

STUDY ON DIVERSITY AND DISTRIBUTION OF ANTS (HYMENOPTERA: FORMICIDAE) IN URBAN AND PERIURBAN AREAS OF AURANGABAD CITY, MAHARASHTRA, INDIA

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ABSTRACT

The present study deals with the ant community variation in and around Aurangabad city. During the study total 16 species of ants belonging to twelve genera and four subfamilies were reported in eight habitat from urban and peri-urban regions. Abundance of ants was more in peri-urban region as compared to urban region. Subfamily myrmicinae was more dominant as compared to other subfamilies. Seasonal abundance of ants was seen to be more in winter season and less in rainy season.

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KEY WORDS : Abundance, Ants, Aurangabad, Distribution, Diversity, Formicidae, Peri-urban, Urban.

Introduction

Ants belong to single family Formicidae order Hymenoptera and class Insecta. Total 26 extant subfamilies with 428 valid genera and 14,711 valid species. In India 12 subfamilies are represented by 87 genera with 652 species⁴. Recently checklist of ants proposed 828 valid species and subspecies from 100 genera and 10 subfamilies from India⁵. In ecosystem ants are considered important components because they act as ecosystem engineers¹⁵. Ants are found everywhere except Antarctica, Greenland, Iceland. Ants play important role in ecosystem processes such as soil turnover, aeration, nutrient cycling. Ants directly and indirectly affect faunal and floral groups by scavenging, predation, tending homopterous¹⁸. For monitoring environmental changes and habitat diversity, ants play important taxa because numerous species have habitat preferences and

response quickly to disturbance to their environment¹. In urban ecosystem there can be constant local human activity, commercial centers, and industry¹⁶.

Urban ecosystem recognized areas under profound and local human activity, being composed of commercial centre, industrial and human habitation. In urbanization process urban ecosystem are created. Rapid urbanization, natural areas under the urban zones will play critical role in safeguarding biodiversity¹⁶. In all ecosystem ants play integral role it include urban environments¹⁸. Ants act as bioindicators in land management practices and they are sensitive to habitat variation quickly respond in changing habitat quality and are easy to collect². Peri-urban areas are the transition zone or interaction zone where urban and rural activities are juxtaposed and landscape features are subject to rapid modifications induced by

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taxonomic composition of ant species were studied from eight different habitats like North West Urban (NW-U), North West Periurban (NW-PU), South West Urban (SW-U), South West Periurban (SW-PU), South East Urban (SE-U), South East Periurban (SE-PU), North East Urban (NE-U), North East Periurban (NE-PU). During the present study six genera of Formicidae are represented by six genera and seven species. Formicidae subfamily consists of four genera with six species. Ponera subfamily consists of one genus with two species and Dolichoderinae subfamily consists of only one species (Table-1). Seasonal abundance of ants in eight different habitats showed more diversity in winter season from South West Periurban region followed by summer season from South East Periurban region followed by rainy season from North West Periurban region and less in winter season from South West Periurban region followed by winter season from North East urban region (Table-2). In eight different habitats ant abundance is more in South East Periurban region and less in South East Urban region (Table-3).

Discussion

The present study revealed that there are 46 species of ants in 11 genera representing 4 subfamilies. Out of four subfamilies Myrmecinae is most abundant having 7 species. Myrmecinae subfamily is widely distributed in all over the world. Crematogaster, Pheidole, Solenopsis are the main genera of these subfamilies. Solenopsis geminata are mostly found in disturbed ecosystems²⁵. In Formicidae subfamily genus Camponotus was recorded by three species. Camponotus ant also called carpenter ant because of their nesting behavior. They also frequently found everywhere¹³. Oecophylla smaragdina and Polyrhachis dives are arboreal ant species whereas Polyrhachis are found in undisturbed areas¹⁷. Ghost ant Tapinoma melanocephalum nest in to building and create nuisances¹⁹. Arboreal ant Polyrhachis, Camponotus, Crematogaster established there colony on the trees²³. Crematogaster species are classified as scavengers²⁷ and they also produced phenolic compounds such as 3-benzylphenol from their mandibular gland and used for defense¹².

