

Butterflies (Lepidoptera Rhopalocera) of the Bor Wildlife Sanctuary, Wardha, Maharashtra, Central India

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ABSTRACT

The diversity of butterfly species (Lepidoptera Rhopalocera) was studied in the Bor Wildlife Sanctuary, Wardha district area (Central India) of 138.12 km² from 2011 to 2017. A total of 114 species of butterflies belonging to 6 families were recorded. Most of the butterflies recorded belong to the family Nymphalidae (35 species). 34 Lycaenidae species were recorded. A total of 18 Hesperidae and 18 Pieridae species were recorded, 8 species were recorded from the Papilionidae and 1 species from the Riodinidae family. Among the 114 butterflies recorded, 9 species come under the protection category of the Indian Wild Life (protection) Act 1972 (i.e., *Pachliopta hector*, *Appias albina*, *Appias libythea*, *Eurema andersonii*, *Euploea core*, *Hypolimnas misippus*, *Euchrysops cnejus*, *Lampides boeticus*, *Ionolyce helicon*, *Baoris farri*). The observations support the value of the National Park (Reserve forest) area in providing valuable resources for butterflies.

KEY WORDS

Lepidoptera; diversity; Bor wild life Sanctuary; Wardha; Maharashtra.

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INTRODUCTION

Bor Wildlife Sanctuary was declared as a tiger reserve in July 2014. It is located near Hingani in Wardha District, Maharashtra. It is a home to a variety of wild animals. The reserve covers an area of 138.12 km² (53.33 sq. mile) at 20°57' N and 78°37' E altitude, which includes the drainage basin of the Bor Dam. Bor Wildlife Sanctuary is covered with southern mixed dry deciduous forest. Teak, aintendu, and bamboo are the main species of flora in this sanctuary. Tigers, panthers, bisons, blue bulls, chitals, sambars, peacocks, barking deers, chinkara, monkeys, wild boars, bears, and wild dogs are the important faunas of the sanctuary. It represents the floral and faunal wealth of Satpuda-Maikal Landscape. Satpuda runs along the Northern Boundary of Maharashtra from West to

East and meets the Maikal Hill range which comes from Kanha (Figs. 1–3).

Among insect, butterflies are the most beautiful and colourful creatures on the earth, have a great aesthetic value and are called the flying jewels or winged jewels of nature. Butterflies are generally regarded as one of the best and most taxonomically studied groups of insects and well observed, not only by the lepidopterists and entomologists, but also by laymen. They are a very common and widespread species, but our understanding on their real biology and diversity may prove to be startlingly below common expectations (Willmott et al., 2001; Ackery, 1987; Tiple & Khurad, 2009).

The butterflies are a very important unit of ecosystem due to the inter-relationship with plants diversity (Kunte, 2000). Their caterpillars can be reared at home and the transformation from cater-

pillar to butterfly can easily be observed. Therefore, they make excellent subjects for natural history observations and scientific studies. Butterflies are very much important for the pollination as they tend to visit different flowers for the nectar feeding, which make them an important unit of environment. Butterflies are very sensitive group to environment and are directly affected by changes in the habitats, atmospheric temperature, and weather conditions. They can be good indicators of environment changes (Tiple et al., 2006).

The Indian sub-region hosts about 1,504 species of butterflies, of which 351 in Peninsular India and 334 in the Western Ghats. In Central India, the butterfly diversity was reported earlier by Forsayeth (1884), Swinhoe (1886), Betham

(1890, 1891) and Witt (1909). D’Abreeu (1931) documented a total of 177 species occurring in the erstwhile Central Provinces (now Madhya Pradesh and Vidarbha). In the recent past, several workers have studied butterflies from urban, rural, and protected areas of Vidarbha. 65 species belonging to 52 genera representing 7 families from Pench Tiger Reserve (Maharashtra) (Sharma & Radhakrishnan, 2005), 68 species of butterflies of 50 genera were recorded from Tadoba Andhari Tiger Reserve (Sharma & Radhakrishnan, 2006) and 103 species of butterflies were recorded from Melghat Tiger Reserve (Wadatkar, 2008). Tiple & Khurad (2009) reported 145 species of butterflies, of which 62 species were new records for Nagpur city. Recently, Tiple (2010) documented 111 species of

