



Assessment of ant diversity in NGM College campus Pollachi, Tamilnadu, India

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Abstract

This study assessed the ant diversity of the NGM College campus, Pollachi, documenting 15 species belonging to 12 genera, 9 tribes, and 4 subfamilies. Ants were surveyed across varied microhabitats, including soil, leaf litter, tree canopies, wood, and anthropogenic structures. Formicinae emerged as the dominant subfamily, followed by Myrmicinae, reflecting the influence of both natural vegetation and disturbed environments on species composition. The community included native arboreal specialists such as *Oecophyllasmaragdina* and *Tetraponerarufonigra*, as well as synanthropic and invasive species like *Paratrechina longicornis*, *Tapinoma melanocephalum*, and *Monomorium pharaonis*. Habitat analysis revealed a balanced distribution of soil-dwelling, arboreal, and nest-associated species, indicating strong habitat heterogeneity within the campus. The findings highlight the ecological value of semi-urban green spaces in supporting diverse ant assemblages and emphasize the importance of maintaining vegetation cover and minimizing disturbance to sustain local biodiversity.

Keywords: Ant diversity, formicinae, myrmicinae, semi-urban ecosystem, campus biodiversity, Pollachi

Introduction

Ants are eusocial arthropods belongs to the order Hymenoptera which comprises of large group of insects including wasps, bees, sawflies and ants. Currently, there are 15,983 extant ant species or subspecies as per the recent classification. They are grouped into 20 subfamilies, with 464 genera. All of these belong to a single Family called Formicidae included in the super family Vespoidea of the order Hymenoptera, which is placed in the largest class insecta in the animal kingdom (Rabeesh *et al.*, 2017) [19]. Ants are estimated to be originated at early cretaceous period approximately 138-115 million years ago (Bardy *et al.*, 2006; Moreau *et al.*, 2006; Benoit 2013) [15] and flourished at Eocene epoch. Ants are holometabolous insects (having complete metamorphosis) with distinctive caste system within the groups which is usually controlled by a single or multiple queen and guarded by worker ants which are mostly females developed from unfertilized egg. Ants are socially diverse group among all other arthropods which accounts for roughly 15-25% of the total terrestrial animal biomass (Akhila and Keshamma 2022) [1] and found to survive in almost all type of ecosystems except Antarctica and few remote islands thanks to their adaptive nature and co operative living style which enables them to conquer the environment they live in and lead as a successful community.

Many ant species are stenothermic, and thus temperature is often the main determinant of abundance, species richness, and composition of ant assemblages, with generally decreasing ant abundances and species richness with decreasing temperature (Jenkins *et al.*, 2011; Kaspari *et al.*, 2003; Longino *et al.*, 2014; Sanders *et al.*, 2007, 2003; Yvonne *et al.*, 2017) [10, 11, 13, 21, 24]. India lies in the tropical region it supports more life forms including ants with its diverse array of habitats which comprises of moderate to

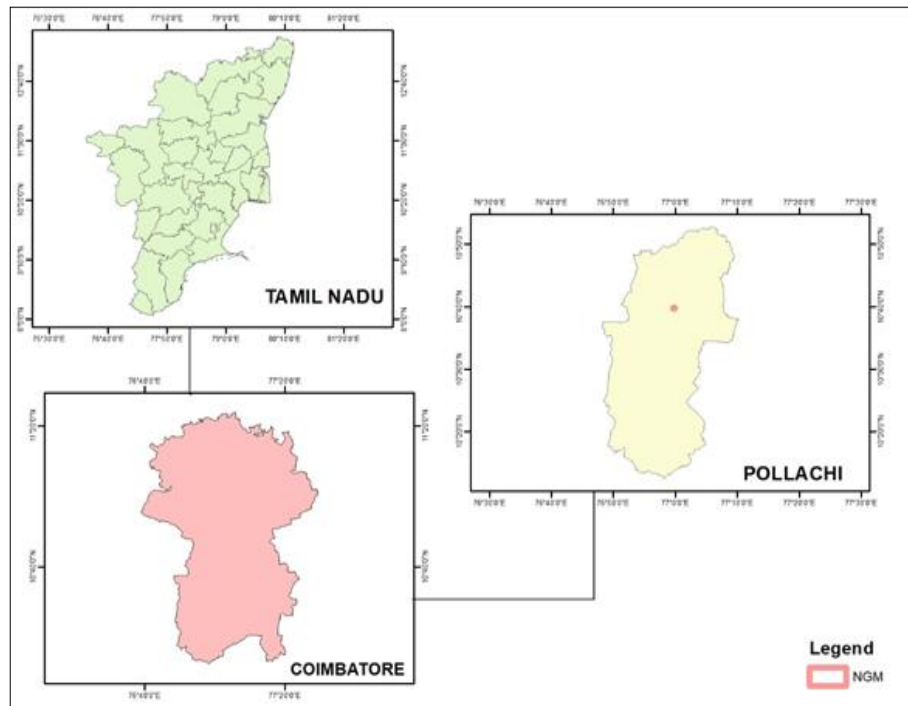
dense forest, deciduous forest, coniferous forest and grasslands. Ants are one of the most important generalist predators of arthropods in terrestrial ecosystems, particularly in the tropics (Hölldobler and Wilson, 1990; Seifert *et al.*, 2016; Yvonne *et al.*, 2017) [9, 22, 24] pollinators, decomposers, scavengers and act as prey for other insects, amphibians, large and small mammals. They also show mutualistic relationship with other plants and fungal species by protecting them from other predators and use them as their food source and shelter. They also act as bio indicators as they are very sensitive to the environmental changes. They are used as surrogate taxa i.e., taxa that are used to represent the biodiversity of other organisms (Akhila and Keshamma 2022) [1]. Though they play a crucial role in stabilizing the ecosystem, they're the most under studied group in India compared to their abundance and diversity. This study aims to delve into the rich world of ant diversity, shedding light on their importance and the need for conservation efforts to preserve these tiny yet essential Creatures. By exploring ant diversity, we aim to uncover the intricate relationships that bind these tiny architects to the broader ecosystem.

