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RESEARCH ARTICLE

BUTTERFLY SPECIES DIVERSITY AND ABUNDANCE IN MANIKKUNNUMALA FOREST OF WESTERN GHATS, INDIA.

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Abstract

Butterflies, one of the most researched insect groups throughout the world, are also one of the groups that face serious threats of various kinds and in varying degrees. Wayanad district is one of the biodiversity rich landscapes within the biodiversity hot spot of Western Ghats. This paper essentially deals with the abundance and diversity of butterfly species in Manikkunnumala forest in Wayanad district of Western Ghats. The hilly ecosystem of this area is under various pressures mainly being anthropogenic. Still this area exhibits fairly good diversity; this includes some very rare and endemic butterflies. When assessed the rarity and abundance, six out of 94 recorded butterflies comes under the Indian Wildlife Protection Act, 1972. The area needs immediate attention to conserve the remaining vegetation in order to protect the butterfly diversity.

INTRODUCTION

Butterflies are one of the unique groups of insects, which grasp the attention of nature lovers worldwide. They are known for their pollination services and as key indicators of environmental health (Oostermeijer et al., 1998). Remarkable studies on Indian butterflies were conducted even in the last century itself (Talbot, 1939; Wynter Blyth, 1956; Holloway, 1969). Systematic monitoring of butterfly population is key factor for the conservation of butterflies and maintaining quality of environment (Pollard and Yates, 1969).

Indian butterflies are one of the well studied insect groups compared to any other insect groups (Gaonker, 1996; Kunte et al., 1999; Kunte and Gadgil, 2000; Ramesh et al., 2010). India hosts 1501 butterfly species and Peninsular Indian region and Western Ghats harbor 350 and 333 species respectively (Gaonker, 1996). Wayanad is one of the biodiversity rich landscapes both in terms of fauna and flora. The peculiar climatic conditions and diverse habitats provide favorable environment for the existence of high rate of endemism in this region (Ratheesh Narayanan, 2009). There is no published record of butterfly diversity of the district available except by the works of Mathew (2001) and Roshnath (2013).

Unfortunately developmental activities and resulting habitat fragmentation create threats to the survival of butterflies worldwide (Tiple and Khurad, 2009; Rathcke, 1993; Asher et al., 2001; Hardey and Dennis, 1999) and Wayanad is not an exception to this. In this context we observe the butterfly diversity and abundance of Manikkunnumala, one of the threatened hill ecosystems of south Wayanad forest division.

Manikkunnumala is a vested forest under Meppadi forest range of south Wayanad forest division of Kerala state. It lies between $11^0$34’34.35” – 11^0 37’ 55.08” N and 76^0 07’ 45.52’’ – 76^0 06’ 40.14” E at an elevation of 850-1200m

Asl. The major vegetation types in this area are semi evergreen forest, moist deciduous forest, grasslands and shoals and plantations.

Materials and Methods

The findings presented here are based on a three months opportunistic random survey carried out from august 2014 to October 2014 at Manikkunnumala. The observations were made regularly from 0800hr to 1100hr, which is the peak time for butterfly activity. Butterflies were primarily identified directly in the field or, in difficult cases, following capture or photography. Field guides were used for the species identification (Wynter Blyth, 1956; Kunte and Gadgil, 2000). All scientific names followed in the present study are based on the work of Varshney (1993). Butterflies were categorized in five categories on the basis of their abundance such as VC - very common (> 100 sightings), C - common (51–100 sightings), NR - not rare (16–50 sightings), R - rare (3–15 sightings), VR - very rare (1–2 sightings) based on Tiple et al., (2009).

Results

During the study period 94 species of butterflies belonging to 66 genera in five families were recorded. Among this Nymphalidae was the most specious family represented by 4 genus and 41 species followed by Hesperidae (17 genus & 17 species), Papilionidae (4 genus & 14 species), Pieridae (7 genus & 12 species) and Lycaenidae (10 genus & 10 species).

