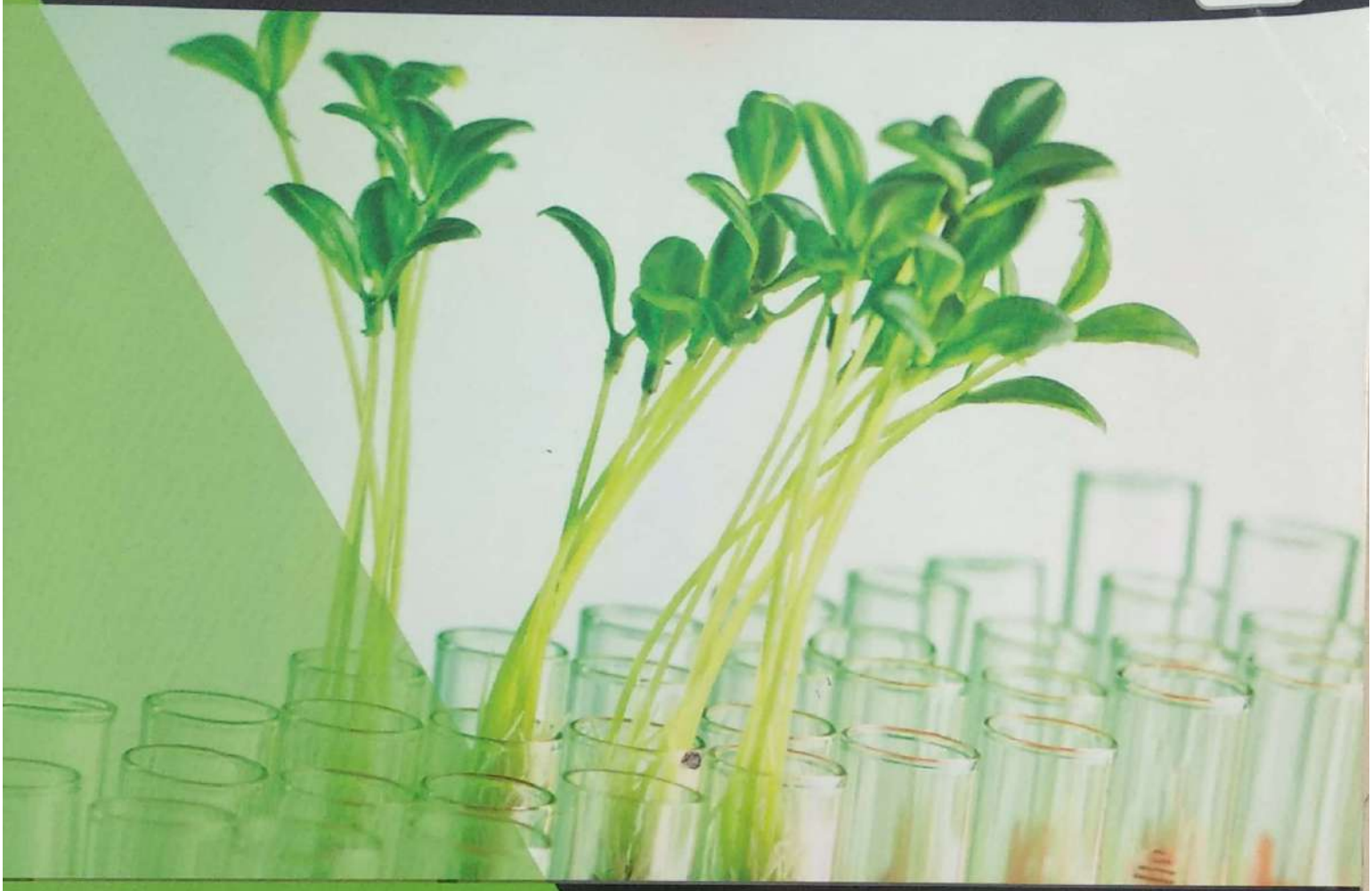
Conference Proceedings



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Editors:
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LIST OF FULL LENGTH PAPERS

THE NUTRIENT DYNAMICS OF TERMITES MOUND SOIL AND ADJACENT SOILS

V. Sijina,[1] M. P Deepthi,[1] R. Chisty Shaila,[1] K. Saminathan[2] and P. Kathireswari*[1]

Abstract

The influence of soil organisms on the availability of nutrients to other biota within ecosystem can be content dependent. In this work the advances made in our knowledge of the effects of termites on the physicochemical properties of soils when compared to the adjacent soil. Soil samples were collected from the inner parts of termite's mounds and also adjacent soils in Palakkad district, Kerala. Generally, termite activities in the soil affect the nutrient and organic matter dynamics and also the productivity of the ecosystem via carbon sequestration, nutrient recycling as well as some properties of the soil.

