



## Physicochemical properties of termitaria soil of *Odontotermes* spp. In Pollachi, taluk, Coimbatore, district, India

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### Abstract

Termites, which are abundant and diverse in tropical woods, are the most common arthropod decomposers. By altering the biotic and abiotic environment, they play a significant role in tropical ecosystems. The range of termite fauna in India has been restricted because to the country's higher altitudes and harsh temperatures. In contrast to the rest of India, the northeastern regions are home to a large population of these termites. The most significant group of soil fauna in the semiarid tropical regions are termites. Conacher and Lobry de Bruyns, 1990<sup>[48]</sup>. They are spread throughout the world's tropical, subtropical, and temperate regions and can be found in a wide variety of terrestrial habitats. Pearce, 1997a; Krishna and Weesner, 1970; Freise, 1949.

**Keywords:** Ecosystem, physicochemical properties, invertebrates, Isoptera, Wood dwellers

### Introduction

In tropical regions with high relative humidity, termites pose a severe danger to agriculture. Termites are divided into two groups: wood dwellers and ground dwellers, based on their habits and habitats. The occupants are made up of both dry and wet wood species. Approximately 80% or 147 species of the commercially significant species are ground dwellers, including underground termites, surrounding mound-building species, and arboreal species. Termites are the most common invertebrates found in soil. Their abundance in any environment drastically alters the biodiversity below earth. Some of them create mounds, and others build nests in dead tree trunks or stumps. It is difficult to identify on the surface of the soil.

Termites are gregarious insects that live in colonies. Although they are not ants, they are sometimes referred to as white "ants" Grimaldi and Engel, 2005. This is because termites are members of the Order Isoptera, whereas true ants are members of the Order Hymenoptera. Termites were classified by Engel and Krishna (2004) into 6 families, 170 genera, and around 2600 species, of which 300 are considered to be economically significant. Termites belong to three broad categories according to the type of wood they live in: moist wood, dry wood, and underground. Rueben and Paul, 2005. Paul and Rueben (2005) state that while dry wood termites do not generally pose a pest problem, they will pose one in specific circumstances. Damp wood termites, on the other hand, do not generally pose a pest problem.

### Materials and methods

The Pollachi Taluk in Coimbatore and its environs served as the study site. There were three study areas in total. Soil samples from termite mounds were gathered from three locations.

### Study area

Bolygounderpalayam, Anamalai-Singanallur, and the Arokiamatha School campus in Makinampatty were the study areas.

### Collection of termites

Samples of dirt from each termite mound were taken, allowed to air dry, sieved using a 2 mm sieve, tagged, packed, covered, and kept at 4 degrees Celsius.

### Compost analysis

Every compost study was done outdoors using dried compost samples that were filtered using a 2 mm screen. The analysis's methods and guiding principles are described below. The analysis employed double-distilled water.

### Nutrients

Nutrients including protein, carbohydrates, and minerals like sodium, potassium, magnesium, and calcium were evaluated in three distinct termite samples using standardised techniques, and laboratory studies were conducted.

### Physicochemical properties

The termite soils were allowed to air dry in order to exclude debris larger than 2 mm. Numerous physical and chemical characteristics, conductivity, organic matter, accessible phosphorus, and exchangeable potassium were all examined in the soil samples.

### pH Determination

In a 100ml beaker, approximately 30 grammes of air-dried termite dirt that had previously been passed through a 2mm screen were added. 60ml of distilled water was then added, and the mixture was thoroughly agitated with a glass rod. The previously calibrated electrodes were added to the beaker holding the soil water suspension after 30 minutes, while the mixture was continuously stirred. The pH metre was used to determine the termite soil's pH.

### Determination of electrical conductivity

Using the soil solution made in a 1:2 ratio for pH testing, the termite soil samples were tested for electrical conductivity. For around thirty minutes, the soil suspension was let to settle in the beaker. A conductivity metre was used to determine the soil's electrical conductivity.

## Macro nutrients in termite soil

### Available phosphorous

A solution of 0.03N ammonium fluoride and 0.1N hydrochloric acid was used to extract the compost; this solution dissolves ferrous and ammonium phosphorus predominantly. The extracted phosphorus was then quantified using a colorimetric technique.

### Nitrogen content

A Kjeldahl tube containing about 0.2 grammes of sample was used for the analysis, which was conducted using the Kjeldahl method.

### Extracted Potassium

Using a flame photometer as a guide, neutral ammonium acetate was used to extract the sample.

### Determination of calcium and magnesium

#### Preparation of sample extract

A 150 ml polythene shaking bottle containing approximately 10 grammes of sample was filled with 50 ml of neutral normal ammonium acetate. The mixture was shaken for approximately 5 minutes using a mechanical shaker. The resulting filtrate was then filtered through Whatman's No. 1 filter paper and utilised to estimate the amounts of calcium and magnesium. Heald, 1965.

