



ISSN: 0975-833X

Available online at <http://www.journalcra.com>

INTERNATIONAL JOURNAL
OF CURRENT RESEARCH

International Journal of Current Research

Vol. 16, Issue, 04, pp.27952-27962, April, 2024

DOI: <https://doi.org/10.24941/ijcr.47025.04.2024>

RESEARCH ARTICLE

A STUDY ON DIVERSITY OF BUTTERFLIES IN SATHYAMANGALAM TIGER RESERVE, ERODE DISTRICT, TAMIL NADU, INDIA: BASED ON A FAUNISTIC SURVEY TOUR

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ARTICLE INFO

Article History:

Received 20th January, 2024

Received in revised form

19th February, 2024

Accepted 15th March, 2024

Published online 30th April, 2024

Key words:

Sathyamangalam Tiger Reserve,
Faunistic Survey, Diversity, Species.

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ABSTRACT

The present paper comprises of 56 species of butterflies belonging to 40 genera under 4 families viz... Papilionidae, Pieridae, Nymphalidae, and Lycaenidae which were collected, photographed and identified by the authors during a fifteen days faunistic survey tour to Sathyamangalam Tiger Reserve, Tamil Nadu, from 27- 07-2023 to 10-08-2023. The family Nymphalidae was predominant in terms of species richness (23 species) followed by Pieridae (16 species), Lycaenidae (9 species) and Papilionidae (8 species) in the present observation. This study provides an understanding of butterfly diversity in Sathyamangalam Tiger Reserve and further studies will reveal a greater number of species from this protected area and also provide an insight for the restoration of the forest habitat.

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Citation: Jayasree Thilak, Ranjana Bhaskar, Praveen, K., Neethu, K.P. and Revathy Venu. 2024. "A study on diversity of butterflies in Sathyamangalam Tiger Reserve, Erode district, Tamil Nadu, India: based on a faunistic survey tour." *International Journal of Current Research*, 16, (04), 27952-27962.

INTRODUCTION

Butterflies are the most beautiful insects seen in all environments. They are regarded as one of the best taxonomically studied group of insects. Lepidoptera represents a most diverse group of insects with a representation of 18,000 species reported worldwide (IUCN, 2021). Butterflies (Class: Insecta Linnaeus 1758, Order: Lepidoptera Linnaeus 1758) are holometabolous group of living organisms. They complete metamorphosis cycles in four stages, viz. egg or embryo, larva or caterpillar, pupa or chrysalis and imago or adult (Gullan and Cranston, 2004; Capinera, 2008). The butterfly is a diverse insect, found in many colours and sizes. The Indian region hosts about 1,646 species of butterflies (Sharma & Goswami, 2021). Presence of Butterfly fauna in a habitat indicates the quality and regional vegetation of an ecosystem (Kocher and Williams, 2000). Some species show migratory behavior, which is seasonal and are restricted in selection of habitats, and therefore it indicates the rich biodiversity of that region. The Sathyamangalam Tiger Reserve is a protected area along the western Ghats in the Erode district of Tamil Nadu. It was initially declared as a Wildlife Sanctuary in 2008. Presently, it is the largest Wildlife Sanctuary in Tamil Nadu with an area of 1411.6 sq. km. In 2013, it became the fourth tiger reserve in Tamil Nadu as part of the Project Tiger. The vegetation type here is mainly tropical, dry deciduous forest.

The evergreen forests are restricted to small patches. The mixed shrub and grassland ecosystem are also present. The butterflies photographed were subjected to identification by referring standard references and confirmed in consultation with experts of that particular groups. The present paper comprises a checklist of butterflies from Sathyamangalam Tiger Reserve comprising a total of 56 species of butterflies belonging to 40 genera under 4 families which were sighted, photographed and identified during the faunistic survey from 27- 07-2023 to 10-08-2023. Some photographs of butterflies were provided by the field staff of Sathyamangalam Tiger Reserve.

MATERIALS AND METHODS

The Sathyamangalam Tiger Reserve is a part of the Nilgiri biosphere Reserve which is located in the Erode district of Tamil Nadu (Fig-1). Sathyamangalam forests act as a corridor in the Nilgiri Biosphere Reserve between the Western Ghats and the Eastern Ghats, which provides genetic link between four other protected areas adjoining Sathyamangalam Tiger Reserve, such as the Billigiriranga Swamy Temple Wildlife Sanctuary, Sigur Plateau, Mudumalai National Park and Bandipur National Park. This protected area falls in the taluks of Sathyamangalam and Gobichettipalayam in Erode district of north western Tamil Nadu.

