

A Study on Species Diversity of Butterfly in Selected Area of Ranchi District, Jharkhand, India

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Abstract: *The present study was carried out on the butterfly diversity of the Ranchi district of Jharkhand from the period of September 2021 to July 2023. A total number of 156 species were found during the study. Among them 50 species belong to Nymphalidae, 41 species belong to Lycaenidae, 30 species belong to Hesperidae, 17 species to Papilionidae, 16 species to Pieridae, and 02 species belong to Riodinidae. Further status of species shows that there were 102 species common in the area whereas 25 species were locally abundant, 15 species were not rare, 07 species were in a rare category, 02 species were found to be very common whereas 01 species is in rare to very rare, and 02 species were uncommon whereas 02 species were in very common. Further percentage distribution of family-wise fish shows that there were 32% of species belong to Nymphalidae, 26% belong to Lycaenidae, 19% belong to Hesperidae, 11% to Papilionidae, 10% belong to Pieridae and 2% belong to Riodinidae.*

Keywords: Butterfly, Diversity, Ranchi District, Conservation

1. Introduction

The butterflies enhance the earth's beauty due to the diverse colors on their wings. The beauty and ecological significance of butterflies are a well-studied group throughout the world (Ghazoul, 2002). Butterflies are an essential part of any natural ecosystem as pollinators and also play a role in energy transfer from herbivorous to the next trophic level (Sreekumar, 2010). Insects are particularly useful indicators in the evaluation of landscapes for indicators in the herbivorous to the next trophic level. Butterflies make a large group of insects in the order of Lepidoptera in phylum Arthropoda. The name comes from the Greek Lepido "Scale" and Ptera "Wings" which refers to a prominent feature of adult butterflies (the tiny scales that cover the wings) (Abdullahi, 2019). Butterflies are wonderful, and diverse in shape, size, and colour. They are found everywhere around the world and are good indicators of climatic conditional, seasonal, and ecological changes. They can also serve in formulating strategies for conservation. However, they have largely been ignored by conservation biologists and policymakers as well. Hence butterflies play a vital role in the ecosystem and the co-evolutionary relationship between them and plants as well as their lives are interlinked (Ghazanfar *et al*, 2016). Butterflies provide many vital economically important services within terrestrial ecosystems (such as nutrient recycling, soil formation, food resources, and pollination).

Kune *et al*, 2012 indicated that India harbored a total 1504 of butterfly species which accounted for 8.74% of the world's butterflies, and 285 species were found in Southern India. The Peninsular India and Western Ghats have 351 and 334 species respectively. The Zoological Survey of India has reported only 1, 318 species of butterflies in India, of which 35 species are critically endangered as per the IUCN Red List (Cotton *et al.*, 2015). There are good number of literature available on butterflies from different parts of India, and most of the studies have been carried out in the southern part of the

country (Kumari *et. al*, 2023). As far as Jharkhand is concerned very few studies have been done in Jharkhand (Morrison - Godfrey, 1950; Verma, 2009; Singh, 2010; Singh and Ahmad, 2017; Kumari *et. al*, 2023). There is a need for the documentation of butterfly species from the Ranchi district due to environmental change and developmental activities. Hence, the present study was undertaken to provide baseline information on the checklist of butterflies and their diversity in the study area in present environmental conditions.

2. Study Site

Ranchi district is one of the twenty-four districts of Jharkhand state in eastern India. Ranchi city, the capital of Jharkhand state is the district headquarters. It was established as a district in 1899. The district of Ranchi at present consists of 2 subdivisions viz., Ranchi & Bundu, and 18 Community Development Blocks. Ranchi lies at 23°22'N 85°20'E near to the Tropic of Cancer. The city covers an area of 175 km² (68 sq mi) and its average elevation is 651 m above sea level. Ranchi is located in the southern part of the Chota Nagpur plateau, which is the eastern section of the Deccan plateau.

