



## Seasonal pattern and Species composition of ants “Hymenoptera: Formicidae” in and around Serampore, Hoogly, West Bengal

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### ABSTRACT

Ants (Hymenoptera: Formicidae) are abundant insects that are essential in the functioning of an ecosystem. They are one of the most ecologically significant and diverse organisms in the world. A total of 16 ant species belonging to 12 genera were recorded from various ecological habitats (Such as field side, road side, town side, and gardens side) from October 2015 to March 2016 at Serampore, Hooghly, West Bengal, India. There were 5 species of 4 genera in both subfamily Formicinae and Myrmicinae, 4 species in 2 genera of subfamily Ponerinae and 1 species of each subfamily Dolichoderinae and Pseudomyrmicinae respectively. The specie number was very low in December and January.

**Keywords:** Seasonal pattern; Species composition; ants

**HOW TO CITE THIS ARTICLE:** Hiroj Kumar Saha\*, Susmita Das: Seasonal pattern and Species composition of ants (Hymenoptera: Formicidae) in and around Serampore, Hoogly, West Bengal, Entomol Appl Sci Lett, 2020, 7(4): 83-88.

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**Received:** 04/09/2020

**Accepted:** 12/12/2020

### INTRODUCTION

Among arthropods, ants (Hymenoptera: Formicidae) are ecologically dominant in most terrestrial environments. They are major components of ecosystems as they constitute an abundant part of the animal biomass and act as ecosystem engineers [1, 2]. They are present at almost all the trophic levels of the food cycle [3, 4], making them indispensable for the proper functioning of most terrestrial ecosystems and the resulting ecosystem services [5]. They are a dominant faunal group in most terrestrial ecosystems and their role is sensitive to mining and agriculture [6-9]; species richness at selected localities [10]; diverse ecological roles, including seed dispersal, nutrient cycling and population regulation of other insects [11, 12]; ecologically significant organisms on earth [13, 14]; community responses to ecological disturbance [15, 16]; important ecological indicator [17, 18]; important function of the animal biomass in terrestrial ecosystems and respond to stress on a much inner scale compared to vertebrates [19]; ecological functions such as pollination, nutrient cycling,

soil turnover, scavenging and predation,- are also responsible for dispersal of numerous plant species [20]; seasonal activity between non-native and native ants in subtropical forest of Okinawa Island, Japan [21]; ecological functioning and species diversity of habitats [22]; role in primary vegetation succession [23]; specific distributions in Indian states [24]; sensitive to changes in the environment [25-28]. A few studies have focused on the seasonal pattern of ants in India [29-31]. To our knowledge no work on the seasonal pattern of ant activity has been conducted in this region. Thus, this study aimed to understand the seasonality of ants in terms of species composition and distribution in different months of ant species in and around Serampore, Hoogly, West Bengal, India. This study will generate some valuable information about the distribution and richness of ant species.

### MATERIAL AND METHOD

#### Study area and sampling

In India, ants occupy various habitats e.g. dead logs, soil, trees, and leaf litter while tramp

species prefer human-modified habitats. Moreover, ants are present at almost all the trophic levels of the food web [3, 32]. The ants were collected from various ecological habitats (Such as field side, road side, town side and gardens side) in and around Serampore, (22.7505° N, and 88.3406° E) is situated in the district Hooghly in West Bengal. The samples were surveyed from October 2015 to March 2016 twice a month at fifteen-day intervals from morning 8AM to 10AM and afternoon 3PM to 5PM during good weather periods (no strong wind and heavy rain). Ants, in general, are very

easy to sample. Ant fauna were sampled using hand collections with forceps or nets and bush beating. The collected ants were kept in plastic vials of 6 cm diameter x 8 cm depth. All the vials were labelled properly by marking the details of the locality, date of collection and information's about the species habitat, whether it was arboreal or ground-dwelling. All the specimens were brought to the laboratory for identification. The specimens were captured by a camera (Nikon S6800). The list of ant species is shown in **Figure A**. All identifications were confirmed from the Zoological Survey of India, Kolkata.



**Figure A.** The list of ant species in the study: 1, *P. longicornis*; 2, *C. compressus*; 3, *C. crassisquamis*; 4, *A. gracilipes*; 5, *O. smaragdina*; 6, *P. affinis*; 7, *C. mogdliani*; 8, *C. rogenhoferi*; 9, *S. geminata*; 10, *P. smythiesi*; 11, *D. rugosum*; 12, *P. sulcata*; 13, *P. rufipes*; 14, *P. melaneria*; 15, *T. melanocephalum*; and 16, *T. rufonigra*.