Study Area

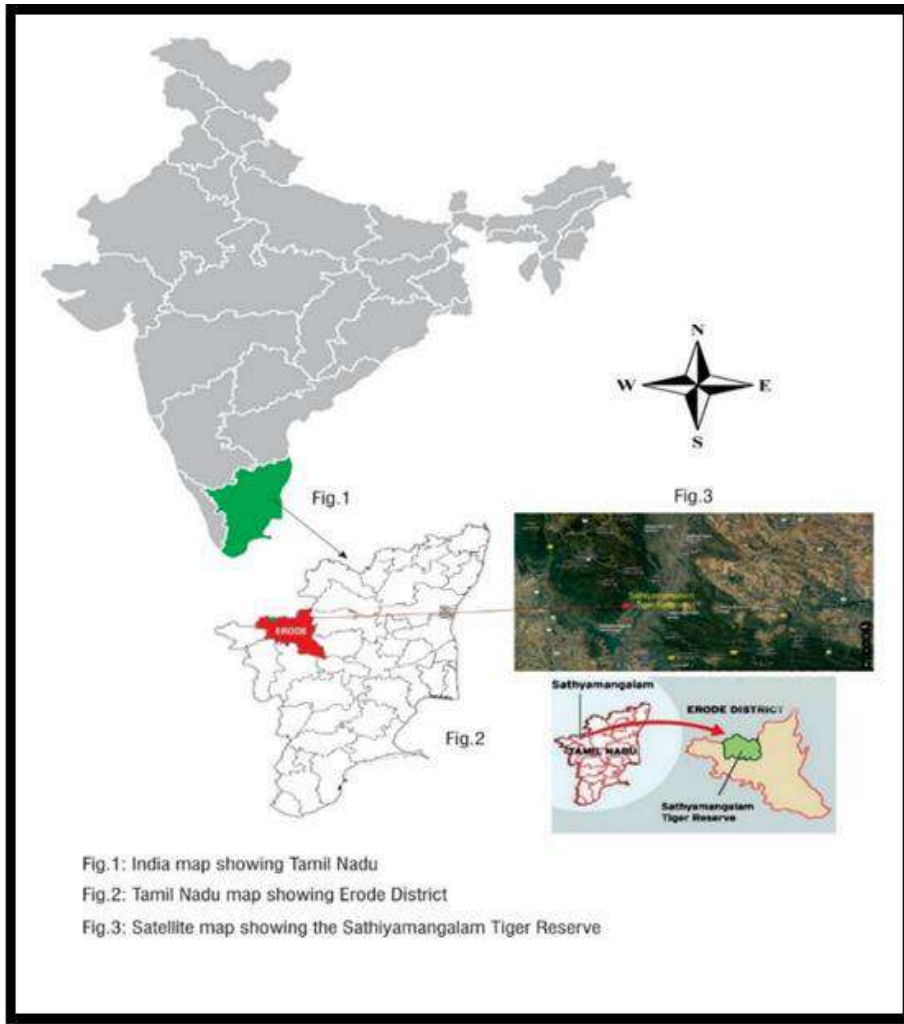


Fig. 1. Location map of Sathyamangalam Tiger Reserve, Tamil Nadu

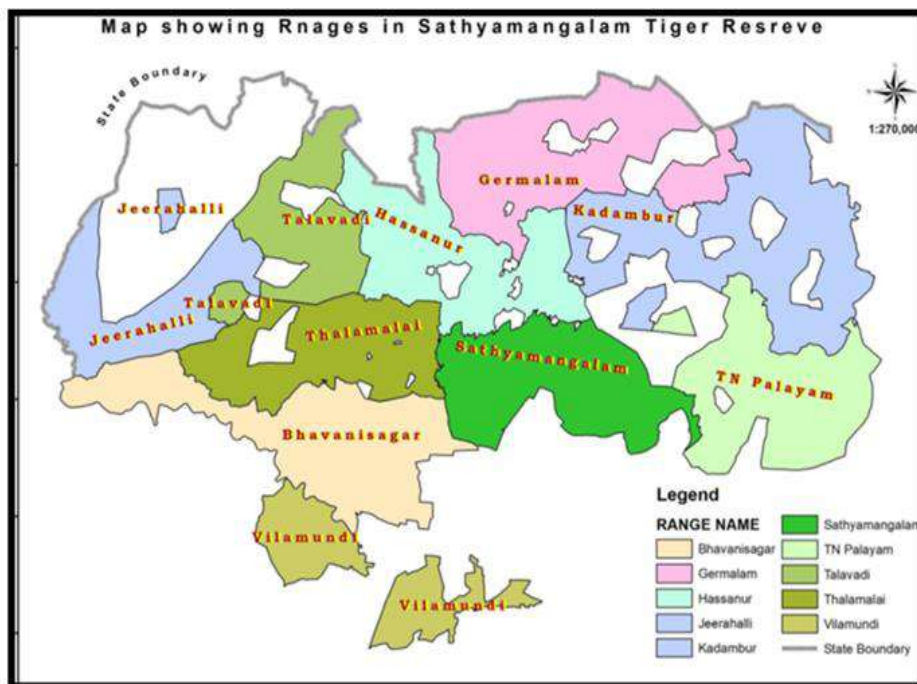


Fig. 2. Map showing the different ranges of Sathyamangalam Tiger Reserve where the Survey was conducted

Tab-1. Systematic list of butterflies observed from Sathyamangalam Tiger Reserve

NO	SCIENTIFIC NAME	COMMON NAME	GENUS	HABITAT	GLOBAL DISTRIBUTION	WILDLIFE PROTECTION ACT-1972 SCHEDULES
PAPILIONIDAE (Swallow tails)						
1	<i>Graphiumteredon</i> (C. & R. Felder, 1865)	Narrow banded bluebottle	<i>Graphium</i>	Moist forest	Oriental, African, Australian, Palaeartic	
2	<i>Papilio polytes</i> Linnaeus, 1758	Common mormon	<i>Papilio</i>	Moist forest	Global	
3	<i>Papilio daksha</i> (Hampson 1889)	Red helen	<i>Papilio</i>	Moist forest	Global	
4	<i>Papilio crino</i> Fabricius, 1793 ^b	Common banded peacock	<i>Papilio</i>	Moist forest	Global	Schedule II
5	<i>Papilio polymnestor</i> Cramer, 1775 ^b	Blue mormon	<i>Papilio</i>	Moist forest	Global	
6	<i>Papilioparis</i> Linnaeus, 1758	Paris peacock	<i>Papilio</i>	Moist forest	Global	
7	<i>Papilio demoleus</i> Linnaeus, 1758	Lime swallowtail	<i>Papilio</i>	Moist forest	Global	
8	<i>Pachlioptaaristolochiae</i> (Fabricius, 1775)	Common rose	<i>Pachliopta</i>	Oriental	Oriental	
PIERIDAE (Whites & Yellows)						
9	<i>Catopsiliapomona</i> (Fabricius, 1775)	Common emigrant	<i>Catopsilia</i>	Woodlands	Oriental, African, Australian	
10	<i>Catopsiliapyranthe</i> Latreille, 1758	Mottled emigrant	<i>Catopsilia</i>	Woodlands	Oriental, African, Australian	
11	<i>Euremablanda</i> (Boisduval, 1836)	Three-spot grass yellow	<i>Eurema</i>	Woodlands	Global	
12	<i>Euremahecabae</i> (Linnaeus, 1758)	Common grass yellow	<i>Eurema</i>	Woodlands	Global	
13	<i>Euremabrigitta</i> (Stoll, 1780)	Small grass yellow	<i>Eurema</i>	Woodlands	Global	