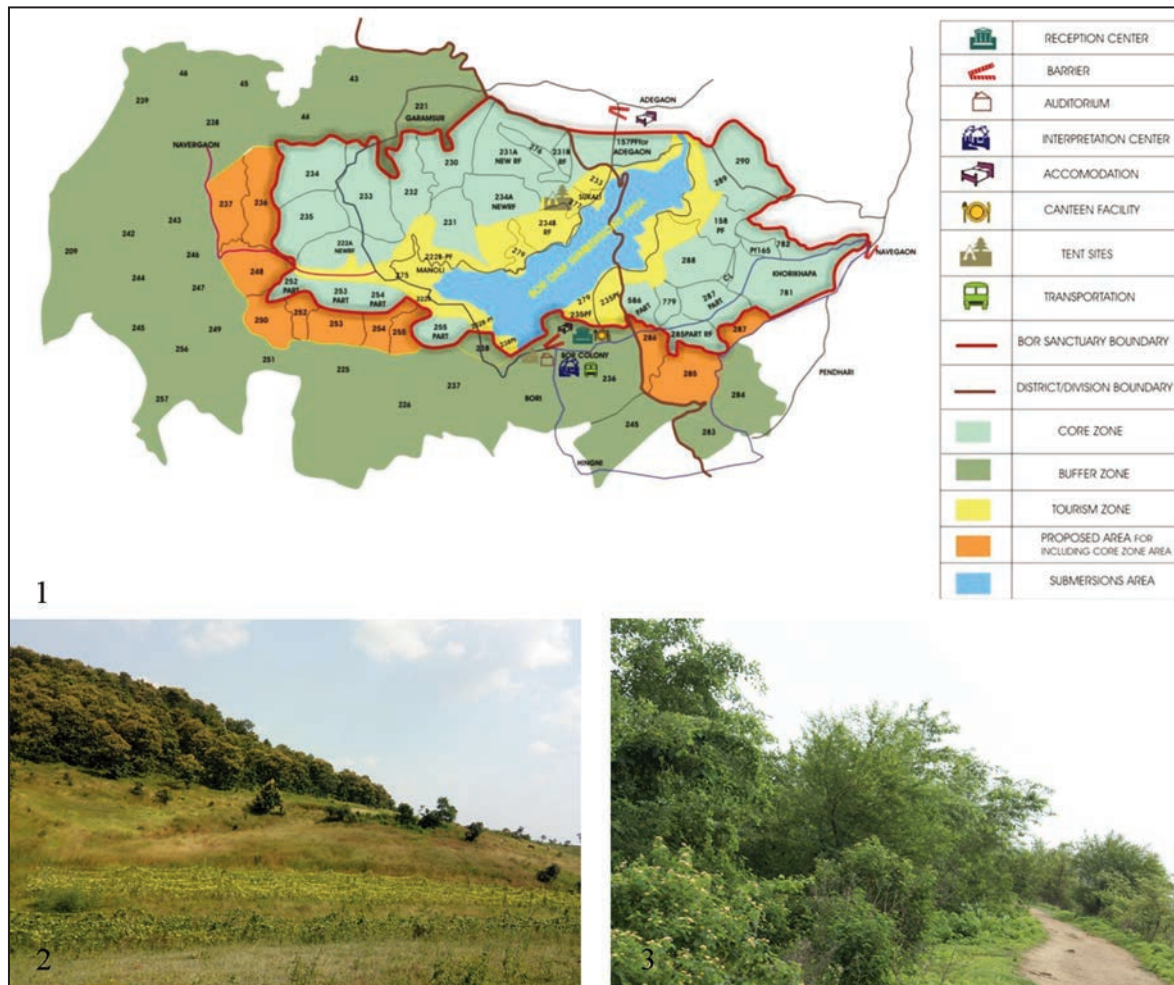


Figure 1. Location map of Bor Wild Life Sanctuary in district Wardha, Maharashtra, Central India (Image Source www.wikimapia.org). Figures 2, 3. Natural environment of Bor Wildlife Santury.

