



## Species composition and seasonal variation of butterflies in Dalma Wildlife Sanctuary, Jharkhand, India

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The Dalma Wildlife Sanctuary is located 10km from Jamshedpur in Jharkhand. It extends over 193km<sup>2</sup> in the thick forest of Dalma mountain range, which rises to an elevation of 3,000ft. This wildlife sanctuary is the habitat of many wild animals. Climatic conditions in Dalma are typical of Indian Sal (*Shorea robusta*) forest. Annual temperature varies from 10°C to 42°C. The hottest months are May and June. The period from November to February is comparatively cool. The maximum rainfall is received during the months of July and August from the South West Monsoon. The natural vegetation comprises of a combination of Sal forest and tropical dry deciduous types.

Information on the butterflies and their seasonal population trends have been recorded for two years and the results are presented in this paper. Classification adopted here is based on Ackery (1989).

### Methods

The butterfly fauna of Dalma Wildlife Sanctuary was surveyed from January 2007 to December 2008. Sampling was conducted at sites dominated by the most representative vegetation type of the region i.e. tropical dry-deciduous forest. To understand the diversity and seasonal variation, transects of 500m length and 10m width were laid at three different sites within the sanctuary. All selected sites had similar vegetation comprised mainly of scattered trees of *Shorea robusta*,

*Buchanania lauzen*, *Diospyros melanoxyton* and *Cleistanthus collinus* along with bushes of *Lantana* spp. Transects in each of the selected sites were surveyed on foot, one day in every week between 0900hr and 1700hr for a period of 92 weeks. Species were identified in the field, and where identification was not possible photographs were taken. Collection was restricted only to those specimens that could not be identified with certainty. The trapped butterflies were brought to the laboratory and placed in a killing bottle containing a wad of cotton soaked in ethyl acetate. After relaxing and setting they were identified with the help of field guides (Goodden 1976; Brooks & Knight 1985; Kunte 2000).

Each year was divided into four seasons. These seasons were: (1) Spring - February and March, (2) Summer - April to June, (3) Rainy season - July to September and (4) Winter - October to January. For each year a data matrix was constructed which recorded the species and their abundance in each season.

Seasonal variation in the abundance of butterflies was calculated using the Shannon-Weiner formula (H) as given below:

$$H = -\sum_{i=1}^N P_i \log P_i$$

Where H = species diversity index

P<sub>i</sub> = the proportion of individuals in the *i*th species

N = total number of species

*i* = species 1, 2, 3... N

### Results

Altogether 39 species of butterflies belonging to 4 families were recorded. Nymphalidae dominated the list with 20 species, followed by Pieridae (9 species), Lycaenidae (6 species) and Papilionidae (4 species) respectively (Table 1).

Fig. 1 shows the values of the index calculated by the Shannon-Weiner equation. Maximum diversity was observed during the last weeks of winter and during spring, while a comparatively low diversity was observed during the rainy season and summer. The number of butterfly species varied with the seasons (Table 1). The maximum number of butterflies was observed during spring and at the height of winter. Species richness showed a reduction at the end of the rainy season (September) and during the warmest part of summer (April to May).

When species richness by family in each season was considered (Fig. 2), Nymphalidae and Lycaenidae attained maximum species richness during the rainy season with a slight decrease during summer. There was only slight seasonal variation in species richness in the case of Pieridae and Papilionidae. Pieridae showed a slight decrease during the rainy season, whereas Papilionidae showed an increase in the value of species richness during summer.

Flowers of *Lantana* (Verbenaceae) bushes were found to be attractive to a variety of butterflies.

### Discussion

Chandra et al. (2007) reported 147 species of butterflies excluding Hesperidae from Madhya Pradesh and Chhattisgarh. The present study area covers a much smaller area. All the same, the occurrence of 39 species does not suggest