14	<i>Euremaandersonii</i> (Moore, 1886)	One-spot grass yellow	<i>Eurema</i>	Woodlands	Global	
15	<i>Colotis aurora</i> (Cramer, 1780)	Plain orange-tip	<i>Colotis</i>	Scrubs & grassland	Oriental, African	
16	<i>Colotisdanae</i> (Fabricius, 1775)	Crimson tip	<i>Colotis</i>	Scrubs & grassland	Oriental, African	
17	<i>Colotisetrida</i> (Boisduval, 1836)	Little orange tip	<i>Colotis</i>	Scrubs & grassland	Oriental, African	
18	<i>Ixias pyrene</i> Linnaeus, 1764	Yellow orange -tip	<i>Ixias</i>	Woodlands	Oriental & Australian	
19	<i>Appiaslibythea</i> (Fabricius, 1775)	Striped albatross	<i>Appias</i>	Low and mid –elevation, evergreen and small ever green forests	Oriental, African, Australian & Neotropical	Schedule IV
20	<i>Appiasalbina</i> (Boisduval, 1836)	Common albatross	<i>Appias</i>	Low and mid –elevation, evergreen and small ever green forests	Oriental, African Australian & Neotropical	Schedule II
21	<i>Delias eucharis</i> (Drury, 1773) ^b	Common Jezebel	<i>Delias</i>	Woodlands	Australian	
22	<i>Ceporanerissa</i> (Fabricius, 1775)	Common gull	<i>Cepora</i>	Woodlands	Oriental	Schedule II
23	<i>Leptosianina</i> (Fabricius, 1793)	Psyche	<i>Leptosia</i>	Woodlands	Oriental, African Australian	
24	<i>Pareroniahippia</i> (Fabricius, 1787)	Indian wanderer	<i>Pareronia</i>	Moist forest	Oriental, Australian	
NYMPHALIDAE (Brush-footed butterflies)						
25	<i>Libythealaius</i> Trimen, 1879	Lobed beak	<i>Libythea</i>	Moist forest	Oriental, African Australian, Palaeartic	Schedule II
26	<i>Euploea core</i> (Cramer, 1780)	Common crow	<i>Euploea</i>	Moist forest	Oriental & Australian	
27	<i>Charaxesbernardus</i> (Fabricius, 1793)	Tawny rajah	<i>Charaxes</i>			
28	<i>Tirumala septentrionis</i> (Butler, 1874)	Dark blue tiger	<i>Tirumala</i>	Woodlands	Oriental, African Australian, Eastern &Palaeartic	
29	<i>Danaus chrysippus</i> (Linnaeus, 1758)	Plain tiger	<i>Danaus</i>	Habitat generalist	Global	