butterflies in Tadoba National Park. The present study was started to examine the diversity of butterflies from Bor Wildlife Sanctuary, Wardha, since there was no known published checklist of butterflies in the Bor Wildlife Sanctuary.

MATERIAL AND METHODS

Butterfly were surveyed in different regions of the Bor wildlife Sanctuary since 2011 to 2017 along the reserve forest areas, buffer zone, lakes, rivers, and surrounding areas. Identification of the butterflies was primarily made directly in the field. In critical condition specimens were collected only with handheld aerial sweep nets and subsequently released without harm. Butterflies were identified from Wynter-Blyth (1957) and Kunte (2000). All scientific names follow Varshney (1983) and common English names are after Wynter-Blyth (1957). Based on the number of sightings, the butterfly species were categorized into very rare (< 2 sightings), rare (2–15 sightings), not rare (15–50 sightings), common (50–100 sightings) and very common (more than 100 sightings).

RESULTS AND DISCUSSION

During the course of study, 114 species of butterflies belonging to 6 families were recorded (Tables 1–3, Figs. 4–15). Most of the butterflies recorded belong to the Nymphalidae (35 species) and Lycaenidae (34 species), followed by Pieridae (18 species), Hesperidae (18 species), Papilionidae (8 species), and 1 from the Riodinidae (see Table 1). Among the 114 butterflies recorded, 9 species come under the protection category of the Indian Wildlife (protection) Act 1972 (Tiple, 2011; Gupta & Mondal, 2005) (i.e., *Pachliopta hector*, *Appias albina*, *A. libythea*, *Eurema andersonii*, *Euploea core*, *Hypolimnas misippus*, *Euchrysops cnejus*, *Lampides boeticus*, *Ionolyce helicon*, *Baoris farri*).

Seasonal patterns of species richness (flight periods) in Bor Wildlife Sanctuary, are presented in figure 16. Most butterfly species were observed from the monsoon (hot/wet season) to early winter (cool/wet season), but thereafter declined in early summer (March). Among the 114 species of butterflies (*Papilio demoleus*, *Cepora nerissa*, *Eurema*

brigitta, *E. hecabe*, *Danaus chrysippus*, *Euploea core*, *Hypolimnas misippus*, *Junonia lemonias*, *Melanitis leda*, *Tirumala limniace*, *Castalius rosimon*, *Catochrysops strabo*, *Luthrodes pandava*, *Zizeeria karsandra*, *Borbo cinnara*) occurred throughout the year (January–December), whereas the remaining 99 species of butterflies were prominently observed only after June–July up to the beginning of summer (April–May). Increasing species abundance from the beginning of the monsoon (June–July) until the early winter (August–November) and decline in species abundance from late winter (January – February) up to the end of summer have also been reported by Tiple et al. (2007), Tiple & Khurad (2009), and Tiple (2010, 2011) in similar climatic conditions in this region of Central India. They further demonstrated that most of the species were noticeably absent in the disturbed and human impacted sites (gardens, plantation, and grassland) and there was no occurrence of unique species in moderately disturbed areas comparable to those of less disturbed wild areas. The present study area, the Bor Wildlife Sanctuary and surrounding areas, is always disturbed and impacted by humans, which may be the reason for overall reduction of the uniqueness of the species from disturbed and impacted sites as compared to the other sites.

