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Preliminary Studies on Coleopteran Diversity in Ratnagiri, (MS), India

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ABSTRACT: Beetles belong to the Coleoptera order, which is the most varied in the class Insecta (Phylum Arthropoda). This is the largest collection of comparable numbers among all animals. India, located in the tropics, is recognized for its abundant Coleopteran fauna. In the study region, these are the serious pests of numerous commercially significant plants, including coconut, cashew nut, jackfruit, etc. Coincidentally, the study area is located near the Western Ghats, one of the world's hottest hotspots. The current study investigated about 32 different species of Coleoptera from 2017 to 2020.

KEYWORDS: Coleoptera, Ratnagiri, Biodiversity, Konkan Region, Beetles

I. INTRODUCTION

Coleoptera is the largest order in the animal kingdom. It consists of about 330000 species, i.e., around 40% of all insects and 30% of all animal species, which are adapted to various modes of life, viz., terrestrial, aquatic, areal, fossorial, etc. Many of these insects can camouflage so well that they cannot be spotted easily (Choate, 2001). Many of these beetles are the pests of a variety of plants in the Konkan region. A few of them bring about pollination of some plants.

Insects belonging to order Coleoptera are the severe pests of many economically important plants such as coconut, cashew nut, jackfruit, etc. Rice weevil is the common pest of rice which is the main crop of this region. The mango plant is attacked by a variety of insects belonging to order Coleoptera during the different stages, viz., during growth, before harvest, and during storage. These insects attack all parts of living plants as well as stored plant products.

On the other hand, scavengers and wood-boring beetles help in decomposing and recycling organic nutrients. Predators such as lady beetles serve as biological control agents against harmful insects such as aphids, whiteflies, scale insects, mealy bugs, etc. Fireflies and their larvae feed on soft-bodied invertebrates like snails, slugs, mites, etc. which destroy vegetable plants, particularly in the rainy season. Fireflies, which are common in this region, serve as pollinators. Ground beetles can be used to check the growth of weeds as they eat their seeds. Tiger beetles can be used as biodiversity indicators.

Despite being the largest order of kingdom Animalia, order Coleoptera has not been studied extensively to date, particularly in Ratnagiri and adjacent regions. Owing to the above-mentioned facts, the present study is focused.

II. MATERIALS AND METHODS

The selected sites were surveyed from November 2017 to November 2020. The insects that had died a natural death were handpicked and preserved by using the dry preservation method, i.e., pinning for hard-bodied, big-sized Coleopterans and carding for small-sized Coleopterans such as weevils. Nocturnal coleopterans which get attracted towards incandescent light were collected between 8.00 pm and 10.00 pm. Some of these were killed using ethyl acetate and preserved in 70% alcohol. With the help of first-hand photos and preserved samples, the Coleopteran insects were identified using available literature.

III. STUDY AREA

Ratnagiri is the coastal city of Maharashtra state situated on the Western coast of India. Its latitude is 16.99020 N

and its longitude is 73.31200 E. It is bounded by Sahyadri Hills to the east and Arabian Sea to the west. It's hot and humid climate has resulted in the growth of evergreen forests and tropical moist deciduous forests which are home to thousands of species of insects. Laterite soil, which is commonly found in this area, is not favorable for growing many crop plants. That's why many people in this region rely on subsistence farming. Yet, the use of irrigation techniques and fertilizers has made it possible to grow some cash crops. The main staple crop grown here is rice. Beside *Oryza sativa* (Rice), *Eleusine coracana* (Finger Millet), *Macrotyloma uniflorum* (Horse gram), and *Vigna unguiculata* (Chavali) are also grown. Important fruit trees are *Mangifera indica* (Mango), *Cocos nucifera* (Coconut), *Syzygium cumini* (Jambhul), *Anacardium occidentale* (Cashewnut), *Artocarpus heterophyllus* (Jackfruit), *Garcinia Indica* (Ratambi), etc. *Tectona grandis* (Teak), *Terminalia tomentosa* (Ain), *Terminalia paniculata* (Kinjal), *Acacia catechu* (*Khair*), etc. are the trees that are found in mixed forests. These trees and crops attract thousands of insects particularly during and after the rainy season (June –November) and during the spring season (February and March). Ratnagiri receives heavy rainfall (average rainfall of 3047 mm) from June to September. It has nurtured a tropical climate which allows a variety of insects to flourish. It encompasses coasts, plateaus, hills, grasslands and plains through which hundreds of streams and rivulets flow due to which a variety of aquatic insects such as dragonflies, damselflies, mayflies, stoneflies, lacewing, etc. as well as terrestrial and arboreal insects such as beetles and weevils have flourished in this region. For the study, areas having distinct contrasting features were selected. Five zones were selected within the stretch of 13 km to study the diversity of Coleoptera in Ratnagiri taluka. The zones are as follows:

Zone I: Pomendy Sacred Grove having mixed and natural vegetation
 Zone II: Outskirts of Konkannagar where subsistence farming is practised
 Zone III: Vicinity of Thibaw Palace overlooking the seashore
 Zone IV: Outskirts of Karwanchiwadi village, Ratnagiri which is a sparsely populated area having mixed forests as well as mango orchards around a stream that is connected to the Kajali River.
 Zone V: Dandeadom, a sparsely populated village with people practicing subsistence farming. Mango orchards are common here.

IV. RESULTS AND DISCUSSION

Maxwell-Lefroy (1909) did pioneering work published in the form of 'Indian Insect Life'. The first thorough study of scarabaeid beetles in the Indian region was published by Arrow (1910, 1917, 1931), in three volumes of the Fauna of British India. Balthasar (1963, 1964) studied subfamilies Scarabaeinae and Aphodinae of the Palaearctic and Oriental regions deeply. Chandra, K. (2000) published an inventory of Scarabaeid beetles (Coleoptera) from Madhya Pradesh of 94 taxa belonging to 9 subfamilies. Kuijten, P.J. (1978, 1983) discussed the taxonomic revision of the scarabaeid genus *Hybosorus* followed by the Revision of the Genus *Phaeochrous*. Zahoor, *et al.* (2008) studied the biodiversity of Coccinellids in forests and agroecosystems and reported 22 species. Banerjee (2014), covered Durgapur of West Bengal and reported 9 families (2014). Wankhade, *et al.* (2014) studied the diversity of the order in the Sawanga-Vithoba Lake region, Amravati, and reported 27 species. Choudhary *et al.* (2014) studied coccinellids as an important part of integrated pest management in mango orchards of the region and 16 species were identified of which 7 species were recorded for the first time from Jharkhand. Thakkar and Parikh (2016) reported 177 species belonging to 117 genera from Gujarat. Singhal *et al.* (2018) studied the diversity of Coleoptera in the Vadodara district, Gujarat, and reported 65 species belonging to 16 families. Satheesha *et al.* (2018) studied a total of 324 beetles belonging to 29 species under 10 families around Davangere University Campus, Karnataka, India. Tingare, (2022) recently Survey of Dung Beetles in Mahad Tehsil, Raigad District, Maharashtra, India which is a site nearer to the present study.

In the study site, 32 species were observed as indicated in Table 1, revealing a good range of the group in the small study area. The individuals encountered belonged to 14 distinct families with a wide range. The study site, Ratnagiri Taluka, has a diversified ecosystem, as seen by the rise in the number of beetle species within it. This is an encouraging indication of insect diversity. According to Bernardes *et al.* (2020), the intensity of land use has an impact on the Coleoptera community. The area with anthropomorphized natural vegetation had the maximum richness, indicating that the fauna of the Coleoptera is sensitive to changes in the environment. In light of this, it is also possible to propose that the region be conserved to maintain its diversity.



