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Diversity of ants at Indira Gandhi Garden in Bhiwandi, Maharashtra

Anam S Momin, Vaishali Somani*and Madhuri Pejaver

Zoology Department, B.N.Bandodkar College of Science, Thane, Maharashtra.
*Zoology Department, M.D.College of Arts, Science and Commerce, Parel.

Email: anms17@gmail.com

Abstract

The study was done about diversity of ants at Indira Gandhi Garden in Bhiwandi, as there is no adequate information pertaining on ant diversity of this region. The present study was carried out during Premonsoon, Post monsoon and winter in 2014-2015. The ants were sampled by employing intensive all out search method. The results showed the sampled specimens representing 13 species belonging to 9 genera and four subfamilies. Most diverse subfamily was Formicinae (4 genera with 5 species), followed by Myrmicinae (4 genera with 4 species) and Dolichoderinae (2 genera with 2 species). Pseudomyrmicinae was represented by only 1 genus with 2 species. Among the sample genera which showed the highest number of species representation were Camponotus and Tetraponera with 2 species. The present study has yielded valuable information of ant availability in this region and also reveals that Indira Gandhi Garden has a rich diversity of ants in spite of disturbance from the visitor and regular alteration in habitat of these ants. This study showed that the ants could survive against the odds and this study area served as a mini model to examine the persistence of ant species in the locality.

Keyword: Ants, Bhiwandi, Diversity, Indira Gandhi Garden.

1. Introduction

Hymenoptera is one of the largest orders of insects it comprises the ants, bees, wasps, and sawflies, among others. It is the only order besides the Isoptera (termites) to have evolved complex social systems with division of labour .Hymenopterans also provide important values to the ecosystem and to human beings .As described by Suryanto (1993) ants can be used as biological control of insect pests as they feed on other insects and small invertebrates.

Ants belong to Phylum Arthropoda, class Insecta and order Hymenoptera are considered as a very successful organism. Biodiversity conservation and management are of worldwide concerns. As described by Underwood and Fisher (2006) ants are considered as one of the most diverse, abundant and ecologically significant organisms on earth. Ants, prominent invertebrate group used in assessing ecological responses are one of nine proposed indicators.

Bolton (1995) stated that ants can manipulate and modify their surroundings to suit their needs. Ants play an important role within the terrestrial ecosystems because they have numerous interactions with different plant species, including seed dispersers, leaf- and seed- predators, and in some cases, as pollinators. Few species of ants establish mutualistic relationships with a many other organisms including invertebrates and vertebrates. Most species are carnivorous, omnivorous, predators and some species are pests on economical important crop plants. In India there are about 828 species under 100 genera and 10 subfamilies, Bharti Himender (2016).Ants diversity in India was studied by many workers such as Ali (1991), Gadagkar *et al*. (1993) Sunil Kumar *et al*. (1997), Basu (1997), Chavhan *et al*. (2010), Sivadasan *et al.* (2013), Mahuya Patra Purkait (2016).

Indira Gandhi Garden is an entertainment park which is crowed by the locals and kids. But at present there is not any report on type, extent and effect of disturbance on the fora and fauna of the study area. So this is the first survey of this kind from the study area. Thus the objective of this study was to find

out ant diversity in Indira Gandhi Garden. This study will generate some valuable information about diversity of ant's species. Hence it was thought to undertake the survey of ants in this region.

2. Material and Methods

Study Area:

Bhiwandi city is locatedin Maharashtra, India. Latitude*:* 19.2963. Longitude: 73.0587. Geographical coordinates: 19° 18' 0" North, 73° 4' 0" East. Bhiwandi Nizampur lies in the Konkan coastal lowland. The average elevation is 24 m from MSL (Mean Sea Level). The Average Rainfall is 3224 mm. In Bhiwandi there are many hills, which add to its scenic beauty. The average annual daytime temperature varies from 28^0-32^0 C, daily nighttime temperature is 18^0-25^0 C. The average daytime humidity is 62.5%.