In the present study, seasonal occurrence of butterfly species was high from monsoon (hot/wet season) to early winter (cool/wet season), but thereafter declined in early summer (March). The cause of this decline might be non-availability of nectar and larval host plants and scarcity of water (Tiple & Khurad, 2009). Of course, this is but one aspect of the resources used by butterflies in the reserve forest area and a complete picture of habitat structure can only be obtained by researching into all consumable and utility resources (Dennis et al., 2003). Butterfly populations would clearly benefit from planting indigenous, as opposed to exotic, nectar and larval host plants which are the sources of various proteins and salts that are essential for the buildup of a healthy and genetically diverse butterfly population (Tiple et al., 2006). In particular, attention should be paid to the seasonal availability of resources and to resources for less common butterflies on this reserve forest area. All in all, this reserve forest area (Bor Wildlife Sanctuary) provides rich ground not just for conservation, but also for research into butterfly biology for students.

Sr. No.	Scientific Name	Common Name	Status	Occurrence (months)
	Papilionidae(08)			
1	<i>Graphium agamemnon</i> (Linnaeus, 1758)	Tailed Jay	C	8-1
2	<i>Graphium doson</i> (C. et R. Felder, 1864)	Common Jay	C	8-1
3	<i>Graphium nomius</i> (Esper, 1799)	Spot Swordtail	R	3-7
4	<i>Pachliopta aristolochiae</i> (Fabricius, 1775)	Common Rose	C	7-2
5	<i>Pachliopta hector</i> (Linnaeus, 1758)	Crimson Rose	C	7-2
6	<i>Papilio demoleus</i> Linnaeus, 1758	Lime Butterfly	VC	1-12
7	<i>Papilio polymnestor</i> Cramer, [1775]	Blue Mormon	R	9-11
8	<i>Papilio polytes</i> Linnaeus, 1758	Common Mormon	VC	7-2
	Pieridae (18)			
9	<i>Belenois aurota</i> (Fabricius, 1793)	Pioneer	VC	9-2
10	<i>Appias albina</i> (Boisduval, 1836)	Common Albatross	VR	11-12
11	<i>Catopsilia pomona</i> (Fabricius, 1775)	Common or Lemon Emigrant	VC	1-12
12	<i>Catopsilia pyranthe</i> (Linnaeus, 1758)	Mottled Emigrant	VC	7-2
13	<i>Cepora nerissa</i> (Fabricius, 1775)	Common Gull	VC	1-12
14	<i>Colotis fausta</i> (Olivier, 1804)	Large Salmon Arab	C	8-11
15	<i>Colotis danae</i> (Fabricius, 1775)	Crimson Tip	VC	6-10
16	<i>Colotis etrida</i> (Boisduval, 1836)	Small Orange Tip	C	8-12
17	<i>Colotis aurora</i> Cramer, 1780	Plain Orange Tip	R	8
18	<i>Ixias pyrene</i> Linnaeus, 1764	Yellow Orange Tip	R	8-9
19	<i>Delias eucharis</i> (Drury, 1773)	Common Jezebel	VC	7-2
20	<i>Eurema blanda</i> (Boisduval, 1836)	Three-Spot Grass Yellow	C	7-2
21	<i>Eurema brigitta</i> (Stoll, [1780])	Small Grass Yellow	C	1-12
22	<i>Eurema hecabe</i> (Linnaeus, 1758)	Common Grass Yellow	VC	1-12
23	<i>Eurema laeta</i> (Boisduval, 1836)	Spotless Grass Yellow	VC	7-12
24	<i>Ixias marianne</i> (Cramer, [1779])	White Orange Tip	C	8-11
25	<i>Leptosia nina</i> (Fabricius, 1793)	Psyche	C	8-1
26	<i>Pareronia hippie</i> (Cramer, [1776])	Common Wanderer	C	8-2
	Nymphalidae (35)			
27	<i>Acraea violae</i> (Fabricius, 1793)	Tawny Coster	VC	10-12
28	<i>Ariadne ariadne</i> (Linnaeus, 1763)	Angled Castor	VC	9-2
29	<i>Ariadne merione</i> (Cramer, [1777])	Common Castor	C	10-2
30	<i>Byblia ilithyia</i> (Drury, [1773])	Joker	C	6-12
31	<i>Charaxes solon</i> (Fabricius, 1793)	Black Rajah	C	10-2
32	<i>Vanessa cardui</i> (Linnaeus, 1758)	Painted Lady	C	6-8
33	<i>Danaus chrysippus</i> (Linnaeus, 1758)	Plain Tiger	VC	1-12
34	<i>Danaus genutia</i> (Cramer, [1779])	Striped Tiger	VC	10-6
35	<i>Euploea core</i> (Cramer, [1780])	Common Indian Crow	VC	1-12
36	<i>Euthalia aconthea</i> (Cramer, [1777])	Common Baron	C	8-11

