

# Study of Ant Diversity in College Campus of Rajarshi Chhatrapati Shahu College, Kolhapur, Maharashtra, (India)

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**Abstract:** *Ants are members of the family Formicidae belongs to order Hymenoptera which is the third largest insect order of Phylum Arthropoda. They are among the most diverse, abundant and ecologically significant organisms on earth. Kolhapur surrounds the Sahyadri mountain ranges which is one of the biodiversity hotspots. Present study was carried out in selected locations in the college campus. Different traps were used for collection of ants. Taxonomically they were identified from expert. 7 different species of ants were identified in college campus. Ants play an important role in our ecosystems because they have numerous interactions with different plant species, even dead bodies of animals. Study indicates that formicidae family is dominant in college campus..*

**Keywords:** Ants, Diversity, Arthropoda, Ecosystem.

## I. INTRODUCTION

Western ghat is one of the world's ten "hottest biodiversity hotspots." It has over 7,402 species of flowering plants, 1,814 species of non-flowering plants, 139 mammal species, 508 bird species, 227 reptile species, 179 amphibian species, 290 freshwater fish species, and 6,000 insect species<sup>[14]</sup>. Out of 828 known ant species from India, about 455 species have been reported from Western Ghats, which highlights the importance of this region as a repository of ant diversity<sup>[15]</sup>.

Kolhapur city is situated on the banks of the Panchganga river and surrounds the Sahyadri mountain ranges. The survey was carried out to study diversity of ant species in the college campus of Rajarshi Chhatrapati Shahu College, Kolhapur. The temperature of the region ranges between 10°C to 35°C. The city receives abundant rainfall from June to September due to its close proximity to Western Ghat.

Ants are members of the family Formicidae belongs to order Hymenoptera which is the third largest insect order of Phylum Arthropoda. Ants belong to class insecta which is the biggest class in Kingdom animalia. They are close relatives of bees and wasps. They are among the most diverse, abundant and ecologically significant organisms on earth<sup>[5]</sup>

As per the recent classification, all ants are grouped into 21 subfamilies<sup>[17]</sup>. Because of their great adaptability, they have occupied every possible niche<sup>[20]</sup>.

Ant communities are indicators for changes in biodiversity composition in other taxa. Individual ant species can have strong effects on ant community composition<sup>[18]</sup>. They help to aerate soil and improve drainage, improve soil chemistry, disperse seeds, and prey on pests. Ants have characteristics relevant to the study of biodiversity, such as plasticity, high diversity, numerical and biomass dominance in various habitats<sup>[17]</sup>.



Present study shows importance of ants due to their values such as pest control, medicine, environmental indicators, their strong effects on ant community composition<sup>[17]</sup>

## **II. MATERIALS AND METHODS:**

### **Study area:**

Rajarshi Chhatrapati Shahu College, Kolhapur is located at Kolhapur. Kolhapur surrounds the Sahyadri mountain ranges which is one of the biodiversity hotspot. Hence the area was selected to study diversity of ants at college campus. Present study was carried out in selected locations in our college campus such as Botanical garden, parking area, canteen area, ladies room area, ladies hostel.

## **III. METHOD OF COLLECTION**

Ants were collected by using different traps. We planted near about 15 traps with the help of some methods such as:

**Oil trap:** few drops of edible oil spread over the paper glass and kept it in the botanical garden for 4hrs. After 4 hours ants were collected from the oil trap and preserved in 70% alcohol.

**Bone trap:** some species of ants are attractive to the meat/ bone. The piece of bone kept within the paper glass for 2-3 hr. Ants were collected and preserved in 70% alcohol.

**Chocolate trap:** Ants easily attract to sweetner, chocolate was kept at the specific area for one hour and ants were collected from the trap.

**Sugar solution trap:** Pinch of sugar and 2-3 drop of water added simultaneously into the plastic glass and put it for one hour.

**Detergent trap:** Detergent + glycerol equally added in the yellow dish for 3-4 hrs.

**Leaf litter sifting:** The specific area selected for the leaf litter sifting. After 3-4 hrs ants were collected on the white paper.

**Dry grains (wheat) trap:** Dry grains such as wheat spread on the white paper for a 1-2 hr.

**Crunched peanut trap:** 5-6 nuts crunched and spread on white paper for 1 hr.

**Ants collected from dead bird body:** the different enzymes secrets from the dead bird and spread smell which is attract to the ants, Ants were directly collected from dead body of crow in botanical garden.

**Glycerol + Ethanol trap:** 3-4 drops of glycerol and 3-4 drops of ethanol which is 1:1 proportion put it in the petri dish for 3-4 hrs.