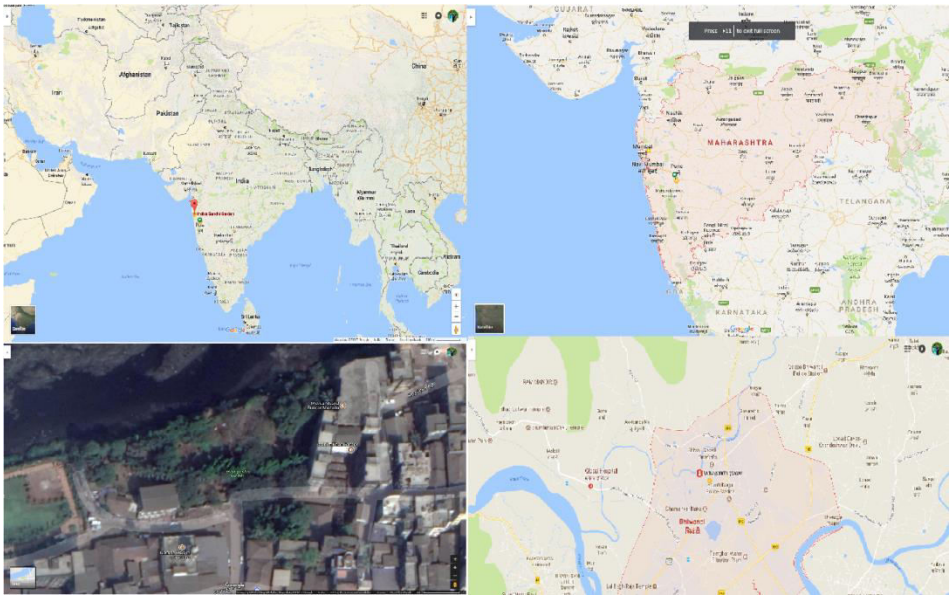

Figure-1 Showing map of study area Indira Gandhi Garden, Bhiwandi, Maharashtra.

Indira Gandhi Garden:

Indira Gandhi Garden is situated in Bhiwandi Latitude: 19.3018165and Longitude: 73.0517401.The garden is especially made for ladies and children. The garden is situated in the heart of city it gets regularly clean and is well maintained by local government. It is a park having special entertainment area for kids. The collection of Ants was carried out using "All out search method" because it is less labor intensive, does not involve time consuming placement of pitfall traps and can be safely used in too wet or with heavy disturbance activities. As stated by Ellison *et al*. (2007) hand collection accumulates species more efficiently than other commonly used pitfall traps or baits.

The collection of ants was carried out during Post-monsoon, winter and Pre-monsoon. Ants collection has not been done during monsoon since the Indira Gandhi garden remain closed due to danger of snakes. Ants were collected in five line transects scattered over the Indira Gandhi Garden. Each of these transects were of different size –Transect1 (82feet), Transect 2(150 feet), Transect 3(200feet), Transect 4(200 feet), Transect5 (190 feet).The captured ant species were brought to the laboratory. In the laboratory, the samples were separated and identified up to Species level using VKSI Binocular microscope 40x-1500x. Identification was done with the help of keys given by Narendra and Kumar (2006). Ant web was used for confirmation of species (https://www.antweb.org). The flora of the study site was identified with help of botanist.

3. Observation

The Indira Gandhi Garden has varieties of plants, and trees they are listed in (Table No.1). In the present study, we reported 13 species of ants belonging to 11 genera representing four subfamilies

namely Myrmicinae, Formicinae, Dolichoderinae and Pseudomyrmicinae.

Table-1 Types of Plants and Trees found in Indira Gandhi Garden.

Family	Genus species	Common name
Annonaceae	Polyalthia longifolia	Indian Mast Tree
Apocynaceae	Calotropis gigantean	Crown flower
Apocynaceae	Catharanthus roseus	Madagascar periwinkle
Arecaceae	Areca spp	Palm tree
Bignoniaceae	Tabebuia argentea	Golden Bell
Cannaceae	Canna indica	Indian shot
Combretaceae	Quisqualis indica	Red jasmine
Euphorbiaceae	Euphobia hirta	Asthma plant
Fabaceae	Peltophorum ferrugineum	Copperpod
Lamiaceae	Ocimum tenuiflorum	Holy Basil/Tulasi
Lythraceae	Punica granatum	Pomegranate
Malvaceae	Hibiscus rosa-sinensis	Hibiscus
Moraceae	Ficus benjamina	Fig
Oleaceae	Jasminum spp	Jasmine
Oleaceae	Jasminum sambac	Mogra
Poaceae.	Bambusa spp.	Bamboo
Rosaceae	Rosa spp	Rose
Rubiaceae	Ixora taiwanensis	Dwarf Miniature Pink

4. Results and Discussion

Occurrence of species:

The ant species that were recorded during all visit in all season were designated as common, whereas species that were recorded once or twice the season were designated as seasonal and the species that were recorded just once visit were designated as occasional.

Seven species were commonly observed at Indira Gandhi Garden those *are Tapinomamelanocephalum,Camponotus compressus,Solenopsis geminate, Monomorium pharaonis, Pheidole watsoni,Paratrechina longicornis,Tetraponera rufonigra.*

Common occurrence of these species in Urban Garden was also reported by Khot *et al*. (2013) in urban garden at Mumbai ,Maharashtra

The results showed the specimens collected represented 13 species belonged to 9 genera and four subfamilies. The most diverse subfamily was Formicinae (4 genera with 5 species), followed by Myrmicinae (4 genera with 4 species) and Dolichoderinae (2 genera with 2 species). The smallest number of species belonging to Pseudomyrmicinae (1 genus with 2 species). Among the collection the genus *Camponotus* and *Tetraponera* showed two ant species.

Paratrechina longicornnis, solenopsis geminate, Camponotus compressus were commonants found in

garden. *Camponotus* because of their nesting behavior they dwell in tree trunk. *Solenopsis* geminata are categorized as Cryptic species functional group by Anderson (2000). These ants are found eating on the food which is droped by the visitors in the garden. *Pharaoh ant Monomorium pharaonis* which is reported as an important urban pest related with human communities is also found in garden are omnivores feeding on wide variety of food. *Anoplolepis gracilipes*, a Formicinae is one of the invasive species was found in study area.

