



Study on Diversity and Species Richness of Ants in Nagpur Region (M.S.), India

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Abstract:

Ants are the amazing, dominant and successful component of ecosystem, likely to be good indicators of ecosystem. The study of species richness and relative abundance of ant population and its cosmopolitan distribution is very important as they are considerable economic importance. Ants deserve a special place among the arthropod fauna to the study of ecology, including behavior, species richness, social habits and high densities. Ants only constitute the largest chunk of the insects belonging to the endopterygote group. Up to this study 23 species of ants in 18 genera from 5 subfamilies were identified only. These ant species belong to five subfamilies, Formicinae, Myrmicinae, Ponerinae, Dolichoderinae and Pseudomyrmicinae. In Nagpur (MS) region most of the tropical, warm, and temperate genera of ants belong to the subfamilies Crematogaster, Ponerinae and Comptoninae are described. The most frequently observed genus are *Camponotus* and *Crematogaster* followed by the genera *Pheidole* and *Solenopsis*.

Keywords:

Endopteryote, Vidarbha, Ponerinae, Comptoninae.

Introduction:

Ants occupy a great variety of habitats, with about 12,000 known species worldwide. Their biomass exceeds that of all vertebrates combined. Their social organization is orchestrated by intricate chemical communication (Johnson *et al.*, 2013). These invertebrates play significant role in the delivery of ecosystem also participated actively in the interactions that develop quality of soil by physical, chemical and biological processes. Many ant species gives an indication of ecosystem health and functioning while some species are purists reliant on undisturbed ecosystems, others are weeds or even invasive. Their abundance and varied ecological roles make them influential in agricultural ecosystems around the world (Gadagkar *et al.*, 1993). Due to rapid urbanization amid growing concern about biodiversity loss of some ant species and communities are at risk of disappearing even appearing on the IUCN Red List, while some invasive contribute to the extinction of other creatures (Holldobler and Wilson, 1990; Bharti and Alpert, 2007). Improved understanding of ants, how to identify them, where they live, what they do is therefore a vital task in sustainably developing world. Perhaps the study of diversity, relative abundance and species richness of ants in Nagpur region of Maharashtra state shows some ecologically important species.





Nagpur is the metropolitan city in the state of Maharashtra, India located at 21°56'N 76°45'E. In Maharashtra state ant fauna, represent the diverse group of species, including ten known subfamilies like; Aenictinae, Amblyoponinae, Cerapachyinae, Dolichoderinae, Dorylinae, Ectatomminae, Formicinae, Leptanillinae, Myrmicinae, Ponerinae, Proceratiinae and Pseudomyrmecina (Nagaraia and Pawar, 2014). All these species shows different variety of habitats such as leaf litter, trees, soil and dead logs, while tramp species prefer human-modified habitats.

Material and methods:

1. Collection of Ant Species

The ant samples were collected from different sites of Nagpur city to study the diverse group of different species. The samples were collected randomly from the selected area using blunt forceps and collected in wide mouthed jars with killing agent (70% alcohol). The sampling and study of diversity of ants is a continuous survey method.

2. Identification of Ant

The ants were identified up to the genus level using the taxonomic keys by B. Bolton (Holldobler and Wilson, 1990) for the Oriental region. Further each genus was classified into recognisable taxonomic units (RTU's) based on morphological differences. For convenience, these RTU's are referred to as species. The collected ants were identified by using stereo microscope based on identification key (Mathew R.N. and Tiwari, 2000; Bolton B, 1994, 2003).

Results and discussion:

During this study, 23 ant species belonging to 18 genera and 5 subfamilies were recorded (Table 1). Comparison of ant species distribution between the different study sites revealed that ant species richness was highest at garden areas than the industrial areas. Relatively high species rich genera are *Camponotus* and *Crematogaster* followed by the *Pheidole* and *Solenopsis* was recorded at all the study sites with dense vegetation. On the other hand, monoculture plantations showed fewer number of ant species. Similarly, ant species richness was low in around urban houses.