**Yeast trap:** active yeast was spread in the yellow dish and dish was kept for 1-2 hrs.

**Powdery mildew on hibiscus plant:** powdery mildew which is the disease on hibiscus plant the ants attract naturally. Ants were directly collected from such plants from botanical garden of the college.

**Dead insect:** Enzymes released from dead insect which attracts ants.

**Orange peel:** The orange peel has a citric acid sweetness to attract some species of ants.

**Decayed wood:** Ants were also collected from decayed wood near to ladies room of College.

Ants were also collected from white powdery mildew on guava plant

Collected ant species were preserved in sample bottle containing 70% ethanol. Each species were characterised and morphological characteristics such as colour, size were also studied. Ant specimens were sent to taxonomy expert Dr. Himender Bharati from Department of Zoology and Environmental Sciences, Punjabi University, Patiala, India.



**IV. RESULT AND DISCUSSION**

**List of identified species by Prof. (Dr.) Himender Bharti, Punjabi University, Punjab**

Sr. No.	Name of trap	Location	Species	Family
	Collected from powdery mildew on Guava plant	Ladies hostel area	<i>Camponotus compressus</i> (Fabricius, 1787)	<i>Formicidae</i>
	Oil trap	Botanical garden	<i>Meranoplus bicolour</i> (Guerin-Meneville, 1844)	<i>Formicidae</i>
	Tamarind trap	College ground	<i>Lepisiota sericea</i> (Forel, 1892)	<i>Formicidae</i>
	Detergent trap	Botanical garden	<i>Crematogaster rothneyi</i> (Mayr, 1879)	<i>Formicidae</i>
	Bone trap	Botanical garden	<i>Nylanderia indica</i> (Forel, 1894)	<i>Formicidae</i>
	Lemon trap	College ground	<i>Solenopsis geminate</i> (Fabricius, 1804)	<i>Formicidae</i>
	Collected from dead bodied Bird (crow)	Botanical garden	<i>Solenopsis geminate</i> (Fabricius, 1804)	<i>Formicidae</i>
	Collected from leaf	Botanical garden	<i>Pheidole malinsii</i> (Forel, 1902)	<i>Formicidae</i>
	Glycerol+ Ethanol trap	College Ground	<i>Crematogaster rothneyi</i> (Mayr, 1879)	<i>Formicidae</i>
	Baking soda+ Sugar powder trap	Ladies hostel area	<i>Camponotus compressus</i> (Fabricius, 1787)	<i>Formicidae</i>
	Peanut Trap	Near Ladies room	<i>Solenopsis geminate</i> (Fabricius, 1804)	<i>Formicidae</i>
	Yeast trap	Near library	<i>Solenopsis geminate</i> (Fabricius, 1804)	<i>Formicidae</i>
	Jaggery trap	Ladies hostel area	<i>Solenopsis geminate</i> (Fabricius, 1804)	<i>Formicidae</i>
	Dry grain	Ladies hostel area	<i>Solenopsis geminate</i> (Fabricius, 1804)	<i>Formicidae</i>
	Chocolate trap	Near Ladies room	<i>Crematogaster rothneyi</i> (Mayr, 1879)	<i>Formicidae</i>
	Honey trap	College ground	<i>Solenopsis geminata</i> (Fabricius, 1804)	<i>Formicidae</i>
	Dry grain (Wheat)	Near Ladies room	<i>Solenopsis geminata</i> (Fabricius, 1804)	<i>Formicidae</i>
	Vinegar trap	College ground	<i>Solenopsis geminata</i> (Fabricius, 1804)	<i>Formicidae</i>
	Sugar solution	Parking Area	<i>Nylanderia indica</i> (Forel, 1894)	<i>Formicidae</i>



Collected from Hibiscus Plant infected with Powdery mildew	Near canteen	<i>Nylanderia indica</i> (Forel, 1894)	<i>Formicidae</i>
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All the collected ants found to be of family formicidae. Out of 20 ant samples identified by taxonomic expert are of type *Camponotus compressus* (Fabricius, 1787), *Meranoplus bicolor*(Guerin-Meneville,1844) *Lepisiota sericea*(Forel, 1892), *Crematogaster rothneyi*(Mayr, 1879), *Nylanderia indica* (Forel, 1894), *Solenopsis geminata*(Fabricius, 1804), *Pheidole malinsii* (Forel, 1902).

