ISSN NO. 2320-5407

Journal homepage: http://www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH

RESEARCH ARTICLE

A PRELIMINARY SURVEY OF BUTTERFLY DIVERSITY IN KOLAMARKA CONSERVATION RESERVE, CENTRAL INDIA

Atul Deokar[1], Prabhu Nath Shukla[2]

1. Range Forest Officer, Sironcha Forest Division, Gadchiroli, Maharashtra, India
2. Deputy Conservator of Forest, Sironcha Forest Division, Gadchiroli, Maharashtra, India

Manuscript Info

Manuscript History:

Received: 12 June 2015
Final Accepted: 12 July 2015
Published Online: August 2015

Key words:

Butterfly, diversity, Central India

Corresponding Author

Atul Deokar

Abstract

Butterfly play very crucial ecological role as a pollinator in any ecosystem and are being increasingly recognized as an ecological indicator. In present study, a preliminary survey of butterfly diversity in Kolamarka Conservation Reserve located in Central India was conducted. Total 65 spp. belonging to 46 genus and five families (Papillionidae, Pieridae, Nymphalidae, Lycaenidae, Hesperiidae) were recorded. Highest representation was from Nymphalidiae and lowest from Hesperididae. Out of total, 35 spp. were common, 23 spp. were uncommon and 7 spp. were rare. Crimson Rose (*Pachliopta hector* Linnaeus) and Danaid Eggfly (*Hypolimnas missipus* Linnaeus) listed in the schedule I and Common Gull (*Cepora nerissa* Fabricius) listed in the schedule II of the Wildlife Protection Act, 1972 of the India providing them highest level of the protection in the country were also reported. Exclusively from the open forest, 28 spp. and from the dense forest 24 spp. were reported. Maximum species were recorded during winter and minimum during summer season.

INTRODUCTION

Butterflies have always fascinated common man because of their exquisite color and delicacy (Arya et al., 2014). Their role as pollinator comes just after bee. They are extremely responsive to any changes in their environment viz., temperature, humidity, light, and rainfall patterns (Sparrow et al., 1994; Spitzer et al., 1997; Brereton et al., 2011), thus are equipped to react any disturbance and change in habitat which make them an ideal ecological indicator (MacNally and Flesishman, 2004, Fleishman et al., 2005; Kumar, 2012). Besides, they require different host plants and habitat types for mating, breeding, and nectaring (Kunte, 1997) and thus may indicate diversity and quality of their habitats (Harsh, 2014). Due to these attributes, butterflies may act as an umbrella species for conservation planning and management (Fleishman et al., 2000, 2001; Betrus et al., 2005; Padhye et al., 2012).

The Indian sub-region hosts about 1504 species of butterflies (Gaonkar, 1996; Smetacek, 1992; Kunte, 2009; Roy et al. 2010; Tiple, 2011), which is close to $1/5^{th}$ of the total butterfly species (~17200 spp.) in the world (Kunte, 2000). In central India, 177 spp. of butterflies have been reported by D'Abreau (1931), while Tiple (2011) reported 166 spp. from Vidarbha, a sub-region of the Central India. However, still a systematic study of butterflies has not been carried out in many regions of the central India having potential to sustain high biodiversity (Rajagopal et al., 2011).

Present study is an effort to survey the butterfly diversity in Kolamarka Conservation Reserve (KCR) aimed at conserving Asiatic wild buffalo and located in Central India. The area having typical monsoon type of climate is covered with southern tropical mixed deciduous forest (Champion and Seth, 1968) with density varying from 0.4 to 0.9.