Plant families like Fabaceae, Poaceae, Euphorbiaceae, Acanthaceae and Asteraceae are the dominant families of larval host plants. In terms of the abundance of butterflies, 29 species (30%) of the butterflies documented are common to the study area in all seasons. 18 species (19%) were commonly occurring, 20 species (21%) were not rare, 22 species (23%) were rare and 6 (6%) were very rare based on their sightings in different seasons. The detailed check list of butterfly species recorded and their relative abundance was given in Table 1.

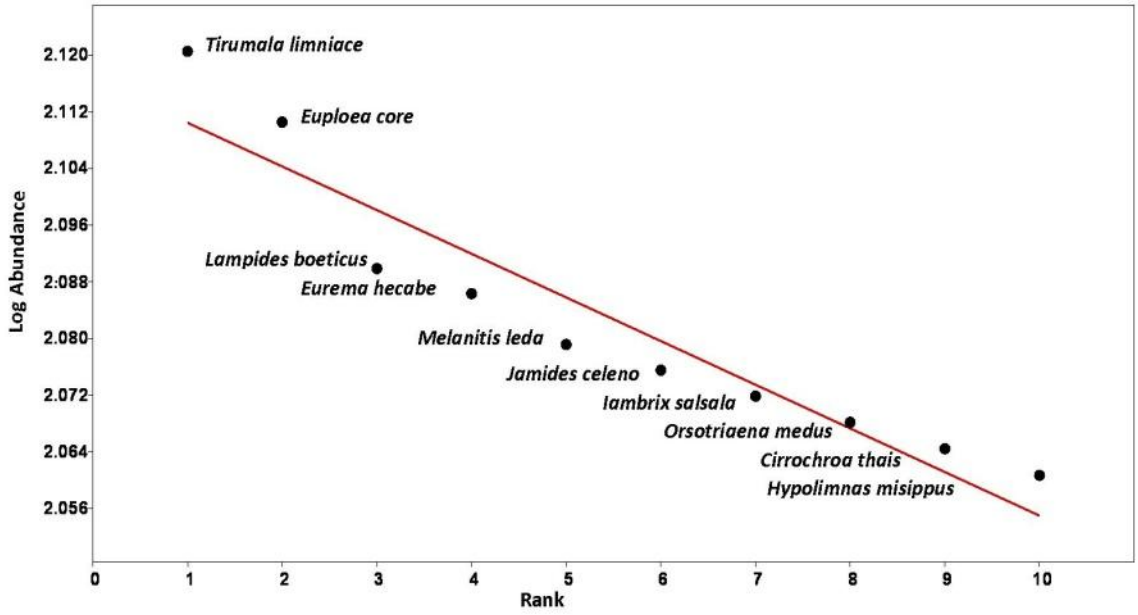

Fig. 1 Abundance plot of butterflies in Manikkunnumala

Table 1. List of butterfly species recorded from Manikkunnumala

Si No	SCIENTIFIC NAME	RELATIVE ABUNDANCE
Papilionidae		
1	Troides minos (Cramer, 1779)	C
2	Pachliopta pandiyana (Moore, 1881)	VR
3	*Pachliopta aristolochiae* (Fabricius, 1775)	C
4	Graphium sarpedon (Linnaeus, 1758)	VC