Table 1/1. List of Lepidoptera Rhopalocera recorded from Bor Wild Life Sanctuary, Wardha, Maharashtra, Central India together with common name, status, and Occurrence.

37	<i>Hypolimnas bolina</i> (Linnaeus, 1758)	Great Eggfly	C	6-3
38	<i>Hypolimnas misippus</i> (Linnaeus, 1764)	Danaid Eggfly	C	1-12
39	<i>Junonia almana</i> (Linnaeus, 1758)	Peacock Pansy	VC	6-2
40	<i>Junonia atlites</i> (Linnaeus, 1763)	Grey Pansy	VC	7-2
41	<i>Junonia hierta</i> (Fabricius, 1798)	Yellow Pansy	C	8-2
42	<i>Junonia iphita</i> (Cramer, [1779])	Chocolate Pansy	VC	8-3
43	<i>Junonia lemonias</i> (Linnaeus, 1758)	Lemon Pansy	VC	1-12
44	<i>Junonia orithya</i> (Linnaeus, 1758)	Blue Pansy	VC	10-4
45	<i>Lethe europa</i> (Fabricius, 1775)	Bamboo Treebrown	C	8-3
46	<i>Melanitis leda</i> (Linnaeus, 1758)	Common Evening Brown	VC	1-12
47	<i>Moduza procris</i> (Cramer, [1777])	Commander	C	8-1
48	<i>Mycalesis intermedia</i> (Moore, [1892])	Intermediate Bushbrown	R	8-1
49	<i>Mycalesis mineus</i> (Linnaeus, 1758)	Dark Branded Bushbrown	C	8-3
50	<i>Mycalesis perseus</i> (Fabricius, 1775)	Common Bushbrown	VC	7-3
51	<i>Phaedyma columella</i> (Cramer, [1780])	Short-banded Sailer	C	9-11
52	<i>Neptis hylas</i> (Linnaeus, 1758)	Common Sailer	VC	7-3
53	<i>Neptis jumbah</i> Moore, [1858]	Chestnut-Streaked Sailer	C	9-11
54	<i>Phalanta phalantha</i> (Drury, [1773])	Common Leopard	VC	6-3
55	<i>Charaxes agrarius</i> (Swinhoe, 1887)	Anomalous Nawab	C	2-3
56	<i>Symphaedra nais</i> (Forster, 1771)	Baronet	C	10-3
57	<i>Tirumala limniace</i> (Cramer, [1775])	Blue Tiger	VC	1-12
58	<i>Ypthima asterope</i> (Klug, 1832)	Common Threering	VC	7-9
59	<i>Ypthima baldus</i> (Fabricius, 1775)	Common Fivering	C	9-10
60	<i>Ypthima huebneri</i> (Kirby, 1871)	Common Furring	C	11-12
61	<i>Ypthima inica</i> (Hewitson, 1865)	Lesser Threering	C	9-12
	Riodinidae (1)			
62	<i>Abisara bifasciata</i> Moore, 1877	Double-banded Judy	R	8-10
	Lycaenidae (34)			
63	<i>Acytolepis puspa</i> (Horsfield, [1828])	Common Hedge Blue	VC	9-2
64	<i>Amblypodia anita</i> Hewitson, 1862	Leaf Blue	VC	8-9
65	<i>Anthene lycaenina</i> (Felder, 1868)	Pointed Ciliate Blue	C	8-11
66	<i>Arhopala amantes</i> (Hewitson, 1862)	Large Oakblue	C	5-6
67	<i>Arhopala pseudocentaurus</i> (Doubleday, 1847)	Western Centaur Oakblue	VR	10
68	<i>Azamus jesous</i> (Guérin-Méneville, 1849)	African Babul Blue	C	10-2
69	<i>Azamus ubaldus</i> (Stoll, [1782])	Bright Babul Blue	R	11-2
70	<i>Castalius rosimon</i> (Fabricius, 1775)	Common Pierrot	VC	1-12
71	<i>Catochrysops strabo</i> (Fabricius, 1793)	Forget-Me-Not	VC	1-12
72	<i>Chilades lajus</i> (Stoll, [1780])	Lime Blue	VC	8-12
73	<i>Luthrodes pandava</i> (Horsfield, [1829])	Plains Cupid	VC	1-12
74	<i>Chilades parrhasius</i> (Fabricius, 1793)	Small Cupid	C	7-2
75	<i>Freyeria putli</i> (Kollar, [1844])	Eastern Grass Jewel	C	7-12

