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Diversity of ants in Karekallu region of Hebbaka, Tumakuru, Karnataka, India

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Abstract

Ants are the integral part of ecosystems, represent a great part of the animal biomass and act as ecosystem engineers. Tropical habitats are home to a rich diversity of ants. Unfortunately, data on ants in natural and simulated habitats are poor, especially for the Indian region. The present study attempts to assess the diversity of ants in the agricultural fields of Brinjal, Ridge guard, Cucumber and Arecanut in Karekallu region of Hebbaka, Tumakuru Taluk and District. The work was undertaken due to the lack of adequate information regarding the diversity of ants in this region. The present study was carried out from November 2023 to April 2024. The ants were collected by search method. 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. Ants exhibit characteristics relevant to biodiversity studies such as plasticity, high diversity, numerical and biomass dominance in different habitats, ease of sampling and the presence of stationary nests. The present study provided valuable information on the availability of ants in the region and revealed that the region of Karekallu, Hebbaka, Tumakuru, has a rich diversity of ants despite of regular habitat changes. The study showed that ants can survive against all the hazards and the study area provides the opportunities to document the diversity of ant species.

Keywords: Ants, ecosystem, agricultural fields, Formicinae, Tumakuru

Introduction

Ants are the important component of terrestrial ecosystem and form a significant part of the biomass (Anderson, 1997) ^[1]. They are the most diverse group among the social insects and form the integral part of the terrestrial biodiversity. Ants serve as the ecosystem engineers and contribute to the wellness of the ecosystem by improving the soil quality and decomposition process (Chavhan and Pawar, 2011) ^[4]. They are considered as the effective biological indicators as they exhibit synergistic behaviour with the flora and fauna (Andersen and Sparling, 1997) ^[2]. These eusocial insects help each other and lead a successful interactive lives and they also exhibit polymorphism (Mahalakshmi and Channaveerappa, 2016) ^[9].

Ants are one of the most abundant and diverse animal groups in tropical ecosystems. They function at several levels of the ecosystem as predators and prey, detritivores, mutualists and herbivores (Guruprasad and Tiwari, 2011) ^[6]. Due to their potential usefulness, ants have been viewed for the important biodiversity and conservation studies (Bolton, 1994) ^[3].

Ants belong to the family Formicidae, class Insecta of the phylum Arthropoda in the superfamily Vesioidea of the order Hymenoptera. Ants are universal in distribution and found in almost all terrestrial habitats (King and Porter, 2004) ^[7]. There are approximately 15,000 species of ants but only 11,769 species were identified. The family Formicidae comprises 21 subfamilies, 283 genera and about 15,000 living ant species. But, 633 species of ants belonging to 82 genera and 13 subfamilies have been documented from India (Mahalakshmi and Channaveerappa, 2016) ^[9]. About 226 ants species belonging to 63 genera and 11 subfamilies have been recorded from Karnataka.

Despite of regular changes in habitat, Tumakuru has a very rich diversity of ants. Several factors like food resources, nesting habits etc., are found to be responsible for the high diversity of ants. So far, no research work has been done on the ants diversity in Karekallu region of Hebbaka, Tumakuru. The major objective of the present work was to study the diversity of ants in the agricultural fields of Karekallu region of Hebbaka, Tumakuru and to compose a checklist of ants.

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Study area

The Study was conducted in the agricultural fields of Karekallu region of Hebbaka, Tumakuru. The Karekallu region of Hebbaka is situated at 13.3958°N, 77.0593°E. The agricultural fields in Karekallu region Hebbaka, Tumakuru covering four and a half hectare of the land encompasses

Hebbaka amanikere on the east, Bellavi forest to the west, Hemavathi channel on the north and Tumkur garbage disposal to the south. The peculiar biotic union of this area extends through the diversified and productive habitat with native plants aesthetically mixed with the buildings introduced around the study area.