Continue

30	<i>Polyuraathamias</i> (Drury) 1773	Common nawab	<i>Polyura</i>	Moist forest	Oriental, African Australian, Eastern & Palaeartic	Schedule II
31	<i>Mycalasisjunonia</i> Butler, 1868	Glad-eye Bushbrown	<i>Mycalasis</i>	Low and mid –elevation, evergreen and small ever green forests	Oriental, African Australian, Eastern & Palaeartic	
32	<i>Ypthimabaldus</i> (Fabricius, 1775)	Common five-ring	<i>Ypthima</i>	Woodlands	Oriental, African Australian, Eastern & Palaeartic	
33	<i>Ypthimahuebneri</i> Kirby, 1871	Common four ring	<i>Ypthima</i>	Woodlands	Oriental, African Australian, Eastern & Palaeartic	
34	<i>Symphaedranais</i> Forster, 1771 ^c	Baronet	<i>Symphaedra</i>	Moist forest	Oriental	
35	<i>Acraea terpsicore</i> (Linnaeus, 1758)	Tawny coster	<i>Acraea</i>	Global	Global	
36	<i>Phalantaphalanthia</i> (Drury, 1773)	Common leopard	<i>Phalanta</i>	Woodlands	Oriental, African Australian,	
37	<i>Neptishylas</i> (Linnaeus, 1758)	Common sailor	<i>Neptis</i>	Moist forest	Oriental, African Australian, Eastern & Palaeartic	
38	<i>Vanessa cardui</i> (Linnaeus, 1758)	Painted lady	<i>Vanessa</i>	Montane habitats	Global	
39	<i>Hypolimnasmisippus</i> (Linnaeus, 1764)	Danaid eggfly	<i>Hypolimnas</i>	Woodlands	Oriental, African & Australian	Schedule II
40	<i>Junoniaatlites</i> (Linnaeus, 1763)	Grey pansy	<i>Junonia</i>	Habitat generalist	African & Australian	
41	<i>Junoniaiphita</i> (Cramer, 1779)	Chocolate pansy	<i>Junonia</i>	Habitat generalist	Habitat generalist (Global)	
42	<i>Junonialemonias</i> (Linnaeus, 1758)	Lemon pansy	<i>Junonia</i>	Habitat generalist	Habitat generalist (Global)	
43	<i>Junoniaorithya</i> (Linnaeus, 1758)	Blue pansy	<i>Junonia</i>	Habitat generalist	Habitat generalist (Global)	
44	<i>Cuphaerymanthis</i> (Drury, 1773)	Rustic	<i>Cupha</i>	Low and mid –elevation evergreen and semi evergreen forests.	Oriental & Australian	
45	<i>Lethe rohria</i> (Fabricius, 1787)	Common tree brown	<i>Lethe</i>	Moist forest	Oriental & Palaeartic	
46	<i>Melanitisphedima</i> (Cramer, 1780)	Dark evening brown	<i>Melanitis</i>	Moist forest	Oriental, African, Eastern Palaeartic& Australian	
47	<i>Kallima horsfieldii</i> (Kollar, [1844]) ^a	Sahyadri Blue Oakleaf	<i>Kallima</i>	Moist forest	Oriental	Schedule II