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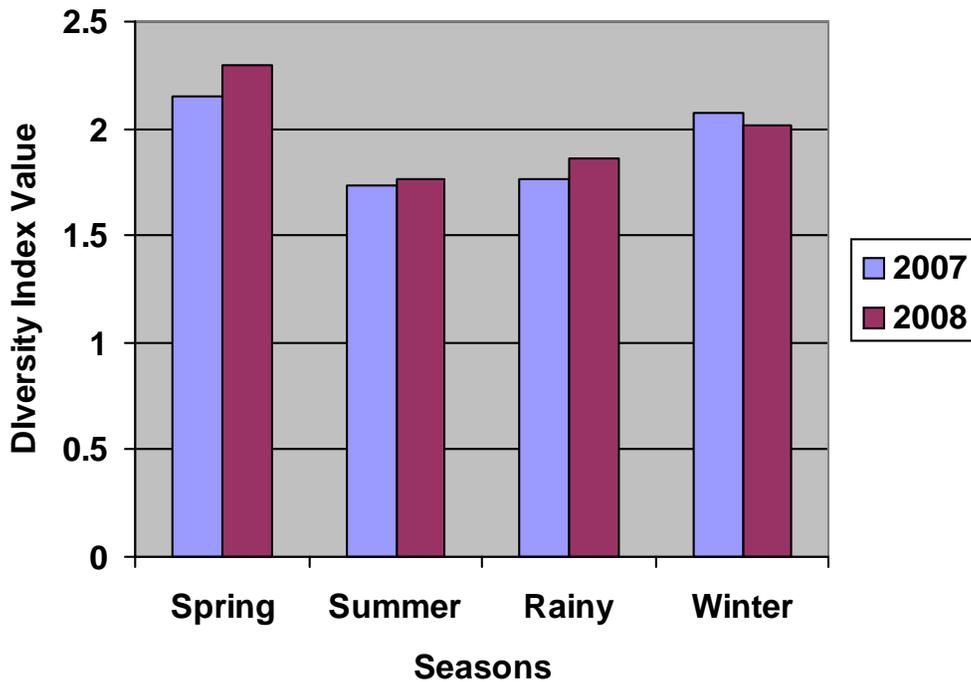
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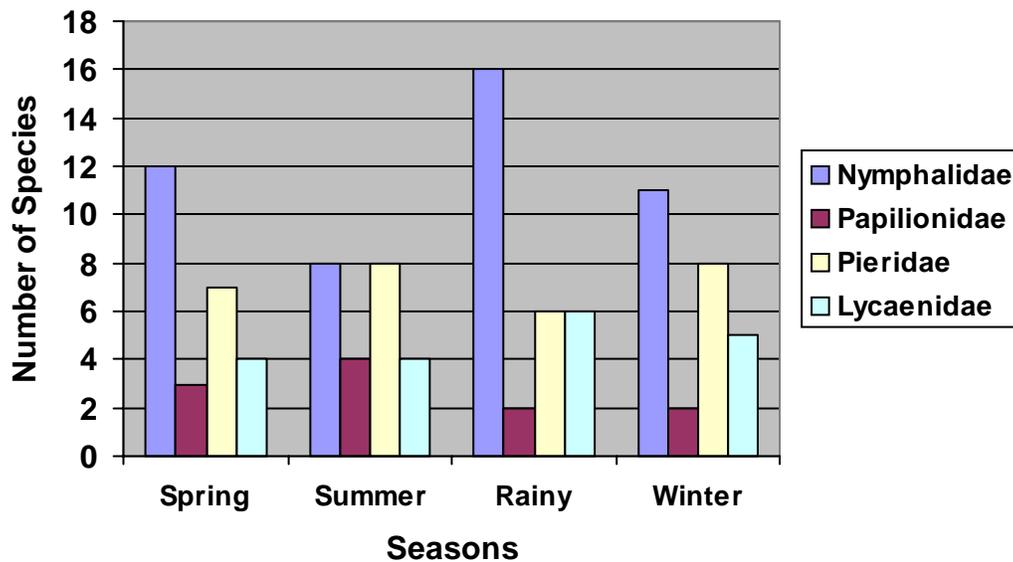
**Table 1. Butterflies recorded at Dalma Wildlife Sanctuary and their seasonal distribution**

