

Diversity of Ants colony in Thana Forest area of Amgoan region District Gondia , Maharashtra, India

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Abstract

Ants represent one of the most significant insect groups concerning their ecological contributions and functional roles within ecosystems. These organisms function as ecosystem engineers, substantially modifying the chemical composition and microbial communities present within the soil environments they inhabit. The present investigation was conducted in the Thana Forest area situated within the Amgaon region of Gondia district, Maharashtra. Specimens were systematically collected from spanning April 2025 through March 2026. During this investigation, various ant species belonging to the family Formicidae, order Hymenoptera, were identified and classified into three subfamilies: Formicinae, Myrmicinae, and Ponerinae. The subfamily Formicinae comprised four species, Myrmicinae encompassed two species, and Ponerinae contained one species, with Formicinae demonstrating dominance throughout the entire study period. In total, seven species distributed across six genera were documented, representing the three aforementioned subfamilies. The primary objective of this research was to identify and catalog ant species present in the study area, thereby establishing a comprehensive checklist of the identified ants fauna.

Keywords: Thana, Amgaon, Formicidae, Hymenoptera, and Amgaon.

Introduction

Ants represent one of the most significant insect groups concerning their ecological contributions. These organisms function as ecosystem engineers by modifying the chemical and microbial characteristics of the soil environments they inhabit [1]. Research has demonstrated that ant mounds elevate soil nitrate and phosphorus concentrations [2] and serve as indicators of soil microbial biomass recovery [3]. Beyond their soil-modifying capabilities, ants facilitate seed dispersal mechanisms [4]. Furthermore, they constitute important predatory organisms in both forest ecosystems [5] and agricultural systems [6]. Ants belong to the family Formicidae, which, alongside caterpillars and bees, comprises the order Hymenoptera. Ant lineages originated from common ancestors during the Cretaceous period, approximately 140 million years ago, subsequently diversifying in response to the emergence of flowering plants. The order Hymenoptera encompasses numerous beneficial insect species for human populations. Ants are eusocial organisms distributed across diverse terrestrial habitats, with the exception of polar regions. Within insect classification, the order Hymenoptera ranks as the third largest, with Coleoptera and Diptera occupying the first and second positions, respectively. Among social insects, ants represent the most diverse and geographically widespread group.

The ant fauna of Maharashtra state comprises a heterogeneous assemblage of species, including ten recognized subfamilies. According to the checklist compiled by [7] regarding Ants (Hymenoptera-Formicidae). and their specific distribution on soybean (*Glycine max*) crops in Nanded District, Maharashtra state, India, more recent regional surveys continue to document this diversity.

Documented over 800 valid ant taxa distributed across 100 genera and 10 subfamilies throughout India, illustrating the considerable ecological complexity [8] and inadequately explored biodiversity present in multiple biogeographic zones. Research conducted by [9] in Maharashtra and [10] in Kolkata has identified significant disparities in species assemblages between urban and protected sanctuary habitats. From both ecological and public health perspectives, ants have gained recognition as valuable bioindicators. [11] compiled an updated inventory of Indian ant species with their respective state-level distributions (Hymenoptera, Formicidae) and examined diversity and distribution patterns of ants along elevational transects. The objective of this investigation was to identify ant species and establish a comprehensive checklist of the identified species.

Materials and methods

Study area

Ant specimens were collected from the Thana Forest area within the Amgaon region of Gondia District, Maharashtra. The study area, located in the north-eastern portion of Maharashtra state, is positioned at 21.2835°N latitude and 80.1875°E longitude, bordering Madhya Pradesh and Chhattisgarh. The Amgaon Tehasil and Gondia District encompass approximately 5,234 km². Ant species were systematically collected from the Thana Forest area during the period from April 2025 to March 2026. Specimens were gathered during daylight hours from diverse microhabitats including forest grasslands, rocky terrain, and anthropogenic zones.



