

Article

Butterfly diversity of Gorewada International Bio-Park, Nagpur, Central India

Kishor G. Patil¹, Virendra A. Shende²

¹Department of Zoology, Institute of Science, R. T. Marg, Nagpur (M.S.), India

²K. Z. S. Science College, Bramhani-Kalmeshwar, Dist- Nagpur (M.S.), India

E-mail: virushende@gmail.com

Received 11 February 2014; Accepted 15 March 2014; Published online 1 June 2014



Abstract

Gorewada international bio-park is a good habitat for biodiversity of butterflies. Its geographical location is 21°11'N 79°02'E. Butterfly watching and recording was done in such a way that there should be least one visit in each line transect during a week with the aid of binocular and digital cameras. Total 92 species of butterflies were recorded belonging to 59 genera and 5 families. Out of total 92 butterfly species 48.92%, 38.04% and 13.04% are common, occasional and rare species respectively. Nymphalidae family is consisting of maximum number of genera and species. Maximum species richness reported from July to January and its number decline from late March to last week of June. The present study will encourage the conservation of a wide range of indigenous butterfly species in an area.

Keywords butterfly; Lepidoptera; biodiversity; Gorewada.

Arthropods
ISSN 2224-4255
URL: <http://www.iaees.org/publications/journals/arthropods/online-version.asp>
RSS: <http://www.iaees.org/publications/journals/arthropods/rss.xml>
E-mail: arthropods@iaees.org
Editor-in-Chief: WenJun Zhang
Publisher: International Academy of Ecology and Environmental Sciences

1 Introduction

The flora and fauna that form today's biodiversity are a snapshot of the earth's 3.8 billion year history of life, representing just 0.1% of all the species that have lived on earth. Thus 99.9% or virtually all of life that has existed on earth has gone extinct (Raup, 1991). Thomas et al. (2004) compared species losses of British butterflies, birds, and plants and found that loss of butterfly species has been greater than that of birds and plants; current rates of species disappearance represent the sixth major extinction event through time.

Butterflies are providing the best rapid indicators of habit quality and they are the sensitive indicators of climatic change (VenkataRamana, 2010). In the world, about 19,238 species were documented by Heppner (1998). There were about 1,504 species of butterflies in Indian subcontinent (Gaonkar, 1996; Smetacek, 1992). In central India, about 177 species of butterflies were reported in the Central Provinces (Vidarbha, Madhya Pradesh and Chattisgarh) by D'Abreau (1931). In Vidarbha region, Tiple (2011) was compiled and records of 167 species of butterflies belonging to 90 genera representing 5 families.

Gorewada is a developing international bio-park situated in Nagpur. It is a good habitat for biodiversity of butterflies. It is situated at North-West of Nagpur city and its geographical location is 21°11'N 79°2'E. It is basically divided into African Safari, Biopark, Energy Plaza, Trails, Indian Safari, Height Safari, Rescue Safari and Gorewada Reservoir. Reservoirs catchment area is approx. 11 sq. mile (17,702.74 sqm.). Biodiversity of odonates of this park have been recently reported (Shende and Patil, 2013; Patil et al., 2014). In spite of its global significance, studies of butterfly diversity of Gorewada International Park have not been recently undertaken.

Since, the main objective of this study has been conduct preliminary observation of butterflies and carried out the checklist, occurrence and richness inhabiting the Gorewada International Park.

2 Material and Methods

The present study has been carried out for a period of two year from March 2011 to February 2013. Butterfly watching and recording has been done during Sunday and holidays in such a way that there should be least one visit in each line transect during a week. The observations were made with the aid of binocular and digital cameras.

Observations were made through walking transects (Pollard, 1993; Caldas and Robbins, 2003) of 0.5 km to 0.7 km length with 2 m to 5 m on either side. The present study is based on 4 line transects to study the butterfly population. The sites were visited in morning and evening hours to note maximum possible species of butterflies and record its activities. The recorded species are identified with the help of photographs by using reference books and publications.

3 Results

A checklist of butterflies of Gorewada International Park has been prepared based on the present study (Table 1-3; Fig. 1-4). Total 92 species of butterflies were recorded belonging to 59 genera and 5 families. The family Papilionidae, Pieridae, Nymphalidae, Lycaenidae and Hesperidae were consisted of 3 genera and 7 species; 8 genera and 14 species; 22 genera and 35 species; 18 genera and 26 species and 8 genera and 10 species respectively (Fig. 1 and 2). A maximum number of species were belong to family- Nymphalidae (35) followed by Lycaenidae (26), Pieridae (14), Hesperidae (10) and minimum number of species were noted in family- Papilionidae (7). These 5 families were contributed 59 genera. The largest number of genera were reported in family- Nymphalidae (22) followed by Lycaenidae (18), Hesperidae and Pieridae (8), and minimum number of genera (3) were reported in family- Papilionidae (Tables 1 and 3).