SNo	Family	Common Name	Scientific Name	Seasons Observed				
1.	Nymphalidae	Tawny Coster	<i>Acraea violae</i> (Fabricius )	Sp	-	Rn	Wi	
2.		Glassy Tiger	<i>Parantica aglea</i> (Cramer)	Sp	-	Rn	-	
3.		Blue Tiger	<i>Tirumala limniace</i> (Cramer)	-	Su	-	-	
4.		Plain Tiger	<i>Danaus (Anosia) chrysippus</i> (Linnaeus.)	Sp	Su	Rn	Wi	
5.		Common Crow	<i>Euploea core</i> (Cramer)	Sp	Su	Rn	Wi	
6.		Brown King Crow	<i>Euploea klugii</i> (Moore)	Sp	-	Rn	-	
7.		Common Fourring	<i>Ypthima hübneri</i> (Kirby)	-	-	-	Wi	
8.		Great Eggfly	<i>Hypolimnas bolina</i> (Linnaeus)	-	Su	-	Wi	
9.		Common Sailer	<i>Neptis hylas</i> (Linnaeus)	Sp	-	-	Wi	
10.		Common Baron	<i>Euthalia aconthea</i> (Cramer)	-	Su	Rn	-	
11.		Baronet	<i>Symphaedra nais</i> (Forster)	-	Su	Rn	Wi	
12.		Common Bushbrown	<i>Mycalasis perseus</i> (Fabricius)	-	Su	Rn	-	
13.		Common Castor	<i>Ariadne merione</i> (Cramer)	Sp	-	Rn	Wi	
14.		Angled Castor	<i>Ariadne ariadne</i> (Linnaeus)	Sp	-	-	-	
15.		Common Palmfly	<i>Elymnias hypermnestra</i> (Linnaeus)	-	-	Rn	-	
16.		Common Leopard	<i>Phalanta phalantha</i> (Drury)	Sp	Su	Rn	Wi	
17.		Blue Pansy	<i>Junonia orithya</i> (Linnaeus)	Sp	-	Rn	-	
18.		Grey Pansy	<i>Junonia atlites</i> (Linnaeus)	Sp	-	Rn	-	
19.		Lemon Pansy	<i>Junonia lemonias</i> (Linnaeus)	-	-	Rn	Wi	
20.		Peacock Pansy	<i>Junonia almana</i> (Linnaeus)	Sp	-	-	Wi	
21.	Papilionidae	Lime Butterfly	<i>Papilio demoleus</i> (Linnaeus)	-	Su	-	Wi	
22.		Common Banded Peacock	<i>Papilio crino</i> (Fabricius)	Sp	Su	Rn	-	
23.		Common Mormon	<i>Papilio polytes</i> (Linnaeus)	Sp	Su	Rn	-	
24.	Pieridae	Common Jay	<i>Graphium doson</i> (C. & R. Felder)	Sp	Su	-	Wi	
25.		Common Emigrant	<i>Catopsilia pomona</i> (Fabricius)	Sp	Su	Rn	Wi	
26.		Mottled Emigrant	<i>Catopsilia pyranthe</i> (Linnaeus)	-	Su	-	Wi	
27.		Common Grass Yellow	<i>Eurema hecabe</i> (Linnaeus)	Sp	Su	Rn	Wi	
28.		Small Grass Yellow	<i>Eurema brigitta</i> (Cramer)	Sp	Su	Rn	Wi	
29.		Common Gull	<i>Cepora nerissa</i> (Fabricius)	-	-	Rn	Wi	
30.		Psyche	<i>Leptosia nina</i> (Fabricius)	Sp	Su	-	Wi	
31.		Common Wanderer	<i>Pareronia valeria</i> (Cramer)	-	Su	Rn	Wi	
32.		Common Albatross	<i>Appias albina</i> (Boisduval)	Sp	-	-	-	
33.		Common Jezebel	<i>Delias eucharis</i> (Drury)	Sp	Su	Rn	Wi	
34.		Lycaenidae	Monkey Puzzle	<i>Rathinda amor</i> (Fabricius)	-	-	Rn	Wi
35.			Dark Cerulean	<i>Jamides bochus</i> (Stoll)	Sp	Su	-	Wi
36.			Common Cerulean	<i>Jamides celeno</i> (Cramer)	Sp	-	-	Wi
37.			Common Pierrot	<i>Castalius rosimon</i> (Fabricius)	Sp	Su	Rn	-
38.	Rounded Pierrot		<i>Tarucus nara</i> (Kollar)	Sp	Su	Rn	Wi	
39.		Common Hedge Blue	<i>Acytolepis puspa</i> (Horsfield)	-	Su	-	Wi	

Sp - Spring; Su - Summer, Rn - Rainy; Wi - Winter



**Figure 1. Seasonal variation in Species Diversity index calculated by Shannon-Weiner formula**



**Figure 2.** Diversity of Nymphalidae, Papilionidae, Pieridae and Lycaenidae across the 4 seasons (Spring, Summer, Rainy and Winter)

that the Dalma Wildlife Sanctuary has high Rhopaloceran species richness. It is not unlikely that a few butterfly species have escaped notice and will be added in the future: such species include Evening Browns (*Melanitis*), Grass Blues (*Zizula*, *Zizina*, *Freyeria*, etc.), the Peablu (*Lampides boeticus*), the Gram Blue (*Euchrysops cnejus*) etc.

Of the species recorded, most were common at suitable seasons and appeared to be well established.

Except for *Euploea klugii* (Moore) the butterflies recorded are typical of the lepidopteran community supported by Sal and Dry Deciduous forest over most of India, which is also present in the study area. In view of this, it is not felt that any special measures need to be adopted with reference to the conservation of lepidopteran diversity in the sanctuary.

### Conclusion

Thirty-nine species of butterflies were recorded from the

Dalma Wildlife Sanctuary. The butterflies recorded are typical of Sal and Dry Deciduous forest present in the study area.

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