

Diversity of ants in Buddha Vana of Tumkur University Campus, Tumkur, Karnataka, India

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Abstract

Ants are one of the important organisms in the terrestrial habitat and form 15% of animal biomass in the ecosystem. They are the leading predators as they feed on the other insects and small invertebrates. Ants are the true insects which are more sensitive and give quick response to the minor disturbance in the environment. Due to this, they can be used to indicate the unethical impact on the ecosystem. The present study was carried out in Buddha vana of Tumkur University campus to study the diversity of ants by search method and hand collection method from July 2022 to December 2022. The results revealed the presence of 10 species of ants belonging to 8 genera and 4 subfamilies. Among these, subfamily Formicinae is represented by 6 species and constitutes 60%, subfamily Myrmicinae is represented by 2 species and constitutes 20%. Subfamily Pseudomyrmicinae and Ponerinae are represented each by one species and constitute 10%. This survey provides valuable information of ant diversity in the Tumkur University campus and the study area served as mini model to examine the persistence of ants' species.

Keywords: Ants, ecosystem, Buddha Vana, biodiversity, formicinae

Introduction

Ants are one of the most diverse and largest ubiquitous insect groups. Ants belong to one of the largest family Formicidae under the order Hymenoptera. They are categorized as eusocial insects and serve as the active participants of the functioning ecosystem. They exhibit huge variation in their morphology and feeding habit. This feeding habit provides the information about their temperament (Ramchandra *et al.*, 2012) [12]. They play a significant role as ecological indicators and ecosystem engineers in the ecosystem (Azhagu Raj *et al.*, 2017) [4]. They serve as one of the important components of food chain, improve the soil fertility as decomposers and also involve in the seed dispersal (Gammans *et al.*, 2005) [7]. Thus, ants are the ecologically significant insects performing important ecological functions in the ecosystem. Hence, the niches occupied by the ants are very important and not to be replaced by other organisms.

Ants represent the most diverse group of social insects and are vital to the diversity of terrestrial ecosystem. They act as the ecosystem's engineers and promote the quality of the ecosystem by enhancing the soil quality and accelerating the decomposition process. (Lalitha *et al.*, 2024) [9] Biodiversity, conservation and management noticed that the ants are one of the most diversified and ubiquitous insects (Azhagu Raj *et al.*, 2017) [4]. Variations in microclimate can affect the ant diversity and this can be utilized in bio-monitoring (Perfecto and Vandermeer, 1996) [11]. Ant species are excellent indicators for restoration and land management techniques. (Andersen, 1990) [12]. The diversity of ant species can serve as an indicator of changes in the environment. (Tied *et al.*, 2017) [15]. As ants show quick response to changes in their environment, they can be used as an effective tool for indicator studies (Joseph and Thomas, 2021) [8].

Plenty of advantages are provided by ants than other arthropods for the study of diversity of species (Sivadasan *et al.*, 2013) [14]. Greedy behaviour of humans' results in adverse effect on diversity of flora and fauna in terrestrial ecosystem (Latha *et al.*, 2022) [10].

Study area

Tumkur University campus is located in the heart of the city is housed in a 'Green Campus' near M.G. Stadium in Bangalore-Honnar Road. It consists of many buildings belong to University College of Science, University College of Arts, Administrative offices etc., and comprises many green rich areas like Botanical Garden, Ramana Maharshi park, Dhanvanthari vana, Buddha vana and so on. We have selected Buddha vana for the survey as it is rich with ants and the work was not carried out in this area of Tumkur University campus, Tumkur. Buddha vana is filled with a variety of plants and trees like Fig tree, Paneer tree, Bamboo, Ficus benjamina Ashoka tree, Bougainvillea, Hibiscus, Nerium, Vincarosea, Euphorbia milli etc. It is situated between 13.3380° N, 77.1203° E. The satellite view of Tumkur University campus is shown in Fig.1 and Buddha vana of Tumkur University campus in Fig.2.



Fig 1: The satellite view of Tumkur University campus



Fig 2: Buddha vana of Tumkur University campus

Materials and methods

Prior research studies have been conducted on the diversity of ants in various areas of the Tumkur University campus by authors like Latha *et al.*, (2022) [10]. This is the first exploratory investigation of ants in the Buddha vana in the campus of Tumkur University.

In the present study, Ant species diversity in the Buddha vana of Tumkur University campus has been studied for a period of six months from July 2022 to December 2022. Ants were collected every day between 9 a.m. to 5p.m. using all out-search method and hand collection method (Gadagkar *et al.*, 1993) [6]. The collected ant species were identified up to the species level and identifications were done with the help of taxonomic keys given by Ali (1992) [1]; Bolton (1994) [5].

