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Research Article

Diversity and Distribution of Ants (Hymenoptera: Formicidae) Nests in the Anjac Campus, Sivakasi, Tamil Nadu

Abstract

The present communication deals with diversity and nesting habitat of ants in ANJAC, Campus, Sivakasi. In the present investigation, we identified ten species belonging to three subfamilies inside the campus. Richness and evenness were high in dry season while comparing to the wet season. In the study nature of nest, some ant's nests were in the soil, some nests in cracks and concrete, while some nests on trees in this investigation.

Introduction

Ants (Hymenoptera: Formicidae) are a conspicuous and important group of terrestrial arthropods [1,2]. They perform a variety of ecosystem services [3], invade novel habitats [4,5], form nomadic armies [6], and have been used as bioindicators of ecosystems [7]. Ant colonies most strongly influence the environment immediately around nest entrances, through the cycling of soil, competitive exclusion, seed dispersal, and mutualisms with plant predators [1,8,9]. Ants are typically regarded as sessile organisms, rooted into their nests as plants are rooted into the ground [10,11].

Materials and Methods

Study site

This study was carried out at the Ayya Nadar Janaki Ammal College Campus (9.47° N, 77.75° E), Sivakasi, Virudhunagar District, Tamil Nadu.

Survey and ant identification

Ants were surveyed in during the dry seasons (March–May, 2017) and rainy (October– December, 2017). The survey was carried out using pitfall traps and all– out search method. Visits have been around the campus, collections of specimens were done. Photos have been taken for the study of nature of nest. Some specimens have been collected from the nests preserved in 70 % ethyl alcohol. Ant specimens were identified to family, genus and species using the identification guide of Hölldobler and Wilson (1990) and Bolton (2002).

Data analysis

Ant species richness, mean abundance Shannon`s diversity index and evenness were calculated using the PAST program for Windows version 8.0.

Result and Discussion

Ant diversity on the campus of ANJA College, Sivakasi has been analyzed in this study. During this study, a total of 348 sampled specimens were captured. Totally ten species of ants belonging to five genera were recorded. Collected ants from college campus were mostly represented by three sub–families viz., Myrmicinae, Formicinae and Pseudomyrmicinae. These are as follows, the Myrmicinae were represented by four species and two genera. The Formicinae were represented by five species and two genera. The Pseudomyrmicinae represented by only one species and one genus. The most speciose genus of these three subfamilies was Camponotus with four species (Table 1).

Species diversity and evenness

The species diversity indices like Simpson's Index of diversity (SID) and Shannon–Wiener index (H) in respect during different dry and wet seasons are presented in table 2. Relatively high diversity in species composition was noticed during October– December, 2017(SID = 0.103; H = 3.275) than during March – May (SID = 0.109; H = 3.248). The evenness (EH) values in respect of seasons, when compared, it became apparent that different species were abundant and occurred almost in similar during March – May (EH=0.95) and October – December (EH=0.96) indicated that the species structure at both the seasons was also found overlapping.

Tetraponera rufonigra and *Oecophylla smardina* species build their nests in trees (arboreal nests). *Monomorium minimum* and *Camponotus* Sp1 prefer mostly crackers and concretes and other species prefer mostly soil for build their nests (Table 3). Soil forms the habitat for many microorganisms. It also forms the habitat and housing place for ants. *Camponotus, Monomorium* and *Solenopsis* construct their nest in the soil and concrete walls. Most of the nests are like the mound in nature. It is found genus *Camponotus* Mayr has made a raised mound like structure and diligently plaster and smoothens the surface by using their own salivary secretions, while some species of *Camponotus* Mayr has constructed a nest in garden *Monomorium* Mayr also have constructed a nest in the soil like tunnels, cones etc. [12].

