



Diversity and distribution of beetles (*Coleoptera*) in Makani Town, Dharashiv District, Maharashtra, India

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Abstract

The present study deals with the diversity of beetles (Order: *Coleoptera*) from Makani Town, Dharashiv District, Maharashtra, India. Beetles represent the largest order of insects and play an important role in ecosystem functioning as predators, herbivores, decomposers, and bioindicators. The survey was conducted from January to December 2025 covering different habitats such as agricultural fields, gardens, roadside vegetation, and semi-natural areas. Beetles were collected using hand nets and simple mechanical traps, then dried, preserved, and identified with the help of standard taxonomic literature. A total of nine species belonging to different families were recorded during the study period. The sub-order Polyphaga was found to be dominant, while *Adephaga* was represented mainly by ground beetles and six-spot beetles. Most species were arboreal, except dung roller beetles which were associated with cattle dung. In agricultural fields, ladybird beetles, green leaf beetles, and metallic green beetles were commonly observed, many of which are phytophagous, while some act as natural enemies of crop pests. Chilocorus beetles were the smallest species recorded. The presence of predatory beetles indicates their important role as natural biological control agents. The study highlights that Makani region supports considerable beetle diversity, but increasing use of chemicals and fertilizers may threaten their natural habitats. Hence, conservation of local habitats is essential for sustaining beetle diversity and ecological balance.

Keywords: Beetle diversity, *Coleoptera*, Makani Town, Dharashiv District, biodiversity conservation

Introduction

Beetles (Order: *Coleoptera*) represent the largest and most diverse group of insects, with more than 400,000 described species worldwide, occupying almost every terrestrial and freshwater habitat [1]. Their success is mainly due to their hard forewings (elytra), which protect the delicate hind wings and body from mechanical injury and desiccation [2]. Beetles exhibit remarkable diversity in size, shape, color, food habits, and life strategies, making them an important group for ecological and evolutionary studies [3]. They perform vital ecosystem services such as pollination, decomposition of organic matter, nutrient cycling, soil aeration, and regulation of pest populations [4].

Different beetle groups show varied feeding habits including phytophagy, predation, scavenging, wood boring, dung feeding, and fungivory [5]. Many beetles, especially ground beetles (*Carabidae*) and ladybird beetles (*Coccinellidae*), are well known as natural enemies of agricultural pests and are widely used as biological control agents [6]. Because of their sensitivity to environmental changes, beetles are also used as bioindicators to assess habitat quality, pollution, land-use change, and climate variation [7]. Several studies have highlighted the role of beetles in monitoring urban ecology, forest health, and agricultural sustainability [8].

India, being a tropical country with varied climatic conditions and landscapes, supports rich beetle diversity ranging from coastal regions to the Himalayan mountains [9]. Forests, grasslands, wetlands, agricultural fields, and urban ecosystems in India provide suitable habitats for a wide range of beetle species [10]. However, rapid urbanization, agricultural intensification, deforestation, and excessive use of chemical fertilizers and pesticides have led to habitat loss and decline in insect diversity [11]. Many natural habitats in

agricultural landscapes have disappeared over the last few decades, resulting in reduced populations of beneficial insects including beetles [12].

The Dharashiv District of Maharashtra has fertile agricultural land along with semi-natural habitats such as grasslands, scrub vegetation, and roadside plantations. These habitats support diverse insect fauna, but they are increasingly disturbed due to changing land-use patterns and intensive farming practices [13]. Makani Town and its surrounding areas include crop fields, gardens, cattle sheds, and open lands, providing varied microhabitats for beetle communities [14]. Despite this, systematic studies on beetle diversity in this region are very limited.

Therefore, the present study was undertaken to document the diversity of beetles in and around Makani Town, Dharashiv District, Maharashtra. The study aims to record species composition, habitat association, and ecological roles of beetles, with special reference to their importance as biological control agents and bioindicators. Such baseline data are essential for understanding local biodiversity and for planning future conservation and sustainable agricultural practices [15].

Materials and Methods

The present study was carried out in and around Makani Town, Dharashiv District, Maharashtra, India, during the period from January to December 2025. Different habitats such as agricultural fields, gardens, roadside vegetation, cattle sheds, and open lands were selected for sampling. Beetles were collected at regular intervals using hand nets, sweep nets, and simple mechanical traps. Occasional hand picking was also done from leaves, stems, soil surface, dung, and tree bark.

The collected specimens were brought to the laboratory, killed using ethyl acetate, and then dried and preserved in insect boxes with naphthalene balls to prevent fungal and insect damage. Each specimen was properly labeled with date, place, and habitat of collection. Identification was carried out using standard taxonomic keys and literature such as [16, 17]. The data were arranged species-wise and habitat-wise to study diversity and distribution patterns.

