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Research Article

DIVERSITY AND RELATIVE ABUNDANCE OF LYCAENIDAE BUTTERFLIES IN ANNAMALAI NAGAR, TAMIL NADU

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ABSTRACT

The present study was carried out to document the species diversity, abundance of Lycaenidae butterflies and their host plants during the year January 2016 to December 2017 in Annamalainagar using transect counting method. There were 15 genera and 16 species of lycaenid butterflies observed from Annamalainagar area and grouped under 3 subfamilies namely Polyommatainae, Theclinae, Curetinae and four Tribes viz., Polyommataini, Loxurini, Arhopalini and Amblypodini. Out of which, nine species were found common and three species were very common based on their relative abundance. There were 20 plant species were observed as important larval host plants species of lycaenid butterflies viz., *Cajanus cajan*, *Vigna sinensis*, *Ziziphus jujube*, *Ziziphus mauritiana*, *Vigna radiate*, *Pongamia pinnata*, *Crotalaria* spp., *Amaranthus spinosus*, *Tribulus terrestris*, *Zornia gibbosa*, *Sesbania bispinosa* etc., and majority of them were belong to the Fabaceae family, which supplies food for their survival in Annamalainagar area.

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INTRODUCTION

Butterflies are colourful and scaled winged insects of the order Lepidoptera of class Insecta. They are an important part of biodiversity and ecologically vital due to the role they play in the food chain and act as bio-indicators of environmental variation and quality that reflect a particular suite of ecological conditions or indicate broader effects of environmental changes (Singh, 2011). The Lycaenidae, are 'blues', 'coppers', 'hairstreaks', 'metalmarks' and related butterflies, are the most diverse and classified under the superfamily of Papilionoidea and comprise between 30 and 40% of all butterfly species and may be considered as world's smallest butterflies. The estimated 6,000 species of lycaenid butterflies amount to one third of all Papilionoidea recorded in the world. The larvae of some feed on flower buds, flowers, and pods may exert stronger discerning pressures on food plant than many foliage feeders. A majority of these butterflies have blue upper sides, though there are species with other colors too. Butterflies are a perfect group of organisms for investigating insect phenology because they are relatively leading and are of more interest to humans than most other insects because of their size and colour, which leads to observations and collections (Sparks and Yates, 1997). From the Indian region, more than 1,438 species of butterflies have been documented and out of these, more

than 438 species belong to the family was Lycaenidae and it takes part about 30% of the total butterfly diversity (Wynter Blyth, 1957; Haribal, 1992 and Kehimkar, 2011). The Lycaenidae are characterized further by striking life history diversity. The behavioral and ecological diversity studies of the Lycaenidae butterflies makes this group particularly compliant to comparative studies of life history evolution. The diversity of butterflies were documented and their abundances recorded by many of the research's from Western Ghats and also from isolated hilly tracts of Tamil Nadu. In particular, the concentration of lycaenids was not given though it has various dimensions on their behavior and diversity. Hence, a maiden attempt was made to document the lycaenid diversity in the coastal areas in particular at Annamalainagar, Cuddalore District, Tamil Nadu.

MATERIALS AND METHODS

An intensive survey for Lycaenidae butterflies was done from January, 2016 to December, 2017 to record the diversity and abundance at Annamalai nagar located at the latitude of 11.39°N, longitude of 79.71°E and the climate in the Annamalainagar is tropically wet and dry. This means that the winter and the early part of summer are observed as typically dry periods. The study area comprises various ecosystems viz.,

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agricultural land, grassland, bushy areas, gardens and ponds etc., The study area was surveyed twice a month and the data documented under the particular month of the study period. The data on the Lycaenidae diversity and its abundance were recorded based on observation of the individual Lycaenidae butterfly species by using photographic documentation and hand netting was also done during the survey from 8.30 to 11.30h during good weather period. Line transect count method according to Kunte (2000) was followed to regulate the butterfly abundance. The transects were fixed in the routes along the paths once in a week covering a section of 50 meter around a radius of 5 meter front from the observer and 2.5m on his either sides. The butterflies were initially identified in the field condition and the unidentified butterflies were collected by using nylon net and brought to the laboratory for better identification. The collected butterflies were killed using a killing jar (wide mouthed bottle contains a cotton piece soaked in ethyl acetate) for 1 hour. After killing, the butterflies were properly preserved in a envelope made using butter paper and fixed on the spreading board using entomological pins (Size 001/002/003). The collected Lycaenidae were identified and confirmed by using the keys of Evans (1932), Otsuka (1991), Kunte (2000), Singh (2011) and Kehimkar (2011) and all scientific names used in the present study are in accordance with Varshney (1983) and common English names following

Wynter-Blyth (1957). The observed butterflies were categorized under five groups on the basis of their abundance in the study area as VC-very common (75-100 sightings), C-common (50-75 sightings), LC-less common (25-50 sightings), R-rare (5-25 sightings), VR-very rare (1-5 sightings) Nimbarlkar (2011).

