

Studies on diversity of ants at Ghodazari Forest Region in Nagbhid district Chandrapur Maharashtra, India

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Abstract

Ants are vital for the ecosystem, not only due to their significant biomass but also their role as ecosystem engineers. This study aims to investigate the variety of ant species present in a particular area. In this study 17 ant species belonging to 10 genera and 4 subfamilies were recorded in Ghodazari forest near Nagbhid city, India. Ant species richness was higher in forest areas than the city areas. The diversity of ants belonging to the subfamily Myrmicinae (9 species), Formicinae (6 species), Ponerinae (1 species), and Pseudomyrmicinae (1 species). The ant subfamily formicinae, myrmicinae was found to be widely distributed in forests.

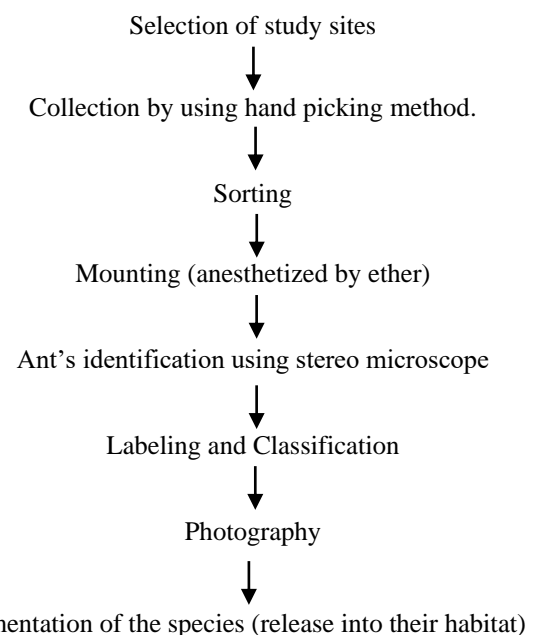
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Introduction

Ants are excellent model organisms for measuring and monitoring biodiversity due to their abundance and diversity in terrestrial ecosystems. As a predator and symbiotic for plants and other organisms, it plays an abundant and dominant role in ecological systems. Forests provide crucial ecosystem services, including nutrient cycling, energy transfer, and seed dispersion, which are essential for maintaining the balance of nature. (Handel *et al.* 1981) [7]. The ant plays a crucial role in the ecosystem. (Holldobler and Wilson 1990). They are an important part of the soil movement process, transferring organic materials and improving aeration. (Agosti *et al.* 2000) [1]. Ants are useful for biomonitoring studies due to their ability to quickly respond to environmental changes. (Underwood and Fisher 2006) [11]. Ants constitute about 1% of all known species of insects. They are classified into 26 subfamilies, comprising of 14,711 confirmed species and 428 valid genera. The International Union for Conservation of Nature (IUCN) has listed 152 of these species, while in India, there are 100 genera representing 10 subfamilies, with a total of 828 species. (Bharti H. *et al.* 2016) [4]. According to the Encyclopedia of Insects, there are approximately 9,000 to 10,000 species of ants in the world today. These species are categorized into 26 subfamilies and around 288 genera. Insects are the most diverse group of animals on Earth. There are more species of insects than any other group of animals. Ghodazari Forest is a wildlife reserve located in Nagbhid, Chandrapur, Vidarbha, Maharashtra, India. The reserve spans across 159 km² (61 sq mi) of dry tropical forest in the south and includes a lake. The forest is a crucial area for tiger migration between Tadoba Andhari Tiger Project and Umred Karhandala wildlife sanctuary. The village, which shares its name with the nearby dam, is situated in the heart of the forest, approximately 2km away from the dam. The Ghodazari area for the investigation of diversity of Ants. In this area there is no listed the diversity of ant species.

Material and Methods: The study was conducted in the Ghodazari Reserve Forest (Latitude: 20. 5485, Longitude: 79. 6054). Insects can be a highly effective form of living organism. The presence of different insect species in an ecosystem can provide valuable insights into its biodiversity status. Specimens were collected using the less labor-intensive hand-picking method. Sampling was done in winter periods from Oct to Dec 2023 of morning as well as later afternoon. Using gloves and forceps, 1-3 samples of each ant were collected and transferred to vials. Standard procedure will be used to mount specimens for identification, including both light and compound microscopes and identified up to genus level using author's Book B. Bolton, 1994 [2] and species levels by standard key explained by (Eleanors, (2017), Mathews and Tiwari, 2000) [9]. After the experiment, the ants were released back into their natural habitat.

Sampling design



Observations: The study aimed to investigate the diversity of ants inhabiting the Ghodazari forest. Table 1 lists 17 ant species from 10 genera and 4 subfamilies. Relative high species rich genera are *Camponotus*, *Crematogaster*, *Monomorium*, and *Solenopsis* was recorded. The diverse ant

species belonging the subfamilies *Myrmicinae*, *Formicinae*, *Ponerinae*, were highest in general habitat following by *Pseudomyrmicinae*. The subfamily *Formicinae* comprises of six different species that are widely distributed.

