pansy and yellow pansy) occurred in this closed canopy. Likewise unique species like common beak, club beak, common tree brown, glad eye bushbrown, common four ring, common lascar, common baron, clear sailer, short banded sailer found only in the evergreen forest have also contributed to the richness.

The least species richness was recorded in thorn forest signifying least favourable microclimate contributed by high temperature and dryness. It is to be noted that the population was mainly contributed by the migrating species like blue tiger, dark blue tiger, common emigrant and common Indian crow . All the eleven common / very common species found in Pachamalai are found in the thorn forest itself (blue tiger, dark blue tiger, plain tiger, common Indian crow, white four ring, tawny coster, common sailer, angled castor, common castor, chocolate pansy and lemon pansy). This supports the report of Vu and Vu, (2011) who stated that common species are found more in open forest.

Deciduous forest recorded 23 species; more than the thorn forest but less than evergreen forest. and it had one exclusive species – common nawab.

Table 1: List of butterflies present in different forest types

Names of butterflies			Butterflies at different Forests		
S.No	Common Name	Scientific Name	TTF	DF	EGF
1.	Common beak	<i>Libythea lepita</i>			
2.	Club beak	<i>Libythea myrrha</i>			
3.	Blue tiger	<i>Tirumala limniace</i>			
4.	Dark blue tiger	<i>Tirumala septentrionis</i>			
5.	Striped tiger	<i>Danaeus genutia</i>			
6.	Plain tiger	<i>Danaeus chrysippus</i>			
7.	Glassy tiger	<i>Parantica aglea</i>			
8.	Double banded crow	<i>Euploea sylvester</i>			
9.	Common Indian crow	<i>Euploea core</i>			
10.	Common nawab	<i>Polyuria athamas</i>			
11.	Common evening brown	<i>Melaniti leda</i>			
12.	Common tree brown	<i>Lethe rohria</i>			
13.	Common bush brown	<i>Mycalesis perseus</i>			
14.	Glad eye bush brown	<i>Mycalesis patnia</i>			
15.	Common three ring	<i>Ypthima asterope</i>			
16.	White four ring	<i>Ypthima ceylonica</i>			
17.	Common four ring	<i>Ypthima huebneri</i>			
18.	Tawny coster	<i>Acraea violae</i>			
19.	Rustic	<i>Cupha erymanthis</i>			
20.	Common leopard	<i>Phalantha phalantha</i>			
21.	Common lascar	<i>Pantoporia hordonia</i>			
22.	Common sailer	<i>Neptis hylas</i>			
23.	Clear sailer	<i>Neptis clinia</i>			
24.	Short banded sailer	<i>Phaedyma columella</i>			
25.	Common baron	<i>Euthalia aconthea</i>			
26.	Angled castor	<i>Ariadne ariadne</i>			
27.	Common castor	<i>Ariadne merione</i>			
28.	Joker	<i>Byblia ilithyia</i>			
29.	Yellow pansy	<i>Junonia hierta</i>			
30.	Chocolate pansy	<i>Junonia iphita</i>			
31.	Peacock pansy	<i>Junonia almana</i>			
32.	Lemon pansy	<i>Junonia lemonias</i>			
33.	Great eggfly	<i>Hypolimnas bolina</i>			
34.	Danaid eggfly	<i>Hypolimnas missippus</i>			

35.	Blue oakleaf	<i>Kallima horsfieldi</i>			
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TTF - Tropical Thorn forest; DF - Deciduous forest; EGF - Evergreen forest

The Table 1 reveals the occurrence of 35 species of nymphalids in Pachamalai hills including tropical thorn forest, deciduous forest and evergreen forest. 15 species (Plain tiger, blue tiger, dark blue tiger, glassy tiger, common Indian crow, double banded crow, tawny coster, common leopard, common sailer, common castor, angled castor, yellow pansy, chocolate pansy, lemon pansy, great eggfly,) were found in all the three forests. This indicates the presence of nectar plants of these butterfly species throughout in these habitats and the absence of some species in any of these forests indicate the specific need or preferences of certain butterflies.

Except common nawab and blue oakleaf all the other 33 species were recorded in the evergreen forest indicating highest diversity among the three. However, it is to be noted that blue oakleaf was recorded in evergreen forest during inventorization of butterflies but not during the study.

Deciduous forest that recorded 23 species had one exclusive species – common nawab. Browns and rings were not recorded in the deciduous forest. Rings' larvae are grass feeders (Kunte, 1997). The absence of grasses due to scotching heat ad sloped landscape see to it that no rings could survive in this area and this could also be the reason for the lesser species richness.

Table 2: Diversity, status and frequency of Nymphalid butterflies at Pachamalai Hills

S. No	Common Name	Occurrence (Months)	Relative Abundance	Status
1.	Common beak**	7,8	*	VR
2.	Club beak**	7,8	*	VR
3.	Blue tiger	1-12	*****	VC
4.	Dark blue tiger	1-12	*****	VC
5.	Striped tiger	7,8,2-4	***	NR
6.	Plain tiger	6-12,4	****	C
7.	Glassy tiger	7,10	*	VR
8.	Double banded crow	7,9,12,1	**	R
9.	Common Indian crow ⁺	1-12	*****	VC
10.	Common nawab [#]	6,7	*	VR
11.	Common evening brown	10-3	***	NR
12.	Common tree brown**	11	*	VR
13.	Common bush brown	10-3	***	NR
14.	Glad eye bush brown**	8-10	**	R
15.	Common three ring	8-11	**	R
16.	White four ring	8-12,2,3	*****	C
17.	Common four ring**	7,8,10	**	R
18.	Tawny coster	6-1	****	C
19.	Rustic	8-10	**	R
20.	Common leopard	8,9,12-2	***	NR
21.	Common lascar**	7-11	***	NR

22.	Common sailer	4-1	*****	VC
23.	Clear sailer	10,12	*	VR
24.	Short banded sailer ⁺	8,10	*	VR
25.	Common baron	7	*	VR
26.	Angled castor	1-12	*****	VC
27.	Common castor	1-12	*****	VC
28.	Joker	9	*	VR
29.	Yellow pansy	10	*	VR
30.	Chocolate pansy	1-12	*****	VC
31.	Peacock pansy	8	*	VR
32.	Lemon pansy	1-12	*****	VC
33.	Great eggfly	7,10-12	**	R
34.	Danaid eggfly ⁺	7,10,11	**	R
35.	Blue oakleaf [#]	6,7,11,12	**	R

+ Butterflies Listed in Indian Wildlife (Protection) Act 1972

Found only in Tropical Thorn Forest (TTF)

** Found only in Evergreen Forest (EGF)

VC- Very Common C- Common NR- Not Rare R- Rare

VR- Very Rare

* Very rare; ** rare; *** not rare; **** common; ***** very common

The above table 2 reveal that among the 35 species recorded 1 species namely the Blue oakleaf were recorded only in Tropical thorn forest and 8 species were recorded only in Evergreen forest

5. CONCLUSION:

The study on the richness of nymphalid butterflies in Pachamalai Hills revealed the occurrence 35 species in three different types of forest namely tropical thorn forest, deciduous forest and evergreen forest. Among this evergreen forest recorded the maximum species richness (33) while tropical thorn forest recorded the least richness (21). 15 species were found in all the forest. 8 species were found only in evergreen forest. Disturbance due to agriculture, cattle grazing and firewood collection leading to fragmentation are found to be major threats. The presence of 5 migratory species and 11 very rare species indicate that Pachamalai Hills is a migratory site and therefore needs much attention in terms of conservation of biodiversity and protection of the forest.

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