In the present study, Twenty three ant species were collected from the different region at random (Table-1). The species diversity indices in 18 genera representing five subfamilies namely were slightly different showing vegetative, industrial habitats. The diverse ant species belonging the subfamilies Myrmicinae, Formicinae, Ponerinae, Dolichoderinae were highest in general habitat following by Pseudomyrmecinae. The subfamily Formicinae, having seven species is widely distributed in all geographic territory. This data correlate with the present studies of different workers (Chavan and Pawar, 2011). The genus *Camponotus* were record of three species in all the study





area. The Carpenter ants are the polymorphic important insect because of their “Nesting Behaviors” (Kadu *et al.*, 2010) in the tree trunks, agriculture soil increasing porosity and nutritive value. Some of the ants which are reported as an important urban pest related to with human communities are Pharaoh ant *Monomorium pharaonis* and red ant *Solenopsis nana* are found in the study in the most of locality. These are omnivores feeding on wide varieties of food. Usually, they are outdoors and nesting in the soil at the base of trees, rotten wood, decayed tree parts or beneath leaf litter. Many other interesting behaviors are exhibited by ants e.g. some like *solenopsis* show jumping behavior for prey captured, some show aggressive postures etc. Another form of behavior which is elucidated by many ant species like *Formica* (native to Himalaya and all parts of the world) is known as slavery. These ants raid other ant colonies capture their brood and workers, tame and use them for their own household chores.

We conclude that while ant species richness generally increases with increase in vegetation and declines with increase industrialisation and urbanisation in cities. Present study reveals the importance of diverse group of ants as they are an important component of our food chain as important to generate resources and clear debris from earth. It is really unfortunate in present scenario that much emphasis has been laid on those natural resources which are of direct importance to humans and to look for alternative resources in the wake of exhaustion of natural resources. Ants provide many services free of cost which ensure the survival of our race. They are the major soil turners, channels of energy, pollinators, scavengers, biological control agents and to sum up the ants are important component of food chain. More recently they are being used as indicator organisms which provide us cues regarding our deteriorating ecosystems.

Table-1: Partial Checklist of ants species in Nagpur region

S.No.	Sub-Family	Genus	species
1.	Dolichoderinae	Iridomyrmex	I. anceps (Roger,1863)
		Tapinoma	T. indicum(Forel,1895)
2.	Formicinae	Camponotus	C. compressus
			C.wasmanni (Emery, 1893)
			C. paria (Emery, 1889)
		Oecophylla	OecophyllaO.smaragdina(Fabricius,1775)
3.	Myrmicinae	Paratrechina	P. longicornis (Latreille,1802)
		Polyrchis	P. rastella (Latreille,1802)
3.	Myrmicinae	Triglyphothrix	T. obese (Andre, 1887)
		Aphaenogaster	A. rotheyi (Forel,1902)
		Monomorium	M. pharohnis (Forel 1902)
		Myrmicaria	M. brunnea(Saunders 1841)





		Cardiocondyla	C. nuda (Mayr, 1866)
		Crematogaster	C. diffusa (Jerdon, 1851)
			C. aberrans (Forel, 1892)
			C. rogenhoferi (Mayr, 1878)
			C. rothneyi (Mayr, 1878)
		Solenopsis	S. molesta
		Tetramorium	T. Guineese (Fabricus, 1793)
		Pheidologeton	P. diversus (Jerdon, 1851)
4.	Ponerinae	Leptogenys	L. dentilobis (Forel, 1895)
		Pachycondyla sp.	P. rufipes
5	Pseudomyrmicinae	Tetraponera	T. nigra (Jerdon,)

Acknowledgement:

Author kindly acknowledge and thankful to Dr. D. B. Tembhare, Ex. Prof. and head of dept. Zoology and Dr. D. D. Barsagade, Prof. Dept. of Zoology, RTM Univ, Nagpur.

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