5	*Graphium doson* (C&R Felder, 1864)	R
6	Graphium Agamemnon (Linnaeus, 1758)	VC
7	*Papilio clytia* (Linnaeus, 1758)	R
8	*Papilio demoleus* (Linnaeus, 1758)	R
9	*Papilio helenus* (Linnaeus, 1758)	C
10	*Papilio polytes* (Linnaeus, 1758)	VC
11	Papilio polymnestor (Cramer, 1775)	C
12	*Papilio paris* (Linnaeus, 1758)	R
13	*Papilio budha* (Westwood, 1872)	R
14	*Papilio crino* (Fabricius, 1792)	VR
Pieridae		
15	*Catopsilia Pomona* (Fabricius, 1775)	VC
16	Catopsilia pyranthe (Linnaeus, 1758)	NR
17	*Eurema brigitta* (Cramer, 1780)	C
18	*Eurema laeta* (Boisduval, 1836)	VR
19	*Eurema hecabe* (Linnaeus, 1758)	VC
20	*Eurema blanda* (Boisduval, 1836)	NR
21	Delias eucharis (Drury, 1773)	NR
22	*Leptosia nina* (Fabricius, 1793)	R
23	*Cepora nerissa* (Fabricius, 1775)	R
24	*Appias indra* (Moore, 1857)	R
25	*Appias lyncida* (Cramer, 1777)	R
26	Hebomoia glaucippe (Linnaeus, 1758)	NR
Nymphalidae		
27	*Melanitis leda* (Linnaeus, 1758)	VC
28	Melanitis phedima (Cramer, 1780)	C
29	Elymnias hypermnestra (Linnaeus, 1763)	NR
30	*Lethe europa* (Fabricius, 1787)	R
31	*Mycalesis anaxias* (W. H. Evans, 1920)	NR
32	*Mycalesis perseus* (Fabricius, 1775)	VC
33	Mycalesis visala (Moore, 1858)	R
34	Mycalesis patina (Moore, 1857)	VC
35	*Orsotriaena medus* (Fabricius, 1775)	VC
36	*Zipaetis saitis* (Hewitson, 1863)	NR
37	Ypthima huebneri (Kirby, 1871)	VC
38	*Ypthima baldus* (Fabricius, 1775)	VC
39	Polyura athamas (Drury, 1773)	R
40	Cupha erymanthis (Drury, 1773)	NR
41	Phalanta phalantha (Drury,1773)	VC
42	*Cirrochroa thais* (Fabricius, 1787)	VC
43	*Neptis jumbah* (Moore,1858)	VR
44	*Neptis hylas* (Linnaeus,1758)	C
45	Pantoporia hordonia (Stoll, 1790)	VC
46	*Athyma perius* (Linnaeus,1758)	R
47	*Parthenos Sylvia* (Cramer, 1775)	R
48	*Tanaecia lepidea* (Butler, 1868)	NR
49	Euthalia aconthea (Cramer,1777)	NR
50	*Dophla evelina* (Stoll, 1790)	R
51	*Ariadne ariadne* (Linnaeus, 1763)	R
52	*Ariadne merione* (Cramer,l777)	NR
53	Libythea 1epita (Moore,1857)	NR
54	*Junonia lemonias* (Linnaeus, 1758)	NR
55	*Junonia almana* (Linnaeus, 1758)	C

