



ELEVATIONAL SURVEY AND DIVERSITY OF BUTTERFLY SPECIES IN KALLAR REGION, COIMBATORE, TAMIL NADU, INDIA

V. Dhivyasree and M. Lekshmanaswamy

PG and Research Department of Zoology, Kongunadu Arts and Science College (Autonomous), G.N. Mills (P.O), Coimbatore Tamilnadu, India

*Corresponding author: ml_swamy64@yahoo.co.in

ABSTRACT

Biodiversity is the variation of life forms within a given ecosystem, biome or for the entire Earth. Butterflies are one of the most conspicuous species of Earth's biodiversity. Being extremely responsive to any changes in their environment namely, temperature, humidity, light and rainfall patterns these insects are identified as useful bioindicators. They have different requirements for different habitat types for mating, breeding and nectaring and are thus, in synchronization with the diversity and quality of their habitats. The present study was to portray the butterfly diversity, relative abundance, Simpson and Shannon index of Kallar region, Mettupalayam, Coimbatore district. Butterflies were collected for a period of eight months recorded from Jan 2018 to Aug 2018. The specimens collected were analyzed to study the general population trend and the guild structure. The 42 butterfly species in 34 genera belonging to 5 families clearly indicate a high diversity of butterflies distributed in the study field. Among this the family Nymphalidae was the dominant family with 14 species. 13 butterfly species were reported in the elevation level (longitude, latitude) of 325m (1,066 ft) in the Kallar region Mettupalayam. The butterflies collected during the study were classified into different study sites in Kallar region.

Keywords: Biodiversity, Butterflies, Altitude, Kallar region

1. INTRODUCTION

Butterflies are day fliers and colorful insects belonging to the Order Lepidoptera. These insects play an important role in ecosystem as plant pollinator in food chain [1]. There are about 18,000 species of butterflies in the world and India has 1,501 species of butterflies [2]. Environmental variations and changes in the forest composition are severely affected for butterflies because butterflies are directly dependent on flora [3 4]. Butterflies are used in scientific research, this is due to their manageable size, and the fact that most are readily identifiable, even on the wing; they are also relatively easy to rear in captivity.

They show symbiotic relationships with the flowering plants, where the plants provide nutritional resources to the animals both in the nectar form for adult butterflies, and plant tissues such as leaves, and soft stems for the caterpillars, the plants also provide shelter from predation a factor which increases butterfly diversity and abundance [5].

Insects are excellent organisms for community and ecosystem studies as they act as biological indicators,

pollinators, seed dispersers, herbivores, predators and prey. The book "Identification of Indian butterflies," Published by Evans [4] provides notes to identify Indian butterflies up to family and species level. Later Gunathilagaraj et al., [5] published a book "Some South Indian Butterflies" with description and photographs for 139 butterflies. In the present study, a low altitude area was concentrated. In and around Kallar region in Mettupalayam was the place selected in which the diversity of the butterflies and the elevation (latitude and longitude) of the area was studied. The area had a wide range of climatic conditions with a diverse butterfly habitat.

2. MATERIALS AND METHODS

2.1. Study Area

Mettupalayam is situated in the Western Ghats which comes under the district of Coimbatore, Tamilnadu. The average annual temperature in Mettupalayam, is 26.9°C. In a year, the average rain fall is 751mm. Kallar is the richest biodiversity hot spot in Mettupalayam range. Kallar region is the foot hills of Nilgiri district about

35km north of Tiruppur in the Indian state of Tamilnadu.

2.2. Methodology

The survey was carried out from September 2017 to January 2018 (morning 6.00 am till 7.00 p.m) Pallassana Village, Palakkad district. The survey of butterflies was undertaken along five different transects. The butterflies were recorded using standard transect counting method [6], counted while walking along the selected transect route of 1 km, in each habitat. The nomenclature used in the check list of Butterflies in IUCN (2015) was followed. The transects surveyed of existing Garden, Agriculture area, Shrubs and herbs, Grassland areas. Typical and unique features of the wings, abdomen and pattern of coloration of all body parts were noted down.