Study Area

This study was conducted in NGM College campus, Pollachi (10° 39' 47.826" N and Longitude 76° 59' 48.066" E) which covers a total land area of 26 acres filled with different type of vegetation and human population which provides good environment and access to variety of food and shelter for the ants. Pollachi town was located at the foothills of Anaimalai which is part of Western Ghats at average elevation of 292.5m above mean sea level with an average annual rainfall of 90.7cm receiving most of its rain from north east monsoon and temperature variation ranges

from 14.9°C to 37°C With red loamy and red sand soil which makes the area fertile and supports the life of diverse

organisms. This study was conducted during the month of August 2024 to February 2025 during monsoon season.



Materials and methods

Sample collection methods

The study area was divided into three regions—Area 1 (Women’s Hostel), Area 2 (Ground), and Area 3 (Garden)—to capture the habitat variation across the NGM College campus, Pollachi. Different sampling methods were employed to ensure comprehensive collection of ant species from these zones. Pitfall traps were set by filling plastic vials with soap water up to two-thirds of their capacity, and attractant baits such as sugar, muffin, and meat were placed around the traps; these were examined every 24 hours to collect the trapped ants. In addition to this passive method, active sampling was conducted through hand picking, wherein ants were directly collected using a fine brush and transferred into vials for preservation. All collected specimens were subsequently preserved, labeled, and stored in the Zoology Department of NGM College for identification and further reference.

Preservation Method

The collected ant samples were preserved by wet preservation method by series of process. First the samples were cleaned completely to remove all the debris attached to the specimen and placed in the 5cm specimen vial which is already filled with 70-75% of alcohol and the vials are labeled with collection details and specific reference code for easy identification (Mathew and Tiwari, 2000; Bolton, 1994, 2003; Nimisha *et al.*, 2023) [5, 6, 14, 17].

Result and Discussion

A total of 15 ant species belonging to 12 genera, 9 tribes, and 4 subfamilies were recorded from the NGM College campus, Pollachi, Tamil Nadu. The documented species exhibited considerable ecological and taxonomic diversity, reflecting the campus's heterogeneous microhabitats

consisting of soil, leaf litter, tree canopies, and anthropogenic structures.

Among the four subfamilies identified—Formicinae, Myrmicinae, Dolichoderinae, and Pseudomyrmecinae—the Formicinae was the most dominant, represented by seven species, primarily from the genus *Camponotus*, *Oecophylla*, *Paratrechina*, and *Anoplolepis*. The genus *Camponotus* alone contributed three species (*C. compressus*, *C. parius*, *C. mitis*), all of which were frequently encountered in nesting sites within tree bark, decaying logs, and man-made structures, indicating their strong adaptability to varied nesting substrates.

The subfamily Myrmicinae formed the second most diverse group with six species, including *Pheidole megacephala*, *Crematogaster rothneyi*, *Crematogaster subnuda*, *Monomorium dichroum*, *Solenopsis geminata*, and *Monomorium pharaonis*. Species such as *Pheidole megacephala* and *Solenopsis geminata* were predominantly associated with soil-rich open habitats and disturbed grounds, indicating their preference for exposed, sun-lit environments. The presence of *Monomorium pharaonis* near food and water sources also reflects the influence of anthropogenic activities on local ant community composition.

