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Diversity of Coccinellid beetles (Coleoptera: Coccinellidae) from Aurangabad district (M.S) India

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Abstract
A field investigation was undertaken from May 2022 to April 2024 to explore the diversity of predaceous coccinellid beetles from different agricultural fields in Aurangabad, Maharashtra. During the current investigation, A total of 13 species belonging to 11 different genera and 3 subfamilies were collected from the studied area. Among these three subfamilies, Coocinellinae was the most diversified and abundant. The primary goal of this research was to present a brief overview of the Coccinellid fauna from Aurangabad district.

Keywords: Diversity, predaceous, Coccinellid beetles, agricultural fields, Aurangabad

Introduction

Biodiversity encompasses the range of variations seen in living beings, including species within and between ecosystems as well as terrestrial, aquatic, and other watery environments and the ecological complexes with which these organisms interact. According to Verma (2016) [17], biodiversity emphasizes that each creature can be identified by its unique combination of taxonomic, ecological, and genetic variety.

Ladybugs, or Coccinellid beetles, are among the most well-known beetle species. They are known by several alternative names around the world, such as virgin insects, god's cows, and lady cows (Moreton 1969) [10]. There are about 6,000 species of beetles known from the Coccinellidae family, which is well-known for being diverse and abundant (Vandenberg, 2002) [16]. Some Coccinellid species are harmful because of their phytophagous behaviour on crops, but the majority of them are beneficial because they are predators. The vital role that Coccinellids play as predators of agriculturally significant insect pests has earned them recognition among farmers. The coccinellid beetles inhabit different ecological niches; most of them are predatory, beneficial to crops while some are phytophagous, causing significant harm to crops. On the other hand, more than 39 species are consumed by the larvae and adults of predatory species, which include mites, aphids, thrips, leafhoppers, scale insects, mealybugs, and other small soft-bodied species and their eggs (Moreton, 1969; Gautam, 1989; Iperti & Paoletti, 1999) [6, 7, 10]. Plant community structure and microclimate have an impact on the predation rates and species diversity of ladybug colonies (Tooker and Hanks, 2000) [15]. Entomological revolts such as severe infestations of insect pests have driven scientists to consider entomologically friendly pest management techniques (Hodek 1970) [5]. Therefore, utilizing biological control with natural enemies is a useful strategy for minimizing the populations of invasive pests (Delfoss, 2005). The economic significance of the Coccinellidae family of beetles originates from its adaptability to diverse habitats, diversity, and function as biological control agents. In relation to their significance in the biological control of a variety of harmful insects, coccinellid beetles are thought to have a considerable economic value in agroecosystems.

Considering their importance in the biological management of agricultural pests, it is highly beneficial to accurately identify the Coccinellid fauna associated with a specific crop and geographic area. In comparison to other zoogeographic zones of the world, the coccinellid fauna of Indian subcontinent is rich and diversified, but receiving very little attention. The detailed study of diversity of these lady beetles from different zoogeographic habitats is important before using them as biological control agents. Therefore, the current investigation is intended to identify the Coccinellid species found in the Aurangabad district of Maharashtra, India.

Material and methods

The current investigation was executed in Aurangabad district of Maharashtra, which is situated at 19.88º N 75.32º E. During May 2022 to April 2024, adult coccinellid samples were collected from agricultural fields in the Aurangabad district. Insects were caught by handpicking and brushing the net. The collected samples were placed in a container containing cotton saturated in chloroform. These bottles were then taken to the laboratory, where the insects were stretched out and pinned. These were dried for preservation and then placed in wooden containers. Each specimen was tagged with information on the host plant, location, and date. A stereoscopic microscope was used to examine the collected specimens of each species in detail. The specimens were identified to the species level using the available standard literature and keys. (Booth, 1998; Omkar and Bind, 1995; Poorani 2002; Pervez, 2004) [1, 11, 13, 14].

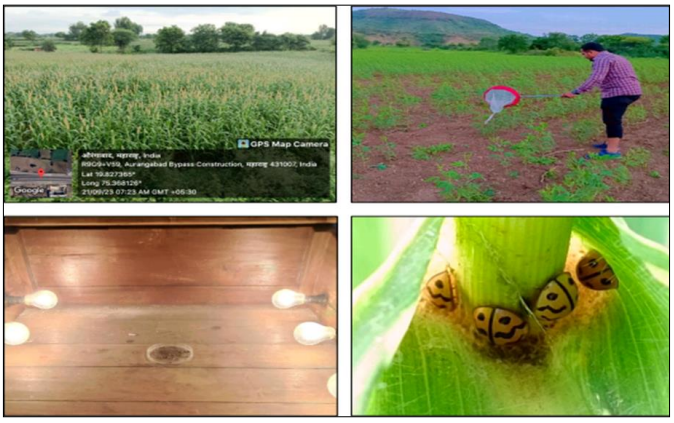

Fig 1: Material and methods

Result and Discussion

Table 1: Taxonomic Composition of Coccinellid Beetles Collected from Aurangabad

Family	Subfamily	Genus	Species
Coccinellidae	Coccinellinae	Coccinella	*Coccinella sepetempuncta*
			Coccinella transversalis
		Cheilomenes	*Cheilomenes sexmaculata*
		Hippodamia	*Hippodamia variegate*
		Micraspis	*Micraspis discolor*
		Propylea	*Propylea dissecta*
		Harmonia	*Harmonia octomaculata*
		Illeis	*Illeis cincta*
		Pseudaspidimerus	*Pseudaspidimerus trinotatus*
	Chilocorinae	Brumoides	*Brumoides suturalis*
		Chilochorus	*Chilochorus nigrata*
	Epilachninae	Epilachna	*Henosepilachna vigintioctopunctata*
			Henosepilachna implicata