Fig. 1. Map of Gondia District



Fig. 2. Map of Amgaon Tehsil

Collection And Identification: -

Ant specimens were systematically collected from the Thana Forest area within the Amgaon forest region. Collection activities were conducted manually utilizing brushes and forceps during daylight hours, with morning and evening periods identified as optimal collection times.

Specimens were gathered employing three distinct methodologies: pitfall traps, scented traps, and hand collection techniques throughout the period from April 2025 to March 2026.

1) Pitfall traps consisted of 0.5-liter plastic containers with 12-centimeter diameter openings, positioned at ground level. A minimum of one pitfall trap was deployed within each of five randomly selected 20-meter by 20-meter quadrats established within a one-hectare plot at each sampling site. Each trap contained 25 milliliters of an ethanol and glycerol solution. Traps were installed between 15:00 and 17:00 hours and retrieved after a 48-hour interval [13].

2) Scented traps were implemented using identical protocols to pitfall traps; however, 25 milliliters of a sugarcane juice and ethanol mixture was substituted for the ethanol and glycerol solution.

3) Hand collection of ant specimens from each sampling plot was executed for 30 minutes to obtain representative individuals of all species present within the quadrat following bait placement. To minimize sampling bias, three complementary collection methodologies were employed to maximize species diversity captured from the study area. Collected specimens were sorted, rinsed, and preserved in 70% ethanol in individual plastic vials, subsequently transported to the laboratory for taxonomic identification. Ant specimens were photographed utilizing a Nikon D-7500 camera with an 18–140-millimeter lens and identified to species level using a stereo zoom trinocular microscope, employing established taxonomic keys [14] [15] [16] and [17].

RESULTS AND DISCUSSION

This investigation examined the taxonomic diversity of formicid species within the Thana forest ecosystem located in the Amgaon region of Gondia District, Maharashtra. The survey identified seven ant species distributed across six genera and three subfamilies within the order Hymenoptera. The family Formicidae demonstrated the highest dominance in the study area. The subfamily Formicinae comprised three species: *Camponotus compressus*, *Camponotus parius*, and *Lasius niger*. The subfamily Myrmicinae was represented by two species, namely *Pheidole megacephala* and *Solenopsis geminate*, while the subfamily Ponerinae was represented by a single species, *Ectomomyrmex astutus*. The relative abundance of Myrmicinae specimens collected from ecologically disturbed sites was notably elevated, which may be attributed to their considerable adaptive capacity to variable environmental conditions and their widespread distribution across diverse habitat types globally. These findings are consistent with previous research; [18] documented the distribution and diversity of ant fauna surrounding Gautala Autramghat Sanctuary in Aurangabad, Maharashtra, recording a total of 17 ant species encompassing 13 genera and 6 subfamilies. Similarly, [19] reported the distribution of ant species in and around Amravati city, Maharashtra, identifying 34 species distributed among 20 genera. According to [20] ants represent one of the most diverse, abundant, and ecologically significant organisms inhabiting terrestrial ecosystems.

CONCLUSION

The findings of this investigation demonstrate that ant diversity across these habitats exhibits considerable species richness, abundance, and compositional variation.

Ants represent an exceptionally effective tool for indicator-based ecological studies, as they exhibit immediate responses to environmental perturbations. In comparative assessments of various taxa as disturbance indicators, ants demonstrated superior performance relative to other invertebrate groups, including spiders and hemipterans. Within the Amgaon region study area, taxonomic analysis revealed seven species distributed across six genera and three subfamilies within the order Hymenoptera. The family Formicidae emerged as the predominant taxon among all surveyed samples.