The subfamily Pseudomyrmecinae was represented by a single arboreal species, *Tetraponera rufonigra*, which was observed in tree canopies and occasionally foraging on the ground. Its occurrence highlights the importance of woody vegetation within the campus for sustaining canopy-dwelling ant fauna. Similarly, the subfamily Dolichoderinae was represented by *Tapinoma melanocephalum* (Ghost ant), a species commonly found in both soil and tree habitats. Its presence indicates adaptability to diverse microhabitats and strong colonizing ability in semi-urban environments.

Table 1: Information about the ant diversity in NGM college Pollachi

S. No	Common name	Scientific name	Habitat	Tribe	Sub family
1	Indian Black Ant	<i>Componotuscompressus</i>	Nest	Formicinae	Formicinae
2	Carpenter Ant	<i>Componotusparius</i>	Nest	Componotini	Formicinae
3	Carpenter Ant	<i>Componotus mitis</i>	Nest in Wood, dead trees	Componotini	Formicinae
4	Weaver Ant	<i>Oecophyllasmaragdina</i>	Nest larva's silk	Oecophyllini	Formicinae
5	Big headed Ant	<i>Pheidole megacephala</i>	Soil, under stone	Pheidolini	Myrmicinae
6	Long horn Crazy ant or black Crazy Ant	<i>Paratrechina longicornis</i>	Soil	Lastini	Formicinae
7	Acrobat ant and Cocktail Ant	<i>Crematogasterrothneyi</i>	Low land Forests	Crematogastrini	Myrmicinae
8	Acrobat ant and Cocktail Ant	<i>Crematogastersubnuda</i>	Forests	Crematogastrini	Myrmicinae
9	Bicolored arboreal ant	<i>Tetraponerarufonigra</i>	Air boreal. Soil	Formicinae	Pseudo Myrmicinae
10	Sahlbergi	<i>Monomorium dichroum</i>	Soil, under rocks	Solenopsidini	Myrmicinae
11	Yellow crazy Ant	<i>Anoplolepisgracilipes</i>	Moist and dry places	Plagiolepidini	Formicinae
12	Big Headed ant	<i>Pheidole</i>	Soil, under stone	Pheidolini	Myrmicinae
13	Tropical fire ant	<i>Solenopsis geminata</i>	Dry moist soil agricultural places	Solenopsidini	Myrmicinae
14	Pharaoh ant	<i>Monomorium pharaonis</i>	Near Food and Water source	Solenopsidini	Myrmicinae
15	Ghost ant	<i>Tapinoma melanocephalum</i>	Soil, Trees	Tapinomini	Dolichoderinae

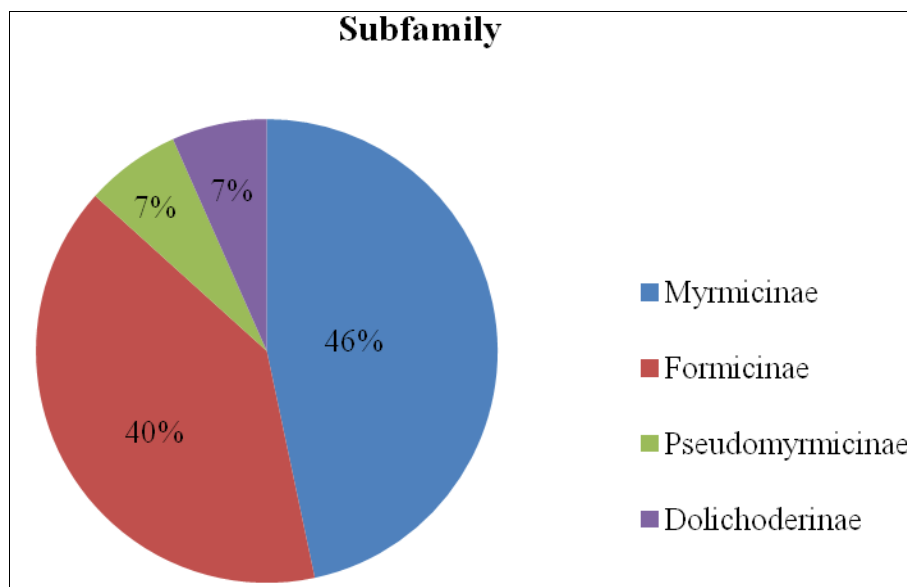


Fig 1: Graphical Representation of percentage of subfamilies collected

Habitat analysis revealed that the majority of species (46%) were associated with soil and stone microhabitats, while 33% were found in forested or arboreal locations. A smaller proportion (21%) utilized nest structures such as tree hollows, larval silk nests, or decayed wood. Species such as *Oecophylla smaragdina* were restricted to arboreal nests constructed using larval silk, whereas *Camponotus mitis* was closely associated with dead wood, highlighting specific habitat preferences.