Sketches were made accordingly using pencils and marked the pattern of colour patches and print distribution. Butterflies were photographed by (Sony W520) camera, from different angles to enable positive identification of species. Descriptions, photographs and drawings were compared with literature and the species were identified based on the collected data and available reference, both printed and electronic. Identification of species was confirmed with the help of the field guides [7] taxonomy and nomenclature has been updated. Vegetations of each site and sub site were keenly observed and relevant data were recorded

2.3. Measurement of Diversity

Relative dominance index of the butterfly species was calculated by Dominance index (%) = Number of individuals of one species (n) X 100/Number of individuals of all species (N). Simpson's Index is a measure of diversity; it takes into account the number of species present, as well as the abundance of each species.

$$D = \sum n(n-1) / N(N-1)$$

Where, D-Simpson's index n-The number of individuals of each different species N-The total number of individuals of all species.

Shannon Weaver index is used to characterize species diversity and abundance in a community. Shannon-Wiener index (H') is given as follows

$$H' = - \sum P_i \ln (P_i)$$

Where, H' -the Shannon's index, P_i -the proportion of individuals in the i th species, \ln -natural log.

Monitoring butterfly diversity is an important means of measuring change in the environment as well as the state of habitats for biodiversity. The present study (Jan 2018 to Aug 2018) was conducted by taking an elevation gradient in Kallar region by Covering all the major

vegetation types. The region was divided into ten stations (900 m interval) and the butterfly diversity was monitored (8). The nomenclature used in the check list of Butterflies in IUCN (2015) was followed. The transects surveyed of existing Garden, Agriculture area, Shrubs and herbs, Grassland areas. Typical and unique features of the wings, abdomen and pattern of coloration of all body parts were noted down. Sketches were made accordingly using pencils and marked the pattern of colour patches and print distribution. Observations were made by direct visual methods. For much specification Digital cameras of Panasonic Lumix G7 4K mirrorless with 14- 42 mm MEGA O.I.S. Lens, 16 Megapixels, 3 Inch touch LCD, DMC- G7KK. Macro mode of camera was used to get fine pictures. Flash was mostly kept off to capture natural colours. Standard guides which are available such [2, 8] aided identification, classification and nomenclature of butterflies.

3. RESULTS

The survey was done by transect method. During the survey 533 individuals were observed. October shows the maximum abundance (n=163), with the relative abundance of 30.58% which was followed by the month of September (n=127), with the relative abundance of 23.82%. December has the individual abundance (n=125) with the relative abundance of 23.45%. November has the least abundance (22.45%) with the relative abundance of 22.14%.

The biodiversity indices of butterfly species in Kallar region, Mettupalayam, Coimbatore. The Shannon index value was the highest in the month of October represents (-0.33933) and lowest in Nov (-0.31355). The October month shows the highest value of Simpson index with (0.115148) and lowest value was found to be in November with (0.098313). Patterns of relative abundance of species that determine the dominance of each insect order in a locality was determined by calculating the dominance index with highest values in the month of October with (30.58%) and found to be lowest in November with (22.14%).

The diversity of butterfly in Kallar region, Mettupalayam, Coimbatore district, Tamilnadu. A Total 42 butterflies species in 34 genera belonging to 5 families clearly indicate a high diversity of butterflies distributed in the study field. Among this the family Nymphalidae was the dominant family with 14 species. The butterflies collected during the study were classified into different study sites in Kallar region