RESULTS AND DISCUSSION

Total 65 species belonging to 46 genus were recorded during the study (Table 1). Out of five families (Papillionidae, Pieridae, Nymphalidae, Lycaenidae, Hesperiidae) in which they fall, Nymphalidiae accounted for 46.2% (30 spp.) followed by Lycenidae with total 13 spp. (20% of total record) (Table 2). Lowest species were represented from Hesperididae (5 species, 8% of total species). According to earlier reports also, family Nymphalidae was most predominant in the grassland, open scrub forest, bamboo groves, moist deciduous forest and evergreen forest (Mathew and Rahamathulla, 1993; Rajagopala et al., 2011; Kumar, 2012; Harsh, 2014; Patil and Shende, 2014). Low level of representation from family Hesperidae may be due to the sampling bias, since Hesperids exhibits crepuscular habit, i.e. they are active in the early morning and to a less extent in the evening (Rajagopala et al., 2011).

Tiple (2011) listed out 167 species of butterflies belonging to 90 genera representing 5 families from Vidarbha region in which study area falls. With reference to above work, six new butterfly species were recorded in present work namely Common Banded Peacock (*Papilio crino* Fabricius), Common Lascar (*Pantoporia hordonia* Stoll), Common Palmfly (*Elymnias hypermnestra* Linnaeus), Grey Count (*Tanaecia lepidea* Butler), Lime Blue (*Chilades laius* Stoll), and Monkey puzzle (*Rathinda amor* Fabricus). Besides, Common Evening Brown butterfly (*Melanitis leda* Linnaeus) was found to show six different forms (Figure 1).

Out of total 65 spp., 35 spp. were tagged as common, 23 spp. were uncommon and 7 spp. were rare (Table 1). Crimson Rose (*Pachliopta hector* Linnaeus), Danaid Eggfly (*Hypolimnas missipus* Linnaeus) have been included in the schedule I of the Wildlife Protection Act, 1972 of the India providing highest level of the protection in the country to these species while Common Gull (*Cepora nerissa* Fabricius) comes under the schedule II of the same act providing next level of the protection.

In the present study, 28 sp were reported exclusively from the open forest while, 24 species exclusively from the dense forest (Table 1). Out of 65 sp, 14 sp were present in both types of the forest. In many other studies also, higher butterfly diversity was reported in disturbed habitat or forest gaps compared to dense forest or closed canopy (Hill et al., 2001; Padhey et al., 2006, Kunte, 2001 and Tiple et al., 2007; Kumar, 2012; Arya et al., 2014). It can be attributed to more gaps and edges in the areas suffering higher biotic interference. Later may result into more light and space supporting higher plants diversity which may ultimately provide higher butterfly diversity (Spitzer et al., 1997; Blair and launer, 1997; Hamer et al., 1997).

Results indicated maximum number of butterfly species during winter season probably due to the availability of more host plants (Rajagopal et al., 2011). Minimum number of butterfly species was recorded during summer season. It was contrary to some other works where maximum butterflies were recorded during the rainy season because of presence of sufficient host plants and favorable climatic conditions for the development and growth of butterflies (Arya et al., 2014). In same study, least number of butterflies was observed during the winter season due to inadequacy of host plants and unfavorable climatic conditions.

Most of the KCR area is remote and inaccessible; hence probably the number observed is underestimation. Furthermore, area is covered with dense forest having almost similar vegetation type thus decreasing variety in habitats. Considering this fact, total number of the species recorded indicated a healthy habitat prevailing in KCR.

Considering the vital role being played by the butterflies in the forest ecosystem, further research on the biodiversity of butterflies including their host plants and factors that affect their distribution, diversity and abundance in the area will be rewarding experience.

Fig.1. Different forms of Common Evening Brown (*Melanitis leda* Linnaeus).

