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Study on Lepidopteran fauna on coastal lateritic plateau of Ratnagiri district

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Abstract:

The Western Ghats in India is recently recognized as World heritage site by UNESCO. It provides support to 400 million people through drinking water, irrigation, transport and hydroelectric power, together with food and resources to sustain livelihoods. Insects are important entities on earth, due to its influence as pest on agriculture crops, its beneficial role as pollinators and its impact on human health as vectors in many diseases. Insects play important role in maintaining balance of ecosystem by acting as primary and secondary consumers in food webs and food chains. Present study reveals diversity of Lepidopteran insects on coastal lateritic plateaus of Ratnagiri district where ecosystems are getting affected due to human settlement. In present study, a total of 52 species from 14 families of butterflies and moths are reported from August 2023 to September 2024. Study indicates rich diversity of insects on these plateaus, which play very important ecological role in maintaining ecosystem balance.

Keywords: *Western Ghats, insect fauna, Lateritic plateaus*

Introduction:

Insects, a largest group of animals from Phylum Arthropoda has multidimensional role in influencing life of mankind. Some insects with their pollinating activities make possible the production of many agricultural crops, they provide us with honey, bee wax, silk and other products of commercial value, they serve as food for many birds, fish and other beneficial animals, they perform valuable services as scavengers, they act as biocontrol agents and keep harmful animals and plants in check, they have been useful in medicine and in scientific research, Gullan and Cranston (2000)

As insect, being the member of biotic community, interact with other living members of the community as well as with nonliving components of the environment. The outcome of these interactions is the population dynamics, the positive or negative growth of the population Borror, et al (1992). Hence the life system, existence, abundance and diversity of insects can be understood by the study of interaction between the insects and the biotic and abiotic factors as well as population dynamics, Daccordi, *et al.* (1987)

The butterflies and moths are common insects and well known to everyone. They have ability to fly and most colorful entities on earth; they have wings covered by scales on it. Its members are to be found almost everywhere, often in considerable number, Gunathilagaraj, et al (1998). Coastal lateritic plateaus are land masses between sea and main terrestrial lands, they can be considered as isolated terrestrial islands. These geographical lands are strongly weathered and uneven, they support various small aquatic and grassland habitats, Lekhak and Yadav (2012). There are various types of grasslands on tropical coastal lateritic plateaus associated with Arabian Sea, though they resemble waste lands, but they are extremely important from the biodiversity point of view as they are abundant in variety of species. The animal plant interaction on these plateaus shows interesting bio- complexities, with behavioural and physiological properties. Study on insect- plant interactions can reveal many secrets of ecology, related to associations between insects and plants. Due to small habitat size, the studies on these habitats are applicable to larger situations and ecological theory in general.

Hence to fill the lacunae of knowledge on Lepidopteran insect faunal diversity of tropical coastal lateritic plateau of Ratnagiri district a humble attempt was made and the observations, results have been provided herein.

Materials & Methods:

Study Area

Ratnagiri is part of Konkan region and one of coastal districts of Maharashtra state. On west side it is surrounded by Arabian Sea and on east side it has mountain ranges of Western Ghats, a biodiversity hotspot, known for its endemic biodiversity. Geographical location of Ratnagiri district lies between latitudes 16°30'N and 18°04'N and longitude

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73°20'and 73°52' E. It has an highest altitude of up to 1022 MSL, enjoys celubrious climate and receives an average rainfall of 300 cm/year, mostly brought by South West monsoon. The temperature ranges between 28 to 33 °C. It has some plateaus in central portion, which are about 30 to 100 meters above sea level; most of the area is near coastal line.