RESULTS AND DISCUSSION

The diversity and relative abundance of Lycaenidae butterflies were observed in Annamalainagar area during January 2016 to December 2017 is given in Table 1. The results revealed that the butterflies observed/collected were identified under the Clade Macrolepidoptera, superfamily, Papilionoidea according to Kristensen *et al.* (2007) classification. There were 15 genera and 16 species of butterflies were identified under the family Lycaenidae. The butterflies were grouped under 3 subfamilies namely Polyommatainae, Theclinae and Curetinae and four Tribes viz., Polyommataini, Loxurini, Arhopalini and Amblypodini. Among the Lycaenidae butterflies recorded in the study area, three of them were very common (Pea Blue, Zebra Blue, Dark Grass Blue) and nine were grouped under common (Indian Sunbeam, Gram Blue, Common Pierrot, Common Cerulean, Lesser Grass Blue, Grass Jewel, Pale Grass Blue, Tiny Grass Blue and Angled Pierrot) and Leaf Blue was less common.

Table 1 Diversity and abundance of Lycaenidae butterflies observed in Annamalainagar, Tamil Nadu during January 2016 to December 2017

Sl. No.	Subfamily	Tribe	Common name	Scientific name	Relative abundance
1	Polyommatainae	Polyommataini	Pea Blue	<i>Lampides boeticus</i>	*****
2	Polyommatainae	Polyommataini	Common Pierrot	<i>Castalius rosimon</i>	****
3	Polyommatainae	Polyommataini	Gram Blue	<i>Euchrysops cnejus</i>	****
4	Polyommatainae	Polyommataini	Dark Cerulean	<i>Jamides bochus</i>	***
5	Polyommatainae	Polyommataini	Common Cerulean	<i>Jamides celeno</i>	****
6	Polyommatainae	Polyommataini	Dark Grass Blue	<i>Zizeeria karsandara</i>	*****
7	Polyommatainae	Polyommataini	Zebra Blue	<i>Leptotes plinius</i>	*****
8	Polyommatainae	Polyommataini	Tiny Grass Blue	<i>Zizula hylax</i>	****
9	Polyommatainae	Polyommataini	Lesser Grass Blue	<i>Zizina otis</i>	****
10	Polyommatainae	Polyommataini	Grass Jewel	<i>Chilades trochylus</i>	****
11	Polyommatainae	Polyommataini	Pale Grass Blue	<i>Pseudozizeeria maha</i>	****
12	Polyommatainae	Polyommataini	Angled Pierrot	<i>Caleta decidia</i>	****
13	Theclinae	Loxurini	Yam Fly	<i>Loxura atymnus</i>	**
14	Theclinae	Amblypodini	Leaf Blue	<i>Amblypodia anita</i>	***
15	Theclinae	Arhopalini	Large Oakblue	<i>Arhopala amantes</i>	***
16	Curetinae	-	Indian Sunbeam	<i>Curetis thetis</i>	****

*Very Rare ** Rare *** Less Common**** Common ***** Very Common

Table 2 Important larval host plants of lycaenids observed in Annamalainagar, Tamil Nadu during January 2016 to December 2017

Sl. No.	Common name	Scientific name	Host plants	Family
1	Pea Blue	<i>Lampides boeticus</i>	<i>Cajanus cajan</i> , <i>Vigna sinensis</i>	Fabaceae
2	Common Pierrot	<i>Castalius rosimon</i>	<i>Ziziphus jujube</i> , <i>Ziziphus mauritiana</i>	Rhamnaceae
3	Gram Blue	<i>Euchrysops cnejus</i>	<i>Vigna radiate</i> , <i>Pongamia pinnata</i>	Fabaceae
4	Dark Cerulean	<i>Jamides bochus</i>	<i>Crotalaria spp.</i> ,	Fabaceae
5	Common Cerulean	<i>Jamides celeno</i>	<i>Pongamia pinnata</i>	Fabaceae
6	Dark Grass Blue	<i>Zizeeria karsandara</i>	<i>Amaranthus spinosus</i> , <i>Tribulus terrestris</i> , <i>Zornia gibbosa</i>	Amaranthaceae, Zygophyllaceae, Fabaceae
7	Zebra Blue	<i>Leptotes plinius</i>	<i>Sesbania bispinosa</i> , <i>Mimosa spp.</i> ,	Fabaceae
8	Tiny Grass Blue	<i>Zizula hylax</i>	<i>Hygrophila auriculata</i>	Acanthaceae
9	Lesser Grass Blue	<i>Zizina otis</i>	<i>Mimosa pudica</i>	Fabaceae
10	Grass Jewel	<i>Chilades trochylus</i>	<i>Pisum sativum</i>	Fabaceae
11	Pale Grass Blue	<i>Pseudozizeeria maha</i>	<i>Oxalis corniculata</i>	Oxalidaceae
12	Angled Pierrot	<i>Caleta decidia</i>	<i>Ziziphus rugosa</i>	Rhamnaceae
13	Yam Fly	<i>Loxura atymnus</i>	<i>Smilax bracteata</i>	Smilacaceae
14	Leaf Blue	<i>Amblypodia anita</i>	<i>Oxalis imbricate</i>	Oxalidaceae
15	Large Oakblue	<i>Arhopala amantes</i>	<i>Terminalia paniculata</i>	Combretaceae
16	Indian Sunbeam	<i>Curetis thetis</i>	<i>Pongamia pinnata</i>	Fabaceae

