IJARASEM

ISSN: 2395-7852

International Journal of Advanced Research in Arts, Science, Engineering & Management

Volume 10, Issue 6, November 2023

ISSN INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 6.551

International Journal of Advanced Research in Arts, Science, Engineering & Management (IJARASEM)

| ISSN: 2395-7852 | www.ijarasem.com | Impact Factor: 6.551 |Bimonthly, Peer Reviewed & Referred Journal|

| Volume 10, Issue 6, November 2023 |

Diversity and Distribution of Lepidopterans in and Around Ratnagiri (MS), India

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ABSTRACT: Lepidoptera is one of the largest orders of insects including butterflies and moths. About 1, 80,000 species are described in 126 families which constitute 10% of the total described species of living organisms. It is one of the most extensively studied orders of class Insecta. In the present study, 86 species belonging to 19 different families of Lepidoptera were identified and recorded. Thus, the study emphasized identifying the biodiversity of Lepidoptera and their significance in the study site
i.e. Ratnagiri city.

KEYWORDS: Biodiversity, Butterfly, Konkan Region, Lepidoptera, Moth, Pollinators, Ratnagiri

I. INTRODUCTION

The Order name Lepidoptera originated from the Greek word “Lepis” meaning “scale” and “pteron” meaning “wing”. Lepidopteran insects including butterflies (Rhopalocera) and moths (Heterocera) are widely distributed around the world from sea level up to 6000m above sea level (Mani, 1968). It is one of the most special orders of the class Insecta (Powell, 2009). The term ‘Lepidoptera’ was used in 1746 by Carl Linnaeus in ‘Fauna Svecica’. Heppner (1991) estimated the diversity of Lepidoptera in each faunal region. More than 10,000 species of moths exist in India (Hampson *et al*, 1892-1937). Many of these have remained unidentified. Many areas are still to be surveyed.

The larval stage of butterflies and moths is the most harmful as the voracious larvae feed upon foliage, shoots, standing crops, vegetables, fruits, stored food grains, flour, clothing, etc. The larvae of families Tortricidae, Noctuidae, and Pyralidae are serious pests of standing crops. The mango fruit-piercing moth is a serious pest of ripe mangoes and other economically important fruit trees of this region. Owing to its scenic beauty and places of historical and religious importance, Ratnagiri has become a famous tourist spot due to which gardening followed by the introduction of exotic ornamental and commercial plants has become common. But, the risk of getting these gardens destroyed by insect larvae such as cutworms has increased. Therefore, it becomes necessary to study this order in detail in the vicinity of Ratnagiri.

Mixed forests, in particular, depend on insects such as bees, butterflies, and moths for cross-pollination. Some big-sized butterflies and moths also help in the dispersal of seeds. Insects of the order Lepidoptera are the indispensable parts of the majority of the food webs. Most butterflies and moths are the food of birds and parasitic entomophagous insects and other animals such as reptiles and small mammals. Being nocturnal in habit, most moths are the food of nocturnal animals. Order Lepidoptera plays a pivotal role in maintaining the balance in an ecosystem. The striking designs on the wings of these insects have been used in the fashion industry, jewelry design, ceramic industry, etc. Some Lepidopterans can be used to indicate the high concentration of CO_2 in the air. The change in food-plant preference of larvae under elevated CO_2 implies potential changes in selection pressure for grass species and might therefore affect evolutionary processes (Goverde, M. and Erhardt, A. 2002).

The intervention of anthropogenic through various activities e.g. proposed power plant near the study sites is likely to affect useful and delicate insects like butterflies and moths which, in turn, will affect the growth of many insect-dependent endemics as well as other species of plants. Therefore, it is necessary to estimate, in time, the aftermath of an increasing number of power plants on the biodiversity of Lepidoptera which is one of the most important orders.

In addition, many farmhouses are coming up which are modifying the natural vegetation of the region. Economically important plants and ornamental plants are given preference over mixed forests in most such farmhouses. The variety of plants will directly be proportional to the variety of insects. It will also increase the risk of infestation to the selected plants due to monocultural practices in an area. This may further affect the natural biodiversity of the study region.