LYCAENIDAE (Blues)						
48	<i>Castaliusrosimon</i> (Fabricius, 1775)	Common pierrot	<i>Castalius</i>	Wide range of dry habitats	Oriental	Schedule I
49	<i>Lampidesboeticus</i> (Linnaeus, 1767)	Pea blue	<i>Lampides</i>	Wide range of dry habitats	Oriental, African, Palaeartic& Australian	Schedule II
50	<i>Acytolepispuspa</i> (Horsfield, [1828])	Common hedge blue	<i>Acytolepis</i>	Moist forest	Oriental	
51	<i>Azanusubaldus</i> (Stoll, [1782])	Bright babool blue	<i>Azanus</i>	Dry deciduous forests, Scrub, Savannah & Grasslands	Oriental & African	
52	<i>Talicedanyseus</i> (Guerin-Meneville, 1843)	Red Pierrot	<i>Taliceda</i>	Habitat generalist	Oriental	
53	<i>Celastrinalavendularis</i> (Moore, 1877)	Plain hedge blue	<i>Celastrina</i>	Moist forest	Oriental, Australian & Holarctic	
54	<i>Cyrestisthodydamas</i> Boisduval, 1836	Common map	<i>Cyrestis</i>	Low and mid –elevation evergreen and semi evergreen forests	Oriental & Australian	
55	<i>Cigaritisvulcanus</i> (Fabricius, 1775)	Common Silverline	<i>Cigaritis</i>	Woodlands	Oriental & African	
56	<i>Syntarucusplinius</i> (Fabricius, 1793)	Zebra blue	<i>Syntarucus</i>	Forest & Bushes	Oriental, Australian	

a Species endemic to the Western Ghats b Species endemic to the Western Ghats and Sri Lanka

c Species endemic to the Western Ghats and peninsular India

PLATE-1
LEPIDOPTERA (BUTTERFLIES)



Libythea laius Trimen, 1879



Catopsilia pomona (Fabricius, 1775)



Danaus chrysippus (Linnaeus, 1758)



Graphium terephon (C. & R. Felder, 1865)



Eurema blanda (Boisduval, 1836)



Cupha erymanthis (Drury, 1773)



Mycalesis junonia Butler, 1868



Cigaritis lohita (Fruhstorfer, 1912)



Caleta decidia (Hewitson, 1876)

PLATE- 2

*Polyura agrarius* Swinhoe, 1886*Papilio helenus* Linnaeus, 1758*Lampides boeticus* (Linnaeus, 1767)*Pareronia hippia* (Fabricius, 1787)*Appias albina* (Boisduval, 1836)*Celastrina lavendularis* (Moore, 1877)*Colotis etrida* (Boisduval, 1836)*Papilio polytes* Linnaeus, 1758*Azamus ubaldus* (Stoll, [1782])*Symphaedra nais* Forster, 1771*Ixias pyrene* Linnaeus, 1764*Melanitis phedima* (Cramer, 1780)*Charaxes bernardus* (Fabricius, 1793)*Kallima horsfieldii* (Kollar, [1844])