Table 1: Coleopteran diversity of Ratnagiri Taluka

Sr. No.	Coleopteran beetle	Family	Zone I	Zone II	Zone III	Zone IV	Zone V
1.	<i>Chlaenius spp.</i>	Carabidae	+			+	
2.	<i>Celosterna scabrator</i>	Cerambycidae	+	+	+	+	+
3.	<i>Coccinella transversalis</i>	Coccinellidae	+			+	
4.	<i>Paederus spp.</i>	Staphylinidae	+	+	+	+	+
5.	Tribe: Cyclocephalini	Scarabaeidae				+	+
6.	<i>Cyrtopistomus spp.</i>	Curculionidae	+			+	
7.	<i>Mesosa spp.</i>	Cerambycidae	+	+	+	+	
8.	Tribe: Panagaeini	Carabidae				+	
9.	<i>Aspidimorpha miliaris</i>	Chrysomelidae.	+			+	
10.	<i>Copris spp.</i>	Scarabaeidae	+	+	+	+	+
11.	<i>Sipalinus gigas</i>	Curculionidae	+			+	
12.	<i>Trirachys spp.</i>	Cerambycidae	+	+	+	+	
13.	<i>Myllocerus spp.</i>	Curculionidae	+			+	
14.	<i>Apriona spp.</i>	Cerambycidae	+	+		+	
15.	Tribe: Harpalini	Carabidae	+	+	+	+	+
16.	<i>Mylabrini spp.</i>	Meloidae	+		+	+	
17.	Tribe: Clytrini	Cerambycidae			+		
18.	<i>Olenecamptus spp.</i>	Cerambycidae	+	+		+	
19.	<i>Oryctes rhinoceros</i>	Scarabaeidae	+	+	+	+	+
20.	<i>Charidotella sexpunctata</i>	Chrysomelidae			+		
21.	<i>Melanotus spp</i>	Elateridae				+	
22.	<i>Sitophilus oryzae</i>	Curculionidae	+	+	+	+	+
23.	<i>Sitophilus granarius</i>	Curculionidae	+	+	+	+	+
24.	<i>Aphanotus spp.</i>	Tenebrionidae	+	+	+	+	+
25.	<i>Cybister spp.</i>	Dytiscidae	+				+
26.	Flea beetle	Chrysomelidae				+	
27.	Flower chafer	Scarabaeidae	+			+	
28.	Straight snouted beetle	Brentidae				+	
29.	Pea and bean weevil	Curculionidae				+	
30.	Darkling beetle	Tenebrionidae	+	+	+	+	+
31.	Stag beetle	Lucanidae	+	+	+	+	+
32.	Fireflies	Lampyridae	+	+	+	+	+

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



		
<i>Charidotella sexpunctata</i>	<i>Aspidimorpha miliaris</i>	<i>Copris spp.</i>
		
<i>Paederus</i>	Clytrini	<i>Mesosa spp.</i>
		
<i>Olenecamptus spp.</i>	<i>Celosterna scabrator</i>	<i>Coccinella transversalis</i>
		