In the present study out of total 92 butterfly species, 45 (48.92%) were common, 35 (38.04%) were occasional and 12 (13.04%) were rare species (Table 2 and Fig. 1). Species richness is reported from July to January and its number start decline from late March to last week of June.

Table 1 Butterflies of Gorewada International Bio-Park.

S. N.	Family	Generic Name	Common Name	Status
1.	Papilionidae (03 genera; 07 species)	<i>Graphium Agamemnon</i> (Linnaeus)	Tailed jay	C
		<i>Graphium doson</i> (Felder)	Common jay	C
		<i>Pachliopta aristolochiae</i> (Fabricius)	Common rose	C
		<i>Pachliopta hector</i> (Linnaeus)	Crimson rose	O
		<i>Papilio demoleus</i> (Linnaeus)	Lime butterfly	C
		<i>Papilio polymnestor</i> (Cramer)	Blue mormon	O
		<i>Papilio polytes</i> (Linnaeus)	Common mormon	O
2.	Pieridae (08 genera; 14 species)	<i>Anaphaeis aurota</i> (Fabricius)	Pioneer	C
		<i>Appias albino</i> (Boisduval)	Common albatross	O
		<i>Appias libythea</i> (Fabricius)	Eastern stripped albatross	O
		<i>Catopsilia Pomona</i> (Fabricius)	Common emigrant	C
		<i>Catopsilia pyranthe</i> (Linnaeus)	Mottled emigrant	C
		<i>Cepora nerissa</i> (Fabricius)	Common gull	C
		<i>Delias eucharis</i> (Linnaeus)	Common jazelbel	R
		<i>Eurema andersonii</i> (Moore)	One spot grass yellow	C
		<i>Eurema blanda</i> (Boisduval)	Three spot grass yellow	O
		<i>Eurema brigitta</i> (Cramer)	Small grass yellow	C
		<i>Eurema hecabe</i> (Linnaeus)	Common grass yellow	C
		<i>Eurema laeta</i> (Boisduval)	Spotless grass yellow	R
		<i>Gandaca harina</i> (Moore)	Tree yellow	O
<i>Pareronia valeria</i> (Cramer)	Common wanderer	C		
3.	Nymphalidae (22 genera; 35 species)	<i>Acraea violae</i> (Fabricius)	Tawny coster	C
		<i>Ariadne ariadne</i> (Linnaeus)	Angled castor	C
		<i>Ariadne merione</i> (Cramer)	Common castor	C
		<i>Athyma perius</i> (Linnaeus)	Common sergeant	O
		<i>Byblia ilithyia</i> (Drury)	Joker	R
		<i>Danaus chrysippus</i> (Linnaeus)	Plain tiger	C
		<i>Danaus genutia</i> (Cramer)	Striped tiger	C
		<i>Euploea core</i> (Cramer)	Common Indian crow	C
		<i>Euripus nyctelius</i> (Doubleday)	Courtesam	R
		<i>Euthalia aconthea</i> (Cramer)	Common baron	O
		<i>Hypolimnna bolina</i> (Linnaeus)	Great eggfly	C
		<i>Hypolimnna misippus</i> (Linnaeus)	Danaid eggfly	O
		<i>Junonia almana</i> (Linnaeus)	Peacock pansy	C
		<i>Junonia atlites</i> (Linnaeus)	Grey pansy	C
		<i>Junonia iphita</i> (Cramer)	Chocolate pansy	C
		<i>Junonia lemonias</i> (Linnaeus)	Lemon pansy	C
		<i>Junonia orithya</i> (Linnaeus)	Blue pansy	C
		<i>Lethe europa</i> (Fabricius)	Bamboo tree brown	R
		<i>Melanitis leda</i> (Linnaeus)	Common Evening brown	C
		<i>Melanitis phedima</i> (Cramer)	Dark Evening brown	O
		<i>Melanitis zitenius</i> (Herbst)	Great Evening brown	O
		<i>Moduza procris</i> (Cramer)	Commander	C
		<i>Mycalesis mineus</i> (Linnaeus)	Dark branded bushbrown	O
		<i>Mycalesis perseus</i> (Fabricius)	Common bushbrown	C
		<i>Mycalesis visala</i> (Moore)	Longbrand bushbrown	O
		<i>Neptis hylas</i> (Linnaeus)	Common sailer	C
		<i>Parantica aglea</i> (Stoll)	Glassy tiger	O
		<i>Phalanta phalantha</i> (Drury)	Common leopard	R
		<i>Symphaedra nais</i> (Forster)	Baronet	C
		<i>Tirumala limniace</i> (Cramer)	Blue tiger	C
		<i>Tirumala septentrionis</i> (Butler)	Dark blue tiger	O