PLATE- 3

*Papilio paris* Linnaeus, 1758*Junonia orithya* (Linnaeus, 1758)*Catopsilia pyranthe* Latreille, 1758*Papilio demoleus* Linnaeus, 1758*Ypthima ceylonica* Hewitson, 1865*Lethe rohria* (Fabricius, 1787)*Neptis hylas* (Linnaeus, 1758)*Euploea core* (Cramer, 1780)*Cepora nerissa* (Fabricius, 1775)*Castalius rosimon* (Fabricius, 1775)*Cyrestis thyodamas* Doyere, 1840*Syntarucus plinius* (Fabricius, 1793)

PLATE- 4

*Appias libythea* (Fabricius, 1775)*Ypthima baldus* (Fabricius, 1775)*Colotis danae* (Fabricius, 1775)*Colotis etrida* (Boisduval, 1836)*Tirumala septentrionis* (Butler, 1874)*Catopsila pomona* (Fabricius, 1775)*Acytoplepis puspa* (Horsfield, [1828])*Vanessa cardui* (Linnaeus, 1758)*Cepora nerissa* (Fabricius, 1775)*Colotis aurora* (Cramer, 1780)*Hypolimnas misippus* (Linnaeus, 1764)*Papilio polymster* Cramer, 1775*Lampides boeticus* (Linnaeus, 1767)*Danaus chrysippus* (Linnaeus, 1758)*Leptosia nina* (Fabricius, 1793)

PLATE- 5

*Papilio crino* Fabricius, 1793*Junonia atlites* (Linnaeus, 1763)*Delias eucharis* (Drury, 1773)*Talicada nyseus* (Guerin-Meneville, 1843)*Ypthima huebneri* Kirby, 1871*Junonia iphita* (Cramer, 1779)*Eurema hecabe* (Linnaeus, 1758)*Eurema brigitta* (Stoll, [1780])*Phalanta phalantha* (Drury, 1773)*Acraea terpsicore* (Linnaeus, 1758)*Eurema andersonii* (Moore, 1886)*Castalius rosimon* (Fabricius, 1775)*Junonia lemonias* (Linnaeus, 1758)*Pachliopta aristolochiae* (Fabricius, 1775)

The present faunistic survey was conducted to the forest areas and water sources of Sathyamangalam, Kadambur, Germalam, Hasanur, Thalavadi, Jeerahalli ranges of STR (Fig. 1&2) as a part of the Annual plan of research work 2023-2024 of SRC/ ZSI/ Chennai. Forest paths, bushes and roads were used for documenting. Butterflies tend to be active as the day warms up, depending on light factor and temperature (Kannan and Chandrasekharan, 2022).

The individuals that could not be identified by sight were either caught with an insect net for close examination or photographed and released. The butterfly fauna was identified and the list was arranged by following standard references viz.. Evans (1932), Kehimkar (2008), Wynter-Blyth, 1957, Kunte (2018), Bhakare & Ogale (2018). The animals photographed were subjected to identification by

referring standard references and confirmed in consultation with experts of that particular groups.

RESULTS AND DISCUSSION

The present study reveals a total of 56 species of butterflies belonging to 4 different families viz., Papilionidae, Pieridae, Nymphalidae, and Lycaenidae. The family Nymphalidae was represented by 23 species and formed the most dominant family followed by Pieridae (16 species), Papilionidae (8 species) and Lycaenidae (9 species) (Tab-2, Fig-3& 4). Of these a total of ten species are included in the Wildlife (Protection) Act, 1972. They are as follows *Castaliusrosimon* (Fabricius, 1775) (Sheduled I), *Papilio crino* Fabricius, 1793, *Ceporanerissa* (Fabricius, 1775), *Polyuraathamas* (Drury, 1773) *Hypolimnasmisippus* (Linnaeus, 1764), *Kallima horsfieldii* (Kollar, [1844]), *Lampidesboeticus* (Linnaeus, 1767), *Libythealaius* Trimen, 1879 and *Appiasalbina* (Boisduval, 1836) are included in Sheduled II species and *Appiaslibythea* (Fabricius, 1775) included in Scheduled IV of Wildlife (Protection) Act, 1972 (Tab-1).