Result

The result revealed the presence of 10 species of ants belonging to 8 genera. Family Formicidae is represented by 4 sub families. Among these, 6 species belong to subfamily Formicinae and 2 species to subfamily Myrmicinae and other 2 species, each one belongs to Pseudomyrmicinae and Ponerinae. The *Camponotus* was the most species-rich genus with three species.

List of ants recorded in Buddha vana of Tumkur University campus is shown in Table.1, Subfamily wise distribution of ants in Fig. 3, Diversity of ants in Fig.4 and Graphical representation of Subfamily-wise Genus and Species of ants in Fig.5.

Table 1: List of ants recorded in Buddha vana of Tumkur University campus

Family	Subfamily	Genus	SPECIES
Formicidae	Formicinae	Oecophylla	smaragdina
		Lasius	niger
		Formica	truncorum
		Camponotus	sericeus
			japonicus
			myrmentoma
	Myrmicinae	Solenopsis	invicta
		Crematogaster	biroi
	Pseudomyrmicinae	Tetraponera	rufonigra
	Ponerinae	Leptogenys	chinensis

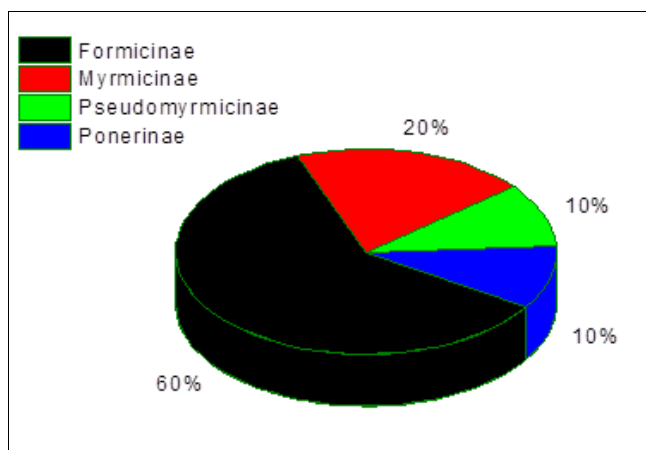


Fig 3: Subfamily wise distribution of ants in Buddha vana of Tumkur University campus