## RESULTS AND DISCUSSION

The most recent species list includes approximately 828 species and subspecies of ants belonging to 100 genera have been listed from India [24]. Mathew & Tiwari [33] reported

163 species in 52 genera, from Meghalaya. They help decompose animal, plant and organic matter remains by fragmentation of organic matters and also propagating the production of decomposers in their nests, and facilitate

microbial activities. Urban ecosystems are complex socio-ecological systems with significant functions. Urban areas increase as residential, commercial, and industrial areas associated with the decrease of the natural environment. Urbanization is an important cause of habitat degradation, habitat loss, and fragmentation. During this study period, month-wise distribution of ant species ('+' = present, '-' = absent) is shown in (Table 1). A total of 16 ant species i.e. *Camponotus compressus* Fab., *Anoplolepis gracilipes* Smith, *Camponotus crassisquamis* Forel, *Oecophylla smaragdina* Fabricius, *Paratrechina longicornis* Latreille,

*Phidologiton affinis* Jerdon, *Crematogaster mogdiliani* Emery, *Crematogaster rogenhoferi* Mayr, *Solenopsis geminata* Fabricius, *Pheidole smythiesii* Forel, *Diacamma rugosum* Le Guillou, *Pachycondyla melaneria* Emery, *Pachycondyla rufipes* Jerdon, *Pachycondyla sulcata* Frane, *Tapinoma melanocephalum* Fabricius and *Tetraponera rufonigra* Jerdon were recorded during the study period. There were 5 species of 4 genera in both subfamily Formicinae and Myrmicinae, 4 species in 2 genera of subfamily Ponerinae and 1 species of subfamily Dolichoderinae and Pseudomyrmecinae respectively.

**Table 1:** Month-wise distribution of ant species ('+' = present, '-' = absent) at Serampore in Hoogly during the study period.

Sub-Family	Species name	Month					
		Oct	Nov	Dec	Jan	Feb	Mar
Formicinae	<i>A. gracilipes</i>	+	+	-	-	+	+
	<i>C. compressus</i>	+	+	-	-	+	+
	<i>C. crassisquamis</i>	+	+	-	-	+	+
	<i>O. smaragdina</i>	+	+	-	-	+	+
	<i>P. longicornis</i>	+	+	+	+	+	+
Myrmicinae	<i>C. mogdiliani</i>	+	+	-	-	+	+
	<i>C. rogenhoferi</i>	+	+	-	-	+	+
	<i>P. affinis</i>	+	+	-	-	+	+
	<i>P. smythiesi</i>	+	+	-	-	+	+
	<i>S. geminata</i>	+	+	+	+	+	+
Ponerinae	<i>D. rugosum.</i>	+	+	-	-	+	+
	<i>P. sulcata</i>	+	+	+	-	+	+
	<i>P. rufipes</i>	+	+	-	-	+	+
	<i>P. melaneria</i>	+	+	-	-	+	+
Dolichoderinae	<i>T. melanocephalum</i>	+	+	+	-	+	+
Pseudomyrmecinae	<i>T. rufonigra</i>	+	+	-	-	+	+

Ants are one of the most ecologically significant and diverse organisms in the world. They are very important group of species among the whole range of biodiversity found all over the world. According to the study of Kumar *et al.* [10], the richness of ant species generally increases with increasing vegetation. Palanichamy *et al.* [34] stated that black ants (*Camponotus* spp.) play a more role in the pollination of some flowering plants. Many ant species are very sensitive to the habitat structure and microclimate fluctuations and

therefore strongly react to environmental alterations [35, 36]. The present study indicated that ants exhibit seasonal fluctuation in the activity. The specie number was very low in December and January. All the species were present in October, November, February, and March but in December and January, 4 and 2 species were observed respectively. The species like *P. longicornis* and *S. geminata* were found all the months during the study period whereas *P. sulcata* and *T. melanocephalum* were absent only in January.

The species richness and abundance were higher during the warmer seasons than winter; this was similar to the findings of Bharti *et al.* [31] and Suriyapong [37]. During this study period number of ant species was very low in January; similar results were observed by Kharbani and Hajong [32]. He also reported that *Pachycondyla javana* and *Pheidole smythiesii* were absent in the winter. Our observation confirmed that the population of ants and its fluctuation is conditioned by the environmental factors and even little alterations in such factors may produce an important effect on the biological behavior of the species concern. It acts as an important environmental indicator and also serves important ecological functions such as interactions with other organisms at any trophic levels [17, 18].

### CONCLUSION

The population of ants which are one of the most ecologically significant and diverse organisms in the world varied in the study as well as in different months of the year. They are major components of terrestrial ecosystems as they constitute an abundant part of the animal biomass and are very sensitive to the habitat structure, microclimate fluctuations and therefore strongly react to environmental alterations. High capability and diversity to adapt to various types of habitats show their unique evolutionary significance.

### ACKNOWLEDGEMENT

The authors are thankful to the Principal, Bethune College and Head, Department of Zoology, Bethune College, Kolkata for providing necessary laboratory facilities. We thank the Zoological Survey of India, Kolkata for confirming the identification of different ant species. Authors are also grateful to Prof. L. K. Ghosh, former Director, Zoological Survey of India, for valuable suggestions and cooperation.

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