*Solenopsis geminate* can be collected by using traps such as honey, dry grain, vinegar, pea nut, yeast, jaggery, lemon trap as well as from dead bodied bird. Glycerol+ethanol, chocolate trap attracts *Crematogaster rothneyi*. *Camponotus compressus* collected by trap such as baking soda+ sugar as well as from powdery mildew on guava plant. *Lepisiota sericea* collected by using tamarind trap whereas oil trap can be used for collection of *Meranoplus bicolor* species.

Study carried out by B. Staffan *et.al* shows that relative abundance of most of the species of ants favoured by the presence of woody debris. According to them a quantitative assessment of the relationship between the abundance of ants and woody debris needs to be done to establish whether or not this is true.

Study by David Lubertazzi *et.al* (2014) examined ant species richness in Jaragua National Park (Pedernales Province, Dominican Republic) during March- April 2012 from 15 different sites. They sampled from dry forest, beach scrub, lakeside acacia scrub, and thorn woodland. The ant species richness observed in their study suggests that the park, along with larger reserve, is successful in preserving important habitat for insects.

Mohammad Misbahul Ahsan (2022) identified three subfamilies namely Myrmicinae, Formicinae and Dolichoderinae. During this study it is noted that out of three subfamilies, Myrmicinae is found to be a most abundant subfamily. Total 09 species of ants were recorded from the study area belonging to 07 genera and 03 subfamilies. During this study it is noted that ant species richness was higher in cultivated fields and rural areas and comparatively lower in urban and residential area because of high levels of disturbances and little or absence of vegetation.

From present study we isolated and identified total 20 different ant species using 20 different traps.

It showed that ants play an important role in our ecosystems because they have numerous interactions with different plant species, even dead bodies of animals.

Study also shows that ants can be considered as a specific indicator which emphasise on conservation of these diverse creatures.

From present study it can be concluded that ants play an important role in our ecosystems because they have numerous interactions with different plant species, even dead bodies of animals. Therefore they can be considered as a specific indicator. They are found everywhere and are diverse. They can be easily collected by using various simple traps.

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## REFERENCES

1. B. Staffan Lindgren, A. M. MacIsaac, (2002). A Preliminary Study of Ant Diversity and of Ant Dependence on Dead Wood in Central Interior British Columbia, USDA Forest Service Gen. Tech.,Page no. 111-119.
2. David Lubertazzi and Gary D. Alpert,(2014).The Ants (Hymenoptera: Formicidae) of Jaragua National Park, Dominican Republic,Hindawi Publishing Corporation Journal of Insects. Volume 2014.