Urban areas in Brazil city species Tapinoma melanocephalum was found to be most dominant and distributed throughout the world²⁵. In urban park

human activities developed, much of their growth is located in such areas. Many Periurban activities move outdoors as the city grows. Other activities and land uses become incorporated within the urban fabric. Periurban areas are mosaics of temporarily new residents and activities mingled with long-standing land uses, including farms, villages, pastures and forest patches¹⁴. Considering the impact of various anthropogenic activities, there are numbers of studies on ants and subfamilies. Diversity and distribution of ant species was studied in and around Amravati city with three different habitats such as forest, grassland and human habitat. In forest and human habitat similarity index of ant species was high¹³. Ant species richness and abundance was reported in urban park based on protected natural areas within park such as mosaic, scrub, herbaceous and forest¹¹. The present study aims to provide the data for diversity of ant species and characteristics to cite in urban and periurban regions of distribution and abundance of ants in Urban and Periurban region.

Material and Methods

Aurangabad city located mainly in Godavari Basin and its some part towards North-West Tapi river basin. Latitude 19° 53' and longitude 75° 23' of Aurangabad. Total area of Aurangabad district is 10,100 sq.km. Out of which 141.1 sq.km is urban area and 99,287 sq.km is rural area. Aurangabad city experiences three distinct seasons that is rainy season from June to September, winter season from October to February and summer season from March to May.

The average rainfall of Aurangabad district is 734mm and minimum temperature is 5.6 °C and maximum temperature is 45.9°C²⁸.

Sampling of ants was done from eight different habitats of urban and periurban regions in and around Aurangabad city. Ants were sampled during the period of June 2015 to May 2016. Ant collection was done by using three different methods such as pitfall trap, scented trap and handpick method. Identification of ant was done by using stereo zoom microscope based on identification key²⁸.

Result

The studies on diversity of ants in and around Aurangabad city reveals that there are four subfamilies twelve genera and sixteen species in urban and periurban areas of Aurangabad city.

TABLE- 1: Taxonomic composition of ants species at different habitats of Aurangabad city (M.S.)

S.No.	Taxa	Site							
		NW-U	NW-PU	SW-U	SW-PU	SE-U	SE-PU	NE-U	NE-PU
1	<i>Cremagaster perelegans</i>	+	+	+	+	+	+	+	+
2	<i>Crematogaster subnuda</i>	+	+	+	+	+	+	+	+
3	<i>Meranoplus bicolor</i>	-	+	-	+	-	+	-	+
4	<i>Monomorium destructor</i>	+	+	+	+	+	+	+	+
5	<i>Solenopsis geminata</i>	+	+	+	+	+	+	+	+
6	<i>Pheidole spathifera</i>	+	+	+	+	+	+	+	+
7	<i>Tetramorium walshi</i>	-	+	-	+	-	+	-	+
8	<i>Paratrechina longicornis</i>	+	+	+	+	+	+	+	+
9	<i>Camponotus compressus</i>	+	+	+	+	+	+	+	+
10	<i>Camponotus sericeus</i>	-	+	-	+	-	+	-	+
11	<i>Oecophylla smaragdina</i>	+	+	+	+	+	+	+	+
12	<i>Camponotus anguisticollis</i>	+	+	+	+	+	+	+	+
13	<i>Polyrhachis dives</i>	-	+	-	+	-	+	-	+
14	<i>Tapinoma melanocephalum</i>	+	+	+	+	+	+	+	+
15	<i>Leptogenys chinensis</i>	-	+	-	+	-	+	-	+
16	<i>Leptogenus processionalis</i>	-	+	-	+	-	+	-	+