Table 1/2. List of Lepidoptera Rhopalocera recorded from Bor Wild Life Sanctuary, Wardha, Maharashtra, Central India together with common name, status, and Occurrence.

76	<i>Virachola isocrates</i> (Fabricius, 1793)	Common Guava Blue	C	8-10
77	<i>Euchrysops cnejus</i> (Fabricius, 1798)	Gram Blue	VC	6-3
78	<i>Everes lacturnus</i> (Godart, [1824])	Indian Cupid	C	12-2
79	<i>Jamides bochus</i> (Stoll, [1782])	Dark Cerulean	C	7-2
80	<i>Jamides celeno</i> (Cramer, [1775])	Common Cerulean	VC	7-3
81	<i>Lampides boeticus</i> (Linnaeus, 1767)	Pea Blue	VC	8-3
82	<i>Leptotes plinius</i> (Fabricius, 1793)	Zebra Blue	VC	7-3
83	<i>Petrelaea dana</i> (de Nicéville, [1884])	Dingy Lineblue	C	8-9
84	<i>Prosotas dubiosa</i> (Semper, [1879])	Tailless Lineblue	C	7-9
85	<i>Prosotas nora</i> (Felder, 1860)	Common Lineblue	C	7-3
86	<i>Psuedozizeeria maha</i> (Kollar, [1844])	Pale Grass Blue	C	8-3
87	<i>Rapala iarbus</i> (Fabricius, 1787)	Common Red Flash	C	8-12
88	<i>Spindasis ictis</i> (Hewitson, 1865)	Common Shot Silverline	C	6-8
89	<i>Spindasis schistacea</i> (Moore, [1881])	Plumbeous Silverline	C	7-8
90	<i>Spindasis vulcanus</i> (Fabricius, 1775)	Common Silverline	VC	8-2
91	<i>Tarucus balkanicus nigra</i> Bethune-Baker, [1918]	Black-spotted Pierrot	C	8-1
92	<i>Tarucus callinara</i> Butler, 1886	Spotted Pierrot	C	8-2
93	<i>Tarucus nara</i> (Kollar, 1848)	Rounded Pierrot/ Striped Pierrot	VC	7-2
94	<i>Zizeeria karsandra</i> (Moore, 1865)	Dark Grass Blue	VC	1-12
95	<i>Zizina otis</i> (Fabricius, 1787)	Lesser Grass Blue	VC	6-3
96	<i>Zizula hylax</i> (Fabricius, 1775)	Tiny Grass Blue	VC	6-3
	Hesperiidae (18)			
97	<i>Badamia exclamationis</i> (Fabricius, 1775)	Brown Awl	VC	8-11
98	<i>Baoris farri</i> (Moore, 1878)	Paintbrush Swift	R	10-12
99	<i>Borbo bevani</i> (Moore, 1878)	Bevan's Swift	C	8-11
100	<i>Borbo cinnara</i> (Wallace, 1866)	Rice Swift	VC	1-12
101	<i>Caltoris kumara</i> (Moore, 1878)	Blank Swift	C	10-12
102	<i>Celaenorhinus leucocera</i> (Kollar, [1844])	Common Spotted Flat	R	8-9