Dominance of Formicinae in terms of diversity was reported at Indira Gandhi Garden. Dominance of Formicinae was earlier recorded by**,** Rajagopal *et al.* (2005) at Virudhunagar District, Tamil nadu and Azhagu *et al.* (2017) at Pachaiyappa's College, Kanchipuram, Tamil Nadu, India and Saranya *et al.* (2013) *at* Periyar Tiger Reserve in South Western Ghats.

Table -2 Ant species collected by All out search method in Indira Gandhi Garden during Post monsoon, winter and Pre-monsoon.

Subfamily	*Genus species*	Post monsoon	Winter	Pre monsoon	Occurrence
Dolichoderinae	*Dolichoderus affinis*	+	+	-	Seasonal
	Tapinoma melanocephalum	+	+	+	Common
Formicinae	*Anoplolepis gracilipes*	-	-	-	Occasional
	Camponotus compressus	-	+	+	Common
	Camponotus irritans	+	+	+	Seasonal
	Lepisiota frauenfeldi	+	-	+	Common
	Paratrechina longicornis	+	+	+	Common
Myrmicinae	*Monomorium pharaonis*	+	+	+	Common
	Solenopsis geminata	+	+	+	Common
	Myrmicaria brunnea	-	-	+	Occasional
	Pheidole watsoni	+	+	+	Common
Pseudomyrmicinae	*Tetraponera rufonigra*	+	+	+	Common
	Tetraponera allaborans	-	-	+	Occasional
Total	13	9	7	11	

The above table indicate monthly data where (+) indicates presence of ants and (-) indicates absence of ants.

Table -3: Percentage contribution of various subfamilies in Indira Gandhi Garden.

Subfamily	Species	Percentage%
Dolichoderinae	1	7.69%
Formicinae	6	46.15%
Myrmicinae	5	38.46%
Pseudomyrmicinae	1	7.69%

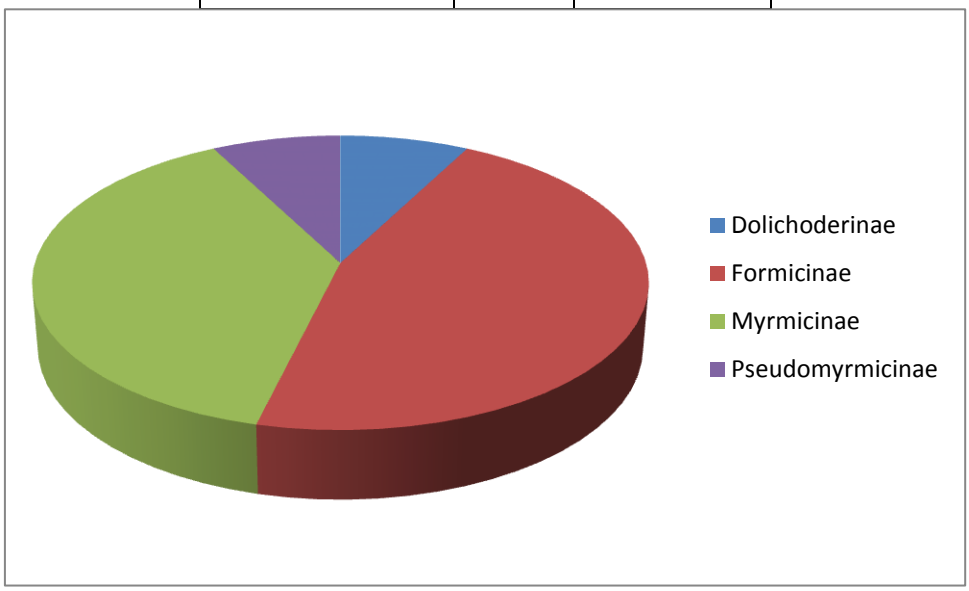

Figure-2-Subfamilies of Ants at Indira Gandhi Garden

Sorensen similarity index was used to analyze extent of similarity between habitats with respect to ant fauna. It is calculated as,

Sorensen similarity coefficient QC ,

QC=2a/(2a+b+c); Where

a=No. of species in sample 1 and 2

b=No. of species in sample1 and not in sample 2

c=No. of species in sample 2 and not in sample 1

Table- 4-Matrix representing Sorensen similarity coefficient Q:-

	Post monsoon	Winter	Pre monsoon
Post monsoon	1		
Winter	0.94	1	
Pre monsoon	0.7	0.8	1

5. Conclusion

The ant *Camponotus* was the most species-rich genera with two species followed by *Myrmicinae* with three species.

Dominance of Formicinae in Indira Gandhi Garden is also reported during this study. Sorensen similarity index indicate that, Highest similarity is observed between-Post monsoon season and winter season.

Ant performs many ecological roles, which are beneficial to a human being, including the suppression of insect populations. This study provides a significant contribution in the field of Ecology. The present study will give valuable information on availability of ants' species in this region.

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