Owing to all these facts, the present study was conducted mainly on the biodiversity of Lepidoptera in Ratnagiri taluka.

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II. MATERIAL AND METHODS

Three zones were selected within the stretch of 30 km to study the biodiversity ofLepidoptera in Ratnagiri taluka. The zones are as follows:
Zone I: Outskirts of Karwanchiwadi village, Ratnagiri is a sparsely populated area having mixed forests as well as mango orchards around a stream that is connected with the Kajali river.
Zone II: Konkan Nagar, Ratnagiri is a densely populated area with patches of agricultural land, fallow land, pasture land, and mango orchards in between.
Zone III: Uttamrao Patil Biodiversity Park, Khanu, Ratnagiri encompasses a protected forest having mixed and natural vegetation.
The zones were visited throughout the year at an interval of 15 days between 2018 and 2019. Live specimens were photographed the dead ones were handpicked and preserved by using dry preservation method. After pinning, the insects were kept in a display box. Small packs of KOH werekept in the corners of the display box to avoid degradation due to moisture and to keep away the pests. Butterflies were collected during the daytime, whereas many moths were collected at night between8 pm and 11 pm. Some species were preserved in 70% alcohol.
With the help of first-hand photos and preserved specimens, the insects were identified usingavailable literature. Further study of collected specimens was carried out as per the standard methods.

Table 1 Location sites and Occurrence of Lepidopterans

Zones	Location	Latitude	Longitude	Occurrence
Zone I	Karwanchiwadi	16.99370 N	73.37480 E	+ + + +
Zone II	Konkan Nagar	16.99920 N	73.32220 E	+ +
Zone III	Khanu	16.97720 N	73.50490 E	+ + +

+ + + + highest in number, + + + Average in number, + + lowest in number, + poor in number

III. RESULTS AND DISCUSSION

Many researchers have made good efforts to study the diversity of Lepidoptera. Linnaeus did a pioneering work. J. C. Fabricius and Pieter Cramer were among the first to describe the Indian butterflies from 1775 onwards. Thomas Horsfield and Fredrick Moore described severalbutterflies between 1828 and 1859. George Marshall and Lionel de Niceville published the first volume of 'The Butterflies of India, Burmah and Ceylon' in 1883 which was followed by two more volumes in 1886 and 1890 (Smetacek, 2000). Evans (1932) recorded approximately 1439 species of butterfly from British India. Kasambe, 2012 independently highlighted 216 species of common butterflies found in Maharashtra and South India with their distribution and larval host plants. Around 1502 species of butterflies have been found in India to date.

Common butterflies and moths recorded during the study were blue Mormon, common crow, common evening brown, common jay, common mormon, common wanderer, grass yellow, great egg fly, lemon pansy, peacock pansy, psyche, ring butterflies, typical blues. The common moths recorded were engrailed, Erebus, lunar

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moths, monkey moths, oleander hawk moths, sphinx moths, waspmoths, etc.

Most of the insects of the order Lepidoptera are useful in one way or the other. Even if the larval stage is damaging, the usefulness overrides the harmfulness. They are indispensable parts of the ecosystem due to interdependence in the food webs and being the important pollinators next to bees. Antheraea spp. (though rare in this region) can be commercially used to produce Tussar silk. Some of them can be used as biodiversity indicators (Tembhare, 2012). Conservation biologists today use butterflies as indicator species to monitor critical habitats, climate change, and environmental degradation (Kehimkar, 2016). Hence, they have a direct impact on the ecosystem of the region, be it an artificial like an agricultural field a natural like a sacred grove, or a protected forest ecosystem.

We can observe some of the diversity of lepidopterans in the Ratnagiri area, even though the research zone is a crowded area. It also indicates the amount of their host plants present at this particular site. The research region i.e. all zones almost showed a good variety of the group and was found to have a total of 19 families of lepidopterans (Butterflies 5 and Moths 14 families).Family Nymphalidae was found to be most dominant followed by Erebidae. As a result, it is determined that there is a high diversity of lepidopterans in the study area and that more research maybe done to gather information on their richness.

