

A NOTE ON OCCURRENCE OF NESTS CONSTRUCTED BY ANTS (ORDER: HYMENOPTERA).

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ABSTRACT:

The studies were done about nesting types of ants in and around Bhiwandi. The ants were searched by employing all out search method during 2016 to 2017 covering all seasons. Total 80 nests of ants from 6 Stations were recorded. Maximum numbers of nests were related to presence of *S.geminata* followed by *P.watsoni*. Lignicololus types of nest were commonly recorded. This study also generates some information on different types of nests build by same species of ants at various habitats. The study also generates the importance of nesting materials used by *P.watsoni* for their nests entrance. It was found during study that *P.watsoni* uses nest materials to obtain body tissue and body fluid of birds and to prevent the water entering the nests and for navigational purpose.

Keywords: Hymenoptera, Nesting, Ants, Bhiwandi, India.

INTRODUCTION:

Insects form a major part of the animal biomass in the ecosystem and in recent times many of them have been used as indicator species. As stated by Cheng (1976) Insects are virtually everywhere on the earth's surface, excluded only by the extremes of climate at the poles and on the peaks of highest mountains; just a few species live in the sea. According to Ramchandra *et al.*, (2012). Ants represent a unique focal group, to be monitored, due to their ability to navigate across all trophic levels, along with their sensitivity to any changes in the environment. Ants show tremendous dominance in almost every habitat throughout the world. Ants can be called as herbivores as they harvest nearly 15% of the herbivory in tropical forests.

Nests are shelters that provide ants with security, defense against enemies, and an improved micro-environment. They also provide efficient brood rearing and food storage facilities. Ants' nests are either simple cavities or a complicated system of interconnected cavities. Various types of habitats are chosen by ants for nesting. Nests in soil are the most common since majority of the ants are terrestrial since the soil provides ants their needs for food, moisture and protection. Nests can be underground, in trees, under rocks, or even inside a single acorn. A refuse-dumping pit is also present at the most inhabitable passage of the nests where the wastes from the colonies as dead nests mates, inedible parts of prey, are dumped. Nesting habit of ants has been reported by Gupte and Somani (2016), Robinson(2014), Kolay and Annagiri (2015), Khot *et al.*, (2013), Cunha *et al.*, (2013), Amarasinghe (2010), Robson and Kohout (2007), Frouz(2000), Moffett(1985).

The study was undertaken to record diverse types of nesting by ants in Bhiwandi region. These included Nursery, Garden, Agricultural area, road side and forest having variable anthropogenic influence.

MATERIAL AND METHODS:

The study was carried out at six stations from October 2016 to May 2017 in and around the region of Bhiwandi (District-Thane, Maharashtra). *Bhiwandi city is located in Maharashtra, India. Latitude: 19.2963. Longitude: 73.0587. Geographical coordinates is 19° 18' 0" North, 73° 4' 0" East. The Average Rainfall is 3224 mm. The average daytime humidity is 62.5%.*

These areas were searched for occurrence of ant's nests. About 90 -120 minutes were spent at each station to search for ants nest and activity of the workers. The search for the nests was carried out on ground level as well as on barks of large trees. Nests encountered were carefully observed and details were recorded by using Canon power shot camera. The classification of the nests was done using the key described by Robson and Kohout (2007). Representative worker ants were carefully collected and brought to the laboratory. The worker ants were segregated and identified up to genus level using Binocular microscope (VKSI) 40x-1500x. The ants were preserved in alcohol glycerin combination (70:30). Identification was done with the help of keys given by Narendra and Kumar (2006) and Ant web (<https://www.antweb.org>). Six stations were selected in and around Bhiwandi representing variety of different habitat for studying the nesting of ants. The details of the station are listed in (Table 1).

OBSERVATIONS:

During this study, ant nests were recorded in cavities of plants, crevices of tree trunks, branches and base of trees, pavements, playgrounds, gardens, crop field margins, mud paths, in the ground cracks in walls. Nests in soil were the most common since majority of the ants are terrestrial. since the soil provides ants their needs for food, moisture and protection.

A total of 80 nests belonging to 14 species were encountered. *S.geminata* was found to be most prominent ant followed by *P.watsoni*. 62% of the nests record were of Lignicolous types (Table: 2). According to Wagner (1997) plants that have ant's nests at their base produce 1.9 times seeds as compared to the plant of similar size without ant's nests. He also found that soil beneath the plant having ant's nests have higher concentrations of nitrate, ammonium, phosphorus and water than a non nests plant. Wollman *et al.*, (2012) reported that nest relocations occurred throughout the spring, summer, and fall. Similar behavior of nest relocation was observed. However fort like nest of *P.watsoni* remained active during all the season.