Introduction

Termites are social insects of the order Isoptera with about 3,000 known species, of which 75% are classified as soil-feeding termites. They are predictable as "ecosystem engineers"(Dangerfield et al., 1998) because they promote soil transformations by their degradation processes. Construction of mounds from mixture of soil and other material within soil horizons must affect the physical and chemical characteristics of both the soil used for construction and the soil of the surrounding areas from which the materials are derived (Lee and Wood, 1971).The present study is to assess the termite activity and understand its impacts on soil properties in different locations viz., Orrapadam, Nellikad, Matumandha, and Mathurregions of Palakkaddistrict, Kerala.

Materials and Methods

The field experiment was done within the limits of Palakkad district during rainy season in the month of June 2017. Different areas having termite infestation were observed and four sites were selected to set up different experiments in the Oorapadam, Nellikad, Mathumandha and Mathur regions of Palakkad District, Kerala. About half kg of soil was collected in polythene bags and sent to District Soil testing laboratory, Thikkoti, Kozhikode in Kerala for analyzing the pH, TSS, Organic carbon (Colorimetry. Walkley Black digestion method, 1934), macro nutrients viz., Nitrogen, Phosphorous (Colorymetry Bray's method. 1948) and Potassium (Flame photometry) and micro-nutrients viz., Zinc, Copper, Manganese and Iron analyzed by Atomic Absorption Spectrophotometry

The results were analyzed and interpreted to observe the enrichment of termite mount soil in comparison with control soil.

Results and Discussions

In the present study the soil samples were collected from four different sites in Palakkad district showed that the pH was mostly acidic and slightly increased in termite mound soil when compared to the surroundings soil except sample D1 and D2. The changes in pH depend upon species and soil types. From the table (1) the TSS value of sample get little increased in B1 than adjacent soil B2. In sample A1 and A2 remains constant. In case of sample C and D the TSS value get decreased. The decreased amount of TSS in termite soil may be due to heavy rain and other climatic factors. Organic Carbon content in the mound soil sample shows lesser than the adjacent soil samples and it shows that termites can able to store less OC content than that of the adjacent soil. OC content may get reduced in termite mount samples than adjacent soils may be due to the gut microbial process of termites and its respiratory activity.

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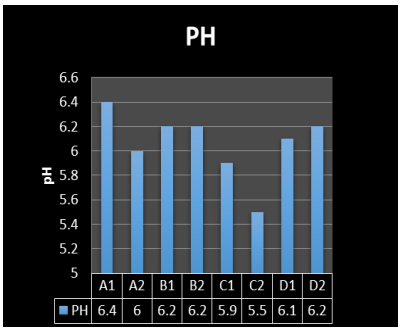
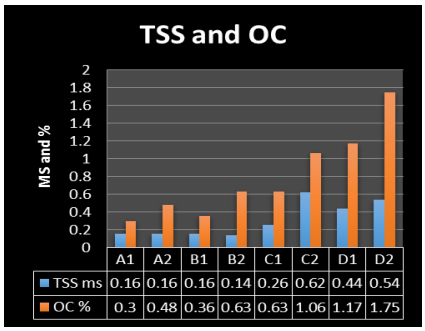
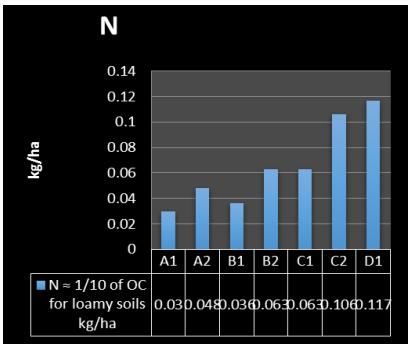


