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A preliminary study on diversity of butterflies (Lepidoptera: Macrolepidoptera) in Regional Institute of Education campus, Bhubaneswar, Odisha, India

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Abstract

Butterflies are brightly coloured scaly winged insects of order Lepidoptera and one of the most important flagship species for conservation of invertebrates. A short term survey was conducted for a period of six months within the Regional Institute of Education Campus in order to study the diversity of butterflies and their distribution among respective families, subfamilies and genera. The major objective of this survey is to develop a systematic checklist of butterflies along with adding a preliminary note on their habitat, status and conservation priorities within the study area. During the course of this survey a total of 45 species of butterflies belonging to 5 families, 14 subfamilies and 35 genera were recorded. It was observed that family Nymphalidae is the most dominating family in the study area representing 6 subfamilies, 12 genera and 18 species followed by Lycaenidae with 3 subfamilies, 11 genera and 11 species. Out of 45 species reported here 7 species were found to be included under Indian Wildlife Protection Act, 1972.

Keywords: Butterfly, Regional Institute of Education (RIE) Campus, Bhubaneswar, Macrolepidoptera, Host plants, Conservation

1. Introduction

Butterflies are extremely important group of colourful insects. The trace of their evolution dates back in mid-Eocene epoch, about 40 - 50 million years ago after the appearance of angiosperms. All butterflies are included under group Macrolepidoptera along with some larger moths. They prefer specific habitats and their diversity is restricted to different seasons [10, 16]. They are highly sensitive to environmental alterations so much that they have been considered as excellent bioindicators of climate [2, 5, 7, 19, 24, 25] and can be used as surrogate to assess the conservation threat to the biodiversity [20]. Apart from being bioindicators of climatic changes, butterflies are potential pollinating agents of host plants and their abundance usually indicates a healthier ecosystem [22]. These day flying insects are often confused with their fellow lepidopterans, moths. The main characteristics that differentiate them include club shaped antennae and overlapping rows of tiny scales on their wings [11]. Butterflies are widely distributed, totalling more than 17000 species all over the world [9]. The diverse climate and vegetation of the Indian subcontinent hosts about 1504 species of butterflies and out of which peninsular India hosts about 351 species [23]. Nearly 200 species of butterflies have been reported in Odisha (India) out of which 170 species are found in Bonai forest division of Sundergarh district [13]. The present study is an attempt to record the diversity and dynamics of butterflies of the Regional Institute of Education campus, Bhubaneswar, Odisha.

2. Study Area

Regional Institute of Education (RIE), Bhubaneswar (20°17′20″N & 85°49′57″E) has a total geographic area of approx. 40.7 hectares (407000 sq.mt.) and is located in the mid-urban area. The study area documents more than 500 species of plants which provides a good habitat for wide variety of butterflies. The major plant species belong to family Apocynaceae, Asclepiadaceae, Acanthaceae, Annonaceae, Caesalpiniaceae, Cruciferae, Malvaceae, Mimosaceae, Rubiaceae, Rutaceae, Fabaceae, Poaceae, Euphorbiaceae etc. The study area experiences tropical weather conditions having average annual rainfall of 1,492 mm (58.73 in) with average temperature ranging between 20 °C and 36 °C which provides a favourable

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environment for occurrence of such wide variety of butterflies. The diversity of butterflies in the study area changes across different seasons. The summer season extends from March to May having maximum temperatures often exceeding 40 °C, followed by monsoon season from June to October with temperature range; 25 °C- 32 °C. Winter lasts for about ten weeks from November to February with temperature range; 15 °C- 18 °C. May is the hottest month with daily temperatures ranging from 32 °C- 42°C. December is the coldest month, with temperatures varying from 15 °C- 28 °C.



Fig 1: A satellite overview map showing the location of the study

3. Materials and Methods

The findings reported here are based on the survey conducted for a period of six months from July 2015 to December 2015. During this survey butterflies were observed throughout the Campus in day hours. Maximum species of butterflies were recorded during basking in morning and evening hours except *Melanitis leda* (Common Evening Brown) and *Melanitis phedima* (Dark Evening Brown) which were recorded during night hours as they remain inactive during day time. October and November were found to be best months for recording

maximum number of species. Butterflies were sited and photographed in their natural habitat with the help of digital cameras (Nikon L100 and Olympus E-420). The identification was done with the help of field guides and available literature [1, 3, 4, 13, 14, 18, 21]. The identified species were listed and classified into their respective families, subfamilies and genera. The status of the butterflies was noted according to their number of sightings during survey period. The observed species were further checked for the concerned list of IWPA, 1972 for developing suitable conservation strategies.