During the present study, A total of 13 species belonging to 11 genera and 3 subfamilies were identified in the studied area. Subfamily Coccinellinae is represented by 9 species belonging to 8 genera, Subfamily Chilocorinae by 2 species belonging to two genera, and Subfamily Epilachninae by 2 species belonging to one genus from the various study sites. Among these three subfamilies, Coocinellinae was the most diversified and widespread. The most frequent predatory coccinellid species found in all agricultural crop fields was *Cheilomenes sexmaculata*.

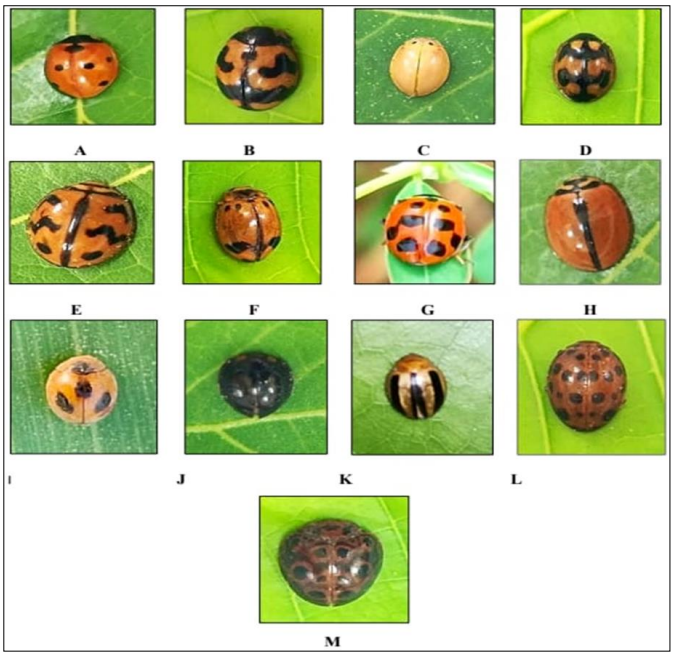

Fig 2: Coccinellid Beetles Collected from different agricultural fields of Aurangabad. A) *Coccinella septempunctata,* B) *Coccinella transversalis,* C) *Illeis cincta,* D) *Propyla dissecta,* E) *Cheillomenes sexmaculata,* F) *H Octomaculata* G) *Hippodamia variegate,* H) *Micraspis discolor,* I) *Pseudaspidimerus trinotatus,* J) *Chilocorus nigrata,* k) *Brumoides suturalis,* L) *Henosepilachna vigintioctopunctata* M) *Henosepilachna implicata*

Numerous researchers from throughout the world have documented a range of Coccinellid beetle species that they came across while conducting their research. Thirteen different species of Coccinellids were identified by Garcia *et al*., (1997) from uncultivated areas and crops such as alfalfa, corn, and wheat. Cotes *et al*., (2010) [3] conducted a survey and collected data on 13 species of ladybird beetles from olive orchard treetops in southern Spain. Joshi and Sharma (2008) [8] gathered and identified thirty-one species of coccinellid beetles from various kinds of habitats in the Haridwar district of Uttarakhand. Megha *et al*., (2015) [9] collected and observed 18 different species of coccinellid beetles in a survey of three diverse habitats in the Dharwad region; agricultural, horticultural, and organic crop cultivation. In the Kolhapur district of Maharashtra, Patil and Gaikwad (2019) [12] identified 13 species of coccinellid beetles in different agricultural fields; 11 of these species were predatory, while two were phytophagous. In the Nashik district of Maharashtra, Shaikh and Dugaje (2020) [18] identified 14 species of coccinellid beetles from agricultural, grassland, forest, and human environments. Eleven genera, five tribes, and four subfamilies were identified among them. All of these studies show that the variety and abundance of different coccinellid beetle species depends on the agricultural crops, prey species, and environmental factors.

Conclusion

The present study has attempted to provide an overview of the predatory coccinellid beetles of the Aurangabad. Studying and cataloguing the coccinellid species that were present in the area was the aim of this investigation. There is still plenty to learn about the Aurangabad district; we have only looked at the agricultural fields. The state of Maharashtra has a variety of altitudinal zoogeographic environments. As a result, the diversity of Coccinellids in the state is not entirely encompassed by current data. To investigate unexplored areas of the coccinellid diversity, more surveys are required.

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