Ratnagiri district has many lateritic plateaus but one of the tourist attraction amongst it is **Thiba Palace plateau**, For present study plateau of Thiba Palace Ratnagiri, was selected as site of study. The plateau is located 50-60 msl. Bhatye estuary is on Southern side of the plateau while it is bordered by flat valleys on Northern side. The slopes have thick vegetation and mango and other tree plantations. Ratnagiri city receives rainfall of about 3000 mm from southwest monsoon. Due to humid and warm climate throughout year in Ratnagiri, seasonal changes on lateritic plateau habitats are observed. The humidity during monsoon is high varying from 90-95 % and for the rest of the year; it ranges from 80-85 %. In study area, laterite rocks occur in almost all localities.

Thiba Palace plateau vegetation is typified by open scrub jungle species like *Carissa*, *Holarrhena*, *Lantian*, *Calicopetris*, *Woodfordia*, *Grewia* and moist deciduous forest with members belonging to the family Rubiceae, Bignoniaceae, Anacardiaceous, Sapindaceae, Fabaceae and confined to the lower elevation of Ghats . All these vegetation provide an excellent habitat for the survival of insects

Present study was carried out from August- 2023- September, 2024; as mentioned earlier plateau shows variety of life in all three seasons, monsoon season is the most favourable and productive period for the life on grassland ecosystem and that's why it selected for study. Due to abundance of plants and grasses on plateau, abundance in insect population was also observed.

Insects were collected and preserved by using standard methods and identified with the help of available standard literature such as Borrer, *et al* (1992), Gullan & Cranstan (2000), Gunathilagaraj, *et al* (1998), Haribal (1992), Mani (1995), Pradhan (1992), Saxena (1992).

Results and discussion:

The Lepidoptera the most colorful and beautiful creation of nature are considered for their economic and ecological importance to mankind. With metamorphic lifecycle with egg, larva, pupa and adult, larval stage, a feeding stage in lepidopterans are phytophagous and considered as serious pests for many agricultural and horticultural crops. Adult butterflies and moths due to their beautiful colors and designs serve as the basis of art and design. Moths like silk moths are known for their silk gland and production of fine fabric i.e. silk.

Present study on lepidopteran fauna on grassland habitat located on coastal lateritic plateau of Thiba palace in Ratnagiri, shows association of butterflies and moths with local species of grasses and flowering plants. Sufficient sunlight, some big trees, small bushes gives shelter and food for butterflies and moths to complete their life cycle; less use of insecticides and pesticides on plateau makes it favourable habitat for plateau, similar observation was recorded by Kasambe (2014).

In current study, total 53 species of butterflies and moths were recorded belonging to 22 different genera of 14 different families. Among these families, Nymphalidae consisted maximum number of species i.e. 17 species, belonging to 14 genera. This was followed by family Papilionidae (8 species, 5 genera), Lycaenidae (6 species, 6 genera) Pieridae (5 species, 4 genera) are amongst the dominat species diversity. Amongst moths species family Arctiidae and Sphingidae were dominant families. Some butterflies and moths were rarely recorded. Similar kind of observations was recorded by Patil et.al, 2017, where they found dominance of Nymphalidae family in study conducted in Rawanwadi village. Dominance of Nymphidae was recorded by Ganvir and Khaparde (2018) and Gokarnkar et al (2014) in some other parts of Maharashtra state. Except dominance of Nymphidae, rest other observations are varying from research work carried out by earlier researchers in Maharashtra. Due to the specialized micro habitat present on this lateritic plateau, biodiversity richness and abundance is more on this small area of lateritic plateau. Which its indicates its importance from biodiversity and ecology point of view.