Ranchi has a hilly topography and dense tropical forests a combination that produces a relatively moderate climate compared to the rest of the state. The total forest area of Ranchi district is 1, 164.49 Km². *Shorea robusta* (Sal) is the predominant species of trees in the concerned Ranchi Forest Divisions. According to the classification of the Forest Types of India (Champion and Seth, 1968), the forests of the area fall under a broad category of Northern Tropical Dry Deciduous forest.

The study was carried out at the following selected sites viz. Biodiversity Park (23°15'15" N; 85°20'48"E), Oxygen Park (23°23'26" N; 85°19'34"E), Bhagwan Birsa Zoological Park (23°27'47" N; 85°27'18"E), Sidhu Kanhu Park (23°23'18" N;

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85°19'01"E) and Kanke Dam (Wetland) (23°24'04" N; 85°18'47"E) in Ranchi District of Jharkhand.



Figure 1: Google Map of Study Site, Ranchi District

3. Materials and Method

- 1) The selected sites were visited at frequent intervals in all the seasons ((1) Spring - February and March, (2) Summer - April to June, (3) Rainy season - July to September, and (4) Winter - October to January) to record the presence or absence of butterfly in the area by walking on fixed routes around water bodies, garden/park, and forest areas.
- 2) Butterfly sampling, some of the basic methods were used in this study, the most common method used for assessing butterfly abundance in monitoring programs (Newman *et al.*, 2003) will done along the transect (WIL, 2017). Transects in each of the selected sites were surveyed on foot, one day every two weeks between 0900 hr and 1700 hr.
- 3) Species were identified in the field by 'direct sighting'. Photography and videography were done for identification and documentation. Collection was restricted only to those specimens that could not be identified with certainty. The species were identified with the help of the following literature/books (Brooks & Knight 1985; Kunte, 2000 and Kehimkar, 2008).

Tools were used:

- 1) Normal and Zoom Cameras.
- 2) GPS device.
- 3) Field guidebooks (Brooks & Knight 1985; Kunte 2000; Kehimkar, 2008).

4. Result and Discussion

The present study was carried out on the butterfly diversity of the Ranchi district of Jharkhand from the period of September 2021 to July 2023. A total number of 156 species were found during the study. Among them 50 species belong to

Nymphalidae, 41 species belong to *Lycaenidae*, 30 species belong to *Hesperiidae*, 17 species to *Papilionidae*, 16 species to *Pieridae*, and 02 species belong to *Riodinidae*. Further status of species shows that there were 102 species common in the area whereas 25 species were locally abundant, 15 species were not rare, 07 species were in a rare category, 02 species were found to be very common whereas 01 species is in rare to very rare, and 02 species were uncommon whereas 02 species is in very common. Further percentage distribution of family - wise fish shows that there were 32% of species belong to *Nymphalidae*, 26% belong to *Lycaenidae*, 19% belong to *Hesperiidae*, 11% to *Papilionidae*, 10% belong to *Pieridae* and 2% belong to *Riodinidae*'

Based on the family - wise composition of butterfly species observed in the study areas, the *Nymphalidae* family accounted for the highest number (50) and percentage (32%) of the species among other families, potentially indicating adaptations and habitat preferences. This finding resonates with similar studies; for instance, Sunita (2021) reported 39 species of butterflies. The seasonal population dynamics observed in our study, with higher butterfly numbers in October, November, April, May, and June, align with findings by Wale and Abdella (2021). These patterns may be attributed to environmental factors such as temperature, as highlighted by Alarape *et al.* (2015), who reported 57 butterfly species surveyed across nine families. Similarly, Choudhary and Sarthi (2022) documented 50 butterfly species from Dalma Wildlife Sanctuary in India. Singh and Ahmad (2017) provided a preliminary list of Lepidopteran insects from Palkot Wildlife Sanctuary, Jharkhand, further enriching our understanding of butterfly diversity in varied habitats. These collective findings underscore the importance of temperature, habitat characteristics, and geographic location in shaping butterfly diversity, providing valuable insights for conservation and management strategies in diverse ecosystems.

