

## Butterfly diversity of Pant Wildlife Sanctuary, Rajgir (Bihar), India

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Received: 25.05.2017

Accepted: 31.05.2017

#### ABSTRACT

Altogether thirty four species of butterflies were observed during the survey period which represents the diversity of Pant Wildlife Sanctuary Rajgir. The study area comes under Gangetic Plains. *Acraea violae*, *Danaus chrysippus chrysippus*, *Danaus genutia*, *Junonia lemonias lemonias*, *Junonia orithya swinhoi*, and *Hypolimnas bolina jacintha*, were common butterfly to this habitat. The maximum diversity was observed in winter and minimum in summer season. Their presence was influenced by the vegetation pattern of hilly land and favourable seasons. Heavy Tourism in the habitat zone is harmful for the butterfly diversity of the region.

**Keywords:** *Butterfly, Diversity, Gangetic plain, Vegetation pattern, Pant Wildlife Sanctuary, Tourism.*

#### INTRODUCTION

Rajgir is known as the Buddhist Tourist place. The Indian tourism has emerged as one of the key drivers of growth in the services sector in India (Ghimire, 2013). For a state like Bihar, tourism is a potential field development of the state.

Butterflies belong to order Lepidoptera of class Insecta of phylum Arthropoda. Kunte (2012) reported that India harboured total 1504 butterfly species which accounted 8.74% of the world's butterfly and 285 species found in southern India. The peninsular India and Western Ghats have 351 and 334 species, respectively. The butterfly diversity of Pant Wildlife Sanctuary was undertaken for the first time for more than one year and 34 species could be documented.

#### **Study area and sampling site**

The study area was the Pant Wildlife Sanctuary, Rajgir in Nalanda District of Bihar. The sanctuary is situated in Nalanda Forest Division covering an area of 35.84 sq. km. under the Nalanda district administration. This Wildlife Sanctuary represents a remnant patch of forests nestled in the picturesque Rajgir hills within the South Gangetic Plain. This sanctuary provides numerous ecosystem services to the surrounding landscape including verities of flora and fauna. Therefore, to protect this forest a 35.84 km<sup>2</sup> was notified as Rajgir Wildlife Sanctuary, Rajgir under section 18 of the Wild life (Protection) Act 1972 vide S.O. No 727 dated 25.05.1978. This sanctuary was subsequently renamed Pant Wildlife Sanctuary, Rajgir vide Forest and Environment Department, Government of Bihar Notification No. 4118 dated 13.09.1988. The random survey includes almost the entire Pant Wildlife Sanctuary but eight important sites were given more attention for the study of butterfly diversity. They are (i) Jaiprakash Udyan (near Son Bhandar), (ii) Venu Van, (iii) Pandu Pokhar, (iv) Ghora Katora Lake, (v) Vyavhar Hill (vi) Jarasandh Ka Akhada (vii) Dear Park /Mrig Vihar (viii) Rajju Path Areas.

## MATERIALS AND METHODS

To study the butterfly diversity in the WLS the photographic technology was adopted. The photographs of butterflies were taken alive from their natural habitats with the help of Nikon digital camera (Model- 300S with 80-400 zoom lens). The photographs were recorded in their consequent months and respective survey.

### Survey Method

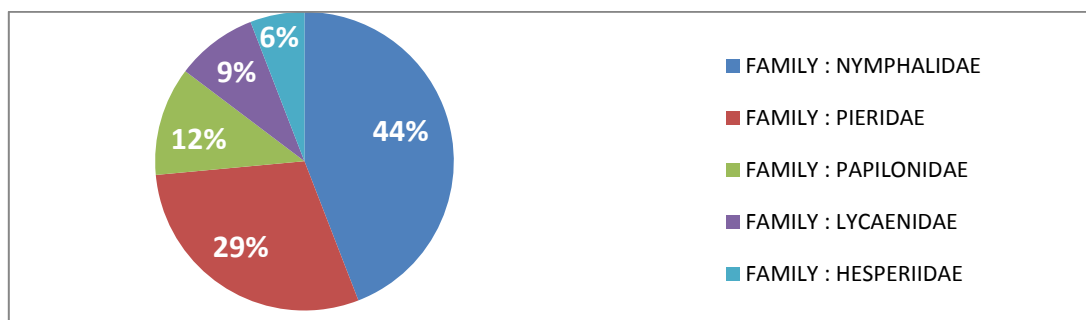
The butterflies were surveyed by the random methods for a period of more than one year (June 2016-May 2017). Their numbers were counted arbitrarily within a range of 25 Feet (in range of eye resolving power) in the early morning to afternoon weekly. The route of survey was fixed and specific in movement and time. Usually the survey was conducted in good weather whereas rainy, cloudy, stormy and extreme hot weather were ignored.