RESULT AND DISCUSSIONS:

1. Maximum number of nests and nest types were found at station 3 followed by station 2 and station 6. **Station 3** was the agricultural region. This region probably offered rich food resources and favorable soil property resulting into better habitat for construction of nests. Hence maximum nests and nest types are found at this station.
2. Garden area (**Station 2**) was also found to have large number of ant's nests. The vegetation here was a combination of herbs, creepers and trees. Though the station had higher anthropogenic activity it provides diverse food resources to the ants making it suitable for establishment of colony.
3. The forest area (**Station 6**) exhibited lower number of nests. This indicated that ants successfully inhabit disturbed habitat as compared to the forest region.
4. Among 80 nests observed during present study highest nests were recorded for *S.geminata* (27.5 %). Nest of *S.geminata* were found at all the stations showing its ability to adapt with diverse environmental condition. It exhibit Subterrenean, Terrestrial, Lignicolous and Lithocolous types of nests.
5. In terms of density nests of *P.watsoni* followed *S.geminata*. The nests by these ants exhibited certain materials at the entrance outside the nest. Material used for their entrance is listed in (Table No 3).
6. 90 % of the nests were observed having feathers or dead carcasses of other ants at the nest entrance. Presence of feathers at the nest entrance might be due to their use as food in form of remains of tissue or body fluid. The feathers may also act as a visual guide for ants to get back to their nests.
7. Dead carcasses of *Camponotus compressus* at the nests entrance indicated the aggressive nature of *P.watsoni*.
8. Presence of leaves outside their nests offered concealment to the inhabitant. Arboreal nests recorded for *O.smaragdina* (3%) was also observed on *Ceiba pentandra*, *Ziziphus rugosa* and *Pongamia sp.*

CONCLUSION:

1. Agricultural area supported better establishment of ant colonies as indicated by higher number of nests.
2. *S.geminata* was dominant in terms of nest construction in disturbed environment.
3. Higher abundance of Lignicolous nest indicated ant-plant interaction beneficial on both the sides.
4. Occurrence of nest inspite of higher anthropogenic activity implied significance of ant as indicator organism.
5. Tunneling and movement of soil during the nest construction showed important role of ant in these habitat.

ACKNOWLEDGEMENT:

The authors would like to thanks the Principal and staff of Zoology Department, V.P.M's B. N. Bandodkar College for the support, and encouragement throughout the research work. The authors are also thankful to the Management of Vidya Prasarak Mandal for providing the facility to carry out research work.

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Image 1: Fort like nest entrance of *P.watsoni*



Image 2: Nest of *O.smaragdina*



Image 3: Feathers and carcasses of *C.compressus* at the nest entrance of *P.watsoni*'s nest

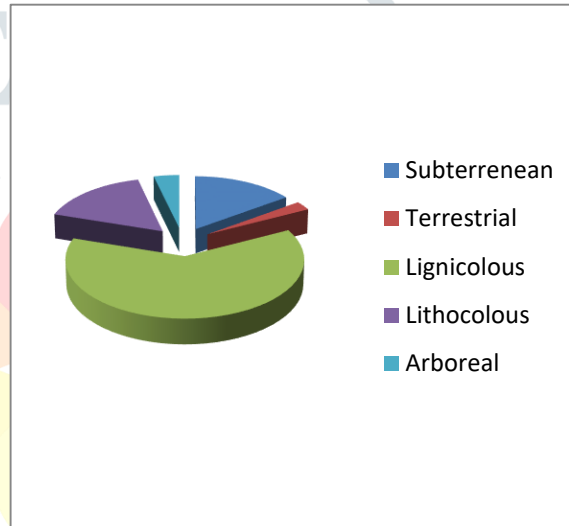


Figure 1: Percentage contribution of various types of ant's nests.

Table No 1: Descriptions of stations along with locations:

Stations	Name	Locations	Descriptions
Station1	Plant nursery	19°18'24.0"N 73°03'21.3"E	It is situated on highway. It has a mixture of plants, herbs, creeps and trees.
Station2	Indira Gandhi Garden	19.3018°N, 73.0519° E	It is a public garden situated in the heart of city. It has ornamental plants
Station3	Pogaon	19.3126°N, 73.0879° E	It is agricultural area having combination of field, trees and has good soil texture.
Station4	Kasheli	19°23'23.3"N 73°00'47.3"E	It lies near area where sand dredging takes place.
Station5	Kalher	19.236202, 73.015141	It lies on heavy traffic road near pipeline having wild herbs and shrubs.
Station6	Wada	19.635327, 73.124598	It lies on National Highway 8.Forest is famous for teak and bamboo plantation.

Table No 2: Distribution of ant's nests and nest types with respect to ant species.

Ants species	Percentage distribution of nests	Nests types
<i>T.melanocephalum</i>	7.5	LG,LT
<i>C.compressus</i>	8.75	LG
<i>L.frauenfeldi</i>	2.5	LG
<i>O.smaragdina</i>	7.5	A,LG
<i>P.longicornis</i>	7.5	LG,LT
<i>P.halidayi</i>	1.25	LG
<i>C.ransonneti</i>	1.25	LG
<i>M.criniceps</i>	2.5	S
<i>M.pharaonis</i>	7.5	LG,LT
<i>P.watsoni</i>	20	S,T,LG,LT
<i>S.geminata</i>	27.5	S,T,LG,LT
<i>P.tesseronoda</i>	1.25	S
<i>T.rufonigra</i>	5	LG

(Where A-Arboreal, S-Subterreanean, T-Terrestrial, LG-Lignicolous, LT-Lithocolous).

Table No 3: Nests types and nests material used by *Pheidole watsoni*

Station	Total Nests	Types of nests	Details of nests entrance.
Station1	2	Lignicolous	Minute and big feathers and dead carcasses of <i>C.compressus</i>
Station 2	5	Lignicolous, Lithocolous	Minute and big feathers and dead carcasses of <i>C.compressus</i> , leaves, tiny shells.
Station 3	2	Lignicolous	Minute and big feathers and dead carcasses of <i>C.compressus</i>
Station 4	1	Subterrean	-
Station 5	1	Lignicolous,	Minute and big feathers
Station 6	4	Subterrean, Terrestrial, Lignicolous	Minute and big feathers, Fort like nests entrance.