		<i>Ypthima asterope</i> (Klug)	Common three ring	R
		<i>Ypthima baldus</i> (Fabricius)	Common five ring	R
		<i>Ypthima heubneri</i> (Kirby)	Common four ring	R
		<i>Ypthima inica</i> (Hewitson)	Lesser three ring	O
4.	Lycaenidae (18 genera; 26 species)	<i>Acytolepis puspa</i> (Horsfield)	Common hedge blue	C
		<i>Azanus jesous</i> (Guérin–Menéville)	African babul blue	O
		<i>Azanus ubaldus</i> (Stoll)	Velvet-spotted Blue	O
		<i>Castalius rosimon</i> (Fabricius)	Common pierrot	C
		<i>Celastrina lavendularis</i> (Moore)	Plain hedge blue	C
		<i>Chilades laius</i> (Stoll)	Lime blue	O
		<i>Chilades pandava</i> (Horsfield)	Plains cupid	C
		<i>Chilades parrhasius</i> (Fabricius)	Small cupid	O
		<i>Chilades trochylus</i> (Freyer)	Grass jewel	C
		<i>Catochrysops panormus</i> (Distant)	Silver Forget-me-not	O
		<i>Catochrysops strabo</i> (Fabricius)	Forget-me-not	C
		<i>Euchrysops cnejus</i> (Fabricius)	Gram blue	O
		<i>Freyeria putli</i> (Kollar)	Oriental grass jewel	O
		<i>Jamides bochus</i> (Stoll)	Dark cerulean	R
		<i>Jamides celeno</i> (Cramer)	Common cerulean	C
		<i>Lampides boeticus</i> (Linnaeus)	Pea blue	O
		<i>Leptotes plinius</i> (Fabricius)	Zebra blue	C
		<i>Prosotas nora</i> (Felder)	Common line blue	C
		<i>Pseudozizeeria maha</i> (Kollar)	Pale grass blue	R
		<i>Surendra vivarna</i> (Hewitson)	Common acacia blue	O
		<i>Tarucus nara</i> (Kollar)	Rounded pierrot	C
		<i>Tarucus venosus</i> (Moore)	Vained pierrot	O
		<i>Virachola Isocrates</i> (Fabricius)	Common guava blue	R
		<i>Zizeeria karsandra</i> (Moore)	Dark grass blue	C
		<i>Zizina otis</i> (Fabricius)	Lesser grass blue	C
		<i>Zizula hylax</i> (Fabricius)	Tiny grass blue	C
5.	Hesperiidae (08 genera; 10 species)	<i>Baoris farri</i> (Moore)	Paint brush swift	O
		<i>Barbo cinnara</i> (Wallace)	Rice swift	C
		<i>Matapa aria</i> (Moore)	Common red eye	O
		<i>Oriens goloides</i> (Moore)	Common dartlet	O
		<i>Pelopidas mathias</i> (Fabricius)	Small Branded swift	O
		<i>Pelopidas subochracea</i> (Moore)	Large Branded swift	O
		<i>Saustus gremius</i> (Fabricius)	Indian palm bob	O
		<i>Telicota ancilla</i> (Herrich-Schäffer)	Dark palm dart	C
		<i>Telicota colon</i> (Fabricius)	Pale palm dart	O
		<i>Udaspes folus</i> (Cramer)	Grass demon	O
	Families- 05	No of Genera-59	No of species-92	

Abbreviations- C- Common; O- Occasional; R- Rare

Table 2 Status of Butterflies of Gorewada International Bio-Park.

S.N.	Status	No. of species	% of species
1.	Common	45	48.91
2.	Occasional	35	35.72
3.	Rare	12	11.90
		92	100.00

Table 3 Distribution of genera and species of Butterflies in respective families.