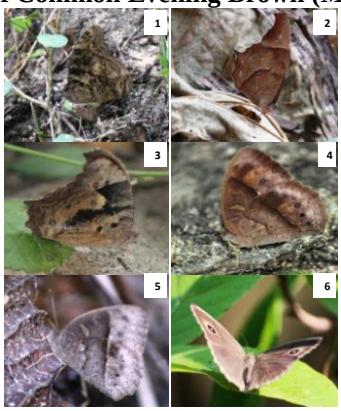

Table 1. Butterfly species recorded from different locations in Kolamarka Conservation Reserve, Central India

Sr. No	Common Name	Scientific Name	Occurrence	Location	Season
		Family: Papilionidae			
1	Blue mormon	*Papilio polymnestor* (Cramer)	U	2	r, w
2	Common Banded Peacock	*Papilio crino* (Fabricius)	R	2	s, w
3	Common Blue bottle	*Graphium sarpedon* (Linnaeus)	U	1, 2	s, r
4	Common mormon	*Papilio polytes Romulus* (Cramer)	U	1	r, w
5	Crimson Rose	*Pachliopta hector* (Linnaeus)	U	2	r, w
6	Lime butterfly	*Papilio demoleous (Linnaeus)*	C	1, 2	s, r, w
7	Spot Swordtail	*Graphium nomius* (Esper)	C	1, 2	s, r, w
		Family: Pieridae		1	
8	Common Grass Yellow	*Eurema hecabe* (Linnaeus)	C	1	s, r, w
9	Common Gull	*Cepora nerissa* (Fabricius)	C	1	s, r, w
10	Common Jezebel	*Delias eucharis* (Linnaeus)	U	1, 2	r, w
11	Common Wanderer	*Pareronia valeria* (Linnaeus)	C	1	s, r, w
12	Mottled Emigrants	*Catopsilia pyranthe* (Linnaeus)	C	1, 2	s, r, w
13	Psyche	*Leptosia nina* (Fabricius)	U	1, 2	r, w
14	Small Grass Yellow	*Eurema brigitta* (Cramer)	C	1	s, r, w
15	Spotless Grass Yellow	*Eurema laeta* (Boisduval)	C	1	s, r
16	Three spot Grass Yellow	*Eurema blanda* (Boisduval)	C	1	s, w
17	White Orange tip	*Ixias Marianne* (Cramer)	U	1, 2	r, w
		Family: Nymphalidae			
18	Bamboo Tree Brown	*Lethe rohria* (Fabricius)	U	2	r, w
19	Baronet	*Symphaedra nais* (Forster)	C	1	s, r, w
20	Blue Pansy	*Junonia orithya* (Linnaeus)	C	1, 2	s, r, w
21	Blue Tiger	*Tirumala limniace* (Cramer)	U	2	r, w
22	Chocolate Pansy	*Junonia iphita* (Cramer)	C	1	s, w
23	Commander	*Moduza procris* (Cramer)	U	1, 2	r, w
24	Common Baron	*Euthalia aconthea* (Cramer)	R	2	w
25	Common Bushbrown	*Mycalesis perseus* (Fabricius)	C	2	s, w
26	Common Castor	*Ariadne merione* (Cramer)	R	2	w
27	Common Evening Brown	*Melanitis leda* (Linnaeus)	C	1	s, w
28	Common Five ring	*Ypthima baldus* (Fabricius)	U	1, 2	r, w
29	Common Four ring	*Ypthima huebneri* (Kirby)	U	2	r
30	Common Indian Crow	*Euploea core* (Cramer)	C	1	s, r, w
31	Common lascar	*Pantoporia hordonia* (Stoll)	R	2	w
32	Common Leopard	*Phalanta phalantha* (Drury)	U	2	r
33	Common Palmfly	*Elymnias hypermnestra* (Linnaeus)	R	2	w
34	Common sailor	*Neptis hylas* (Linnaeus)	C	1	s, w