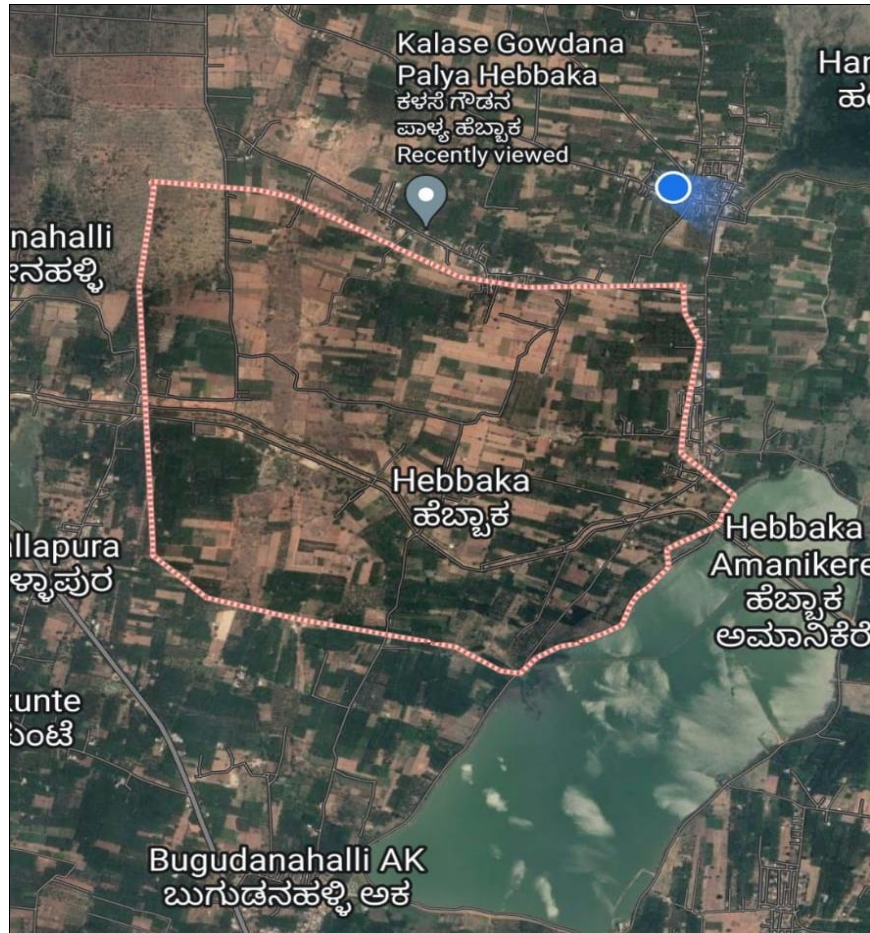


Fig 1: Study area- Karekallu region of Hebbaka, Tumakuru

Habitat characterization

The agricultural field of the karekallu region has elevated, forest land comprising plants predominantly belonging to the families: Arecaceae, Solanaceae, Cucurbitaceae, and grass-covered land patches.

Materials and Methods

Fieldwork was carried out in and around Karekallu region of Hebbaka, Tumakuru. Ant field sampling was conducted for a period of six months from November 2023 to April 2024. Every day from 9 a.m. to 6 p.m, ants were collected by all-out intensive search method. i.e., manual collection using brush and forceps. Generally, collection of ants during morning and evening by all-out search method yield good results (Gadagkar *et al.*, 1993) [5]. Date and time of collection, habitat

and area information were recorded at the time of collection (Guruprasad and Tiwari, 2011) [6].

Ants cleaning and sorting

Dust particles and materials stuck to the body of ants were removed using a brush dipped in water. Sorting is a very important step that has to be done carefully (King and Porter, 2004) [7]. After the collection, collected ants were sorted into groups and named as group 1, group 2 etc., and placed in separate vials. The vials were provided with appropriate labels to avoid confusion (Petal *et al.*, 1975) [10].

Identification

Based on the taxonomic keys, ants were identified to genus level using a stereomicroscope (Bolton, 1994) [3].



Fig 2: Diversity of ants in Karekallu region of Hebbaka, Tumakuru

Results

Ants diversity in the agricultural fields of Karekallu region, Hebbaka Tumakuru has been analyzed and the result revealed the presence of 9 species of ants belonging to 6 genera and 4 subfamilies. The sub family Formicinae was represented by 3 genera and 6 species. The sub families Myrmicinae, Ponerinae and Dolichoderinae, each represented by one genus and one species. The most distinctive genus of these 4 subfamilies is Camponotus with 4 species. Sub family Formicinae contributing 67% of species and Sub families

Myrmicinae, Ponerinae and Dolichoderinae each contributing 11% of species. Among these species, the occurrence of Camponotus compressus was higher than that of other species and was evident everywhere.

Ants diversity in Karekallu region of Hebbaka, Tumakuru is shown in Table 1 and 2 and Figure 2,3,4 and 5.

