

## Studies on ant diversity at different agricultural habitats in Satara district, Maharashtra

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### Abstract

Ants belong to the class Insecta, order Hymenoptera and family Formicidae. Ants play significant ecological role in different ecosystems and are acting as ecosystem engineers. The agricultural habitats are most disturbed ecosystem and ants are abundantly occurring in all types of agricultural habitats. The present study aims to explore the diversity of ants at different agricultural habitats in Satara district of Maharashtra during June 2021-May 2022. During the present study irrigated, horticulture, dryland and grassland agricultural habitats were studied for ant diversity. The study reveals that there are 11 species of ants belongs to 9 genera and 4 subfamilies. It was also found that the diversity of ants varies at different agricultural habitats.

**Keywords:** Ants, ecosystem, biodiversity, agricultural habitats

### Introduction

Biodiversity, as defined by Gaston & Spicer (2004) [1], is the variety of life that encompasses differences in biological organization, ranging from genes to species to ecosystems that consist of several components. Ants are classified family Formicidae, in order Hymenoptera of class Insecta. (LaSalle and Gauld, 1993) [2]. Ants involve 21 subfamilies, 300 genera and 22,000 species (Bolton, 1994). Ecosystems are composed of dynamically interacting parts of their environment. Agricultural system are areas of land where human manipulate physical, chemical, biological processes using group of practices to obtain beneficial product for their own use. Ants perform different role in agro ecosystem like plant pollination, soil turbation, bioindication and the regulation of crop damaging insects. (Green & Sullivan, 1950) [4]. They are generalist predators and hunt pest that damage fruits, seeds and leaves. Ants improve the mineral quality of soil, by dissolving of mineral element. When it is about the part that insects play in the ecosystems, ants are among the most prominent. Ant populations in agricultural habitats are impacted by food availability and the suitability of the surrounding environment for ant colonies. Ant diversity may serve as a bioindicator of the health of the agroecosystem. (Widhiono *et al.* 2017) [5]. Both biotic and abiotic factors have an impact on the population of ants (Cushman 1993 [6]; Perfecto and Vandermeer 1996) [7]. Environmental changes have a significant impact on the quantity of ant species in a specific region, and ants will react to disturbances or changes in their habitat or environment. (Supriati *et al.* 2019) [8]. Agricultural system are areas of land where human manipulate physical, chemical, biological processes using group of practices to obtain beneficial product for their own use. To understand

level of organization in the particular region we must consider biotic and abiotic factors with interaction between them to employ best conservation practices restore biodiversity in this region. The present study aims to establish species composition of the ant community with understand the ant diversity in the different agricultural habitats. till date no one has studied the diversity of ants in Satara district. Khurane *et.al* described biodiversity of ants from Western Ghats.

Satara district lies between 17.5-to-18.11-degree North latitude and 73.33-to-74.54-degree Eastern longitude. The district comprises of 11 tehsils namely Satara, Koregaon, Khatav, Karad, Patan, Wai, Jaoli, Mahabaleshwar, Khandala, Phaltan and Man.

### Material and methods

Ants were collected during June 2021 to May 2022 from the Satara district. For the ant collection the Hand collecting (HC), pitfall trap (PF) (Watanasit, S. *et al* 2005) [10] procedures followed A one-hectare (100 × 100 m) plot was taken for each site study. Ants were collected using two sampling techniques in 20 m x 20 m quadrates. The ants were kept in different vials with 70% alcohol. The Magnus microscope (MSZ Bi) was used to identify the ants. Standard taxonomic keys, as recommended by (Bolton 1994, Mathew and Tiwari 2000 [11], Bingham 1903 [12] and Sheela 2008 *etc.*) [13], were used to identify the ants.

### Results and discussion

During the present study 11 species belonging to 8 genera from 4 subfamily were recorded in different agricultural habitats. As shown in the table

Table 1

Sr. No.	Agricultural Habitat	Subfamily	Genus	Species
1	Dryland	Dolichoderinae	<i>Dolichoderus</i>	<i>Dolichoderus bispinosus</i>
2		Formicinae	<i>Componotus</i>	<i>Componotus compressus</i>
3		Formicinae	<i>Componotus</i>	<i>Componotus angusticollis</i>
4		Pseudomyrmecinae	<i>Tetraponera</i>	<i>Tetraponera nigra</i>
5		Myrmicinae	<i>Solenopsis</i>	<i>Solenopsis geminata</i>

6			<i>Crematogaster</i>	<i>Crematogaster subnuda</i>
7	Irrigation	Myrmicinae	<i>Pheidole</i>	<i>Pheidole ghatica</i>
8		Myrmicinae	<i>Crematogaster</i>	<i>Crematogaster rhogenferi</i>
9		Myrmicinae	<i>Pheidole</i>	<i>Pheidole morrisi</i>
10	Horticulture	Myrmicinae	<i>Monomorium</i>	<i>Monomorium indicum</i>
11	Grassland	Myrmicinae	<i>Aphenogaster</i>	<i>Aphenogaster smythiesii</i>

Occurrence of the ant species, which was noted during practically every visit during the three seasons. From the table we can easily understand that the majority of the ants in the study area belongs to subfamily Myrmicinae. In myrmicinae *Solenopsis*, *Crematogaster*, *Pheidole* *Monomorium*, *Aphenogaster* genera are recorded during study. Due to ability to adopt environment myrmicinae most dominant subfamily in different agricultural habitats, which is the best fit to given condition. The species of *Crematogaster* were dominant on tree trunk which nested

on trees. The second diversified subfamily is Formicinae. common occurrence of species *componotus compressus* and *componotus angusticollis* were associated with some vegetable crops like lima beans and Maize crop. *Componotus spp* were the most dominant species in terms of number of individuals. Dolichoderinae and Pseudomyrmecinae with a single species recorded for each subfamily, they are the least diversified. *Dolichoderus bispinosus* and *Tetraponera nigra* both species recorded in dryland agricultural habitats.



*Tetraponera nigra*



*Dolichoderus bispinosus*



*Pheidole morrisi*



*Crematogaster subnuda*



*Aphenogaster smythiesii*



*Componotus Compressus*



*Componotus angusticollis*



*Solenopsis geminata*



*Pheidole ghatica*



*Monomorium indicum*



*Crematogaster rhogenferi*

## Conclusion

The present study is the first to provide an understanding of the types of relationships that take place between occurrence of ants and their agricultural habitats in Satara District. Because of favorable conditions for nesting sites, food and foraging, among other things, the populations of some ant species in particular environments showed an enormous improve. Ant diversity is higher in arid location with higher moisture content.

From the above study it is found that 11 species belonging to 8 genera from 4 subfamily were recorded. our result suggest Myrmicinae subfamily is most diverse with record of seven species represented by six genera. Followed by formicinae- 2 species. Pseudomyrmecinae, Dolichoderinae subfamily is least diverse with record of one species each.

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