Only one number of butterfly, Yam Fly was observed as rare based on their abundance (Plate 1). The results are supported with the findings of Kunte (2000) who reported that the Lycaenidae is the most abundant family of the Western Ghats. The results are in tune with the findings of Venkataramana (2010) who reported that the relative abundance of Lycaenidae butterfly species of Eastern ghats in Andhra Pradesh under various categories like common (5), very common (1), less common (1) and rare (3) during the year 2006 to 2009. Further, Kanagaraj and Kathirvelu (2016) reported that the abundance of butterflies of various families in which, the abundance of Lycaenidae butterflies were common (4), Less common (3) and rare (1) from coastal area of Cuddalore District during the year December 2013 to November 2014.

The results are contrary with the findings of Kanagaraj and Kathirvelu (2018) reported that the relative abundance of Lycaenidae butterfly species as less common (7), common (3), very common (1), and rare (1) from Pachaimalai hills, Tamil Nadu during the year 2015 to 2016.

The larval host plants for Lycaenidae butterflies were also identified from the study area and given in Table 2. There were 20 plant species noticed in Annamalainagar belong to Fabaceae, Rhamnaceae, Amaranthaceae, Zygophyllaceae, Acanthaceae, Oxalidaceae, Smilacaceae, Olacaceae and Combretaceae families. Among them, Fabaceae family was found predominant with major larval host plants of lycaenids of Annamalainagar.



1. Pea Blue
Lampides boeticus



2. Common Pierrot
Castalius rosomon



3. Gram Blue
Euchrysops cnejus



4. Dark Cerulean
Jamides bochus



5. Common Cerulean
Jamides celeno



6. Dark Grass Blue
Zizeeria karsandara



7. Zebra Blue
Leptotes plinius



8. Tiny Grass Blue
Zizula hylax



9. Lesser Grass Blue
Zizina otis



10. Grass Jewel
Chilades trochylus



11. Pale Grass Blue
Pseudozizeeria maha



12. Angled Pierrot
Caleta calet



13. Yam Fly
Loxura atymnus



14. Leaf Blue
Amblypodia anita



15. Large Oakblue
Arhopala amantes



16. Indian Sunbeam
Curetis thetis

Plate 1 Lycaenid butterflies of Annamalai Nagar, Tamil Nadu

The family comprise the plant species like *Cajanus cajan*, *Vigna sinensis*, *Zizyphus jujube*, *Zizyphus mauritiana*, *Vigna radiata*, *Pongamia pinnata*, *Crotalaria* spp., *Amaranthus spinosus*, *Tribulus terrestris*, *Zornia gibbosa* and *Sesbania bispinosa* etc., The Rhamnaceae, Amaranthaceae and Oxalidaceae were followed suit by providing food to them. The results are in tune with the report of Venkataramana (2010) revealed that lycaenids like *Talicauda nysus* lays eggs on *Bryophyllum calycinum* and *Castalis rosimon*, *Rathinda omor* and *Curetis thetis* lays egg on *Zizyphus jujube*, *Ixora croton* and *Pongamia glabara* respectively. Similar findings were made by Kunte (1997) who reported that the lycaenid populations were occurred at the time when the plants were in suitable phenophase for growth of the caterpillars. Further, Kunte (2000) reported that important larval food plants of Lycaenidae were *Butea monosperma*, *Crotalaria* spp., *Millettia peguensis*, *Terphrosia candida*, *Vingna cylindria*, *Pongamia pinna* and *Xylia xylocarpa*. Palot (2012) also reported that the deciduous forests with trees like *Dalbergia latifolia*, *Pterocarpus marscpium*, *Xylia xylocarpa* and *Pongamia pinnata* were found as larval food plants of the Rare cerulean butterfly. The results of study coincided with the findings of Fiedler (1995) who reported that the larvae of three species of Polyommata were found feeding on Fabaceae plants.

CONCLUSION

The present study exposed the existence of 16 species under 15 genera of Lycaenidae found in Annamalai Nagar area, Tamil Nadu during January 2016 to December 2017. The Lycaenidae butterflies mainly feeds on the and plants belong to Fabaceae family and active during early morning hours. Proper or necessary conservation strategies may also be taken for their abundance and survival.

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