### Identification of butterfly species

The colour photograph was used in the identification of butterflies. The colour, colour patterns and design were compared in identification of species with the help of relevant literatures. eKehimkar 2008, Gupta and Majumdar, 2012. Bingham, 1905 and 1917, Gajbe, (2016), Evans (1932) Kumar *et al.* (2016) and TERI (2015). The habitat, season, and associated plants have also been considered in the identification and characterization of species.

## RESULTS AND DISCUSSION

Thirty four species of butterflies were reported during the study period in and around the Pant WLS, which are listed in Table 1 as well as showed in Fig. 2 also. Species belonging to the family Nymphalidae were dominant (44%), over Pieridae (29%), Papilionidae, 12% Lycaenidae 9%, and Hesperidae, 6% (Fig.1). *Papilio polytes romulus* (Indian Common Mormon) was noticed maximum in size during the survey. The number of butterflies was observed maximum in winter than rainy and summer season. During winter they were found hovering on the new flowers. The diversity is more influenced by seasonal changes and vegetation patterns. They were more associated to the vegetation of microhabitats such as *Lantana camera*, *Sida cordifolia*, *Tagetes erecta*, *Tabernaemontana divaricata*, *Hibiscus rosa sinensis*, *Wedelia chinensis*, *Rosa indica*, *Phlox paniculata*, *Cynodon dactylon*, *Dichanthium indica*, *Tridax procumbens*, *Boerhavia diffusa*,. But few of them were found throughout the year. Moreover the Nymphalidae was maximum in number among all reported species from Pant Wildlife Sanctuary during survey periods. The observed species represents the butterflies of common groups available in the entire Gangetic plains (Plate 1-4).



**Fig.1: Pie chart diagram represent the percentage of observed species in families of butterflies in Pant Wildlife Sanctuary, Rajgir 2016-2017.**

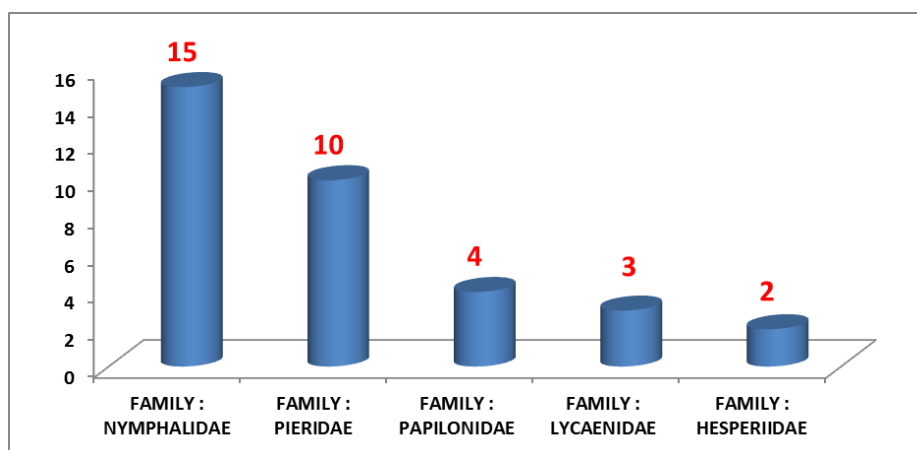


Fig. 2: Number of species in each families

Table 1

List of observed butterflies in and around Pant Wildlife Sanctuary, Rajgir, Nalanda during 2016-2017