Table: Checklist of Lepidopteran species recorded from Thiba Plateau, Ratnagiri

Family	Sr. No	Common Name	Scientific Name
Nymphalidae	1	Chocolate pansy	*Précis iphita iphita*
	2	Peocock pansy	*Précis almana almana*
	3	Common evening brown	*Melanitis leda*
	4	Commander	*Moduza procris undifragus*
	5	Common castor	*Ariadne merione merione*
	6	Danaid eggfly	*Hypolimnas misippus*
	7	Blue tiger	*Tirumala limniace*
	8	Common sailer	*Neptis hylas varmona*
	9	Tamil yeoman	*Cirrochroa thais thais*
	10	Tawny coster	*Acraea violae*
	11	Black rajah	*Charaxes solon solon*
	12	Map butterfly	*Cyrestis thyodamas indica*
	13	Common crow	Eulopoea core core
	14	Plain tiger	*Danaus chrysippus chrysippus*
	15	Striped tiger	*Danaus genutia genutia*
	16	Blue tiger	*Tirumala limniace exoticus*
	17	Dark blue tiger	*Tirumala septentrionis*
Lycanidae	18	Banded blue pierrot	*Discolampa ethion vavasanus*
	19	Bright babul blue	*Azanus ubaldus Cramer*
	20	Common pierrot	*Castalius rosimon rosimon*
	21	Red pirrot	*Talicada nyseus nyseus*
	22	Yamfly	*Loxura atymnus*
	23	Angled sunbeam	*Curetis dentata*
Papilionidae	24	Common mormon	*Papilio polytes romulus*
	25	Common mormon	*Papilio polytes stichius*
	26	Common rose	*Pachliopta aristolochiae*
	27	Crimson rose	*Pachliopta hector*

	28	Tailed jay	*Graphium agamemnon menid*
	29	Yellow swallowtail	*Papilio machaon*
	30	Common blue apollo	*Parnassius hardwicii*
	31	Southern bird wing	*Triodes minos*
Pieridae	32	Common wanderer	*Pareroniavaleria hippia*
	33	Psyche	*Leptosia nina nina*
	34	Tree yelow	*Gandaca harina assamica*
	35	Small grass yellow	Eurema brigitta
	36	Common grass yellow	Eurema hecabe
Brahmaeidae	37	*Tortrix viridana*	*Tyria jacobaeae L*
Cossidae	38	*Oxytilus sps*	*Brahmaea wallichi*
Tortricidae	39	*Nepticula sps*	*Zeuzera sps*
Pterophoridae	40		*Tortrix viridana*
Nepticulidae	41		*Oxytilus sps*
	42		*Nepticula sps*
Satyridae	43	Bush brown	*Mycalesis ssubdita*
	44	Common evening brown	*Melanitis leda leda*
Sphingidae	45	Striped hawkmoth	*Hyles lineataa*
	46	Bedstraw hawkmoth	*Hyles gallii*
	47	Head hawkmoth	*Acherontia atropos*
Saturnidae	48	Atlas moth	*Attacus atas*
	49	Lunamoth	*Actias luna*
Arctiidae	50	Jercy tiger	*Euplagia qudripundari*
	51	Ruby tiger	*Phragmatobia fuliginosa*
	52	Cinnabar moth	*Tyria jacobaeae L*
	53	Gray moth	*Brahmaea wallichi*
	54	Leopard moth	*Zeuzera sps*

Probably over 1 million species of insects have been described i.e. have been recorded in taxonomic publications. It is also observed that some insect species have been described as new more than once because of failure to recognize the nature of variation or through ignorance of previous description, the actual number of species that have been described is not certain (Groombridge, 1992).

The insect fauna of Thiba Palace plateau is dominated by order Coleoptera and Lepidoptera, followed by and others.

Present study indicates need of more attention towards conservation of habitats of butterflies and moths for maintaining ecological balance.

Conclusion

The present study reveals a rich diversity of Lepidopteran fauna on the coastal lateritic plateau of Thiba Palace, Ratnagiri district. A total of 53 species belonging to 14 families were recorded, indicating that the plateau provides a favorable habitat for butterflies and moths due to its vegetation diversity and minimal human disturbance. The dominance of the Nymphalidae family aligns with similar studies in the Western Ghats region. This study highlights the ecological importance of lateritic plateaus and emphasizes the need for conservation measures to protect these unique ecosystems and their associated insect biodiversity.

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Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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