3. Zhanna Reznikova , Boris Ryabko,(2001).A study of ants' numerical competence,Online: <https://www.researchgate.net/publication/220465351>
4. João L. O. Rosado, Michel G. de Gonçalves , William Dröse , Eduardo J. E. e Silva , Rodrigo F. Krüger , Rodrigo M. Feitosa and Alci E. Loeck.(2012).Epigeic ants (Hymenoptera: Formicidae) in vineyards and grassland areas in the Campanha region, state of Rio Grande do Sul, Brazil, Check List 8(6): 1184–1189.
5. Mohammad Misbahul Ahsan,(2022).Partial checklist of Ants (Hymenoptera: Formicidae) in selected localities in and around Achalpur, District Amravati, Maharashtra, India, International Journal of Scientific Research in Biological Sciences Vol.9, Issue.2, pp.44-47.
6. Hridisha Nandana Hazarika, Kamal Adhikari, Bulbuli Khanikor,(2019).Diversity and Distribution of Ants (Hymenoptera: Formicidae) in Gauhati University Campus, Assam, International Journal for Research in Engineering Application & Management (IJREAM),Vol-04, Issue-11,448-53.
7. Saranya Sivadasan, Anu Anto, Gigi K. Joseph and Shaju Thomas,(2013). A Study on the Ant Diversity (Hymenoptera: Formicidae) of Periyar Tiger Reserve in South Western Ghats, , Indian Forester, 139 (10) : 936-942.
8. Manjiri A. More and Manisha M. Bhosale,(2017). Insect Diversity In Hutatma Park Area Kolhapur, IJBAT, Special Issue (2), Vol-V, page no.996-1001.
9. H.C.J.Godfray, O.T.Lewis,J.Memmott,(1999),Studying insect diversity in the tropics, ,The Royal Society,Phil.Trans.R.Soc.Lon. B.,354,1811-1824.
10. BV Sonune, RJ Chavan,(2016).Distribution and diversity of ants (Hymenoptera: Formicidae) around Gautala Autramghat Sanctuary, Aurangabad Maharashtra, India,Journal of Entomology and Zoology Studies 4(2): 361-364.
11. N.B. Patkar, R.J. Chavan,(2014). Diversity of Ants (Hymenoptera: Formicidae) From Undisturbed And Disturbed Habitats of Great Indian Bustard Wildlife Sanctuary, (M. S.), India, , Volume : 3,Issue : 12, Research Paper, Page no. 398-401
12. Himender Bharati,(2012). Ants Superorganisms of the World,Feature article,SCIENCE REPORTER, ,19-23.
13. S.Gokulakrishnan, N.Ramakrishnan, J.Roopavathy,(2014).Ant Diversity In Three Selected Localities of Thanjavur and Cuddalore Districts of Tamilnadu,Research paper,Volume 4 ,Issue 9,561-565.
14. “Western Ghats - Wikipedia.” Western Ghats - Wikipedia, en.wikipedia.org, 1 Jan. 2022, [https://en.wikipedia.org/wiki/Western\\_Ghats](https://en.wikipedia.org/wiki/Western_Ghats)
15. Blog, Myrmecological News. “Ants of Western Ghats, India – Myrmecological News Blog.” Myrmecological News Blog, blog.myrmecologicalnews.org, 15 May 2019, <https://blog.myrmecologicalnews.org/2019/05/15/ants-of-western-ghats-india>
- 16.4 Reasons We Can't Live Without Ants. (2019, December 3,ThoughtCo; [www.thoughtco.com](http://www.thoughtco.com). <https://www.thoughtco.com/what-good-are-ants-1968090>.
17. Manikandan, B., Anusuyadevi\*, P., & Sevarkodiyone, S. (n.d.). Diversity and Abundance of Ants (Hymenoptera: Formicidae) from Thiruthangal, Sivakasi (Taluk), Tamil Nadu. Diversity and Abundance of Ants (Hymenoptera: Formicidae) from Thiruthangal, Sivakasi (Taluk), Tamil Nadu; [www.peertechzpublications.com](http://www.peertechzpublications.com).Retrieved August 21, 2022, from <https://www.peertechzpublications.com/Agricultural-Science-Food-Technology/IJASFT-4-128.php>.
18. An introduction to ants. (n.d.). An Introduction to Ants; [ipm.ucanr.edu](http://ipm.ucanr.edu). Retrieved August 21, 2022, from <http://ipm.ucanr.edu/TOOLS/ANTKEY/antid1.html>
19. How do I make a bipedal non-colony ant species somewhat believable in a world 20 million years in the future? (n.d.). Quora;[www.quora.com](http://www.quora.com). Retrieved August 21, 2022, from <https://www.quora.com/How-do-I-make-a-bipedal-non-colony-ant-species-somewhat-believable-in-a-world-20-million-years-in-the-future>.
20. Ants of India - Home. (n.d.). Ants of India - Home; [www.antdiversityindia.com](http://www.antdiversityindia.com). Retrieved August 21, 2022, from <https://www.antdiversityindia.com/>



21. Ant Control Mississauga. (n.d.). Ant Control and Exterminator, Mississauga, Oakville, Brampton and Etobicoke.; antscontrol.ca. Retrieved August 21, 2022, from <http://antscontrol.ca/mississauga.html>
22. Ant. (n.d.). Ant; [www.bionity.com](http://www.bionity.com). Retrieved August 21, 2022, from <https://www.bionity.com/en/encyclopedia/Ant.html> .
23. Kadu, Seema. G. (2016). Species richness and diversity of ants in nagpur city (ms), india. In international journal of researches in biosciences, agriculture and technology vishwashanti multipurpose society (Global Peace Multipurpose Society) R. No. MH-659/13(N) : Vol. IV (Issue 3, pp. 42–44).
24. Das, S. M. (2020, May 29). &lsquo; Ants are amazing scientific and social beings &mdash; we humans need them & rsquo; - Times of India. The Times of India; [timesofindia.indiatimes.com](https://timesofindia.indiatimes.com). <https://timesofindia.indiatimes.com/ants-are-amazing-scientific-and-social-beings-we-humans-need-them/articleshow/76097345.cms>
25. How do antennae help ants? – Heimduo. (2021, May 20). How Do Antennae Help Ants? – Heimduo; [heimduo.org](http://heimduo.org). <https://heimduo.org/how-do-antennae-help-ants/>
26. Ant - Simple English Wikipedia, the free encyclopedia. (2008, June 6). Ant - Simple English Wikipedia, the Free Encyclopedia; [simple.wikipedia.org](https://simple.wikipedia.org). <https://simple.wikipedia.org/wiki/Ant>

