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Diversity and Density of Ants from Undisturbed and Domesticated Sites of Meenampatti, Sivakasi Taluk

C. Sundareswari¹, P. Anusuyadevi², S. P. Sevarkodiyone³

^{1,2}Ph.D Research Scholar, ³Post-Graduate and Research Department of Zoology, Ayya Nadar Janaki Ammal College (Autonomous), Sivakasi, Tamil Nadu-626124, India.

Abstract: The present swot deals with the diversity and density of ants in undisturbed and domesticated sites of Meenampatti, Sivakasi Taluk, Tamil Nadu, India. Ants are most successful social insects, live in almost all types of habitats. Ant diversity is associated with structural habitat diversity, Plant diversity, land use and soil type or structure. Ants are considered useful for bio monitoring studies as they can respond rapidly to environmental changes. From undisturbed and domesticated sites, 12 and 10 ant species were collected respectively. Ant species richness, Shannon-Wiener index, Simpson's index and evenness index for undisturbed site was higher than domesticated site. Alpha diversity value for undisturbed site was lower than domesticated site. Relative abundance of the subfamily Myrmicinae was higher in undisturbed and domesticated site. Correlation between ant species with rainfall and temperature was positive.

Keywords: Diversity, density, ants, insects, undisturbed, domesticated.

I. INTRODUCTION

Biodiversity is the variability among living organisms, including genetic and structural differences between individual and within and between individual and within and between species. Insects are the most diversified form of animals. They are of beetles, flies, termites, moths, butterflies, bees, ants, grasshoppers, crickets, caddis flies, social wasps. Ant diversity is associated with structural habitat diversity [1]. Plant diversity [2], land use [2], and soil type or structure [3]. Ants are most successful social insects, live in almost all types of habitats. They can withstand various ecological hazards adapting with the situations. Being tiny creatures they have to face all types of anthropogenic activities. The objective of the study are to, conduct a survey of ant species diversity in *Azadirachta indica* (Neem tree) in domesticated and undisturbed sites, know the density of ant species in *Azadirachta indica* (Neem tree) in domesticated and undisturbed sites, assess the population fluctuations of ants against various ambient factors.

II. MATERIALS AND METHODS

A. Study area

The study was carried out in domesticated and undisturbed site of Meenampatti, Sivakasi Taluk from July 2016 to March 2017. The study area lies between latitudes 9° 27' 2.6424" from north and longitudes of 77° 48' 26.0496" from east.

B. Sample collection

Ants samples were taken during morning (8-9 am) and evening (4-5 pm) by means of all-out search method and trapping method.

C. Data analysis

Species richness was calculated by means of Menhinink's index, Species diversity was analysed by using Simpson index, Relative abundance was calculated by using Michael P index, Species dominance was calculated by using Alpha diversity, were calculated using software PAST.

III. RESULTS

In the present study totally 13 species of ants belonging to 4 subfamilies were recorded (Fig 1). Among these 4 subfamilies the subfamily Dolichoderinae was represented by only 1 species, the subfamily Formicinae was represented by 4 species, the subfamily Myrmicinae was represented by 7 species and the subfamily Pseudomyrmicinae was represented by only 1 species of ant. A total 12 and 10 species were collected from undisturbed and domesticated sites respectively (Table 1, 2). Out of 13 species 9 species were commonly present in both sites. Ant species richness was high in undisturbed site (0.54) than domesticated site (0.53). Simpson's

diversity index is high in undisturbed site (0.85) than domesticated site (0.81). Relative abundance of subfamily Myrmicinae was high in both Domesticated (60%) and undisturbed site (58.34%). The Fisher alpha is found to be high in domesticated site (1.267) and low in undisturbed site (1.196) (Table 3).

IV. DISCUSSION

Ants can be considered as a surrogate indicator of biodiversity [4]. Ants are using the same anthropogenic resources to create large populations that have high impact on their ecosystem [5]. Ants show tremendous diversity, numerical and biomass dominance in almost every habitat throughout the world. To understand the diversity and the stability of an ecosystem, it becomes important to study the species composition changes that occur due to variations in microclimate and habitat. All over the world there are about 22 subfamilies of ants are present, Indian ant fauna diversity includes 12 subfamilies. Of these 12 subfamilies, 4 subfamilies were recorded in domesticated and undisturbed sites of the study area (Meenampatti, Sivakasi Taluk) during the study period (July 2016 – March 2017). Rajagopal et al., (2005) recorded 25 ant species in some selected localities of Virudhunagar district, they reported that more number of ant species were in river line area and low ant species diversity was in industrial area this due to availability of vegetation is more in river line area than industrial area and due to pollution in industrial area the ant species richness is low. Dolichoderinae, Formicinae, Myrmicinae, Pseudomyrmecinae are the four subfamilies reported in the study sites of Meenampatti, Sivakasi Taluk. Except domesticated site other three sites have all four subfamilies. The subfamily Pseudomyrmecinae is absent in domesticated site (Table 1, 2).