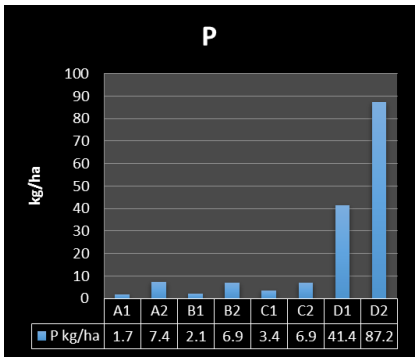
Graph-1: showing pH



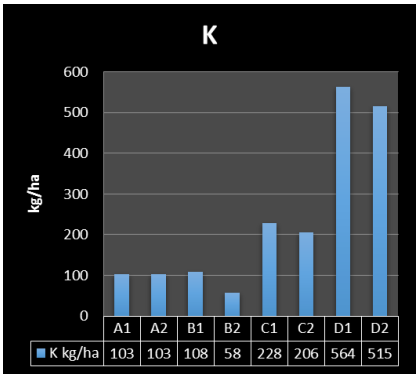
Graph-2: showing TSS& OC



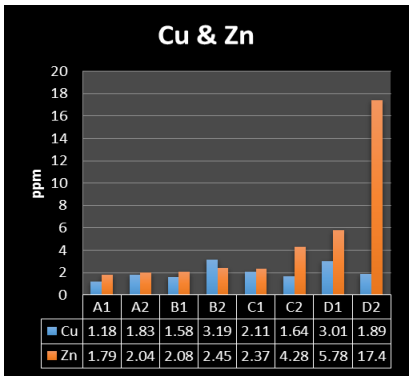
Graph-3: showing available Nitrogen



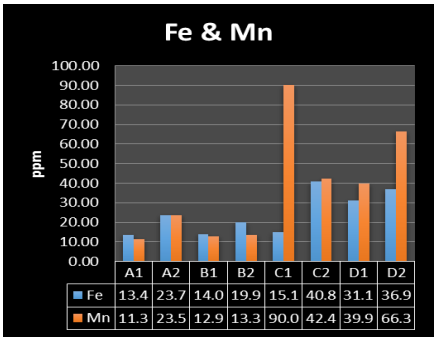
Graph-4: showing available phosphateavailable Nitrogen



Graph-5: showing available potassiumavailable Nitrogen



Graph-6: showing micronutrients Cu& Znshowing available potassiumavailable Nitrogen



Graph-7: showing micronutrients Fe& Mn

Footnotes

A1=Kodumbu Mound Soil /A2=Adjacent Soil
B1=Nellikadu Mount Soil /B2=Adjacent Soil
C1=Matumandha Mount Soil /C2=Adjacent Soil
D1=Mathur Mount Soil /D2=Adjacent Soil

The level of potassium in mound soils is lesser than the adjacent soil samples because of heavy rain during the time of soil collections. The main role of K is to provide the ionic environment for metabolic processes which regulates various processes including growth regulation. Nitrogen is as necessary macronutrient for the plant growth and key regulator of ecosystem processes (Paster et.al, 1984). The increased N causes acidification and eutrophication (Linda et.al, 2010). The Phosphorus was found to be higher in surrounding soil than the mound soil in all samples may also because of heavy rain during sample collections and due to less mineralization in the gut of termites.

Table (1) shows that amount of zinc, copper, Manganese, Iron are lesser in mound soil than adjacent soil in all samples may be due to heavy rain during sample collections and further study needed to conform in different seasons. Zinc is essential for plant such as production of auxins, activates enzymes in protein synthesis, regulation and consumption of sugars, starch formation and root development. It is necessary for the formation of chlorophyll and carbohydrates. The copper is essential for plant such as a catalyst in photosynthesis, respiration, several enzyme systems for carbohydrate and protein metabolism. It is important for the formation of lignin in plant cell walls. Copper also affects the flavor, the storage ability and the sugar content of fruits. Manganese is essential for many enzymatic reactions involved in metabolize of organic acids. Manganese along with Fe plays role in the formation chlorophyll in plants. Nutrients level is lesser in mound soil than the adjacent soil shows variation in result when compared to other research papers (Dangerfield,et. al, 1998),(Abbadie,et,al, 1989),(Arshad et. al,1982),(Hesse et. al,1955) and (Anderson et.al,1984) that we verified that may due to heavy rain and we further concentration in different seasons in soil nutrient dynamics.

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