Table 1: Inventory of Butterfly Diversity of Ranchi District, Jharkhand

Sl. No	Family	Common name	Scientific Name	Status
1	Hesperiidae	Bevan's Swift	<i>Pseudoborbo bevani</i>	Common
2	Hesperiidae	Grass Demon	<i>Udaspes folus</i>	Common
3	Hesperiidae	Restricted Demon	<i>Notocrypta curvifascia</i>	Common
4	Hesperiidae	Common Small Flat	<i>Sarangesa desahara</i>	Common
5	Hesperiidae	Water Snow Flat	<i>Tagiades litigiosa</i>	Not rare

6	Hesperiidae	Conjoined Swift	<i>Pelopidas conjuncta</i>	Not rare
7	Hesperiidae	Straight Swift	<i>Parnara guttatus</i>	Common
8	Hesperiidae	Indian Palm Bob	<i>Suastus gremius</i>	Common
9	Hesperiidae	Common Banded Awl	<i>Hasora chromus</i>	Common
10	Hesperiidae	Brown Awl	<i>Badamia exclamationis</i>	Not rare
11	Hesperiidae	Indian Skipper	<i>Spialia galba</i>	Common
12	Hesperiidae	Common Spotted Flat	<i>Celaenorrhinus leucocera</i>	Common
13	Hesperiidae	Fulvous Pied Flat	<i>Pseudocoladenia dan</i>	Common
14	Hesperiidae	Tricoloured Pied Flat	<i>Coladenia indrani</i>	Common
15	Hesperiidae	Chestnut Angle	<i>Odontoptilum angulata</i>	Not rare
16	Hesperiidae	Golden Angle	<i>Caprona ransonnetti</i>	Not rare
17	Hesperiidae	Tamil Grass Dart	<i>Taractrocera ceramas</i>	Locally Abundant
18	Hesperiidae	Indian Dartlet	<i>Oriens goloides</i>	Common
19	Hesperiidae	Dark Palm Dart	<i>Telicota ancilla</i>	Common
20	Hesperiidae	Pale Palm Dart	<i>Telicota colon</i>	Not rare
21	Hesperiidae	Oriental Straight Swift	<i>Parnara bada</i>	Common
22	Hesperiidae	Rice Swift	<i>Borbo cinnara</i>	Common
23	Hesperiidae	Small Branded Swift	<i>Pelopidas mathias</i>	Common
24	Hesperiidae	Blank Swift	<i>Caltois kumara</i>	Common
25	Hesperiidae	Karwar Swift	<i>Caltois canaraica</i>	Common
26	Hesperiidae	Common Redeye	<i>Matapa aria</i>	Common
27	Hesperiidae	Chestnut Bob	<i>Iambrix salsala</i>	Common
28	Hesperiidae	Common Banded Demon	<i>Notocrypta paralysos</i>	Locally Common
29	Hesperiidae	Bush Hopper	<i>Ampittia dioscorides</i>	Locally Common
30	Hesperiidae	Pygmy Scrub Hopper	<i>Aeromachus pygmaeus</i>	Common
31	Papilionidae	Common Rose	<i>Atrophaneura aristolochiae</i>	Common
32	Papilionidae	Crimson Rose	<i>Atrophaneura hector</i>	Common
33	Papilionidae	Spot Swordtail	<i>Graphium nomius</i>	Locally Common
34	Papilionidae	Common Banded Peacock	<i>Papilio crino</i>	Locally Common
35	Papilionidae	Common Mormon	<i>Papilio polytes</i>	Very Common
36	Papilionidae	Blue Mormon	<i>Papilio polymnestor</i>	Not rare
37	Papilionidae	Lime Butterfly	<i>Papilio demoleus</i>	Very Common
38	Papilionidae	Common Jay	<i>Graphium doson</i>	Locally Common
39	Papilionidae	Tailed jay	<i>Graphium agamemnon</i>	Common
40	Papilionidae	Common Bluebottle	<i>Graphium sarpedon</i>	Common
41	Papilionidae	Common Mime	<i>Chilasa clytia</i>	Not rare
42	Papilionidae	Malabar Raven	<i>Papilio dravidarum</i>	Uncommon
43	Papilionidae	Red Helen	<i>Papilio helenus</i>	Common
44	Papilionidae	Paris Peacock	<i>Papilio paris</i>	Not rare
45	Papilionidae	Malabar Banded Peacock	<i>Papilio buddha</i>	Rare
46	Papilionidae	Malabar Rose	<i>Atrophaneura pandiyana</i>	Locally Common
47	Papilionidae	Southern Birdwing	<i>Troides minos</i>	Not Rare
48	Nymphalidae	Striped Tiger	<i>Danaus genutia</i>	Common
49	Nymphalidae	Plain Tiger	<i>Danaus chrysippus</i>	Common
50	Nymphalidae	Glassy Tiger	<i>Parantica aglea</i>	Common
51	Nymphalidae	Common Leopard	<i>Phalanta phalantha</i>	Common
52	Nymphalidae	Baronet	<i>Euthalia nals</i>	Locally Common
53	Nymphalidae	Common Crow	<i>Euploea core</i>	Common
54	Nymphalidae	Great Eggfly	<i>Hypolimnas bolina</i>	Common
55	Nymphalidae	Tawny Coster	<i>Acraea violae</i>	Common
56	Nymphalidae	Peacock Pansy	<i>Junonia almana</i>	Common
57	Nymphalidae	Blue pansy	<i>Junonia orithy</i>	Common
58	Nymphalidae	Chocolate Pansy	<i>Junonia iphita</i>	Common
59	Nymphalidae	Angled castor	<i>Ariadne ariadne</i>	Common
60	Nymphalidae	Common Sailer	<i>Neptis hylas</i>	Common
61	Nymphalidae	Blue Tiger	<i>Tirumala limniace</i>	Common
62	Nymphalidae	Brown King Crow	<i>Euploea klugii</i>	Locally Common
63	Nymphalidae	Common Fouring	<i>Ypthima hubneri</i>	Common
64	Nymphalidae	Common Bushbrown	<i>Mycalesis perseus</i>	Common
65	Nymphalidae	Common Castor	<i>Ariadne merione</i>	Common
66	Nymphalidae	Common Lascar	<i>Pantoporia hordonia</i>	Common
67	Nymphalidae	Common Baron	<i>Euthalia aconthea</i>	Common
68	Nymphalidae	Common Palmfly	<i>Elymnias hypermnestra</i>	Common
69	Nymphalidae	Grey Pansy	<i>Junonia atlites</i>	Locally Common
70	Nymphalidae	Lemon Pansy	<i>Junonia lemonias</i>	Common
71	Nymphalidae	Clear Sailer	<i>Neptis clinia</i>	Rare
72	Nymphalidae	Common Sergeant	<i>Athyma perius</i>	Locally Common