Table 1: The checklist of butterfly species in Kallar region, Mettupalayam

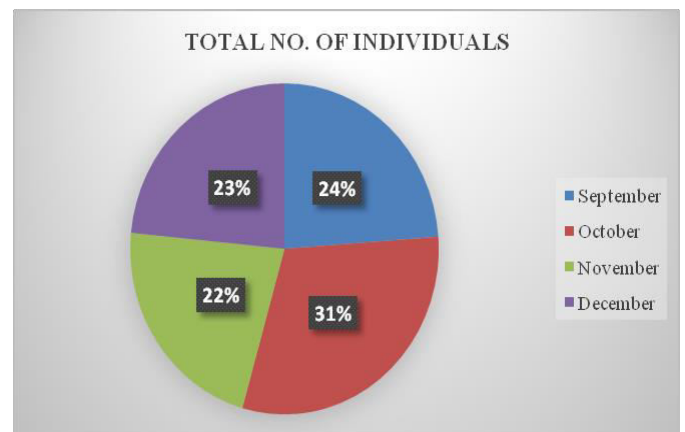
S. No	Species	Scientific Name	September	October	November	December
1	The Indian skipper	<i>Spialia galba</i>	4	20	7	12
2	White-bar bushbrown	<i>Mycalesis anaxias</i>	9	17	10	11
3	Gaudy baron	<i>Euthalia lubentina</i>	13	22	9	10
4	Chocolate pansy	<i>Junonia iphita</i>	13	15	12	16
5	Quaker	<i>Neopithecops zalmora</i>	7	5	8	4
6	Fulvous pied flat	<i>Pseudocoladenia dan</i>	3	2	4	3
7	Green- spotted triangle	<i>Graphium agamemnon</i>	6	4	3	5
8	Common Mormon	<i>Papilio polytes</i>	10	12	13	11
9	Great orange -tip	<i>Hebomoia glaucippe</i>	7	8	6	7
10	Common Line Blue	<i>Prosotas nora</i>	9	10	7	7
11	Five bar Swordtail	<i>Graphium antiphates</i>	6	8	5	4
12	Common buckeye	<i>Junonia coenia</i>	7	9	4	5
13	West virginia white	<i>Pieris virginisis</i>	5	4	4	5
14	Common Leopard	<i>Phalanta phalantha</i>	6	5	4	3
15	Dark blue tiger	<i>Tirumala septentrionis</i>	12	13	11	14
16	Common four ring	<i>Ypthima huebneri</i>	10	9	11	8
	Total		127	163	118	125

Table 2: The biodiversity indices of butterfly species in Kallar region, Mettupalayam, Coimbatore

Months	Total no. of individuals	Relative abundance	Shannon index	Simpson index
September	127	23.82 %	-0.31609	0.099914
October	163	30.58 %	-0.33933	0.115148
November	118	22.14%	-0.31355	0.098313
December	125	23.45%	-0.36727	0.134885

Table 1 showing the diversity of butterfly in Kallar region, Mettupalayam, Coimbatore district, Tamilnadu. A Total 42 butterfly species in 34 genera belonging to 5 families were surveyed during the period from Jan 2018 to Aug 2018.

During the study period the latitude and longitude for 13 species were observed in family Nymphalidae 4 species of butterflies were observed along with their latitude and longitude. *Mycalesis anaxias* has the latitude of (11.336171) and longitude (76.878674), followed by Lycaenidae family 3 species of butterflies were observed along with their latitude and longitude. *Thaduka multicaudata* has the latitude of (11.337666) and longitude (76.863531), followed by Papilionidae family *Graphium Agamemnon* has the latitude of (11.33637) and longitude (76.882953), followed by Pieridae family *Hebomoia glaucippe* has the latitude of (11.336273) and longitude (76.872958), followed by Hesperidae family *Spialia galba* has the latitude of (11.338185) and longitude (76.881213).



4. DISCUSSION

Butterflies mixture ultimately reflects overall plant range specially herbs and shrubs in the region. Lakshmi et al., 2017 [9] reported that overall 79 species of butterflies belong to five families including family Nymphalidae with Maximum of 40 species followed by Lycaenidae 13 varieties, Papilionidae 9 species, 7 Hesperidae species

under the five different habitats like Grassland, Herbs and shrubs, Pond, Agrifield and Garden field. The results show strong altitudinal zonation matching the vegetation belts, as in a previous study [9] and show similarity between slope and wetland habitats at similar altitude. The diversity of butterfly in Kallar region, Mettupalayam, Coimbatore district, Tamil Nadu. A Total 42 butterfly species in 34 genera belonging to 5 families clearly indicate a high diversity of butterflies distributed in the study field. Among this the family Nymphalidae was the dominant family with 14 species. The butterflies collected during the study were classified into different study sites in Kallar region.richness.

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