4. Results

The present study documents a total of 45 species of butterflies belonging to 5 families, 14 subfamilies and 35 genera (Table 1 and 2, Plate 1, 2, 3 and 4). The maximum number of species were reported from the family Nymphalidae (18 species) which represent 40% of the total butterflies studied in the Campus and least from family Hesperiidae (4 species). Lycaenidae (11 species) was found to be second largest family (24.44%) in the study area followed by Pieridae (15.55%), Papilionidae (11.11%) and Hesperiidae (8.88%) (Table 2, Figure 2). Only one subfamily was recorded under family Papilionidae constituting 2 genera and 5 species while there were 6 subfamilies which were reported under the family Nymphalidae making it the most diverse family in the study area (Table 1). Further it was observed that Nymphalinae (Nymphalidae) and Polyommatinae (Lycaenidae) were found to be most dominating subfamilies each representing 7 species in the study area (Figure 3) and this wide diversity may be attributed to the presence of host plants like Annona sp., Bougainvillea sp., Murraya sp., Hibiscus sp., Tridax sp., Calotropis sp., Lantana camara, Ixora sp., Citrus sp. etc. Among all 45 butterfly species reported, 13(28.88%) were found to be very common, 21(46.66%) were common, 8 (17.77%) were uncommon and 3(6.66%) were rare (Figure 4). The 7 species of butterfly recorded were included under IWPA,1972; Neptis columella, Hypolimnas misippus and Castalius rosimon in Schedule I, Hypolimnas misippus, Euchrysops cnejus and Lampides boeticus in Schedule II and Appias libythea and Euploea core in Schedule IV (Table 1). The status of these species differs from the IWPA list as they were reported in abundant number in the study area.

Table 1: A Checklist of butterflies recorded in the RIE Campus with status.

Family/ Subfamily	Common Name Scientific Name		IWPA 1972	Status							
Papilionidae (02 genera; 05 species)											
	1. Tailed Jay	Graphium agamemnon (Linnaeus, 1758)		C							
	2. Common Jay	Graphium doson (Felder, 1864)		C							
Papilioninae	3. Common Banded Peacock	ed Peacock Papilio crino (Fabricius, 1792)		UC							
	4. Common Lime	4. Common Lime Papilio demoleus (Linnaeus, 1758)		VC							
	5. Common Mormon	Papilio polytes (Linnaeus, 1758)		VC							
Pieridae (06 genera; 07species)											
Colindina	6. Common Emigrant	Catopsilia pomona (Fabricius, 1775)		VC							
Coliadinae	7. Common Grass Yellow	Eurema hecabe (Linnaeus, 1758)		VC							
	8. Striped Albatross	Appias libythea (Fabricius, 1775)	IV	C							
	9. Psyche	Leptosia nina (Fabricius, 1793)		C							
Pierinae	10. Common Wanderer	Pareronia valeria (Cramer, 1776)		C							
	11. Arctic White	Pieris angelika (Eitschberger, 1983)		R							
	12. Cabbage White	Pieris brassicae (Linnaeus, 1758)		UC							
	Nymphalidae (12 genera; 18 species)										
Biblidinae	nae 13. Common Castor Ariadne merione (Cramer, 1777)			UC							
Danaidae	14. Plain Tiger	Danaus chrysippus (Linnaeus, 1758)		VC							
Danaidae	15. Common Indian Crow	Euploea core (Cramer, 1780)	IV	VC							
Heliconiinae	16. Tawny Coster	16. Tawny Coster Acraea violae (Fabricius, 1793)		VC							
Limenitidinae	dinae 17. Common Sergeant Athyma perius (Linnaeus, 1758)			UC							