<i>Myllocerus spp</i>	<i>Melanotus spp</i>	<i>Chlaenius spp</i>

Figure 1 Photographs of Coleopteran beetles

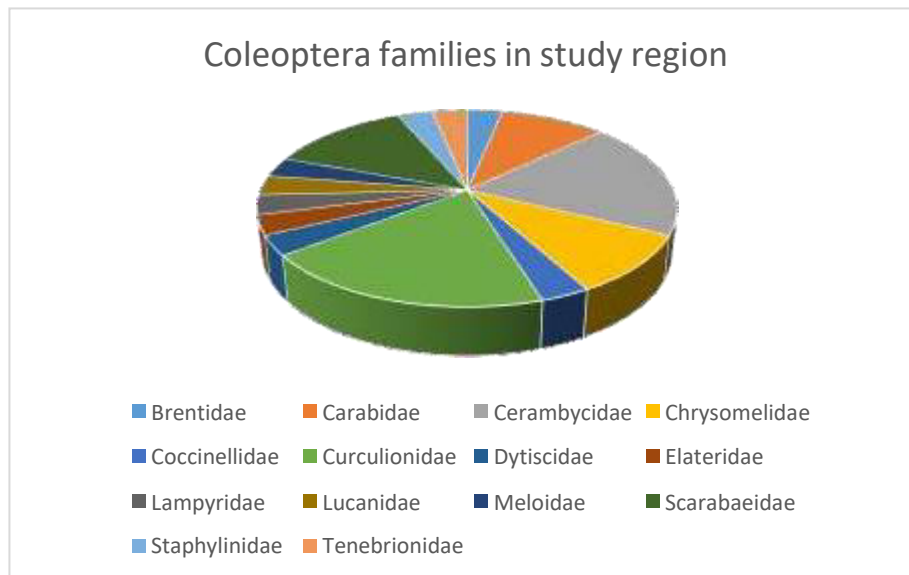


Figure 2 Family-wise distribution of Coleoptera

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REFERENCES

1. **Arrow, G. J. (1910).** The Fauna of British India including Ceylon and Burma, (Cetoniinae and Dynastinae) Vol. V-XIV, Taylor & Francis, London, 322pp.
2. **Arrow, G. J. (1917).** The fauna of British India including Ceylon and Burma, Vol. V-XIII (Rutelinae, Desmonychinae, and Euchiirinae), Taylor & Francis, London, 387pp.
3. **Arrow, G. J. (1931).** The fauna of British India including Ceylon and Burma, Vol. V-XII (Coprinae). Taylor & Francis, London, 128pp
4. **Balthasar, V. (1963).** Monographie der Searabaeidae and Aphodiidae der Palaearktisehen and Orientalisehen Region, Prague, Veri. Tschechosl Akad. Wissensch I, 391 pp., 137 figs.24 pls.
5. **Balthasar, V. (1964).** Monographie der Searabaeidae and Aphodiidae der Palaearktisehen and Orientalisehen Region Prague, Veri. Tschechosl Akad. Wissensch III, pp. 652, 224 figs.
6. **Banerjee, M. (2014).** Diversity and Composition of Beetles (Order: Coleoptera) of Durgapur, West Bengal, India. Psyche: A Journal of Entomology. 2014. 1-6. 10.1155/2014/792746.
7. **Bernardes ACC, Oliveira OCC, Silva RA, Albuquerque PMC, Rebêlo JMM, Viana JH, Siqueira GM. (2020).** Abundance and diversity of beetles (Insecta: Coleoptera) in land use and management systems. Rev Bras Cienc Solo.; 44:e0190183.
8. **Chandra, K. (2000).** Inventory of Scarabaeid beetles (Coleoptera) from Madhya Pradesh, India.
9. Zoo's Print Journal 15(11): 359-362.
10. **Choate P. M., (2001).** Manual for identification of the ground beetles (Coleoptera: Carabidae) (including tiger beetles) of Florida
11. **Choudhary, Jaipal & Naaz, Naiyar & Mukherjee, Debu & Prabhakar, Chandra & Maurya, Sudarshan & Das, Bikash & Kumar, Shivendra. (2014).** Biodiversity and Seasonality of Predaceous Coccinellids (Coleoptera: Coccinellidae) In Mango Agro-Ecosystem of Jharkhand. The Ecoscan - An International Quarterly Journal of Environmental Science. 8. 53-57.
12. **Kuijten, P.J. (1978).** Revision of the Genus Hybosorus Macleay (Coleoptera: Scarabaeidae: Hybosorinae). Zool. Verh. Leiden, 203: 1-49.
13. **Kuijten, P.J. (1983).** Revision of the Genus Phaeochrous Castelnau (Coleoptera: Scarabaeidae: Hybosorinae). Zool. Verh. Leiden, 165: 1-40.
14. **Maxwell-Lefroy (1909).** *Indian insect life; a manual of the insects of the plains (tropical India)*
15. Calcutta & Simla: Thacker, Spink & Co.



16. **Satheesha D, Nikhath AJ, Vrushali MM, Jayaraj FC, Sreenivasa G. (2018).** Preliminary study on composition and diversity of beetles (Order- Coleoptera) in and around Davangere University Campus, Davangere, Karnataka. *J Entomol Zool Stud* 2018; 6(4):1751-1758.
17. **Singhal, S., Thakkar, B., Pandya, P. and Parikh, P. (2018).** Unraveling the diversity, phylogeny, and ecological role of cryptic Coleopteran species of Vadodara district: a first comparative approach from India. *The Journal of Basic and Applied Zoology*. 79. 10.1186/s41936-018-0062-2.
18. **Thakkar, B. and Parikh, P. (2016).** A Study on diversity and abundance of coleopterans in Gujarat, India. 4. 1082-1089.
19. **Tingare B. P. (2022).** Survey of Dung Beetles in Mahad Tehsil Western Ghats, Raigad District, Maharashtra, India, *International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)* Volume 2, Issue 4, March 2022
20. **Wankhade, V., Manwar, N. and Malu, A. (2014).** Preliminary Studies on Diversity of Order Coleoptera at Sawanga-Vithoba Lake Region, District Amravati, Maharashtra, India. *Journal of Entomology*. 11. 170-175. 10.3923/je.2014.170.175.
21. **Zahoor, K. and Suhail, A., Iqbal, J., Zulfaqar, Z. and Anwar, M. (2003).** Biodiversity of Predaceous Coccinellids and Their Role as Bioindicators in an Agroecosystem. *International Journal of Agriculture and Biology*. 5. 555- 559.
22. <https://latitude.to/map/in/india/cities/ratnagiri>
<https://www.mapsofindia.com/lat-long/maharashtra/ratnagiri.html>



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