Of these 13 species of ants, 8 species were present to pilgrimage site, 11 species were noticed in industrial site, 10 species were found in domesticated site and 12 species were belonging to undisturbed site. Out of these 13 ant species, *Solenopsis xyloni*, *Solenopsis invicta* of Myrmicinae and *Tetraoponera rufonigra* of Pseudomyrmecinae were abundantly present in all four different sites of the study area (Meenampatti, Sivakasi Taluk). This may be due to presence of suitable microhabitats for the above mentioned ant species. Ant species richness was high in undisturbed site than domesticated site. This may be due to increase in vegetation in undisturbed site and increase in disturbance in domesticated site. Sunilkumar et al., (1997) reported that, ant species richness generally increased with increase in vegetation. Ponnuraj and Sevarkodiyone (2004) reported ant species richness was high in *Azadirachta indica* due to the facultative association between ant species and *Azadirachta indica* in Duraisampuram at Rajapalayam. Since these ants are considered as insectivorous and pollinators (Table 3).

Simpson's diversity index is high in undisturbed site than domesticated site. The results were coincide with previous observations made by Patkar and Chavan (2014) in undisturbed and disturbed sites of Great Indian Bustard Wildlife Sanctuary and reported that Simpson's and Shannon indices of ant species diversity were high in undisturbed site than disturbed site of since habitat destruction and increase in disturbance by various anthropogenic activities. Relative abundance of ant Subfamilies Myrmicinae was maximum in all different sites of the study area (Meenampatti, Sivakasi Taluk) this was because of these ants shows worldwide distribution, presence of rich source of availability of food. Relative abundance of these Myrmicinae species in undisturbed site were slightly lower than domesticated site this due to presence of predators like birds, spiders etc., in undisturbed site. The Fisher alpha is found to be high in domesticated site and low in undisturbed site. This is because of the availability of food source, availability of more plantation than domesticated site (Table 3).

V. CONCLUSION

Biodiversity deals with the life of different living organisms on earth, their homes and habitats and the structure that support them. An effort has been done to study the ant species diversity and density in domesticated and undisturbed sites of the study area (Meenampatti, Sivakasi Taluk) by means of all out search method and pitfall trap method and the data attained were subjected to various diversity indices and the results were discussed. The study revealed a total of 13 ant species belonging to 4 subfamilies. In domesticated site 10 ant species belonging to 3 subfamilies and in undisturbed site 12 species belonging to 4 subfamilies were reported in the study area during the study period of July 2016 – March 2017. Ant species richness and species diversity were found to be high in undisturbed site, Alpha diversity was high in domesticated site, the subfamily Myrmicinae shows high relative abundance. The significance of this kind of biodiversity study is to boosts ecosystem productivity where each species, no matter how small, all have an important role to play.

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TABLE I
ANT SPECIES DIVERSITY IN DOMESTICATED SITE

S. No	Ant	Sub Family
1	Tapinoma sp.	Dolichoderinae
2	Camponotus compressus	Formicinae
3	Camponotus crispulus	
4	Polyrhachis sp.	
5	Crematogaster sp.,	Myrmicinae
6	Messor sp.	
7	Monomorium minimum	
8	Solenopsis invicta	
9	Solenopsis geminata	
10	Solenopsis xyloni	
11	Tetramorium sp.	
12	Tetraponera rufonigra	Pseudomyrmicane

TABLE II
ANT SPECIES DIVERSITY IN UNDISTURBED SITE

S. No	Ant	Sub Family
1	Tapinoma sp.	Dolichoderinae
2	Camponotus compressus	Formicinae
3	Camponotus crispulus	
4	Componotus sp.	
5	Crematogaster sp.,	Myrmicinae
6	Messor sp.	
7	Monomorium minimum	
8	Solenopsis invicta	
9	Solenopsis xyloni	
10	Tetramorium sp.	

TABLE 3
SPECIES RICHNESS, SIMPSON'S DIVERSITY INDEX AND ALPHA DIVERSITY INDEX OF ANTS FROM UNDISTURBED AND DOMESTICATED SITES OF MEENAMPATTI (SIVAKASI TALUK)

	Study site	
	Undisturbed site	Domesticated site
Species richness (Menhinick's index)	0.54	0.53
Diversity index (Simpson's index)	0.85	0.81
Alpha diversity	1.196	1.267



Tapinoma sp



Camponotus compressus



Camponotus crispulus



Camponotus sp



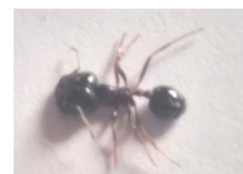
Polyrhachis sp



Tetraopnera rufonigra



Crematogaster sp



Messor sp



Monomorium minimum



Solenopsis geminata



Solenopsis invicta



Solenopsis xyloni



Tetramorium sp

Fig. 1 Diversity of ants recorded in the study area (Meenampatti, Sivakasi Taluk) during the study period (July 2016 – March 2017)



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