73	Nymphalidae	Colour Sergeant	<i>Athyma nefte</i>	Not rare
74	Nymphalidae	Staff Sergeant	<i>Athyma selenophora</i>	Common
75	Nymphalidae	Common Map	<i>Cyrestis thyodamas</i>	Common
76	Nymphalidae	Leopard Lacewing	<i>Cethosia cyane</i>	Common
77	Nymphalidae	Rajah	<i>Charaxes</i>	Common
78	Nymphalidae	Orange Oak Leaf	<i>kallima inachus</i>	Common
79	Nymphalidae	Commander	<i>Moduza procris</i>	Common
80	Nymphalidae	Common Evening Brown	<i>Melanitis leda</i>	Common
81	Nymphalidae	Dark - branded Bush Brown	<i>Mycalesis mineus</i>	Common
82	Nymphalidae	Lesser Three Ring	<i>Ypthima mica</i>	Common
83	Nymphalidae	Common Nawab	<i>Polyura athamas</i>	Not rare
84	Nymphalidae	Indian Plain Tawny Rajah	<i>Charaxes psaphon imna</i>	
85	Nymphalidae	Dark blue Tiger	<i>Tirumala septentrionis</i>	Common
86	Nymphalidae	Double - Branded Crow	<i>Euploea sylvester</i>	Locally Common
87	Nymphalidae	Blue Nawab	<i>Polyura schreiber</i>	Rare
88	Nymphalidae	Bamboo Treebrown	<i>Lethe europa</i>	Common
89	Nymphalidae	Tamil Treebrown	<i>Lethe drypetis</i>	Common
90	Nymphalidae	Glad - eye Bushbrown	<i>Mycalesis patnia</i>	Common
91	Nymphalidae	Tailed Palmfly	<i>Elymnias caudata</i>	Common
92	Nymphalidae	Common Fivering	<i>Ypthima baldus</i>	Common
93	Nymphalidae	Chestnut - streaked Sailer	<i>Neptis jumbah</i>	Common
94	Nymphalidae	Yellow Pansy	<i>Junonia hierta</i>	Common
95	Nymphalidae	Danaid Eggfly	<i>Hypolimnas misippus</i>	Common
96	Nymphalidae	Blue Oakleaf	<i>Kallima horsfieldi</i>	Locally Common
97	Nymphalidae	Autumn Leaf	<i>Doleschallia bisaltide</i>	Rare
98	Pieridae	Common Emigrant	<i>Catopsilia pomona</i>	Common
99	Pieridae	Mottled Emigrant	<i>Catopsilia pyranthe</i>	Common
100	Pieridae	Common Grass Yellow	<i>Esenahе cabe</i>	Common
101	Pieridae	Small Grass Yellow	<i>Eurema brigitta</i>	Common
102	Pieridae	Common Jezebel	<i>Delias eucharis</i>	Common
103	Pieridae	Common Gull	<i>Cepora nerissa</i>	Common
104	Pieridae	Psyche	<i>Leptosia nina</i>	Common
105	Pieridae	Common Wanderer	<i>Pareronia valeria</i>	Common
106	Pieridae	Common Albatross	<i>Appias albina</i>	Common
107	Pieridae	Chocolate Albatross	<i>Appias lyncida</i>	Locally Common
108	Pieridae	Common Gagrant	<i>Catopsilia florella</i>	Locally Common
109	Pieridae	One Spot Grass Yellow	<i>Eurema andersoni</i>	Not rare
110	Pieridae	Three Spot Grass Yellow	<i>Eurema blanda</i>	Common
111	Pieridae	Spotless Grass Yellow	<i>Eurema laeta</i>	Common
112	Pieridae	Great Orange Tip	<i>Hebomoia glaucippe</i>	Common
113	Pieridae	Pioneer	<i>Belenios aurota</i>	Common
114	Lycaenidae	Plains Cupid	<i>Chilades pandava</i>	Locally Common
115	Lycaenidae	Indian Cupid	<i>Everes lacturnus</i>	Locally Common
116	Lycaenidae	Tailless Lineblue	<i>Prosotas dubiosa</i>	Common
117	Lycaenidae	Large Oakblue	<i>Arhopala amantes</i>	Locally Common
118	Lycaenidae	Indian Oakblue	<i>Arhopala atrax</i>	Locally Common
119	Lycaenidae	Forget - me - not	<i>Catochrysops strabo</i>	Common
120	Lycaenidae	Common Cerulean	<i>Jamides celeno</i>	Common
121	Lycaenidae	Pale Grass Blue	<i>Pseudozizeeria maha</i>	Common
122	Lycaenidae	Common Hedge Blue	<i>Acytolepis puspa</i>	Common
123	Lycaenidae	Common Acacia Blue	<i>Surendra quercetorum</i>	Common
124	Lycaenidae	Zebra Blue	<i>Syntarucus plinius</i>	Common
125	Lycaenidae	Dark Cerulean	<i>Jamides bochus</i>	Common
126	Lycaenidae	Common Pierrot	<i>Castalius rosimon</i>	Common
127	Lycaenidae	Rounded Pierrot	<i>Tarucus nara</i>	Common
128	Lycaenidae	Monkey Puzzle	<i>Rathinda amor</i>	Not rare
129	Lycaenidae	Angled Pierrot	<i>Caleta caleta</i>	Not rare
130	Lycaenidae	Pea Blue	<i>Lampides boeticus</i>	Common
131	Lycaenidae	Lime Blue	<i>Chilades laius</i>	Common
132	Lycaenidae	Yamfly	<i>Loxura atymnus</i>	Common
133	Lycaenidae	Plum Judy	<i>Abisara echerius</i>	Common
134	Lycaenidae	Purple Leaf Blue	<i>Amblypodia anita</i>	Rare
135	Lycaenidae	Kanara Oakblue	<i>Arhopala alea</i>	Locally Common
136	Lycaenidae	Long - banded Silverline	<i>Spindasis lohita</i>	Not rare
137	Lycaenidae	Common Onyx	<i>Horaga onyx</i>	Locally Common
138	Lycaenidae	Common Imperial	<i>Cheritra freja</i>	Locally Common
139	Lycaenidae	Peacock Royal	<i>Tajuria cippus</i>	Uncommon