Table 2: Butterflies of Ratnagiri

Sr. No.	Name of the butterflies	Family	Zone I	Zone II	Zone III
1.	*Acraea terpsichore*	Nymphalidae			+++
2.	*Caleta caleta*	Lycaenidae	+++		
3.	*Castalius rosimon*	Lycaenidae	++		+
4.	*Cupha erymanthis*	Nymphalidae			++
5.	*Danaus chrysippus Nymphalidae*	Nymphalidae	++++		
6.	*Danaus genutia*	Nymphalidae			+++
7.	*Delias eucharis*	Pieridae	+++		+++
8.	*Deudorix perse*	Lycaenidae		++	
9.	*Euploea core*	Nymphalidae	++++	++	+++
10.	*Eurema blanda*	Pieridae	+++	+	
11.	*Eurema hecabe*	Pieridae	+++	++	++
12.	*Euthalia acantha*	Nymphalidae	++		
13.	*Graphium Agamemnon*	Papilionidae	+++	+	++
14.	*Graphium doson*	Papilionidae	++	+	+
15.	*Hypolimnas bolina*	Nymphalidae	++++	++	+++
16.	*Junonia almanac*	Nymphalidae	++++	++	++++
17.	*Junonia lemons*	Nymphalidae	+++	+	+++
18.	*Lampides boeticus*	Lycaenidae		+	
19.	*Leptosia nina*	Pieridae	+++	+	++
20.	*Loxura alumnus*	Lycaenidae			+
21.	*Luthrodes Pandava*	Lycaenidae	++++	++	+++
22.	*Melanitis leda*	Nymphalidae	+++	+	++
23.	*Melanitis pneuma*	Nymphalidae	++		
24.	*Mycalesis perseus*	Nymphalidae	++		
25.	*Neptis hylas*	Nymphalidae	++		+
26.	*Pachliopta aristolochiae*	Papilionidae	+++	+	++
27.	*Papilio demoleus*	Papilionidae			++++
28.	*Papilio polymnestor*	Papilionidae	++++	++	++++
29.	*Papilio polytes*	Papilionidae	++++	+	++++
30.	*Pareronia valeria*	Pieridae	+++	+	++
31.	*Pelopidas mathias*	Hesperiidae	++		

32.	*Phalanta spp.*	Nymphalidae	+		
33.	*Tajuria jehana*	Lycaenidae	++		
34.	*Taractrocera ceramas*	Hesperiidae	++		
35.	*Tarucus nara*	Lycaenidae	+++		
36.	*Talicada nyseus*	Lycaenidae	+++		
37.	*Tirumala eliminate*	Nymphalidae			++
38.	*Vanessa cardui*	Nymphalidae	++		
39.	*Ypthima spp.*	Nymphalidae	++	+	++
40.	*Zizeeria karsandra*	Lycaenidae		+	
41.	*Zizina otis*	Lycaenidae		++	
42.	*Pelopidas mathias*	Hesperiidae		+	
43.	*Swift paintbrush swift*	Hesperiidae	++		