Results and Discussion

The present investigation revealed that Makani Town and its surrounding areas in Dharashiv District support a moderate diversity of beetles. A total of nine beetle species belonging to different families were recorded during the study period (January–December 2025). These beetles were collected from varied habitats such as agricultural fields, gardens, roadside vegetation, cattle sheds, and open lands. The diversity observed indicates that the region provides suitable ecological conditions for different beetle groups.

Table 1: Beetle Diversity Recorded from Makani Town, Dharashiv District

Sr. No.	Common Name	Family	Habitat / Location	Distinguishing Character
1	Chilocorus beetle	<i>Coccinellidae</i>	Crop fields, gardens	Small, turtle-like body
2	Stem borer beetle	<i>Carabidae</i>	Mango and fruit trees	Long antennae
3	Dung roller beetle	<i>Scarabaeidae</i>	Dung, grazing land	Found rolling dung balls
4	Green leaf beetle	<i>Chrysomelidae</i>	Crop plants, gardens	Shiny green color
5	Ladybird beetle	<i>Coccinellidae</i>	Agricultural fields	Bright, colorful, round body
6	Long-horn beetle	<i>Cerambycidae</i>	Trees, woody plants	Very long antennae
7	Rhinoceros beetle	<i>Scarabaeidae</i>	Decaying matter, trees	Horn-like structure on head
8	Large black ground beetle	<i>Adephaga</i>	Soil surface, open land	Metallic black color
9	Six-spot beetle	<i>Cerambycidae</i>	Vegetation, shrubs	Six spots on body

Dung roller beetles were found near cattle sheds and grazing lands, playing an important role in decomposition of dung and nutrient recycling. Rhinoceros beetles were seen near decaying organic matter and coconut or palm trees. Long-horn beetles and stem borer beetles were associated with woody plants and fruit trees like mango, indicating their role as both decomposers and sometimes pests.

The smallest beetles recorded were Chilocorus beetles, while the largest were rhinoceros beetles and large black ground beetles. Color variation ranged from dull brown and black to shiny green and metallic shades. The diversity in size, color, and habitat preference reflects the ecological richness of the Makani region.

However, during field visits it was observed that excessive use of chemical fertilizers and pesticides, along with habitat disturbance due to agriculture and construction, may negatively affect beetle populations. Reduction in natural vegetation and overuse of chemicals can reduce the number of beneficial predatory beetles. Therefore, conservation of natural habitats and adoption of eco-friendly farming practices are necessary to maintain beetle diversity and ecological balance.

The overall results show that Makani region has good beetle diversity, including both beneficial and phytophagous species. Proper management of agricultural practices and conservation of natural habitats will help in sustaining this diversity for future ecological stability.

Conclusion

The present study on beetle diversity in Makani Town, Dharashiv District, Maharashtra, reveals that the region supports a moderate but ecologically important diversity of

The sub-order Polyphaga was dominant in the study area, represented by families such as *Coccinellidae*, *Chrysomelidae*, *Cerambycidae*, and *Scarabaeidae*. The sub-order *Adephaga* was represented mainly by ground beetles and six-spot beetles. Most beetles were arboreal in nature, living on plants and trees, except dung roller beetles which were strictly associated with cattle dung and open grazing areas. This shows that beetle distribution is strongly influenced by habitat type and availability of food sources.

In agricultural fields, ladybird beetles, green leaf beetles, and metallic green beetles were commonly found. Ladybird beetles and Chilocorus beetles are predatory in nature and feed on aphids and scale insects, thus acting as natural biological control agents. Their presence is beneficial to farmers as they help in reducing pest populations without the need for chemical pesticides. Green leaf beetles and metallic green beetles were phytophagous and were mostly observed feeding on crop plants and garden vegetation.

Coleopteran species. A total of nine species belonging to different families were recorded from varied habitats such as agricultural fields, gardens, roadside vegetation, cattle sheds, and open lands. The dominance of the sub-order Polyphaga and the presence of predatory groups like ladybird and Chilocorus beetles highlight the ecological value of these insects as natural biological control agents. Phytophagous beetles were also common, indicating their close association with agricultural and garden vegetation. The variation in size, color, and habitat preference reflects the ecological richness of the study area. However, increasing use of chemical fertilizers, pesticides, and habitat disturbance pose serious threats to beetle populations. Loss of natural vegetation may reduce beneficial insect diversity and disturb ecological balance. Therefore, conservation of local habitats, reduction in chemical usage, and promotion of eco-friendly farming practices are essential for sustaining beetle diversity. This baseline study will be useful for future biodiversity monitoring and conservation planning in the Makani region.

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