56	*Junonia atlites* (Linnaeus, 1763)	VC
57	*Junonia iphita* (Cramer,1779)	VC
58	*Kaniska canace* (Linnaeus,1763)	R
59	*Hypolimnas bolina* (Linnaeus, 1758)	VC
60	Hypolimnas misippus (Linnaeus, 1764)	VC
61	Kal1ima horsfieldi (Kollar, 1844)	VR
62	*Parantica aglea* (Stoll, 1782)	NR
63	Tirumala limniace (Cramer, 1775)	VC
64	Tirumala septentrionis (Butler, 1874)	VC
65	*Danaus chrysippus* (Linnaeus, 1758)	NR
66	*Danaus genutia* (Cramer, 1779)	C
67	*Euploea core* (Stoll, 1780)	VC
Lycaenidae		
68	*Castalius rosimon* (Fabricius, 1775)	C
69	*Caleta caleta* (Hewitson, 1876)	VC
70	*Acytolepis puspa* (Horsfield, 1828)	NR
71	Neopithecops zalmora (Butler,1870)	R
72	*Megisba malaya* (Horsfield,1828)	R
73	*Chilades laius* (Stoll, 1780)	C
74	*Lampides boeticus* (Linnaeus,1767)	VC
75	*Jamides celeno* (Cramer, 1775)	VC
76	*Loxura atymnus* (Stoll,1780)	R
77	*Cheritra freja* (Fabricius, 1793)	VR
Hesperiidae		
78	Bibasis jaina (Moore, 1865)	VC
79	*Hasora chromus* (Cramer, 1780)	C
80	Badamia exclamationis (Fabricius,1775)	NR
81	Celaenorrhinus leucocera (Kollar , 1844)	C
82	Tagiades litigiosa (Moschler, 1878)	VC
83	Psuedocoladenia dan (Fabricius, 1787)	NR
84	Sarangesa dasahara (Moore, 1866)	C
85	*Spialia galba* (Fabricius, 1793)	VC
86	Iambrix salsala (Moore,1866)	VC
87	*Psolos fuligo* (Mabille,1876)	C
88	*Notocrypta curvifascia* (C. & R. Felder, 1862)	VC
89	*Udaspes folus* (Cramer, 1775)	NR
90	*Suastus gremius* (Fabricius, 1798)	NR
91	*Gangara thyrsis* (Fabricius, 1775)	R
92	*Matapa aria* (Moore, 1866)	R
93	Taractrocera maevius (Fabricius, 1793)	C
94	*Borbo cinnara* (Wallace, 1866)	C
C = Common, VC = Very Common, R = Rare, NR = Not Rare, VR = Very Rare		

Discussion

Butterfly abundance rank was calculated based on the number of sightings in all seasons. *Tirumala limniace* (Cramer, 1775) was the top ranked and most abundant butterfly species among these 94 species of butterflies sighted in the study area in all seasons followed by *Euplea core* (Stoll, 1780), *Lampides boeticus* (Linnaeus,1767), *Eurema hecabe* (Linnaeus, 1758) and *Melanitis leda* (Linnaeus, 1758) (Fig.1). When the rarity was analysed, *Cheritra freja* (Fabricius, 1793), *Kallima horsfieldi* (Kollar, 1844), *Neptis jumbah* (Moore,1858), *Eurema laeta* (Boisduval, 1836), *Papilio crino* (Fabricius, 1792) and *Pachliopta pandiyana* (Moore, 1881) were the rarest sighted only once in all seasons.

Migration of *Tirumala limniace* (Cramer, 1775) was also observed during the winter season. Hundreds of butterflies migrate through the valleys of Manikkunnumala in November- December months. Mass congregation of male

butterflies of *Tirumala limniace* (Cramer, 1775) was also observed during this period. Males of this species need alkaloids to maintain their sex pheromones to attract the opposite sex. Plants like *Crotalaria*, *Heliotropium* and *Ageratum* are good source of such alkaloids for butterflies.

Six of the recorded species comes under the Indian Wildlife Protection Act, 1972. They are as follows, *Hypolimnas missipus* (Schedule 1), *Papilio budha*, *Appias lyncida*, *Mycalesis anaxias*, *Tanaecia lepidea*, *Lampides boeticus* (Schedule 2). Four endemic butterfly species were also recorded. *Troides minos* (Cramer, 1779), *Pachliopta pandiyana* (Moore, 1881), *Zipaetis saitis* (Hewitson, 1863) and *Kallima horsfieldi* (Kollar, 1844) are endemic to South India.

Considering all the above factors Manikkunnumala forests of Wayanad is one of the potential habitats for butterflies. Unfortunately most of the valleys are disturbed due to varying kinds of anthropological pressures. Booming quarries, crusher units and land encroachments ultimately leads to the collapse of this healthy ecosystem. Being the primary indicators of ecosystem health, butterflies will become the prime victims if the existing trend continues. In order to conserve this fragile habitat urgent conservation measures are needed.

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