Table 3: Moth species

Sr. No.	Name of the Moths	Family	Zone I	Zone II	Zone III
1.	*Actias luna*	Saturniidae	++	+	++
2.	*Amata bicincta*	Erebidae	++		
3.	*Amata sperbius*	Erebidae	+++	+	++
4.	*Agathia gemma*	Geometridae	++		
5.	*Amplypterus panopus*	Sphingidae	++		
6.	*Antheraea*	Saturniidae	+		
7.	*Asota caricae*	Erebidae	++	+	
8.	*Attacus atlas*	Saturniidae	++	+	
9.	*Attacus taprobanis*	Saturniidae	++		
10.	*Chiasmia nora*	Geometridae	++++	++	
11.	*Chrysocraspeda*	Geometridae	+		
12.	*Cyana puella*	Erebidae	+++		
13.	*Daphnis nerii*	Sphingidae	+++	+	++
14.	*Ectropis spp.*	Geometridae	++	+	
15.	*Erebus spp.*	Erebidae	++	+	++
16.	*Euchromia polymena*	Erebidae	++	+	++
17.	*Eudocima maternal*	Erebidae	++		
18.	*Eupterote*	Eupterotidae	++	+	
19.	*Grammodes geometrica*	Erebidae	++		
20.	*Hippotion rosetta*	Sphingidae	+++		
21.	*Hyalobathra spp.*	Crambidae	+++		
22.	*Hyposidra talaca*	Geometridae	++++	+	
23.	*Hypsopygia spp.*	Pyralidae	+		
24.	*Loepa katinka*	Saturniidae	+++		
25.	*Macroglossum*	Sphingidae	++	+	
26.	*Micronia aculeate*	Uraniidae	++		
27.	*Mocis spp.*	Erebidae	++		
28.	*Olepa spp.*	Erebidae	+++	++	
29.	*Orgyia spp.*	Erebidae	++		
30.	*Orvasca subnotata*	Erebidae			+
31.	*Parapoynx spp.*	Crambidae	+++	+	++

32.	*Pingasa spp.*	Geometridae	+++	+	
33.	*Plutodes transmutata*	Geometridae	++		
34.	*Polytela gloriosae*	Noctuidae	+++		
35.	*Pseudoblabes oophora*	Erebidae	+++	+	
36.	*Spoladea recurvalis*	Crambidae	++	+	
37.	*Trabala vishnou*	Lasiocampidae	+		
38.	*Trypanophora semihyalina*	Zygaenidae	+		
39.	Owl Moth	Brahmaeidae	++		
40.	Plume moth	Pterophoridae	++	+	
41.	Scaly-legged pyralids	Pyralidae	+++	+	
42.	Sphinx moth	Sphingidae	+++	+	+++
43.	Tussock moth	Liparidae	++++	++	

Acknowledgment:

Author[1] is thankful to the Principal Dr. D L Bharamal, Principal, SPK Mahavidyalay, Sawantwadi for his guidance in the identification and verification of species.

| ISSN: 2395-7852 | www.ijarasem.com | Impact Factor: 6.551 |Bimonthly, Peer Reviewed & Referred Journal|