103	<i>Coladenia indrani</i> (Moore, [1866])	Tricolour Pied Flat	C	9-12
104	<i>Hasora badra</i> (Moore, [1858])	Common Awl	C	7-9
105	<i>Hasora chromus</i> (Cramer, [1780])	Common Banded Awl	VC	9-10
106	<i>Hasora taminatus</i> (Hübner, 1818)	White Banded Awl	C	8-10
107	<i>Parnara naso</i> (Fabricius, 1798)	Straight Swift	C	9-12
108	<i>Pelopidas mathias</i> (Fabricius, 1798)	Small Branded Swift	VC	7-12
109	<i>Pseudocoladenia dan</i> (Fabricius, 1787)	Fulvous Pied Flat	R	9
110	<i>Spialia galba</i> (Fabricius, 1793)	Indian Skipper	VC	8-3
111	<i>Suastus gremius</i> (Fabricius, 1798)	Indian Palm Bob	C	7-12
112	<i>Telicota bambusae</i> (Moore, 1878)	Dark Palm Dart	VC	8-12
113	<i>Telicota colon</i> (Fabricius, 1775)	Pale Palm Dart	C	7-10
114	<i>Udaspes folus</i> (Cramer, [1775])	Grass Demon	C	9-12

Table 1/3. List of Lepidoptera Rhopalocera recorded from Bor Wild Life Sanctuary, Wardha, Maharashtra, Central India together with common name, status, and Occurrence.



Figures 4–9. Lepidoptera Rhopalocera recorded from the natural environment of Bor Wildlife Santury, Wardha, Maharashtra, Central India. Figure 4: Spot Swordtail, *Graphium nomius* (Esper, 1799). Figure 5: Common Mormon, *Papilio polytes* Linnaeus, 1758. Figure 6: Common Emigrant, *Catopsilia pomona* (Fabricius, 1775). Figure 7: Common Jezebel, *Delias eucharis* (Drury, 1773). Figure 8: Tawny Coster, *Acraea violae* (Fabricius, 1793). Figure 9: Joker, *Byblia ilithyia* (Drury, [1773]).



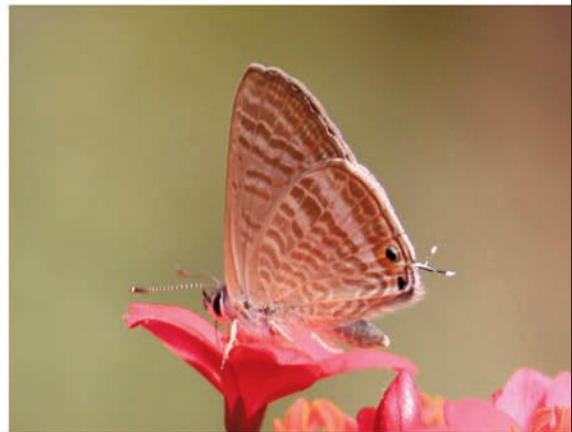
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Figures 10–15. Lepidoptera Rhopalocera recorded from the natural environment of Bor Wildlife Santury, Wardha, Maharashtra, Central India. Figure 10: Danaid Eggfly, *Hypolimnas misippus* (Linnaeus, 1764). Figure 11: Blue Pansy, *Junonia orithya* (Linnaeus, 1758). Figure 12: Baronet, *Symphaedra nais* (Forster, 1771). Figure 13: Pea Blue, *Lampides boeticus* (Linnaeus, 1767). Figure 14: Tiny Grass Blue, *Zizula hylax* (Fabricius, 1775). Figure 15: Small Branded Swift, *Pelopidas mathias* (Fabricius, 1798).