19. Commander <i>Moduza procris</i> (Cramer, 1777) 20. Great Eggfly <i>Hypolimnas bolina</i> (Linnaeus, 1758)	
20 Great Egofly Hypolimnas holina (Linnaeus, 1758)	UC
20. Great Eggily Hypotimital bottita (Elimacus, 1750)	C
21. Danaid Eggfly <i>Hypolimnas misippus</i> (Linnaeus, 1764) I, II	C
22. Peacock Pansy Junonia almana (Linnaeus, 1758)	C
Nymphalinae 23. Grey Pansy <i>Junonia atlites</i> (Linnaeus, 1763)	С
24. Chocolate Pansy <i>Junonia iphita</i> (Cramer, 1779)	С
25. Lemon Pansy Junonia lemonias (Linnaeus, 1758)	VC
26. Blue Pansy Junonia orithya (Linnaeus, 1758)	С
27. Common Palmfly Elymnias hypermnestra (Linnaeus, 1763)	C
Saturinea 28. Common Evening Brown Melanitis leda (Linnaeus, 1758)	VC
Satyrinae 29. Dark Evening Brown Melanitis phedima (Cramer, 1780)	VC
30. Dark Brand Bush Brown Mycalesis mineus (Linnaeus, 1758)	С
Lycaenidae (11 genera; 11 species)	
Lycaeninae 31. Purple Sapphire <i>Heliophorus epicles</i> (Godart, 1823)	R
32. Common Pierrot Castalius rosimon (Fabricius, 1775) I	С
33. Lime Blue Chilades lajus (Stoll, 1780)	VC
34. Gram Blue Euchrysops cnejus (Fabricius, 1798) II	С
Polyommatinae 35. Indian cupid Everes lacturnus (Godart, 1824)	С
36. Pea Blue Lampides boeticus (Linnaeus, 1767) II	С
37. Striped Pierrot Tarucus nara (Kollar, 1848)	VC
38. Dark Grass Blue Zizeeria karsandra (Moore, 1865)	С
39. Slate Flash Rapala manea (Hewitson, 1863)	UC
Theclinae 40. Monkey Puzzle Rathinda amor (Fabricius, 1775)	UC
41. Common Silverline Spindasis vulcanus (Fabricius, 1775)	С
Hesperiidae (04 genera; 04 species)	
42. Chestnut Bob Iambrix salsala (Moore, 1865)	С
Hesperiinae 43. Oriental Straight Swift <i>Parnara guttatus</i> (Bremer & Grey, 1852)	VC
44. Indian Palm Bob Suastus gremius (Fabricius, 1798)	R
Heteropterinae 45. Grass Demon <i>Udaspes folus</i> (Cramer, 1775)	UC

Abbreviations-VC-Very Common (50-70 sightings), C-Common (30-50 sightings), UC-Uncommon (5-30 sightings), R-Rare (1-5 sightings); IWPA- Indian Wildlife Protection Act, 1972.

Table 2: Distribution of Genera and Species of butterflies in their respective families and subfamilies.

Sl. No.	Family	Subfamily	No. of Genera		%	No. of Species		%
1.	Papilionidae	Papilioninae	2		5.7	5		11.11
2.	Pieridae	Coliadinae	2	- 6	17.14	2	7	15.55
		Pierinae	4			5		
3.	Nymphalidae	Biblidinae	1	12	34.28	1	18	40
		Danaidae	2			2		
		Heliconiinae	1			1		
		Limenitidinae	3			3		
		Nymphalinae	2			7		
		Satyrinae	3			4		
4.	Lycaenidae	Lycaeninae	1	11	31.42	1	11	24.44
		Polyommatinae	7			7		
		Theclinae	3			3		
5.	Hesperiidae	Hesperiinae	3	4	11.42	3	4	8.88
		Heteropterinae	1			1		

Total no. of Genera: 35; Total no. of Species: 45

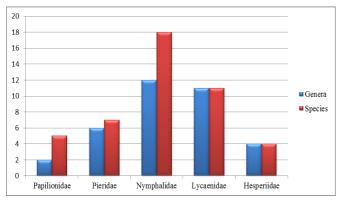


Fig 2: Graph showing family-wise distribution of butterflies in RIE, Campus

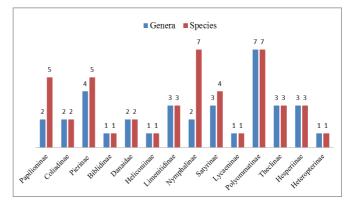


Fig 3: Graph showing Subfamily-wise distribution of butterflies in RIE, Campus.

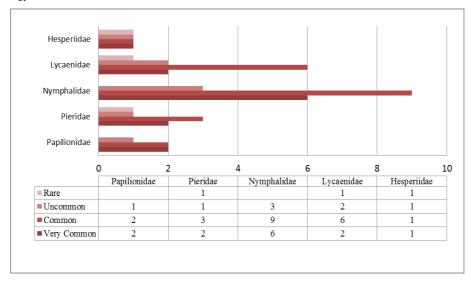


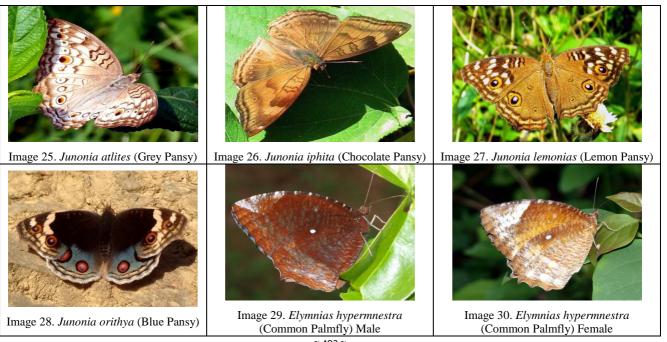
Fig 4: Graph showing status of butterflies in RIE, Campus.