Sl. No.	Common Name	Scientific Name	Place of Occurrence							
			Jaiprarkash Udyan (near Son Bhandar)	Rajjumarg areas	Benu Van	Pandu Pokhar	Ghora Katora Lake	Vyavhar hill	Jarasandhka Akhada	Dear Park / Mrig Vihar
<b>FAMILY : NYMPHALIDAE</b>										
1.	Peacock Pansy	<i>Junonia almana</i>	+			+			+	
2.	Lemon Pansy	<i>Junonio lemoniaslemonias</i>						+		+
3.	Blue Pansy	<i>Junonio orithya swinhoel</i>	+		+	+			+	+
4.	Common Baron	<i>Euthalia aconthea</i>		+		+				
5.	Baronet	<i>Euthalia nais</i>		+			+			+
6.	Plain Tiger	<i>Danaus chrysippus chrysippus</i> ,		+	+			+		
7.	Common Tiger	<i>Danausgenutia</i> (Cramer, 1779)	+						+	
8.	Blue Tiger	<i>Tirumala limniace</i> (Cramer, 1775)		+					+	+
9.	Common Leopard	<i>Phalanta phalanta</i>		+				+		
10.	Common Evening Brown	<i>Melanitis leda</i> (Linnaeus, 1758)			+					
11.	Common Indian Crow	<i>Euploea core</i>			+		+			+
12.	Great Egg fly	<i>Hypolimnas bolina</i>	+		+					
13.	Tawny Costor	<i>Acraea violae</i> (Fabricius, 1793)		+		+		+		+
14.	Common Fourring	<i>Ypthima huebneri</i>		+			+			
15.	Common Bushbrown	<i>Mycalesis perseus</i>	+						+	
<b>FAMILY : PIERIDAE</b>										
16.	Common Emigrant	<i>Catopsilia pomona</i>		+	+					
17.	Molted Emigrant	<i>Catopsilia pyranthe</i>				+			+	+
18.	White Orange Tip	<i>Ixias marianne</i>	+				+			

19.	Common Jezebel	<i>Delias eucharis</i>		+			+	+		+
20.	Common Grass Yellow	<i>Eurema hecabe</i> (Linnaeus, 1758)	+			+			+	
21.	Spotless Grass Yellow	<i>Eurema laeta</i>	+		+		+			
22.	Common Gull	<i>Cepora nerissa</i> (Fabricius, 1775)			+					+
23.	Pioneer Butterfly	<i>Belenois aurota</i> (Fabricius, 1793)		+				+		
24.	Psyche	<i>Leptosia nina</i>	+			+		+		+
25.	Common Wanderer	<i>Pareronia valeria</i>	+		+				+	+
<b>FAMILY : PAPILONIDAE</b>										
26.	Lime Butterfly	<i>Papilio demoleus</i>	+			+			+	
27.	Common Mormon	<i>Papilio polytes</i>	+		+	+		+		+
28.	Common Jay	<i>Graphium deson</i>					+			
29.	Common Mime	<i>Chilasa clytia</i>		+					+	
<b>FAMILY : LYCAENIDAE</b>										
30.	Common Pierrot	<i>Castaliu srosimon</i>	+			+				
31.	Common Silverline	<i>Spindasis vulcanus</i>		+					+	
32.	Indian Gram Blue	<i>Euchrysops cnejus</i> (Fabricius, 1798)			+				+	
<b>FAMILY : HESPERIIDAE</b>										
33.	Poethanthis sp.		+		+					+
34.	Common Sailor	<i>Neptis hylas</i> (Linnaeus, 1758)	+					+		



Fig.1: *Papilio polytes* (Common Mormon)

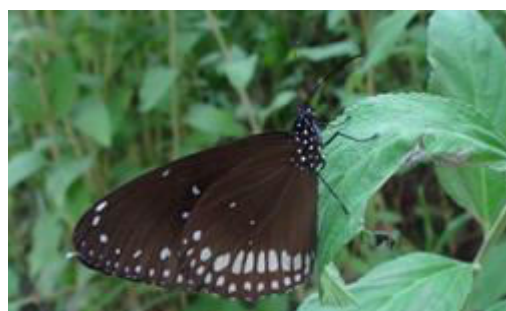


Fig. 2: *Euploea core* (Common Crow)



Fig. 3: *Ariadne merione* (Common Castor)



Fig. 4: *Papilio polytes* (Common mormon)



Fig. 5: *Tirumalalimniace* (Blue Tiger)



Fig. 6: *Melanitisleda* (Common Evening Brown)

Plate 1



Fig. 7: *Ypthima asterope* (Common Three-Ring)



Fig. 8: *Pelopidas subochracea* (Large Branded swift)