TABLE- 2: Seasonal abundance of ants population at different habitats of Aurangabad city (M.S)

Sr. No	Sampling sit	Season		
		Rainy	Winter	Summer
1	NW-U	607.0	724.8	482.8
2	NW-PU	822.0	765.7	578.5
3	SW-U	408.7	657.7	614.5
4	SW-PU	599.5	853.1	741.6
5	SE-U	543.8	758.8	680.6
6	SE-PU	743.4	815.0	849.4
7	NE-U	692.5	600.4	494.5
8	NE-PU	785.6	674.9	564.2

of 24 protected natural areas were selected and studied the factors which had influence on ant community composition²⁰. During present study there were greater disturbances reported due to civilization which affect the ant community of urban region. In Aurangabad district around Gautala Autramghat sanctuary, Seventeen ant species belonging to thirteen genera and six subfamilies were reported¹⁰. In Warsaw city Poland, four type of urban habitat such as bordering streets, housing estate, park, patches of urban woodland are reported. Ant species diversity was seen more in parks and wooded areas and lowest in green areas and bordering streets²⁶. In present study Urban region reported less ant abundance as compared to Peri-urban region due to possibility based up on anthropogenic activity,⁸ reported in area of Mediterranean basin impact of ant diversity due to anthropogenic activity. Worker studied ant

response in highly disturbed and less disturbed areas in and around Bangalore city²³.

During present study seasonal abundance of ant population reported more in winter season followed by summer and rainy season. Accordingly Ant species diversity reported more in rainy season and less in dry season in Brazil city¹². Species number was highest during the dry season (December to March) and lowest during late wet season (October and November)³. Ant species richness was more in summer season as compared to winter season⁶. Number of individuals of ants was highest in spring and summer and lowest during winter²¹. The present study shows that periurban area was rich in abundance of ant community because in periurban region there is less anthropogenic activity observed as compared to urban region.

TABLE - 3 : Genus wise ants abundance at different habitats of Aurangabad city (M.S.)

Genera	No.of species	NW-U	SW-U	SW-PU	SE-U	SE-PU	NE-U	NE-PU	Total
		No.of ind.	No.of ind.	No.of ind.	No.of ind.	No.of ind.	No.of ind.	No.of ind.	
<i>Cremagaster</i>	2	388.2	403.9	480.33	366.3	490.3	401.5	449.7	3502.7
<i>Meranoplus</i>	1	-	-	66.86	-	40.1	-	68.03	242.1
<i>Monomorium</i>	1	170.9	186.5	188.5	168.5	197.6	187.2	196.3	1481
<i>Tetramorium</i>	1	-	-	25.1	-	28.2	-	26.3	91.7
<i>Solenopsis</i>	1	184.9	196.8	247.2	225.4	237.4	189.9	218.7	1745
<i>Pheidole</i>	1	140.9	167	181.7	183.5	188.3	171.2	199.8	1392
<i>Paratrechina</i>	1	178.6	161.2	189.6	157.3	216.1	198.1	184.9	1475
<i>Oecophylla</i>	1	191.9	170.8	178.2	161.7	215.7	294.2	213.7	1602
<i>Camponotus</i>	3	295.8	288.9	362.5	300.6	345.3	303.9	345.3	2589
<i>Polyrhachis</i>	1	-	-	20	-	10.05	-	15.01	66.1
<i>Tapinoma</i>	1	257.4	206.7	163.8	155.5	215.2	193.4	217.7	1624
<i>Leptogenys</i>	2	-	-	57.09	-	42.48	-	39.89	182.9
<i>Total</i>	16	1808.6	1781.8	2160.8	1718.8	2226.7	1939.4	2175.3	15994

Note: NW-U: Northwest urban, NW-PU: Northwest periurban, SW-U: Southwest urban, SW-PU: Southwest periurban, SE-U: Southeast urban, SE-PU: Southeast periurban, NE-U: North east urban, NE-PU: Northeast periurban.

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