Table 2. Showing the familywise and genera wise % composition of butterflies which were recorded from Sathyamangalam Tiger Reserve during the survey from 27- 07-2023 to 10-08-2023

Sl.No.	Family	No. of Species	% Level	No. of Genera	% Level
1	Papilionidae	8	14.28	3	7.5
2	Pieridae	16	28.57	9	22.5
3	Nymphalidae	23	41.07	19	47.5
4	Lycaenidae	9	16.07	9	22.5
Total		56	99.99	40	100

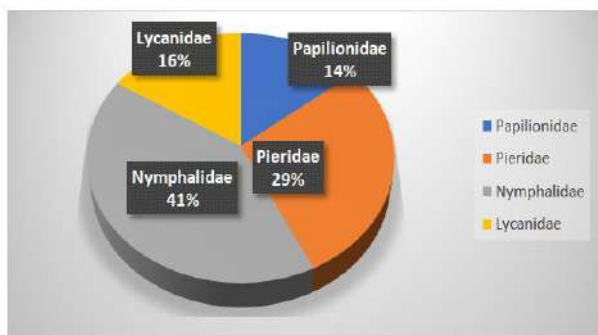


Fig. 3. Showing the family and species wise % composition of butterflies which were recorded from Sathyamangalam Tiger Reserve during the survey from 27- 07-2023 to 10-08-2023

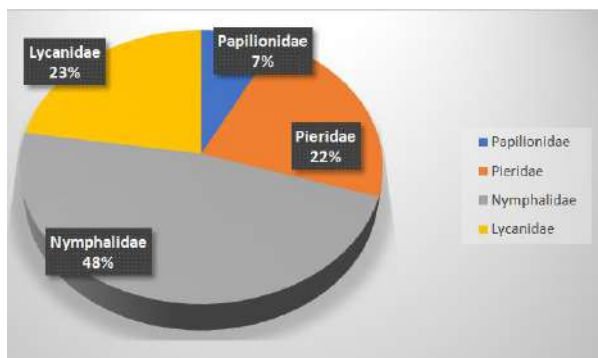


Fig. 4. Showing the family and genera wise % composition of butterflies which were recorded from Sathyamangalam Tiger Reserve during the survey from 27- 07-2023 to 10-08-2023

The present study reports a total of 56 species of butterflies which includes several interesting lots. Endemic species are useful indicators of habitat quality and can also act as umbrella species for conservation, planning and management. *Kallima horsfieldii* (Kollar, [1844]) Sahyadri Blue Oakleaf is an endemic species to Western Ghats. *Mycalesisjunonia* Butler, 1868, *Papilio crino* Fabricius 1793, *Papilio polymnestor* Cramer, 1775, *Colotisetrida* (Boisduval, 1836), *Delias eucharis* (Drury, 1773) are endemic to Western Ghats as well as to SriLanka. *Symphaedranais* Forster, 1771Baronet is the species endemic to the Western Ghats and peninsular India. Common mormon *Papilio polytes* Linnaeus, 1758, Common Grass Yellow *Euremahecab* (Linnaeus, 1758) Butterfly-pea Blue *Lampidesboeticus* (Linnaeus, 1767) invasive alien species. The indicator species observed where Common Mormon *Papilio polytes* Linnaeus, 1758 and Common Hedge Blue *Actyolepispupa* (Horsfield, [1828]). Total number of butterfly species so far reported from India are 1,439 (Evans, 1932; Kunte, 2018). Sreekumar and Balakrishna, 2001 stated that the documentation of butterfly fauna in India particularly in protected areas of central, northern and north-east parts of India already taken place. About 334 species of butterflies is reported from Western Ghats of which 37 species are purely endemic (Kunte et al., 2018). From the Sathyamangalam Tiger Reserve, Naganathan et al., (2019) recorded 150 species of butterflies belonging to 6 families. Later Kannan and Chandrasekharan (2022) have reported 168 species of butterflies with Sathyamangalam Tiger Reserve. The present study is based on a 15 days survey tour conducted by the Southern Regional Centre, Zoological survey of India which resulted in identifying 56 species of butterflies belonging to 40 genera under 4 families. The authors also suggests that more exploration of this area will result in a greater number of species.

ACKNOWLEDGEMENTS

The authors are thankful to the Director, Zoological Survey of India and to the Officer-in-Charge, Southern Regional Centre, Chennai for providing necessary facilities. We are also thankful to the Tamil Nadu Forest Department for their logistic support and also to Mr. M. Muthukumar, Forest Guard, Germalam Range, Sathyamangalam Tiger Reserve for providing us some photographs of butterflies.

Conflict of interest: The authors declare that they have no conflict of interest.

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