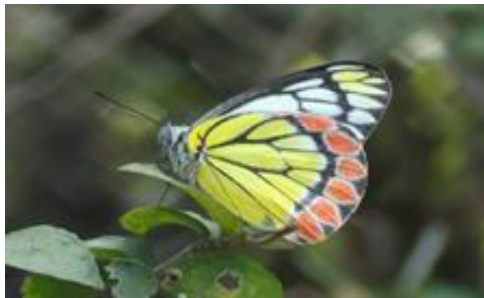


Fig. 9: *Delias eucharis* (Common Jezebel)



Fig. 10: *Mycalesis perseus* (Common Bushbrown)

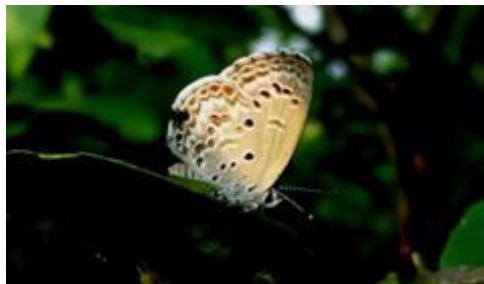


Fig. 11: *Chilades lajus* (Lime Blue)



Fig. 12: *Pelopidas sinensis* (Chinese Swift)



Fig. 13: *Danaus genutia* (Common Tiger)



Fig. 14: *Eurema hecabe* (Common grass yellow)



Fig. 15: *Pareronia valeria* (Common Wonderer)



Fig. 16: *Tarucus venosus* (Himalayan Pierrot)

Plate 2



Fig. 17: Mud-puddling butterflies



Fig. 18: *Juninia orithya ocyale* (Blue Pansy)



Fig. 19: *Bothrinia chennelli* (Hedge Cupid)



Fig. 20: *Euchrys opsnejus* (Gram Blue)



Fig. 21: *Eurema andersonii* (One spot Grass Yellow)



Fig. 22: *Chilades lajus* (Lime Blue)

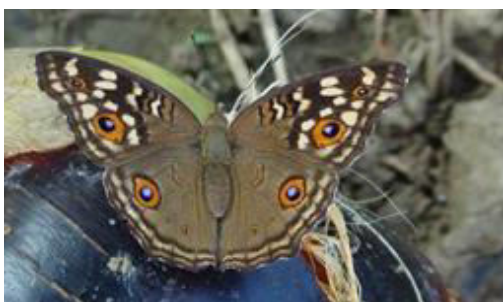


Fig. 23: *Junonia lemonias* (Lemon Pansy)



Fig. 24: *Leptosia nina* (Psyche)



Fig. 25: *Eurema laeta* (Spotless Grass Yellow)

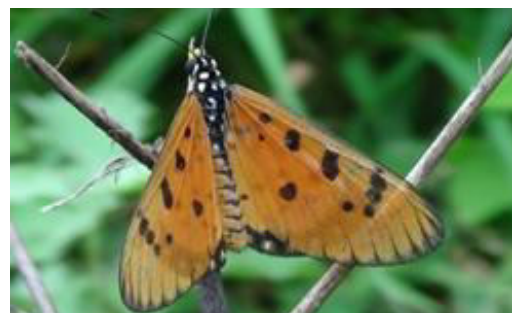


Fig. 26: *Acraea violae* (Tawny coster)

Plate 3



Fig.1: Way to Ghora Katora Lake



Fig.2: Panorama of Ghora Katora Lake



Fig. 3: Way to Rajju Path, Rajgir



Fig.4: Panoram of Pandu Pokhar Rajgir

#### Plate 4: HABITAT

### ACKNOWLEDGEMENTS

We are very much thankful to the Director Zoological Survey of India for providing facilities to conduct the survey. We are also highly grateful to the DFO Nalanda Forest Division, Bihar Sharif for his kind cooperation for providing all facilities which was very effective during survey. The special gratefulness is to Sri Navin Kumar, Former General Manager, Bihar State Tourism Development Corporation, Bihar for his generosity to accompany us during the survey. My thanks to Sri Kumar Kaustubh, Faunal Diversity of Dalma Wildlife Sanctuary and Sarana Forest Division, Jharkhand Biodiversity Board for his kind help during photo analysis and identification of species through photographs. Sincere thanks to Sri Surendra Kumar, Sr. ADM, D.M. office Bihar Sharif, Nalanda for his kind help.

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