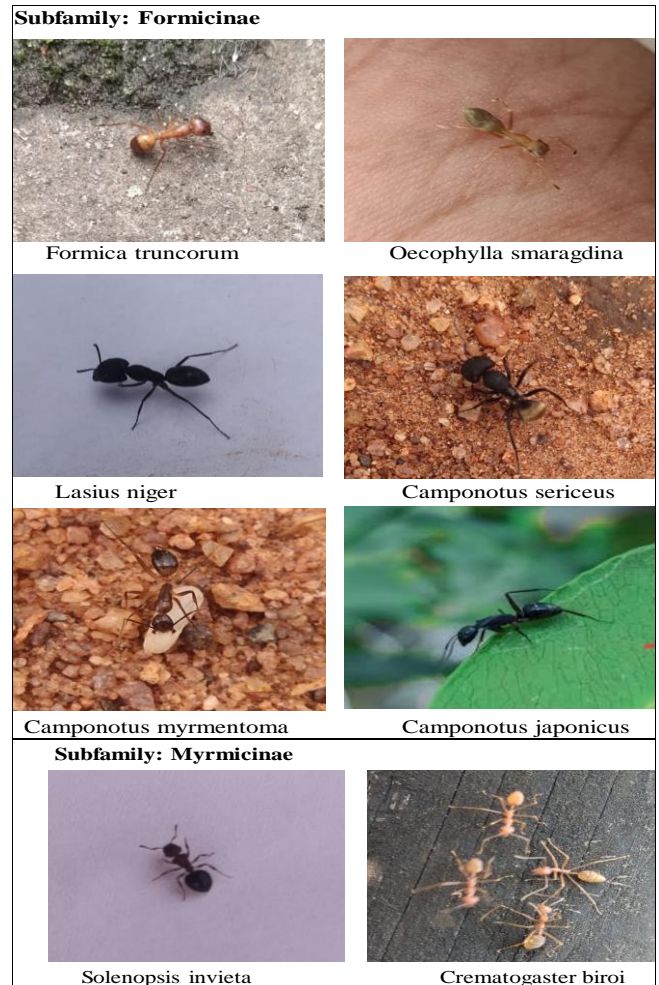


Fig 4: Diversity of ants in Buddha vana of Tumkur University campus

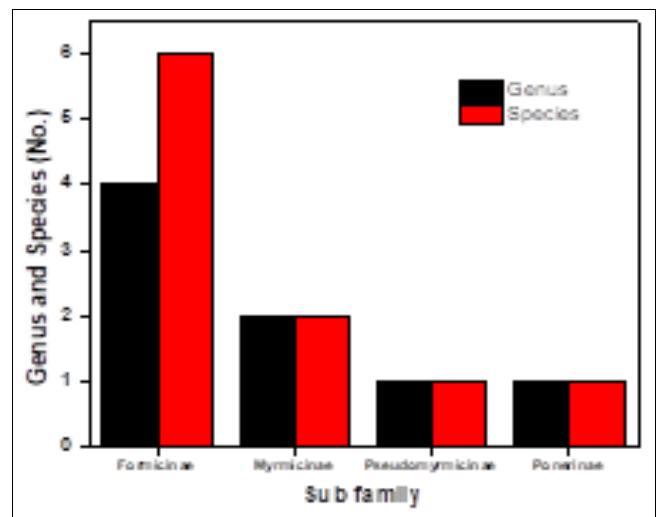


Fig 5: Graphical Representation of Subfamily-wise Genus and Species of Ants in Buddha vana of Tumkur University campus

Discussion

In the present study, rich diversity of the ants was documented may be due to the adequate nesting sites and availability of food as well as foraging. This shows that this area is good habitat for ants. The members of Formicinae were found most abundant and the dominance was exhibited by subfamily Formicinae with six species. The genus *Camponotus* is recorded with three species.

Azagu Raj *et al.*, (2017) ^[4] studied ants' diversity in Pachaiyappa's college campus and recorded 10 species belonging to 09 genera and 04 subfamilies. Out of the four subfamilies, the Formicinae was found most dominant with 5 species followed by Myrmicinae with 03 species, Pseudomyrmicinae with 01 species and Dolichoderinae with 01 species. Sub family Formicinae was found dominant with 6 species.

Antony *et al.*, (2021) ^[3] conducted survey on the ant diversity in the Kerala University Campus and revealed a total of 64 species under six subfamilies. Species belonging to the Myrmicinae dominated (51.5%) followed by Formicinae (20.6%), Ponerinae (13.2%), Dolichoderinae (4.4%), Pseudomyrmicinae (4.4%) and Dorylinae (1.5%). The results indicated the rich ant diversity in the campus and the sites with human interference showed less diversity.

Savitha *et al.*, (2008) ^[13] studied the distribution and abundance of ant species across a disturbance gradient in and around Bangalore city and documented 51 species of ants belonging to 24 genera and 7 sub families. They observed high abundance of *Solenopsis geminate* and indicates that it is capable of adapting to variety of changing environmental conditions. *Solenopsis geminate* abundance rises with the rise in disturbance levels. Consequently, in the disturbed sites, *Solenopsis geminate* could be employed as an indicator. They suggested that disturbed areas serving as home to the rare species, indicating that urban habitats also need to be protected. Similar result was also observed in the present study where the genus *Solenopsis* was recorded indicating the changes in the urban areas.

In Tumkur University campus, Latha *et al.*, (2022) ^[10] surveyed the diversity of ants belonging to five subfamilies, Formicinae, Myrmicinae, Ponerinae, Dolichoderinae and Pseudomyrmicinae and recorded 28 ant species belonging to 17 Genera. The subfamily Myrmicinae was found more dominant with 6 genera and 13 species (46%) followed by Formicinae with 6 genera and 10 species (36%) and subfamily Pseudomyrmicinae with 1 generic species.

Lalitha *et al.*, (2024) ^[9] studied diversity of ants in Karekallu region of Hebbaka, Tumakuru and the result showed the presence of a total of 9 Species belonging to 6 genera and 4 sub-families. The most diverse sub-family found was Formicinae. Among the sampled genera, *Camponotus* showed the highest number of species representation with 4 species. The present study showed similar results.

Conclusion

The present study indicates that the Buddha vana of Tumkur University campus is showing a rich diversity of ants. Subfamily Formicinae dominates as it has the ability to adjust to different habitats but other subfamilies will be adapted to specific niche. The findings of the present study about the patterns of diversity are analogous with earlier research findings. Analysis of ant diversity can be used to comprehend the effects of human. This survey provides valuable information of ant diversity in the Tumkur University campus and the study area served as mini model to examine the persistence of ants' species. Maintaining ants' diversity in the campus is essential for the better improvement of ant species conservation.

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Conflict of interest

The author has no conflict of interest.

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