In general, the ant community structure at NGM College campus indicates a balanced representation of soil-dwelling, arboreal, and synanthropic species, reflecting the ecological richness of the campus landscape. The co-occurrence of native species (*Oecophylla smaragdina*, *Tetraponera rufonigra*) and invasive or tramp species (*Paratrechina longicornis*, *Tapinoma melanocephalum*, *Monomorium pharaonis*) further suggests habitat heterogeneity influenced by both natural and anthropogenic factors. Overall, the results demonstrate that NGM College campus supports a

diverse assemblage of ant fauna, emphasizing the ecological value of semi-urban green spaces for sustaining insect biodiversity.

Discussion

The present inventory of 15 ant species from the NGM College campus reflects a moderate but ecologically meaningful ant assemblage typical of semi-urban green spaces in South India. Similar campus and village surveys in Tamil Nadu and Kerala have found comparable species richness in fragmented and semi-natural habitats, where a mixture of native canopy specialists and synanthropic/tramp species coexist (Sornapriya & Varunprasath, 2018; Antony, 2021) [2, 23]. The dominance of Formicinae and the strong representation of *Camponotus* and other large-bodied formicines in our survey mirror patterns reported from Coimbatore and nearby localities, where woody substrates and tree cover favour formicine nesting and (Arunachalam, 2023) [3]. The presence of arboreal specialists such as

Oecophylla smaragdina and *Tetraponera rufonigra* on campus further emphasizes the role of mature trees and canopy continuity in maintaining canopy-associated ant fauna. At the same time, synanthropic species (e.g., *Paratrechina longicornis*, *Tapinoma melanocephalum*, *Monomorium pharaonis*) is consistent with surveys from both Kerala and Tamil Nadu that document the widespread occurrence of these human-associated ants in built and disturbed habitats (Rajasree *et al.*, 2023) ^[20]. These species commonly exploit anthropogenic resources and altered microhabitats, and their local persistence signals continual human influence that can facilitate biotic homogenization. Weaver ants (*Oecophylla*) recorded here have been repeatedly documented across Tamil Nadu studies for their strong role in canopy predation and potential ecosystem services (biocontrol) in tree crops and agroecosystems (Nalini and Ambika 2019) ^[16]. Their occurrence on campus suggests functional benefits predation on herbivores and other arthropods that help structure canopy arthropod communities. The study conducted by Antony *et al.*, 2021 ^[2] highlights the Kerala University Campus as a significant reservoir of ant diversity, supporting endemic species such as *Camponotus invidus* and *Carebara spinata*, along with introduced taxa like *Anoplolepis gracilipes* and *Paratrechina longicornis*, while clearly showing reduced diversity in areas with higher human disturbance. The ant diversity recorded in the Kattanchimalai region reflects a well-structured community dominated by Formicinae and Myrmicinae, indicating varied microhabitats that support both generalist and specialized taxa. The presence of widely distributed genera such as *Camponotus* and *Pheidole*, along with single-species genera like *Oecophylla* and *Tetraponera*, highlights the ecological richness and conservation value of this understudied landscape (Lekshmanaswamy and Sornapriya 2022) ^[12].

Overall, the ant assemblage recorded from the NGM College campus demonstrates that even semi-urban green spaces can support a functionally rich and ecologically diverse community. The coexistence of native arboreal specialists, soil-dwelling generalists, and synanthropic tramp species reflects the heterogeneous microhabitats created by both natural vegetation and human-modified structures. Comparisons with studies from Tamil Nadu and Kerala indicate similar trends in species composition, highlighting the role of campus environments as important refuges that sustain regional ant diversity despite increasing urbanization. The findings underscore the need to conserve existing tree cover, ground vegetation, and minimally disturbed zones within educational institutions to maintain ecological balance and promote long-term biodiversity persistence

Conclusion

The present study documented fifteen ant species from the NGM College campus, providing a clear snapshot of the local Formicidae diversity and its ecological significance. The species composition closely mirrors findings from Tamil Nadu and Kerala, where native arboreal taxa coexist with disturbance-tolerant tramp species, indicating both habitat value and the influence of human activity. These results highlight the role of campus green spaces as micro-refuges for native biodiversity while emphasizing the need for simple habitat management to reduce anthropogenic

pressures. Overall, the study serves as a useful baseline for future research and demonstrates the importance of continued monitoring using advanced and diverse sampling techniques to improve understanding of regional ant communities.

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