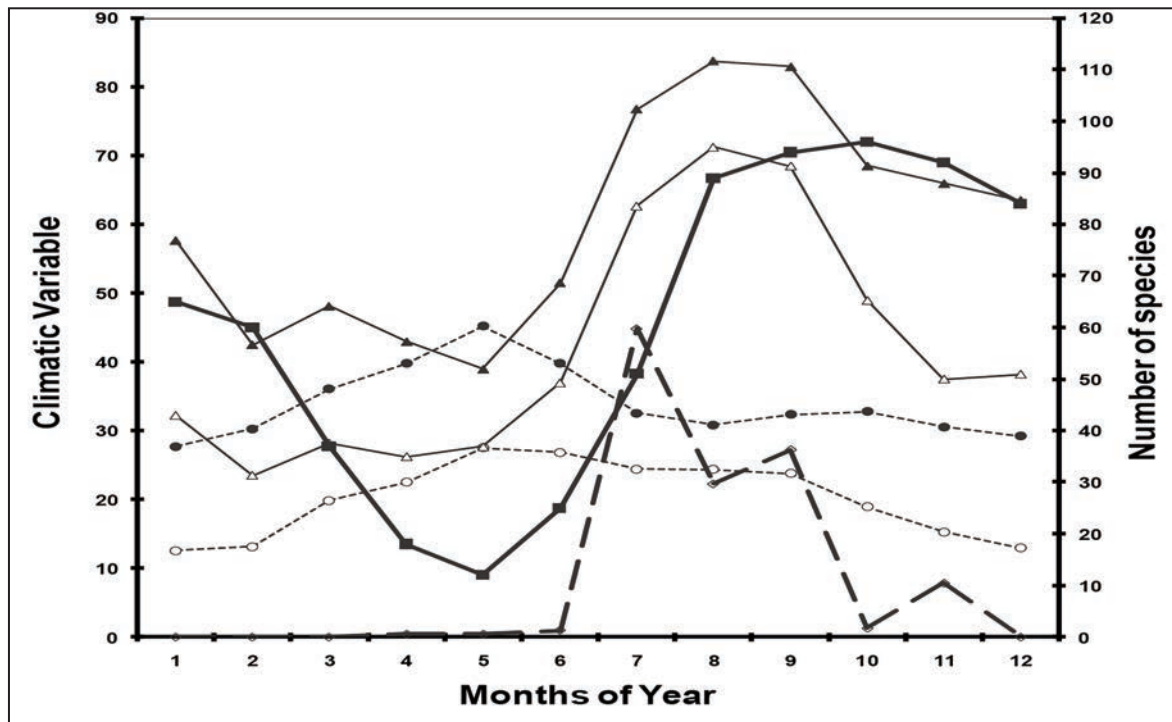


Figure 16. Seasonal distribution in number of species inside and around Bor Wild Life Sanctuary. Right scale: black squares, number of species. Left scale: climate variables, circles, temperatures (0°C); closed circles, maximum mean temperatures (0°C); open, minimum mean temperatures (0°C); triangles, relative humidity (%); closed triangles, maximum relative humidity (%); open triangles, minimum relative humidity (%); diamonds, rainfall (cm).

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