### Determination of calcium alone

After being pipetted into a 250 ml conical flask, around 10 ml of the filtrate was diluted with 100 ml of water. Ten millilitres of 10% sodium hydroxide and ten drops of ammonium hydroxide were added to the diluted solution. After adding hydrochloric acid, the mixture was set aside to allow the reaction to finish.

### Determination of magnesium alone

After creating a standard curve by feeding the standard magnesium solution into the atomic absorption spectrophotometer (GBC908AA), the sample was extracted using neutral ammonium acetate and fed straight into the device. Readings were then obtained using the magnesium lamp.

### Termite: *Odontotermes obesus*



### Conclusion

General comparison of 3 termite mounds soil are discussed below As indicated in table 1, data showed that the pH was 8.17 in sample A, In sample B was 9.15 and 9.11 in sample C. Slight difference on based on termites. It depends upon to species and soil type. Present data revealed that the EC was 270 in sample A, sample B is 130 and sample C is 83 by

agriculture point of view soils with an EC, The sample A is greater than B and C it consider as saline the termite soil was not saline. In the present study nitrogen was observes as 0.22% in sample A, sample B 0.16% and 0.17% in sample C. Sample A, B, C almost have nitrogen content. Nitrogen is necessary macro nutrient for the plant growth and key of ecosystem processes. The increased N cause acidification and eutrophication. So it is essential to know about N present in soil future planning for cropping pattern. The phosphorous was found to b 650 mg/kg in sample A, 303 mg/kg in sample B and 592 mg/kg in sample C in mound soil. Sample A having greater phosphorous content when compared to sample Band C. Phosphorous is often recommended as row – applied starter fertilizer increases growth even if P does not increase grain yield. In the present study potassium was noticed 13 mg/kg in sample A, 5 mg/kg in sample Band 3 kg/mg in sample C in termite soil. Sample A is more when compared to sample B and C potassium is essential element. The main role of K is to provide the ionic environment for metabolic processes which regulates various processes including growth regulation. The calcium was 286 mg/kg in sample A, 48mg/kg in sample B and very less in sample C. Sample A contains the higher calcium content. The magnesium was 67 mg/kg in sample A, 58 mg/kg in sample B and sample C contains very less amount. Sample A contains the highest amount of magnesium content. Chloride amount in termite soil sample A 791 mg/kg, sample B contains 298 mg/kg, sample C contains 180 mg/kg, Sample A has the highest content of chloride. The protein content in sample A is 1.36%, sample B contains 1.01%, Sample C contains 1.06%. Sample A has the highest amount of protein. The carbohydrate content in sample A has 1.98%, sample B has 1.67%, 1.64% in sample C. Sample A has higher carbohydrate content. The data pertains in table shows sample A contains sulphur content was 1185 mg/kg, sample B contains 429 mg/kg, sample C contains 131 mg/kg. Sample A contains highest content of sulphur the availability of sulphur to plants is dependent on the release from soil organic matter. Several workers have shown that net mineralization of soil sulphur is affected by organic matter additions, plant growth, in addition tp temperature, moisture and nutrient supply.

The organic matter and the breakdown of faces and saliva fill the soil with organic carbon, caco<sub>3</sub>, p, mg, and k, which is why studies on the variance in termite soil in three samples have been conducted. They have the ability to reduce the trash to tiny particles during the process, which will boost bacterial and fungal activity and encourage the breakdown of organic materials. When organic material enters the digestive tract, it undergoes a number of chemical and biological processes. For example, when organic material enters the digestive track, it undergoes a number of chemical and biological processes. The degree of humification of the organic material, when compared to the adjacent soil, is attributed to termites' behaviour of ingesting organic matter and returning it as faeces, where it is chemically and physically protected and forms stable aggregates. Termites can accelerate the breakdown of organic matter, increasing aggregate stability and soil porosity, both of which improve water retention. When compared to nearby soil, the mounds' higher organic matter content is correlated with higher phosphorus levels in the oligotrophic environment, where phosphorus is mostly

organic. The following observations are made with reference to the study, and they explain the mechanism and forecast sound soil. Higher pH and greater concentrations of C and P in termite mounds compared to nearby soil are related to termites incorporating organic materials through saliva- and feces-mixed pellets. When comparing the microstructure of the mineral soil that is brought to the surface through digging, it is shown that termites have a significant impact on the nutrient cycling and renewal of that soil. This, when combined with micromorphological research, further supports the crucial role that termites play in these processes. They ought to be taken into account when discussing soil. The information provided here supports the role that termites play in ecosystems and soils, but more research is required before we can draw firm conclusions.

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