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Kinetic study on butterfly diversity in erode district, Tamilnadu, India

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ABSTRACT

Butterflies are fascinating creatures of order Lepidoptera have special place in the insect world. The present study was carried out to document the species diversity and abundance from January to December 2011 in the Erode District, using transects counting method. All the butterflies recorded at a distance of 5m from the observer during the counts. Species diversity and abundance is calculated by Shannon –Weiner index. A total of 694 individuals belonging to 23 species of butterflies were recorded during the period and highest numbers of species was recorded from the family Nymphalidae, Papilionidae Pieridae were recorded. Butterflies are sensitive to the changes in the habitat and climate, which influences their distribution and abundance. It is suggest that butterfly species diversity generally increase with increase in vegetation.

Introduction

Biodiversity is the variety of life describing the number and variability in relation to ecosystem in which they occur. Insects comprise more than half of the world's known animal species **(Wilson, 1992)** of which the second largest and more diverse order is Lepidoptera of class Insecta **(Benton, 1995).** There are 16,823 species recorded from all over the world among them 1501 species of butterflies are recorded in from India **(Gaonkar, 1996)**. The butterflies are the best indicator of these changes and can be used as surrogate to assess the conservation threat to the biodiversity. Many of butterfly species are strictly seasonal and prefer only a particular set of habitats **(Kunte, 1997)** and they are good indicators in terms of anthropogenic disturbance and habitat quality **(Kocher** and **Williams, 2000)**.

Butterflies are cold blooded invertebrates are easily affected by changes in climate and like most animals their distribution too is greatly affected by these changes **(Kehimkar, 2008).** Increases in human population combined with advances in technology have directly subjected in the ecosystems of the world to many changes and leads to decline in the habitats of many species. The different urban landscapes showed variations in the family and species abundance, richness and percent frequency of species. The purpose of present investigation is to understand the butterfly diversity, seasonal variations and to analyze changes in abundance of butterflies diversity and species richness in Erode District.

Materials And Methods

Study Area

Erode District is one of the industrialized districts located in the western part of the state of Tamil Nadu, India. Erode District is landlocked and is situated at between 10 36" and 11 58" north latitude and between 76 49" and 77 58" east longitude. The climate is mostly dry and characterized by good rainfall. The average annual rainfall is 772 mm. Sampling was conducted at sites dominated by the most representative vegetation types of the region. The temperature is moderate; the maximum and minimum temperatures being 35°C and 26°C respectively.

Methodology

Butterfly transects are a way of measuring the number and variety of butterflies present at a site from year to year, and require a weekly to two-weekly recording. Mostly photographic documentation was done. Modifications of the line transect count as per. **(Kunte, 1997)** was used to determine butterfly richness and abundance. In this method permanent 300m line transects was setup in each habitat.

The transect in each habitat was slowly traversed at a uniform pace for 30min at each habitats from 8.30 to 11.30 h during good weather period (no heavy rain or strong winds). This timing was found ideal in the area based on preliminary counts done in different times of the day revealed that the maximum butterfly activity was during that time. Butterfly species were recorded around a radius of five meter from the observer covering his either sides, above and front. All individuals were identified in the field using standard guides **(Gunathilagaraj *et al.*, 1998; Kunte, 2000; Jahir *et al.*, 2008).** And data were analyzed by using Shannon's diversity index (H'). Diversity and evenness values for litter and soil arthropods were estimated using Shannon's diversity index (H') **(Ludwing** and **Reynolds, 1988).**

Results And Discussion

During the transect sampling, we recorded a total of 445 individuals belonging to 23 species of butterflies were observed during the study. The check list of butterflies is given in table 1.

Papilionidae found to be the dominant family during all seasons.

The percentage of different butterfly families recorded in the study area is given in Fig.1The Papilionidae was the most specious family in the all sites. Eight species belonged to this family, which accounted for around 40% of the species richness. And the abundance species richness more in Nymphalidae**,** Papilionidae and Pieridae families during the study period which may be due to the availability of host plants. And the study reveals increase in richness and abundance during winter.