Plate 1: Photographs of Butterflies recorded in RIE Campus, Bhubaneswar-Image: 1-6, Papilionidae; 7-12, Pieridae.



Plate 2: Photographs of Butterflies recorded in RIE Campus, Bhubaneswar-Image: 13-14, Pieridae; 15-24, Nymphalidae.



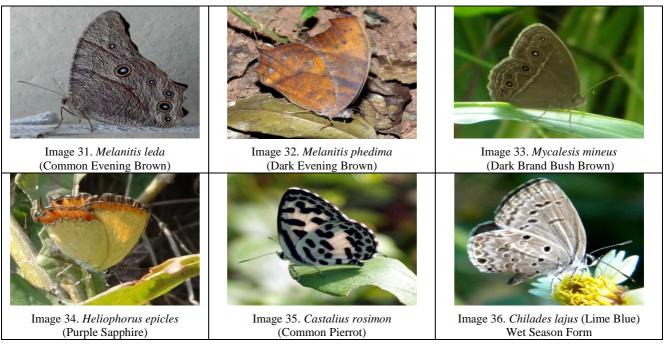


Plate 3: Photographs of Butterflies recorded in RIE Campus, Bhubaneswar-Image: 25-33, Nymphalidae; 34-36 Lycaenidae.



Plate 4. Photographs of Butterflies recorded in RIE Campus, Bhubaneswar-Image: 37-44, Lycaenidae; 45-48, Hesperiidae.

5. Discussion

During present study, all five butterfly families, Papilionidae-Swallowtails and Apollos, Pieridae-Whites and Yellows, Nymphalidae- Brush footed butterflies, Lycaenidae-Blues and Hesperiidae - Skippers were reported in the study area. Papilio demoleus, Papilio polytes, Catopsilia pomona, Eurema hecabe, Danaus chrysippus, Euploea core, Acraea violae, Junonia lemonias, Melanitis leda, Melanitis phedima, Chilades lajus, Tarucus nara and Parnara guttatus were found to be the most commonly occurring butterflies in the observed area. It was observed that the most of the species belong to family Nymphalidae. Such rich diversity might be attributed to their polyphagous nature, body size and active flying abilities [6, 8]. Family Hesperiidae documents least number of species as the members of this family are highly site specific, shade loving and prefer specific host plants. The species belonging to the family Lycaenidae were found to be closely associated with the plants belonging to family Fabaceae, Rubiaceae, Caesalpiniaceae, Mimosaceae and Rutaceae. Singh (2011) [21] described Nymphalidae as the most diverse family in India representing 522 species of butterflies, followed by Lycaenidae (443 species), Pieridae (109 species), Papilionidae (107 species) and Hesperiidae (321 species). In Odisha, few studies have been done in this area and among those most of them were found to be restricted to reserves, sanctuaries and zoos. In a survey conducted by Nair (2007) [15] in Similipal Tiger Reserve, a total of 106 species of butterflies belonging to 5 families and 15 sub-families were recorded representing Nymphalidae as the most dominating family with 42 species. Palei and Rath (2014) [17] studied the species diversity of butterflies of Sunabeda Wildlife Sanctuary and reported 40 species belonging to Family Nymphalidae. Nandankanan Wildlife Sanctuary (Bhubaneswar) documented 92 species belonging to 68 genera [12]. All these studies were found to be similar with the present observations describing the Nymphalidae as the most dominant group of butterflies among all five families in Odisha.

6. Conclusion

The study area supports a rich diversity of butterflies accounting wide variety of plants which provide them an ideal breeding habitat. It is estimated that there may be more than 80 species of butterflies within the campus. As they are specific to different seasons and this survey is done for only six months, it is difficult to collect, preserve, photograph and identify all species in the study area. The present study is an attempt to prepare a checklist of butterfly species in the study area which will be subjected to continue updating for future reference.

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8. References

- 1. Arun PR. Butterflies of Siruvani forest of Western Ghats, with notes on their seasonality. Zoos Print Journal. 2002; 18(2):1003-1006.
- 2. Barlow J, Overal WL, Araujo IS, Gardner TA, Carlos AP. The value of primary, secondary and plantation forests for fruit-feeding butterflies in the Brazilian Amazon. Journal of Applied Ecology. 2007; 44:1001-1012.