140	Lycaenidae	Banded Royal	<i>Rachana jalindra</i>	Rare to Very Rare
141	Lycaenidae	Common Guava Blue	<i>Common Guava Blue</i>	Common
142	Lycaenidae	Indian Red Flash	<i>Rapala airbus</i>	Common
143	Lycaenidae	Slate Flash	<i>Rapala manea</i>	Common
144	Lycaenidae	Common Silverline	<i>Spindasis vulcanus</i>	Common
145	Lycaenidae	Banded Blue Pierrot	<i>Discolampa ethion</i>	Locally Common
146	Lycaenidae	Common Lineblue	<i>Prosotas nora</i>	Common
147	Lycaenidae	Metallic cerulean	<i>Jamides alecto</i>	Locally Common
148	Lycaenidae	Dark Grass blue	<i>Zizeeria karsandra</i>	Common
149	Lycaenidae	Lesser Grass Blue	<i>Zizina otis</i>	Common
150	Lycaenidae	Tiny Grass Blue	<i>Zizula hylax</i>	Common
151	Lycaenidae	Grass Jewel	<i>Freyeria trochylus</i>	Locally Common
152	Lycaenidae	Red Pierrot	<i>Talicauda nyseus</i>	Locally Common
153	Lycaenidae	Quaker	<i>Neopithecops zalmora</i>	Common
154	Lycaenidae	Gram blue	<i>Euchrysops cnejus</i>	Common
155	Riodinidae	Orange Punch	<i>Dodona egeon</i>	Rare
156	Riodinidae	Double Banded Judy	<i>Abisara bifasciata</i>	Common