Table 1: List of ants collected in the Ghodazari forest categorized by subfamily, genus, and species.

Subfamily	Genus and Species
1. Myrmicinae (9)	<i>Crematogaster rothneyi</i> (Mayr, 1879) <i>Crematogaster scutellaris</i> (Olivier 1792) <i>Monomorium pharaonis</i> (Linnaeus, 1758) <i>Solenopsis geminate</i> (Fabricius 1804) <i>Solenopsis aurea</i> (Wheeler, W. M., 1906) <i>Myrmicaria brunnea</i> (Saunders, 1842) <i>Monomorium indicum</i> (Forel, 1902) <i>Pogonomyrmex californicus</i> (Cole, 1968) <i>Pogonomyrmex barbatus</i> (Smith, F., 1858)
2. Formicinae (6)	<i>Camponotus compressus</i> (Fabricius 1787) <i>Oecophylla smaragdina</i> (Fabricius 1775) <i>Anoplolepis gracilipes</i> (Smith 1857) <i>Camponotus sericeus</i> (Fabricius, 1798) <i>Camponotus modoc</i> (Wheeler, W. M., 1910) <i>Camponotus herculeanus</i> (Linnaeus, 1758)
3. Ponerinae (1)	<i>Leptogenys processionalis</i> (Jerdon, 1851)
4. Pseudomyrmicinae (1)	<i>Tetraoponera rufonigra</i> (Jerdon, 1851)

Result and Discussion: Subfamily - Myrmicinae O



Subfamily – Formicine





Subfamily – Ponerinae



Leptogenys processionalis

Subfamily Pseudomyrmicinae



Tetraponera rufonigra

Discussion

During the study, it was found that there were 17 different ant species belonging to 10 different genera and 4 subfamilies, relative high species rich genera are *Camponotus*, *Crematogaster*, *Monomorium*, and *Solenopsis* was recorded. The diverse ant species belonging the subfamilies *Myrmicinae*, *Formicinae*, were highest in general habitat. Overall relative abundance of *Myrmicinae* from disturbed sites was more because they may have high potential to adapt varying environmental conditions and they are found in different types of habitats worldwide, they are classified as Generalized Myrmecinae functional group by Bestelmeyer and Wiens. In the study area, four species of the *Camponotus* genus were recorded. These ants are commonly known as Carpenter ants because of their nesting behaviors. They make their homes inside tree trunks but do not feed on the wood. Instead, they mostly consume a combination of dead insects and honeydew. The largest ants that are common in forests are carpenter ants (*Camponotus* species). With 83 described species in India, the ant genus *Camponotus* is the most diverse. There are 19 species known to exist in Maharashtra (Bharti *et al.* 2016) [4]. Everywhere, the *Camponotus* was a commonly occurring species. It was the highest number on its own. Because of the manner in which they construct their nests, these ants have been identified as carpenter ants (Chavhan *et al.* 2011) [5]. They can have a thorax that is reddish brown in color or be completely black. Although their thoraxes are uniformly rounded and devoid of indentation, carpenter ants can be observed from field ants, because they are most closely resembled. During the present study it is observed that *Pheidole*, *Oecophylla*, *Solenopsis*, *Crematogaster*, *Camponotus* shows predatory behavior. The nest of *Oecophylla smaragdina* hanging on trees and they are

aggressive predators. In this area, *Crematogaster* ants exist in two varieties. *Crematogaster* species likely have been more commonly found during the current investigation because it has been shown that they can feed on plant and insect exudates to access a high quantity of canopy foliage. *Tetraponera rufonigra*, the arboreal bicolored ant is reported to nest in dead wood of trees (Narendra and Kumar, 2006) [10]. India is habitat of the glossy, slender-bodied *Leptogenys processionalis* species of ant (Bharti H *et al.* 2016) [4]. These species mostly prey on termites, while they also occasionally prey on other arthropods. Loose material on the ground's surface serves as the *Leptogenys*' natural nest site. These ants' workers are bold and possess a highly potent sting. Workers hunt alone or in various feeding tracks day and night. The *Monomorium pharaonis*, or pharaoh ants, had been found on the darkened leaves that covered the ground in the Ghodazari nature. In the forest area where these ants were dispersed in colonies or groups, there were plenty of dry, shaded leaves. The effects of *Pogonomyrmex* harvester ants on ecosystems and communities. Harvester ants have a major direct and indirect impact on community structure and ecological health due to their nest numbers, nest lifespan, and amount of handled soil and seed. In the immediate surroundings of their nests, harvester ants alter the variety and composition of plant species. Their construction of nests results in regions with greater amounts of nutrients. Their actions may have such widespread consequences in some places that they significantly alter the structure of plant communities. This study's future goals include identifying the ants and documenting their variety in this area. Additionally, this study will produce some very insightful data regarding the distribution and species richness of ants. Even though researchers are unaware of them, certain non-targeted animals, such as those in the

order Hymenoptera, are highly beneficial to humans. As a result, we have started a study on the variety of ants in this area and plan to continue it in the future.

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