S.N.	Family	No. of Genera	No. of Species
1.	Papilionidae	03	07
2.	Pieridae	08	14
3.	Nymphalidae	22	35
4.	Lycaenidae	18	26
5.	Hesperiidae	08	10
	05	59	92

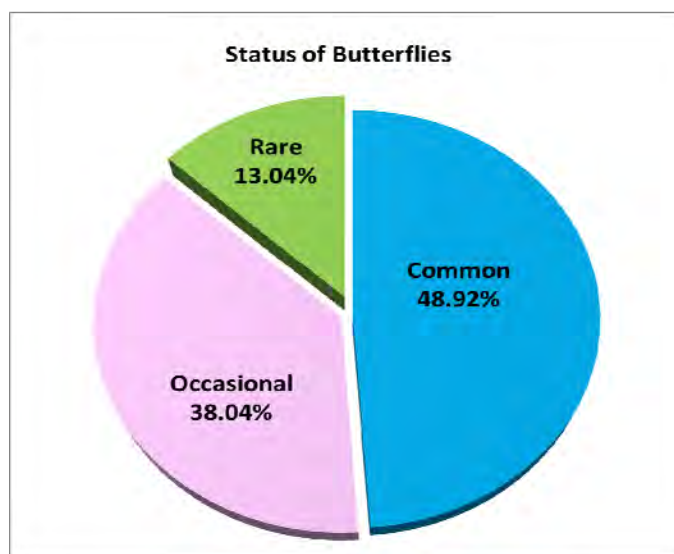


Fig. 1 Status of butterflies.



Fig. 2 Distribution of genera and species of butterflies in respective families.



Fig. 3 Diversity of butterflies (A)- 1. *Graphium doson* (Common Jay); 2. *Pachliopta hector* (Crimson Rose); 3. *Papilio demoleus* (Lime Butterfly); 4. *Papilio polytes* (Common Mormon); 5. *Catopsilia pomona* (Common Emigrant); 6. *Catopsilia pyranthe* (Mottled emigrant); 7. *Delias eucharis* (Common Jezebel); 8. *Eurema hecabe* (Common grass yellow); 9. *Acraea violae* (Tawny Coster); 10. *Ariadne ariadne* (Angled Castor); 11. *Ariadne merione* (Common Castor); 12. *Byblia ilithyia* (Joker); 13. *Danaus chrysippus* (Plain Tiger); 14. *Danaus genutia* (Striped Tiger); 15. *Euploea core* (Common Indian Crow) and 16. *Euthalia aconthea* (Common Baron).



Fig. 4 Diversity of butterflies (B)- 17. *Hypolimnas bolina* (Great Eggfly); 18. *Hypolimnas misippus* (Danaid Eggfly); 19. *Junonia almana* (Peacock Pansy); 20. *Junonia atlites* (Grey Pansy); 21. *Junonia lemonias* (Lemon pansy); 22. *Junonia orithya* (Blue Pansy); 23. *Melanitis leda* (Common evening brown); 24. *Melanitis phedima* (Dark Evening Brown); 25. *Parantica aglea* (Glassy Tiger); 26. *Phalanta phalantha* (Common leopard); 27. *Tirumala limniace* (Blue Tiger); 28. *Azanus ubaldus* (Velvet-spotted Blue); 29. *Catochrysops strabo* (Forget-me-not); 30. *Jamides celeno* (Common Cerulean); 31. *Pelopidas mathias* (Small Branded swift) and 32. *Pelopidas subochracea* (Large branded Swift).

4 Discussion

In the present study, total 92 species of butterflies were recorded belonging to 59 genera and 5 families. Family- Nymphalidae was the largest family comprised of maximum number of genera (22) and species (35). Earlier D'Abreu (1931) was documented 91 butterfly species in Nagpur city; Later on Pandharipande (1990) recorded 61 species of butterflies at Nagpur city (Seminary Hills, Telangkhedi Lake and Garden, University Campus, Maharajbagh, Gandhibag Garden, Shukrawari Lake, Dhantoli Garden, Ambazari Lake Garden and Airport) including Gorewada Lake and Garden. He agreed with the present observations regarding occurrence of maximum species in a family and reporting season of butterflies.

Tiple and Khurad (2009) were recorded total 145 species of butterflies in and around Nagpur City at the eight study sites (Seminary Hills, Satpuda Botanical Garden, Agricultural Land and Bull Rearing Center, R.T.M. Nagpur University and L.I.T. Campus, Ambazari Garden and Bare Land at Lake Side, Sides of National Highway, Maharaj Bag and Futala Farm Area). The highest number of butterflies was recorded belonging to the Nymphalidae (51 species) followed by Lycaenidae (46 species), Hesperidae (22 species), Pieridae (17 species) and Papilionidae (9 species). The study revealed that Nymphalidae was most dominating family with a highest number of species and most butterfly species were observed from the monsoon to early winter but thereafter declined in early summer (Kunte, 1997).