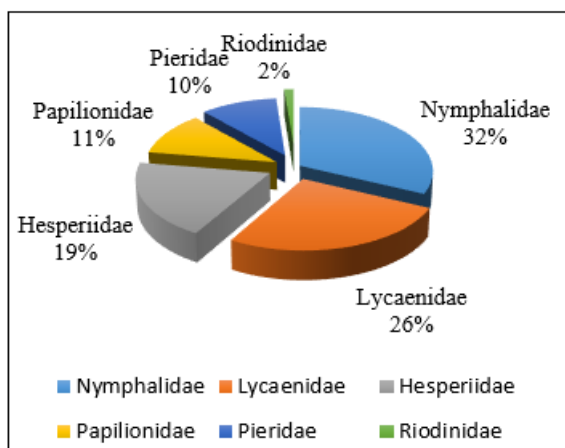


Figure 2: Family wise distribution of the species

5. Conclusion

A total of 156 species of butterfly were recorded from the study area. Based on the result obtained from the study on butterfly diversity in the study area, the *Nymphalidae* family was found maximum in number (50) and percentage (32%) of the species of butterfly among all other families. Therefore, it is concluded that the study area is rich in butterfly diversity, and further research could be conducted to obtain details and documentation on butterfly diversity for the conservation in the study area.

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