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Fig: 1. Family wise distribution of butterfly in the study area

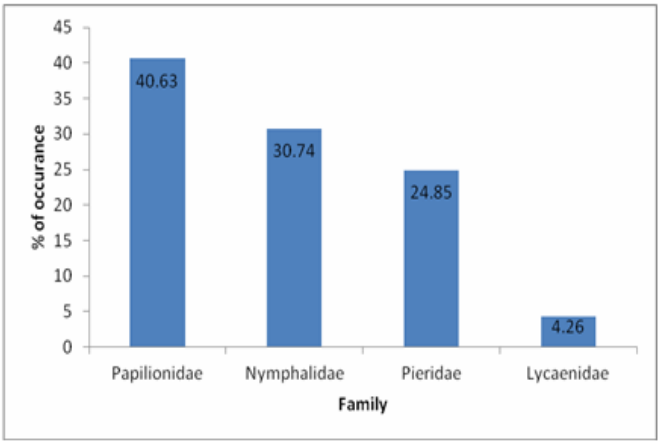

Table: 1. Check list of butterflies in the study area

S.NO	SPECIES	TOTAL NUMBER OF SPECIES	% OF OCCURRENCE
1	Familiy: Nymphalidae		
	Tirumala limniace	38	8.53
	Euuploea core	17	3.82
	Danaus chrysippus	12	2.69
	Lasiommata megera	10	2.24
	Danaus plexippus	14	3.14
	Agrualis vanilla	11	2.47
	Melantis leda	14	3.14
	Hypolimnas misippus	13	2.92
	Junonia orithya	08	1.79
2	Familiy:Papilionidae		
	Pachliopta hector	41	9.21
	Papilio polytes	27	6.06
	Papilio polyxenes	23	5.16
	Papilio demoleus	46	10.33
	Papilio polymnestor	21	4.71
	Papilio blumei	05	1.12
	Graphium Agamemnon	08	2.47
	Graphium sarpedon	07	1.57
3	Familiy:Pieridae		
	Dalias encharis	14	3.14
	Gonepteryx rhamni	40	8.98
	Colias hyale	27	6.06
	Hybomoia glaucippe	19	4.26
	Colotis danae	11	2.41
4	Familiy:Lycaenidae		
	Celaotrina argiolus	19	4.26
	Total	445	99.9

Fig: 2 Diversity and richness of different families collected from the study area

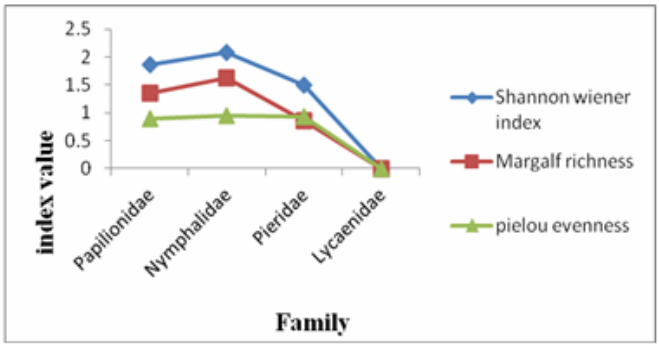

Table 2: Diversity and richness of different families collected from the study area

Sl.No	Family	Shannon wiener diversity index	Margalf richness	Pielou evenness
1	Papilionidae	1.858	1.351	0.893
2	Nymphalidae	2.077	1.626	0.945
3	Pieridae	1.504	0.849	0.935
4	Lycaenidae	0.000	0.000	0.000

Many researchers have reported that butterflies are good responders to changes in the environment **(Kunte, 1997; Arun, 2002; Borkar** and **Komarpant, 2004; Padhye *et al.*, 2006; Tiple *et al.*, 2006** and **2007; Joshi, 2007; Mathew** and **Anto, 2007; Krishnakumar *et al.*, 2008).**

The distributions of butterflies depend upon not only on the availabity of food plants, but also on the climatic and topographic features of different regions. **Mathew** and **Rahamathulla (1993)** observed that the distribution might also be associated with specialties in the floral composition of plants in a particular habitat. The preference of butterfly species at a particular habitat also depends upon other factors like abundance of predators, parasitoids and prevalence of diseases. Butterflies are seasonal in their occurrence. They are common for only a few months and rare or absent in other parts of the year **(Kunte, 2000)**. Butterflies are sensitive to the changes in the habitat and climate, which influence their distribution and abundance **(Blyth, 1957)**. The study area also contains three species (Crimson rose, Blue mormon and Common jezebel) which are endemic to Peninsular India and Sri Lanka. Agricultural sites had significantly more butterflies than non-agricultural sites **(Fleishman, 1999)**.