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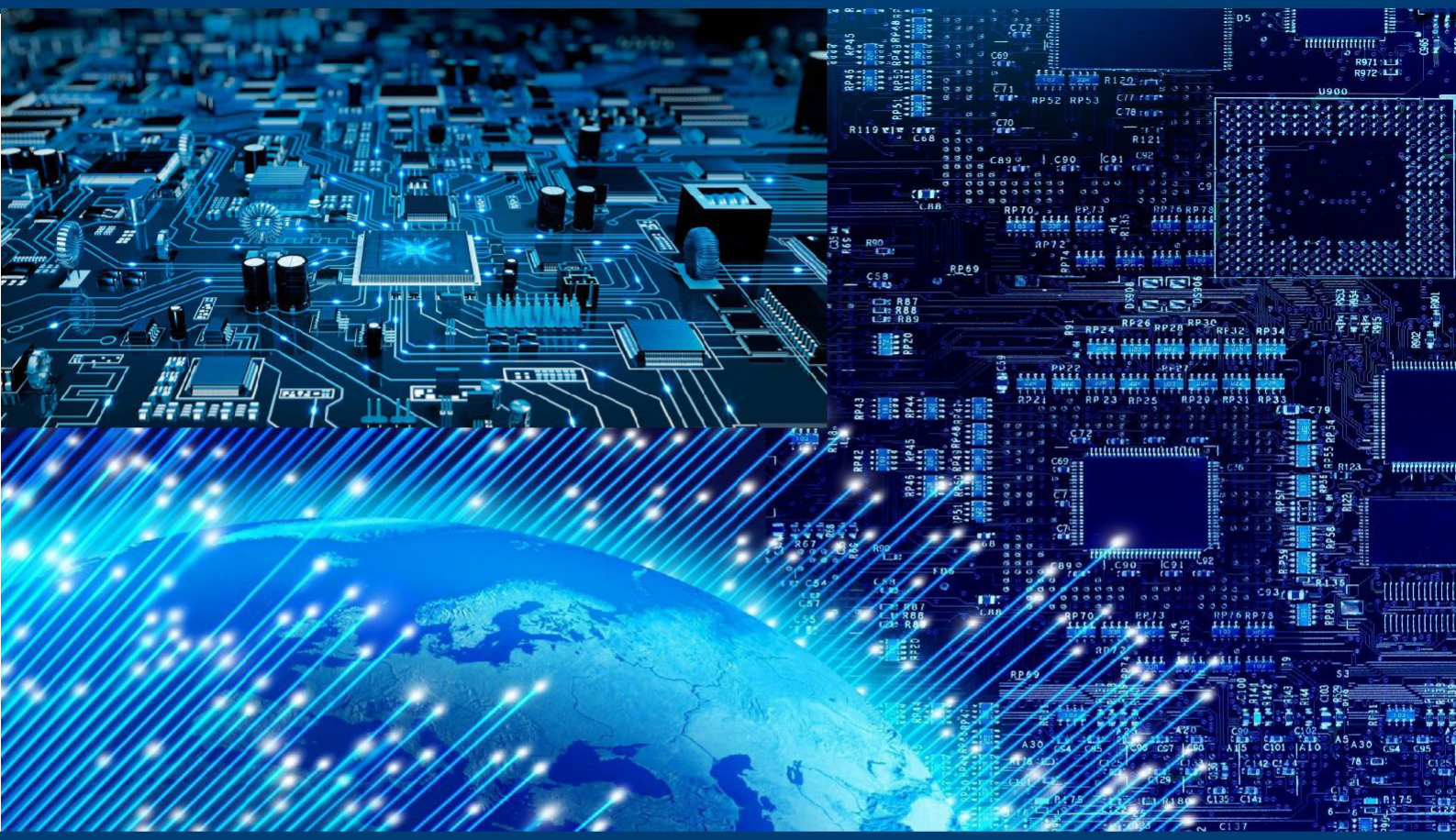
REFERENCES

1. **Evans, W. H. (1932)** Introduction. In: Identification of Indian Butterflies, 2nd Edition, Bombay Natural History Society, Mumbai, 1-35.
2. **Goverde, M. & Erhardt, A. (2002).** Effects of elevated CO2 on development and larval food-plant preference in the butterfly *Coenonympha pamphilus* (Lepidoptera, Satyridae). Global Change Biology. 9. 74 - 83.
3. **Hampson, et al (1892-1937).** Fauna of British India Including Ceylon and Burma-Moths Vols.1-5 (xix + 2813p-1295 figs-1table-15 pl (12 incol.)
4. **Heppner, J. B. (1991).** Faunal Regions and the Diversity of Lepidoptera, Association for Tropical Lepidoptera, Volume 2 of Tropical Lepidoptera, ISSN 1048-8138
5. **Kasambe, (2012).** Butterflies of Maharashtra, Edition: 2012, Publisher: Sahitya Prasar Kendra, Nagpur, ISBN: 978819226715
6. **Kehimkar I. (2016).** Butterflies of India, Bombay Natural History Society (Reprint 2021).
7. **Mani, M. S. (1968).** Ecology and Biogeography of High-Altitude Insects, Springer-Science+Business Media, B.V.
8. **Powell, J. A., (2009)**. Chapter 151 - Lepidoptera: Moths, Butterflies, In *Encyclopedia of insects* (pp. 559-587). Academic Press.
9. **Smetacek P. (2000).** The Study of Butterflies, 1. The Naming of Indian Butterflies, Resonance, Indian Academy of Sciences. https://www.ias.ac.in
10. **Tembhare D. B. (2012).** Modern Entomology, Himalaya Publishing House. ISBN 9789350518281.



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