- 3. Bora A, Meitei LR. Diversity of butterflies (Order: Lepidoptera) in Assam University Campus and its vicinity, Cachar district, Assam, India 2014; 5(3):328-339.
- 4. Chinery M. Collins gem: Butterflies. Harper Collins Publishers Limited: London, 2012.
- 5. Das J, Parida SP. Preliminary study of butterfly species variation in FRI Campus in accordance to its micro climatic condition. Current Life sciences, 2015; 1(3):112-117.
- 6. Eswaran R, Pramod P. Structure of butterfly community of Anaikatty hills Western Ghats. Zoo's print Journal. 2005; 20:1939-1942.;
- Kocher SD, Williams EH. The diversity and abundance of North American butterflies vary with habitat disturbance and geography. Journal of Biogeography. 2000; 27:785-794.
- 8. Krishnakumar N, Kumaraguru A, Thiyagesan K, Asokan S. Diversity of papilionid butterflies in the Indira Gandhi Wildlife Sanctuary, Western Ghats, Southern India. Tiger Paper 2008; 35:1-8.
- 9. Kumar A. Butterfly abundance and species diversity in some urban habitats. International Journal of Advanced Research, 2014; 2(6):367-374.
- 10. Kunte K. Seasonal patterns in butterfly abundance and species diversity in four tropical habitats in the Northern Western Ghats. Journal of Bioscience. 1997; 22:593-603.
- 11. McGavin GC, Sorkin LN, Gorton S. Smithsonian Handbooks Insects: Spiders and Other Terrestrial Arthropods. American Museum of Natural History, New York. Published by Dorling Kindersley, 2002, 158-177.
- 12. Mishra S, Mahapatra PK, Sinha S, Nayak HP, Mishra AK, Nair MV *et al.* Butterflies Diversity of Nandankanan Wildlife Sanctuary, Odisha, India. E-planet, 2010; 8(1):31-37.
- 13. Mohapatra PP, Sarkar V, Mishra AK, Nair MV. A field guide for beginners. Butterflies of Bonai, Odisha. Published by Odisha Forestry Sector Development Project, 2012.
- 14. Nair AV, Mitra P, Aditya S. Studies on the diversity and abundance of butterfly (Lepidoptera: Rhopalocera) fauna in and around Sarojini Naidu College Campus, Kolkata, West Bengal, India, 2014.
- 15. Nair MV. Butterflies of Similipal Tiger Reserve: A preliminary study on species diversity, species composition and habitat preference, e-planet 2007; 5(1):76-81.
- Padhye AD, Dahanukar N, Paingankar M, Deshpande M, Deshpande D. Season and Landscape wise distribution of butterflies in Tamhini, Northern, Western Ghats, India. Zoos' Print Journal. 2006; 21(3):2175-2181.
- 17. Palei NC, Rath BP. Butterflies Diversity of Sunabeda Wildlife Sanctuary, Odisha. Journal of Entymology and Zoological Studies. 2014; 2(2):39-44.
- 18. Patil KG, Shende AV. Butterfly diversity of Gorewada International Biopark, Nagpur, Central India. Arthropods, 2014; 3(2):111-119.
- Parmesan C. Butterflies as bioindicators for climate change effects. In: C.L. Boggs, W.B. Watt & P.R. Ehrlich (eds.) Evolution and Ecology Taking Flight: Butterflies as Model Systems. University of Chicago Press, Chicago, 2003 541-560.
- Shobana G, Gunasekaran C, Lena M, Agnes DA, Sharmila BA. Diversity and abundance of butterflies in Villupuram District, Tamil Nadu, South India.

- International Journal of Recent Scientific Research. 2012; 3(7):637-639.
- 21. Singh AP. Butterflies of India. Published by Om Books International, 2011.
- 22. Tiple AD, Deshmukh VP, Dennis RLH. Factors influencing nectar plant resource visits by butterflies on a university campus: implications for conservation. Nota Lepidopteralogica, 2006, 213-224.
- 23. Tiple AD. Butterflies of Vidarbha region, Maharashtra State, central India. Journal of Threatened Taxa. 2011; 3(1):1469-1477.
- 24. Williams PH, Gaston KJ. Biodiversity indicators: Graphical techniques, smoothing and searching for what makes relationships work. Ecorgraphy, 1998; 21(5):551-560
- 25. Venkata Ramana SP. Biodiversity and Conservation of Butterflies in the Eastern Ghats. The Ecoscan, 2010; 4(1):59-67.