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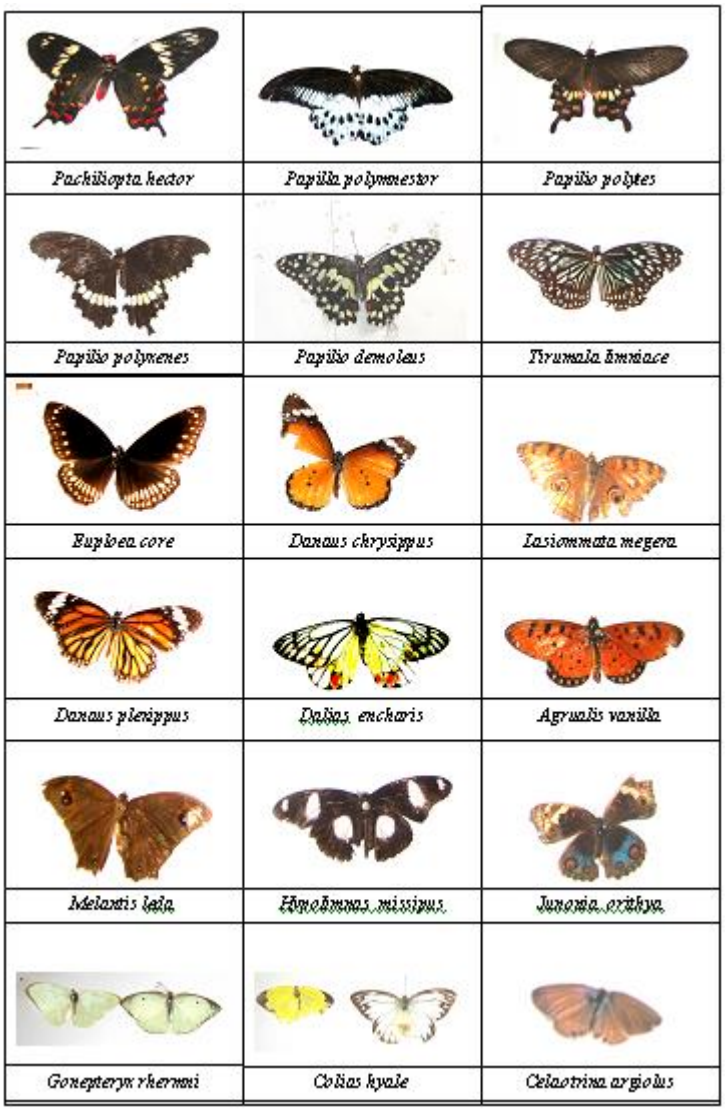
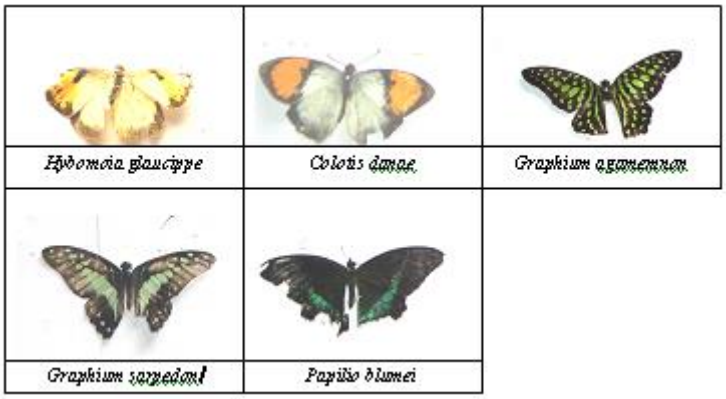
Plate 1. Butterflies collected from Erode District



Pachliopta hector	*Papilio polymnestor*	*Papilio polytes*
Papilio polymenes	*Papilio demoleus*	*Tirumala limniace*
Euploea core	*Danaus chrysippus*	*Lasiommata megera*
Danaus plenippus	*Delias eucharis*	*Agraulis vanilla*
Melanitis leda	*Hypolimnas missipus*	*Junonia orithya*
Gonepteryx rhermni	*Colias hyale*	*Celaotrina argiolus*



Hybomoia glaucippe	*Colotis danae*	*Graphium agamemnon*
Graphium sarpedon	*Papilio blumei*	

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