Diversity of ants representing Subfamily, genus with species

Table 1: Checklist of Ants in Karekallu region of Hebbaka, Tumakuru

Sl. No	Common Name	Scientific name	Ecological Status
1.	Golden-backed ant	<i>Camponotus sericeus</i>	Common
2.	Giant carpenter ant	<i>Camponotus compressus</i>	Common
3.	Long-legged Hunchback ant	<i>Aphaenogaster beccari</i>	Common
4.	Procession ant	<i>Leptogenys processionalis</i>	Common
5.	House ant	<i>Tapinoma sessile</i>	Common
6.	Black carpenter ant	<i>Camponotus radiatus</i>	Common
7.	Yellow Crazy ant	<i>Anoplolepis gracilepis</i>	Common
8.	Black crazy ant	<i>Paratrechina longicornis</i>	Common
9.	Long-necked sugar ant	<i>Camponotus angusticollis</i>	Common

Table 2: Subfamily-wise distribution of ants in Karekallu region of Hebbaka, Tumakuru

Sub Family	Genus	No. of species
Formicinae	Camponotus	4
	Paratrechina	1
	Anoplolepis	1
Myrmicinae	Aphaenogaster	1
Ponerinae	Leptogenys	1
Dolichoderinae	Tapinoma	1
TOTAL	6	9

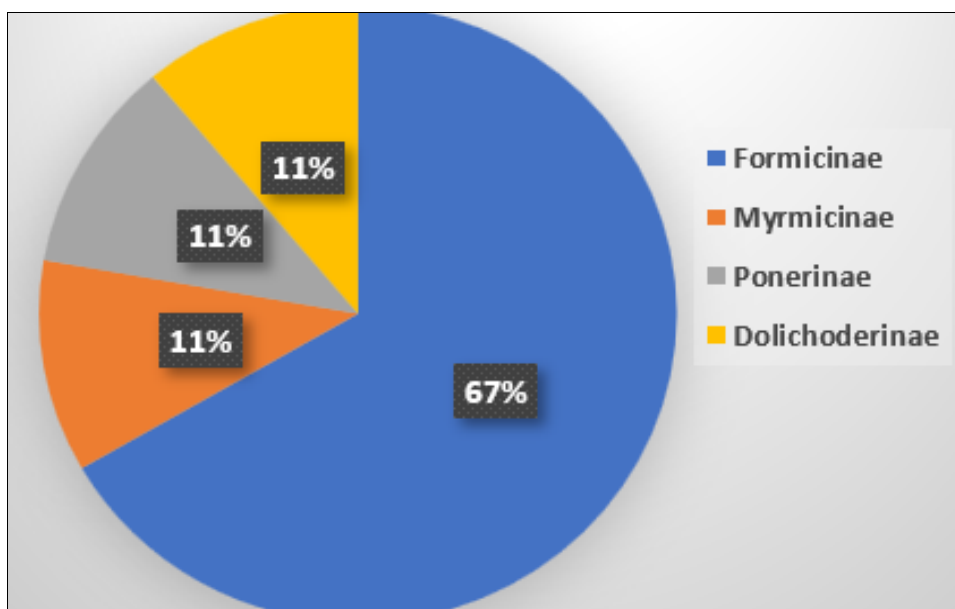


Fig 3: Subfamily-wise distribution of Ants in Karekallu region of Hebbaka, Tumakuru

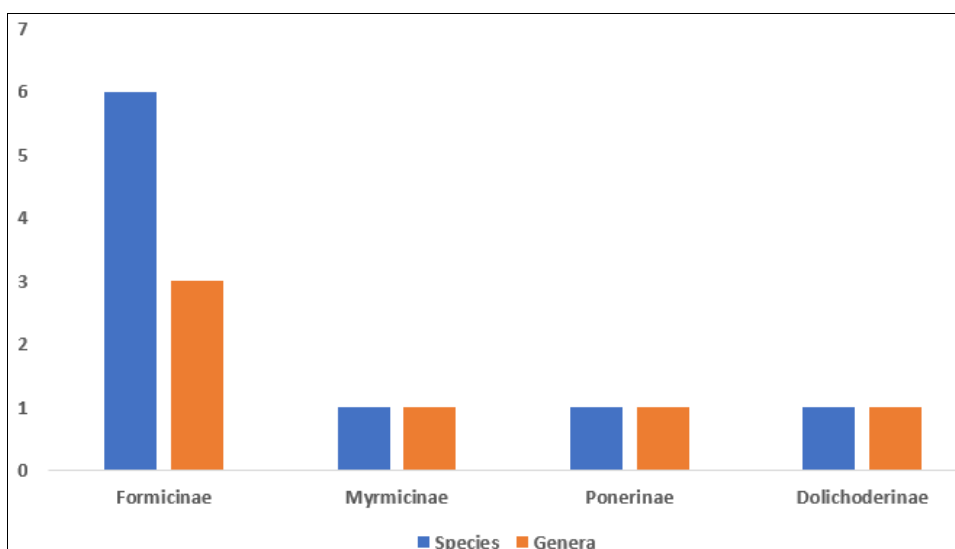


Fig 4: Graphical Representation of Subfamily-wise Genus and Species of Ants in Karekallu region of Hebbaka, Tumakuru