Table 1: Showing the species diversity from the Thana forest area

Sr. No	Family	Subfamily	Genus	Species
1	Formicidae	Formicinae	Camponotus	Compressus
3	Formicidae	Formicinae	Camponotus	Parius
3	Formicidae	Formicinae	Lasius	Niger
4	Formicidae	Formicinae	Oecophylla	Smaragdina
5	Formicidae	Myrmicinae	Pheidole	Megacephala
6	Formicidae	Myrmicinae	Solenopsis	Geminata
7	Formicidae	Ponerinae	Ectomomyrmex	Astutus

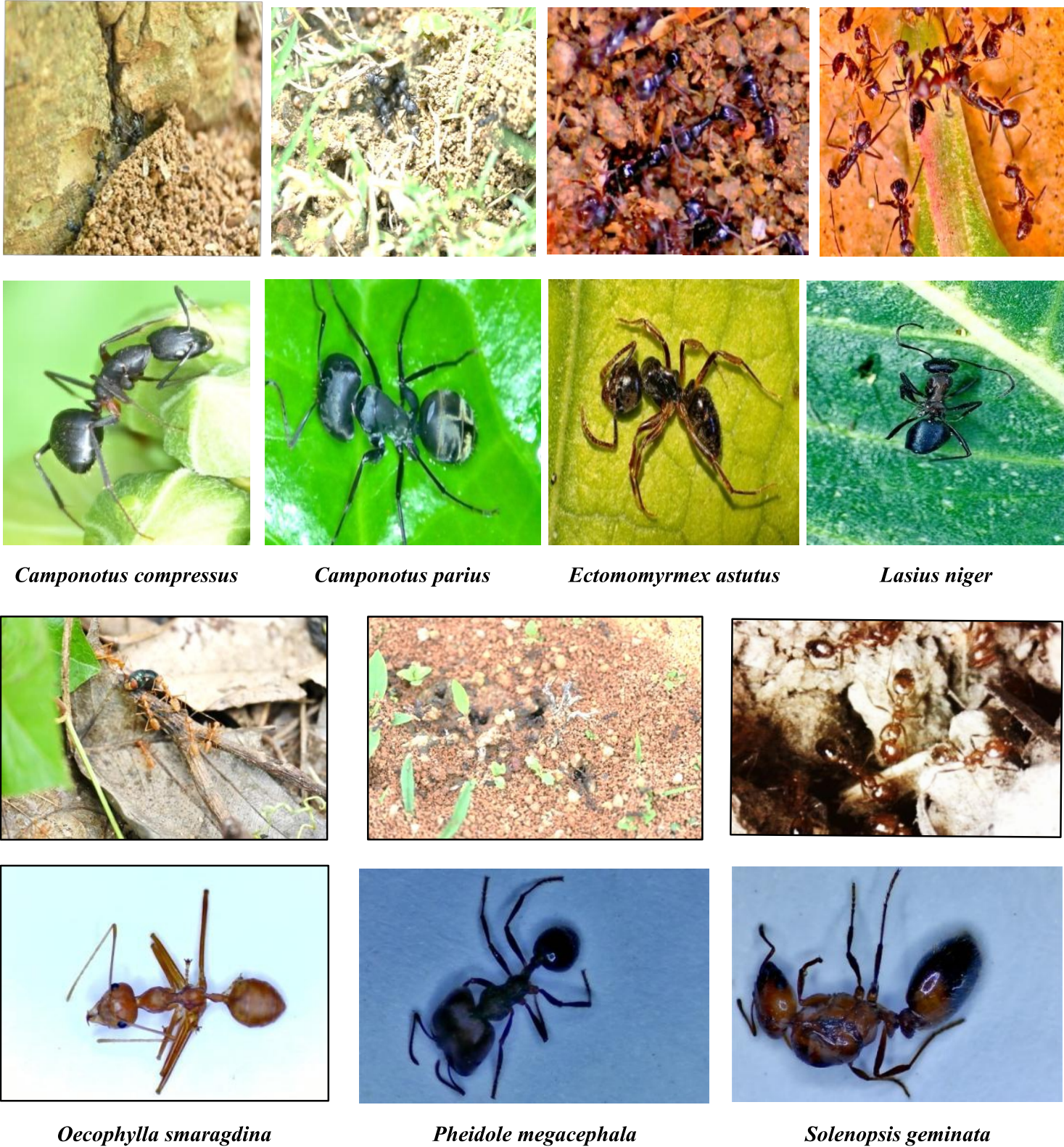


Fig. 3. Ants species diversity at the Thana Forest area Amgaon District Gondia

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