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BIODIVERSITY OF PIERID BUTTERFLIES IN THE HILL REGIONS OF KADAPA RANGE IN THE EASTERN GHATS OF SOUTHERN ANDHRA PRADESH

V. Prasanna Kumar, P. Harinath and *S. P. Venkata Ramana

Department of Zoology, Yogi Vemana University, Kadapa

**Author for Correspondence*

ABSTRACT

The butterflies are the beautiful insects which increase the aesthetic value of the nature. They are the keystone for pollination. Among different families pierids includes whites and yellows are dominant. The Kadapa region is surrounded by hills which has thick vegetation compared to plains. The hill regions recorded diversified species of Pierid butterflies. The common emigrants are distributed both on plains and on hill regions where as tipped whites are mostly confined to hill top and hill foot regions. The Catopsilias includes *C. pyranthe*, *C. crocale*, *C. pomona* and *Colotis* species including *Colotis danae*, *C. fausta*, *C. eucharis* and *Ixias pyrene* are restricted to the hill region in the study area. *Euremas* including *Eurema hecabe*, *E. brigitta* are dominant on grass fields of the hill region. Searches find out several pierid species in the study area and the diversity of species was calculated by using Simpson's diversity formula along with the seasonality and population index of life stages were also discussed.

Key Words: *Pierids, Biodiversity, Simpson's Diversity Indices, Kadapa Region, Southern Andhra Pradesh*

INTRODUCTION

India enjoys tropical climate, variance in topographic and habit types suitable for sustaining a variety of butterfly fauna (Venkataramani, 1986). The mountains of Kadapa region which comes under Eastern Ghats of Southern Andhra Pradesh where much information about butterfly species is unavailable (Venkataramana, 2010). Butterflies offer nearly inexhaustible well of stimulating material for those who are curious in carrying out applied and pure research (Matthews *et al.*, 1997). The need for conservation of insects is increasing with each year and the butterflies are considered to be the important flag ships for insect conservation (New *et al.*, 1995, Smetacek, 1996). The butterflies are essential part of any natural ecosystem play a dual role as pollinators and energy transferors. It is hence encouraging that butterflies are now being included in biodiversity studies and biodiversity conservation prioritization programme (Murugesan *et al.*, 2001). About a 1000 species of Pierid are known to occur throughout the world out of which 109 species occur in India. They are commonly known as Whites and yellows because of their wings are mainly white or yellow, with black, red, orange or yellow markings. The present study deals with occurrence and diversity of Pierid family species in different Hill regions of Kadapa range in Eastern Ghats of Southern Andhra Pradesh.

Study area

Kadapa is located at 14.47°N 78.82°E. It has an average elevation of 138 meters (452 ft). It is in shape an irregular parallelogram, divided into two nearly equal parts by the range of the Eastern Ghats, which intersects it throughout its entire length. The first, which constitutes the north, east and south-east of the district, is a low-lying plain; while the other, which comprises the southern and southwestern portion The city lies in the "Bugga" or "Ralla Vanka" in a hollow bordered on the south by the main Palakondas, part of the Eastern Ghats and on the east by a strip of the same hills projecting north towards the Lankamalas on the other side of the Penneru. The two tracts thus formed possess different features. The normal rain fall of 700mm and varies from 400+ to 800 + mm. The maximum temperature varies from 33-43° C. The Lankamalai hills (14°45' - 14°72' N and 79°07' - 78°80' E); Palakonda hills (14°28' - 14.47°N and

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78°55'E - 78.92°E) and Guvvala Cheruvu Ghat (14° 3' 0" N, 78° 45' 0" E) of Kadapa region were selected for present study. The places are known for its good climate and consist of rich variety of butterfly host plants (Kadapa).

MATERIALS AND METHODS

The butterflies were observed and their relative abundance was recorded. The butterflies were initially identified in the field condition and unidentified butterflies were collected using nylon nets and were identified using the keys of Kehimkar (2008) and Wynter – Blyth (1957). The larvae of certain butterflies were collected along with host plants in the petri plates and their life cycle was studied in the captive conditions in Glass house and a few in the Butterfly Park. The diversity of Pierids (richness and evenness of the species) was calculated using the Simpson’s diversity indices

$$D = \sum (n/N)^2$$

n= the total number of organisms of a particular species

N= the total number of organisms of all species

(The values will be between 0 and 1. The value D is subtracted from 1. Greater the value greater the diversity)

RESULTS AND DISCUSSION

Undersides of the wings of some of the butterflies have cryptic colouration. Some pierids like jezebels are distasteful to predators due to chemicals derived from their food plants and are also aposematically coloured. Male butterflies congregate at rivers or streambeds for mudpuddling (Kehimkar, 2008).