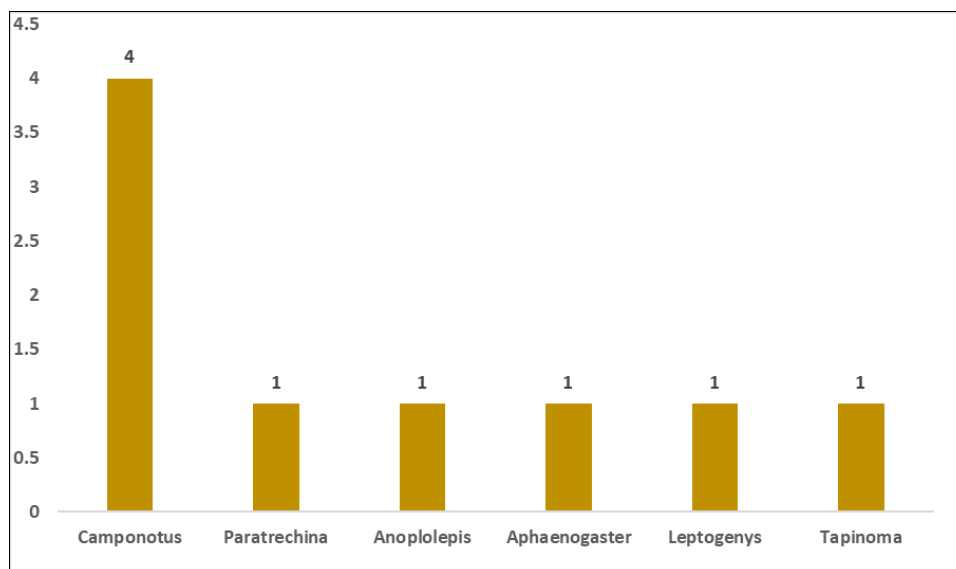


Fig: Graphical representation of Subfamilies vs Genera & Speciosa

Discussion

Karekallu region of Hebbaka has undergone several changes in flower cultivation lands, expansion of permanent entities and many others which have become more rapid in recent years. The region is situated on the edge of a busy road with heavy vehicular traffic which has significantly increased the air pollution compared to previous years. Noise and vibrations from vehicular traffic have reached to a disturbing level. In this region, gardening is done every year in a regular process that involves digging, changing soil, replacing soil and adding fertilizers. Extensive use of chemical pesticides, insecticides, burning of litter and alteration of vegetation and grass led to changes in the topological profile of the ant ecosystem (Latha *et al.*, 2022) [8].

A total of 4 subfamilies, 6 genera and 9 species of ants have been recorded in the Karekallu region of Hebbaka, Tumakuru. Most of the species belong to the subfamily Formicinae, followed by other subfamilies. The genus *Camponotus* was the most unique genus identified in the study. Sub family Formicinae was the most diverse group represented by 6 species with most abundant number of ants. The availability of food and nesting habits made these ants highly specific. The extreme dominance was exhibited by the subfamily Formicinae with three genera. The genus *Camponotus* was represented by four species and were frequently distributed everywhere. Due to their peculiar nesting behaviours, they were called as carpenter ants (Chavhan and Pawar, 2011) [4].

As only a smaller population of ants are exposed to the pollutants, they exhibit greater resistance and adaptability to pollutants compared to other invertebrates. Thus, ants exhibit unique activity when exposed to pollutants and their density generally decrease with increasing pollution. Ant's abundance can be correlated with plant species richness, invertebrates and microbial biomass (Andersen and Sparling, 1997) [2].

With all the encroachments on the ants habitat in the Karekallu region of Hebbaka, Tumakuru, the ants showed a persistent existence and continued for generations and years. A rich diversity of ants has been recorded due to numerous nesting sites, availability of food and showed that the area provides suitable habitat for the ants. This study indicated that ants can survive despite of regular habitat changes and the study area serves as a mini model to record the existence of diversified ants species.

Conclusion

The present work on ant diversity in Karekallu region of Hebbaka, Tumakuru clearly represents the richness of ant fauna. The study revealed the presence of 9 species of ants belonging to 4 subfamilies. Even though, Karekallu region was exposed to regular habitat alterations, it showed rich diversity of ant species. The present study provides valuable information on ants diversity and is useful to myrmecologists in preparing management plans.

Acknowledgements

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Conflict of interest

The author has no conflict of interest.

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