Guptha et al. 2012 recorded a total of 50 species of butterflies belonging to 5 families in Seshachalam Biosphere Reserve, Eastern Ghats Andhra Pradesh, India. The family Nymphalidae (20 species) was found dominant followed by Lycaenidae (12 species), Pieridae (11 species), Papilionidae (5 species) and Hesperidae (2 species).

In eastern part of Western Ghats, Murugesan and Muthusamy (2013) surveyed 103 individual butterfly species belonging to 5 families namely Nymphalidae (32), Pieridae (23), Lycaenidae (19), Hesperidae (15) and Papilionidae (14), which revealed that Nymphalidae and Pieridae were the rich dominant families, while Hesperidae and Papilionidae were less dominant; similar to the present observations. High incidences of butterfly population with wide distribution were observed during the months of March-April and the monsoon seasons (September - November) which diminish during December-January. All the observations are similar with the present observations, except species richness season in eastern part of Western Ghats, may be due to geographic and climatic variations.

5 Conclusion

The present research have concludes by systematically studied butterfly biodiversity and prepared a checklists and catalogs in the study area. Family-Nymphalidae carries the maximum number of species than other families. Species richness season of butterflies in Central part of India is different than that of eastern part of Western Ghats. This study would be useful to conserve wide range of indigenous butterfly species in an area.

References

- Caldas A, Robbins R. 2003. Modified Pollard transects for assessing tropical butterfly abundance and diversity. *Biological Conservation*, 110: 211-219
- D'Abreu EA. 1931. The Central Provinces Butterfly List. Records of the Nagpur Museum Number VII. Government Printing Press, Nagpur. India
- Gaonkar H. 1996. Butterflies of Western Ghats with notes on those of Sri Lanka. A Report to the Center of Ecological Sciences. Indian Institute of Science, Bangalore, Zoological Museum, Copenhagen and Natural History Museum, London, UK

- Guptha MB, Chalapathi RPV, Srinivas RD, et al. 2012. A preliminary observation on butterflies of Seshachalam Biosphere Reserve, Eastern Ghats Andhra Pradesh, India. *World Journal of Zoology*, 7(1): 83-89
- Heppner J. 1998. Classification of Lepidoptera- Part I Introduction. *Holarctic Lepid*, 5: 148
- Kunte KJ. 1997. Seasonal patterns in butterfly abundance and species diversity in four tropical habitats in northern Western Ghats. *Journal of Biosciences*, 22 (5): 593-603
- Murugesan S, Muthusamy M. 2011. Patterns of butterfly biodiversity in three tropical habitats of the eastern part of Western Ghats. *Journal of Research in Biology*, 1(3): 217-222
- Pandharipande TN. 1990. Butterflies from Nagpur City, Central India (Lepidoptera: Rhopalocera). *Journal of Research on the Lepidoptera*, 29(1-2): 157-160
- Patil KG, Shende VA, Uke SB. 2014. Diversity of damselflies (Zygoptera) in Gorewada International Bio-Park, Nagpur, Central India. *Arthropods*. 3(1): 80-87
- Pollard E, Yates TJ. 1993. *Monitoring Butterflies for Ecology and Conservation*. Chapman & Hall, London, UK
- Raup DM. 1991. Extinction: Bad Genes or Bad Luck? Life on Earth. In: *An Encyclopedia of Biodiversity, Ecology and Evolution Volume-1 A-G*. W.W. Norton, New York, USA
- Shende VA, Patil KG. 2013. Diversity of dragonflies (Anisoptera) in Gorewada International Bio-Park, Nagpur, Central India. *Arthropods*, 2(4): 200-207
- Smetacek, P. 1992. Record of *Plebejuse versmanni* (Stgr.) from India. *Journal of the Bombay Natural History Society*, 89: 385-386
- Thomas JA, Telfer MG, Roy DB, et al. 2004. Comparative losses of British butterflies, birds, and plants and the global extinction crisis. *Science*, 303: 1879-1881
- Tiple AD. 2011. Butterflies of Vidarbha region, Maharashtra State, central India. *Journal of Threatened Taxa*, 3(1): 1469-1477
- Tiple AD, Khurad AM. 2009. Butterfly Species Diversity, Habitats and Seasonal Distribution in and Around Nagpur City, Central India, *World Journal of Zoology*, 4(3): 153-162
- VenkataRamana SP. 2010. Biodiversity and Conservation of Butterflies in the Eastern Ghats. *The Ecoscan*, 4(1): 59-67