35	Dark Evening Brown	*Melanitis phedima* (Cramer)	U	2	s, r
36	Danaid Eggfly	*Hypolimnas missipus* (Linnaeus)	C	1	s, w
37	Glassy Tiger	*Parantica aglea* (Stoll)	U	2	s, w
38	Great Eggfly	*Hypolimnas bolina* (Linnaeus)	C	1	s, w
39	Grey Count	*Tanaecia lepidea* (Butler)	R	2	w
40	Grey Pansy	*Junonia atlites* (Linnaeus)	C	1	s, r, w
41	Lemon Pansy	*Junonia lemonias* (Linnaeus)	C	1, 2	s, r, w
42	Painted lady	*Cynthia cardui* (Linnaeus)	U	2	r, w
43	Peacock Pansy	*Junonia almanac* (Linnaeus)	C	1, 2	s, r, w
44	Plain Tiger	*Danaus chrysippus* (Linnaeus)	C	1, 2	s, r, w
45	Stripped Tiger	*Danaus genutia* (Cramer)	C	1, 2	s, r, w
46	Tawny coster	*Acraea violae* (Linnaeus)	U	2	rw
47	Yellow Pansy	*Junonia hierta* (Fabricius)	C	1	s
	Family: Lycaenidae				
48	Common Cerulean	*Jamides celeno* (Cramer)	C	1	s, w
49	Common Hedge Blue	*Acytolepis puspa* (Horsield)	C	1	s, r, w
50	Common Line blue	*Prosotas nora* (C. Felder)	C	1	s
51	Common Pierrot	*Castalius rosimon* (Fabricius)	C	1	s, r, w
52	Dark Cerulean	*Jamides bochus* (Stoll)	U	2	s
53	Forget-me-not	*Catochrysops strabo* (Fabricius)	U	2	s, r
54	Gram Blue	*Euchrysops cnejus* (Fabricius)	C	1	s, r
55	Grass Jewel	*Chilades trochylus* (Freyer)	U	2	r
56	Indian Cupid	*Everes lacturnus* (Godart)	U	2	s, r
57	Lime blue	*Chilades laius* (Stoll)	U	2	s, r
58	Monkey puzzle	*Rathinda amor* (Fabricus)	R	2	w
59	Tailless Line Blue	*Prosotas dubiosa* (Evans)	U	2	r
60	Tiny Grass Blue	*Zizula hylax* (Fabricius)	C	1	s, w
	Family: Hesperidae				
61	Chestnut Bob	*Imbrix salsala* (Moore)	C	1	s, w
62	Grass Demon	*Udaspes folus* (Cramer)	C	1	r
63	Indian Skipper	*Spialia galba* (Fabricius)	C	1	s, w
64	Rice swift	*Borbo cinnara* (Wallace)	C	1	s, r, w
65	Straight swift	*Pamara naso* (Bremer & Grey)	C	1	s, w

A preliminary survey for the butterfly diversity was carried out in Kolamarka Conservation Reserve, Maharashtra State, Central India at two locations viz., (1) open forest and (2) dense forest in three seasons namely summer (s), rainy (r) and winter (w) during 2013-14 and 2014-15. They were categorized as Common (c) when sighted in more than 60% of the filed visits, uncommon (u) when sighted in 20 to 60% of field visits and rare (r) when sighted in less than 20% of the field visits. Butterflies were noticed and recorded during field visits in area. The data were collected mainly through Line transect method with visual encounter method. Roads were used as a transect lines as it's is useful to cover wider area. Area is under influence of Left Wing Extremist activities. Hence, transect surveys were not carried regularly but nearly all butterflies listed were photographed using Canon 600D DSLR camera and also

observed with Olympus 10×50 DPSI binocular. Identification of butterfly was carried out with the help of field guide, 'The Book of Indian Butterflies' by Kehimkar (2008) and also confirmed on 'Species pages' on website

Table 2. Taxonomical distribution of the species

S. No	Family	Genus	Species	% of total species
1	Papillionidae	3	7	10.8
2	Pieridae	7	10	15.4
3	Nymphalidae	21	30	46.2
4	Lycaenidae	10	13	20.0
5	Hesperiidae	5	5	7.7
	Total	**46**	**65**	

Acknowledgements

Authors are thankful to Maharashtra forest Department, India for providing the facilities and opportunity to carry out this study.

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