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Short communication

Diversity of Termites from Durgapur Government College Campus, Paschim Bardhaman, West Bengal, India

UTPAL SINGHA ROY
Department of Zoology, P. R. Thakur Government College, Thakurnagar, 743287, West Bengal, India
E-mail: srutpal@gmail.com

ABSTRACT
The present study was carried out inside Durgapur Government College campus to enlist the diversity of termites by direct search method. A total of six different termite species (*Odontotermes feae*, *O. horni*, *O. gurdaspurensis*, *O. redemanni*, *Microtermes obesi* and *Coptotermes heimi*) were recorded during the present study. Ant species and termites were found to be closely associated in sharing the habitable space inside the campus.

Key words: Diversity, Durgapur, Insect, Isoptera, Laterite soil, Termite, White ant

INTRODUCTION

Termites, generally known as white ants, form an important group of insects. They cause expensive damage to agricultural crops (e.g., tea, coffee, coconut, rubber, sugarcane, etc.) and timbers. They can attack both living and dead plants. Termites can cause damage to homes, buildings and other structures. They feed on wood, which makes them a particular concern for wood-frame homes. In addition to the damage, they cause by gnawing on wood, termites also secrete enzymes that allow them to digest cellulose in wood (Tolossa 2022). When these enzymes are sprayed onto other materials like paint or drywall, they can eat away those materials as well. The damage caused by termites amounts to millions of currencies, however, in return they offer ecological role worth millions. These include their influence on the soil quality where they live and forage because they consume dead plant matter and excrete digestive enzymes into their waste. This process releases nutrients back into the soil, contributing to its fertility. They also help to increase soil porosity, aeration and, water infiltration into the ground and can reduce erosion (Bera et al. 2020).

Termites are social insects, living in colonies that can number into the millions. They have specialized jobs within these colonies, including soldiers, workers, and reproductive casts. The termite colony is often referred to as a superorganism because it functions as a single entity. It takes care of its young, defends itself against predators, and maintains the nest. Out of about 3,000 different species of termites known from the world (they substantially inhabit the tropical and tropical regions), about 300 are known from the Indian region (Bhanupriya et al. 2022). Spread over 30 acres of area Durgapur Government College campus is rich in floral and faunal diversity (Garai et al. 2013, Mukherjee and Roy 2021, Adhurya et al. 2023). Termite mounds can be seen instantaneously as one enters the campus. These subterranean termite mounds can be observed all over the industrial city of Durgapur however, no previous work has been done on these Isopterans from this area. So, it was thought pertinent to carry out the study on termite diversity in the Durgapur Government College campus area.

MATERIALS AND METHODS

Study area

The present study was conducted inside Durgapur Government College Campus (23.5427°N, 87.3269°E, elevation 65 m AMSL) located in the Durgapur city of Paschim Bardhaman district of West Bengal, India. The total area of the college campus is about 30 acres. Most of the area of the campus is covered by trees like *Shorea robusta*, *Ficus benghalensis*, *F. religiosa*, *Mangifera indica*, *Azaradicta indica*, *Syzygium cumini* and shrubs like *Phyllanthus niruri* and *Lantana camara*. Apart from the building area, some of the campus area is barren in which different kinds of lawn flowers are grown. These trees and other plants give refuge as well as

food to diverse types of organisms. The temperature of the study area ranges between 8-43°C and the average rainfall vary between 6 – 213 mm. Soils of this area are of three types – laterite soil with gravel, silty clayey soil and sandy clayey soil (Nayak and Roy 2016).

Methods

Termite specimens were collected between March 2018 to February 2019 on a monthly basis by a direct search method which included searching in termite mounds, living plants, underneath dead decaying plant materials, fallen logs, and different parts of buildings. Attempts were made to collect termite soldiers specifically, since termite taxonomy is based mainly on the head morphology of the soldiers for all species by using brush moistened with alcohol. Specimens collected from different sites were preserved separately in 70% alcohol in 5 ml glass vials.

Collected termite specimens (soldiers) were mounted in grooved slides using DPX and were subjected to analysis under light and compound microscopes. Suitable literature available was consulted for the identification purpose (Maity 1983, Roonwal and Chhotani 1989, Chhotoni 1997).

RESULTS AND DISCUSSION

During the present study six different termite species were recorded which were *Odontotermes feae*, *O. horni*, *O. gurdaspurensis*, *O. redemanni*, *Microtermes obesi* and *Coptotermes heimi* (Table 1). Among the recorded species *O. redemanni* was recorded as the most abundant species and was collected from almost all over the college campus. Most of the mounds recorded in the present study belonged to *O. redemanni* species. Apart from this termite species, only one species (*O. gurdaspurensis*) was found to construct mounds. Rest of the four species didn't construct mounds and was recorded from dead decaying plant materials, fallen logs, soil and barks of live plants. In a similar type of study, Kumar and Thakur (2010) have reported 15 termite species from Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana. Anantharaju et al. (2014) have reported 10 different termite species from 210 acres of land area of Pondicherry Engineering College, Pondicherry. It may be noted that the size of the sampling area, methodology applied along with physicochemical conditions of the habitat types play a major role in the inventory of biodiversity of a particular geographic area and these might have resulted in the present findings. In a previous study from Durgapur Government College campus Mukherjee and Roy (2021) have reported 31 ant species. Ants and termites are often found in the same habitats and can have similar ecological roles. Both ants and termites can play important roles in breaking down plant material and recycling nutrients in forest ecosystems. Additionally, some species of ants and termites have evolved mutualistic

Table 1. Diversity, occurrence and encounter rate of termites as recorded in the present study from Durgapur Government College Campus. Encounter rate = probability of finding a particular termite species during each sampling

Termite species	Collection site	Encounter rate
Odontotermes feae	Underneath dead decaying plant materials and plant barks	Medium
Odontotermes horni	Underneath dead decaying plant materials and plant barks	High
Odontotermes gurdaspurensis	Termite mounds	Medium
Odontotermes redemanni	Termite mounds, tree barks, walls, plywood floor	Very High
Microtermes obesi	Underneath dead decaying plant materials, fallen logs and decaying fruits like Bengal quince and near the mounds of *O. redemanni*	Medium
Coptotermes heimi	Underneath dead decaying plant materials, fallen logs, live plant barks and soil	High

relationships, where they benefit from each other's presence and behaviour. For example, some species of ants will protect termites from predators in exchange for access to the termites' food source. During the present study similar observations were made where ant and termite species were found to coexist inside decaying Bengal quince (*Aegle marmelos*) fruits. This finding corroborates well with previous studies where it has been reported that ant species richness and abundance had positive correlations with termite species richness (Mertl et al. 2012). All the species recorded in the present study have been reported to occur from wide geographic region in the Indian subcontinent, including India, Pakistan, Bangladesh, Bhutan and Nepal. Mention may be made that all the species recorded in the present study have been reported as pests of timber and crops (Maity 1983).

CONCLUSIONS

Termites play a vital role in maintaining the balance of ecosystems around the world. They break down organic matter and recycle nutrients, which help to fertilize the soil and support the growth of plants. They also create habitats for other animals and help to prevent desertification. Additionally, termites have been a source of inspiration for engineers and scientists looking to design sustainable buildings and develop new forms of renewable energy. Therefore, despite their reputation as pests that damage structures, termites are an essential part of our natural world, and we must learn to coexist with them to preserve the health and well-being of our planet. The present study was conducted from a small area over a short span of time. More extensive studies will surely result in an inventory of many more termite species from the adjacent regions. Also, further studies on termite ecology will be interesting.

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