Conclusion

When ants found a suitable environment, they get attracted toward that location avoiding disturbed area. They have exhibited well social behavior and caste system i.e. fertile female, the male and worker. They have lived in groups or colony within the nest. Some ants spend most of the time in nest. They also ensure the growth and survival of the colony. The nested form the safe place for maintaining the offspring and also for the storage of food [13] in some nest lot of chambers have been constructed for certain purpose like for brood eggs, larvae, pupae, food storage etc.,

Acknowledgement

References

1. Hölldobler B, Wilson EO (1990) The Ants. Cambridge: Harvard University Press. **Link:** https://goo.gl/CP3rxX

2. Lach L, Parr CL, Abbott KL (2010) Ant ecology. Oxford: Oxford University Press. **Link:** https://goo.gl/wrG8vL

3. Toro ID, Ribbons R, Pelini S (2012) The little things that run the world revisited: a review of ant–mediated ecosystem services and disservices (Hymenoptera: Formicidae). Myrmecological News 17: 133–146. **Link:** https://goo.gl/v1KqXa

4. Tschinkel WR (2006). The fire ants. Cambridge: Harvard University Press. **Link:** https://goo.gl/y1uuz3

5. Roeder KA, Kaspari M (2017) From cryptic herbivore to predator: stable isotopes reveal consistent variability in trophic levels in an ant population. Ecology 98: 297–303. **Link:** https://goo.gl/Bcsthg

6. Kaspari M, Odonnell S (2003) High rates of army ant raids in the Neotropics and implications for ant colony and community structure. Evolutionary Ecology Research 5: 933–939. **Link:** https://goo.gl/dSqmxY

7. Andersen AN, Majer JD (2004) Ants show the way down under: invertebrates as bioindicators in land management. Frontiers in Ecology and the Environment 2: 291–298. **Link:** https://goo.gl/szRhWn

8. Andersen AN (1992) Regulation of "momentary" diversity by dominant species in exceptionally rich ant communities of the Australian seasonal tropics. Am Nat 140: 401-420. **Link:** https://goo.gl/ryfBUk

9. Schultz TR, McGlynn TP (2000) The interaction of ants with other organisms. In: Agosti D, Majer JD, Alonso L, Schultz TR (eds), Ants: standard methods for measuring and monitoring biodiversity. Smithsonian Institution Press. 35-44. **Link:** https://goo.gl/oaDvpL

10. Andersen AN (1991) Parallels between ants and plants: implications for community ecology. In: Huxley CR, Cutler DF (eds), Ant-Plant interactions. Oxford University Press. 539-553. **Link:** https://goo.gl/rET4cG

11. Andersen AN (1995) A classification of Australian ant communities based on functional groups which parallel plant life-forms in relation to stress and disturbance. Journal of Biogeography 22: 15- 29. **Link:** https://goo.gl/NGdWA7

12. John P, Rabeesh TP, Karmaly KA (2015) Ants (Hymenoptera: Formicidae) Nest and Habitat. International Journal of Innovative Science, Engineering & Technology 2: 1187-1194. **Link:** https://goo.gl/HgZnvi

13. Narendra A, MS Kumar (2006) On a trail with Ants, A Handbook of the Ants of The Peninsular India. **Link:** https://goo.gl/nLN1Wt

14. Barry B (1994) Identification guide to the ant genera of the world. USA: Harvard University Press. **Link:** https://goo.gl/U9DYRk

Table 1: The list of ant fauna recorded in Campus.

S. No	Species	Subfamily
1	*Solenopsis invicta*	Myrmicinae
2	*Solenopsis xyloni*	
3	*Monomoriumm minimum*	
4	*Monomorium pharaonis*	
5	*Camponotus compressus*	Formicinae
6	*Camponotus* Sp1	
7	*Camponotus* Sp2	
8	*Camponotus* Sp3	
9	*Oecophylla smardina*	
10	*Tetraponera rufonigra*	Pseudomymecinae

Table 2: Species richness, diversity and evenness in ant community of ANJAC, Campus.

Seasons	Species Richness	Diversity indices		Evenness (E_H)
		Simpson's diversity index (SID)	Shannon diversity index (H)	
Dry (March- May, 2017)	1.538	0.109	3.248	0.9513
Wet (October-December, 2017)	1.594	0.103	3.275	0.9677

Table 3: List of ant fauna and nesting habitat of ants in ANJAC, Campus.

S. No	Species	Nesting habitat
1	*Solenopsis invicta*	Soil
2	*Solenopsis xyloni*	Soil
3	*Monomoriumm minimum*	Soil, Concrete
4	*Tetraponera rufonigra*	Bark of trees
5	*Camponotus compressus*	Soil
6	*Camponotus* Sp1	Soil, Cracks in wall
7	*Camponotus* Sp2	Soil
8	*Camponotus* Sp3	Soil
9	*Oecophylla smardina*	Leaves