Table 1: Butterfly fauna, relative abundance and seasonality in study sites from May 2011 to January 2012

| Scientific Name | Common Name | Season by months | Relative Abundance |
|---------------------------|-------------------------|------------------|--------------------|
| Family:Pieridae | | | |
| <i>Belenois aurora</i> | The pioneer | 1-12 | * * * * |
| <i>Appias lalage</i> | Spot puffin | 7-2 | * * |
| <i>A. albina</i> | Common albatross | 12-4 | * * |
| <i>Catopsilia crocale</i> | Common emigrant | 1-12 | * * * |
| <i>C. Pomona</i> | Lemon emigrant | 6-10 | * * * * |
| <i>C. pyranthe</i> | Molted emigrant | 1-12 | * * * * * |
| <i>Colotis danae</i> | Crimson tip | 1-12 | * * * * * |
| <i>C. eucharis</i> | Plain orange tip | 1-12 | * * * * * |
| <i>C. fausta</i> | Large salmon arab | 6-11 | * * * * * |
| <i>C. amata</i> | Small salmon arab | 8-12 | * * |
| <i>C. etrida</i> | Small Orange tip | 1-12 | * * * * |
| <i>Delias eucharis</i> | Common jezebel | 9-12 | * * |
| <i>Eurema hecabe</i> | Common grass yellow | 1-12 | * * * * |
| <i>Eurema blanda</i> | Three spot grass yellow | 1-12 | * * * * |
| <i>Eurema brigitta</i> | Small grass yellow | 1-12 | * * * * |
| <i>Leptosia nina</i> | The psyche | 9-4 | * * |
| <i>Pernonia valeria</i> | Common wanderer | 1-4 | * * * |
| <i>Ixias pyrene</i> | Yellow orange | 1-12 | * * * * |
| <i>Cepora nerissa</i> | Common gull | 1-12 | * * * * |

*very rare **rare ***less common ****common *****very common

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In present study nearly 20 Pierid species were recorded (Table-1) and their abundance at different sites was also tabulated (Table-2). In which endemic pierids like *Colotis danae*, *C. fausta*, *C. eucharis*, Catopsilias includes *C. pyranthe*, *C. crocale*, *C. pomona*, were identified. The tiny yellows *Euremas* including *Eurema hecabe*, *E. brigitta* and *E. blanda*, smallest Pierid like *Leptosia nina*, fast mover like *Pernonia valeria*. Occasional visitor like *Appias lalage* were also recorded. Majority of them having whites, yellows, yellows with black, red, orange colour wings also with same markings were observed. Finally its diversity in all the study sites was calculated using Simpson's diversity index (Table-3).

Table 2: Butterfly population at different study sites during May 2011 to January 2012

| Family | Lankamalai hills | Palakondalu mountains | Guvvla cheruvu Ghat |
|---------|------------------|-----------------------|---------------------|
| Yellows | 4 | 4 | 2 |
| Whites | 15 | 16 | 14 |
| Total | 19 | 20 | 16 |

Table 3: Diversity indices of butterfly species at different study sites during May 2011 to January 2012

| Family | Lankamalai hills | Palakondalu mountains | Guvvlacheruvu Ghat |
|---------|------------------|-----------------------|--------------------|
| Yellows | 0.95 | 0.96 | 0.98 |
| Whites | 0.39 | 0.36 | 0.24 |

Due to topographical and vegetation changes and availability of the host plants at the study sites the distribution of species and availability of the species differed a lot. The richness of the species differs from study site to study site. Palakondalu region recorded greater richness and Guvvlacheruvu region the least. We could observe unevenness of species i.e., relative abundance of the species differed at the study sites. The Lankamalai region and Palakondalu region recorded almost equal number of varieties of whites, the diversity at Palakondalu mountain region is a little greater when compared with to Lankamalai hills, whereas Guvvalcheruvu Ghat with less number of varieties recorded greater diversity. Whereas yellows' though abundant in Palakonda mountains they are less diversified when compared to Lankamalai. Guvvalcheruvu Ghat region is the least. The diversity of species depends on factors like topography and climate of the region; they are the effective indicators of climate and environment (Asher *et al.*, 2001). Though the whites are emigrants diversified species are found on Lankamalai hills than the other two regions which are due to much availability of host plants. Among whites the Catopsilias includes *C. pyranthe*, *C. crocale*, *C. pomona*, are seen both on plains and hill regions and *Colotis* species including *Colotis danae*, *C. fausta*, *C. eucharis* are found mostly on hill top regions and less on hill foot regions but not in plains and *Ixias pyrene* species both wet and dry forms are restricted to the hill region in the study area. *Euremas* including *Eurema hecabe*, *E. brigitta* and *E. blanda* are dominant on grass fields of the hill region. The *Euremas* were found throughout the year but abundant after monsoon.

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