

Research Title: A Study of the Relationship between Soil Properties and Biodiversity in a Tropical Rainforest: A Case Study of Thung Khai Botanical Garden, Trang Province

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Abstract

A study of the relationship between soil properties and biodiversity in a tropical rainforest: within Thung Khai Botanical Garden, Trang Province. This study aimed to analyze the relationship between soil properties, namely pH value, moisture, and soil structure, and the diversity of soil organisms within the tropical rainforest area of Thung Khai Botanical Garden, Trang Province.

This study was conducted by: 1) collecting soil samples from randomly selected areas in the tropical rainforest of Thung Khai Botanical Garden; analyzing soil properties such as pH value, moisture, and soil structure; and collecting and classifying soil organisms.

From the preliminary survey conducted in the tropical rainforest area within Thung Khai Botanical Garden, Trang Province, it was found that the soil had high moisture content, a pH value close to neutral, and a granular soil structure, which are favorable for the survival of various soil organisms. In particular, organisms in the groups of social insects and decomposers, such as ants, termites, and earthworms, were found in relatively high abundance compared to other organisms. This indicates that the soil environment in the study area is suitable for supporting soil organism diversity.

Keywords: soil properties, biodiversity, tropical rainforest

Introduction

Soil is a natural resource that plays a vital role in ecosystems. It not only serves as a medium supporting plant growth but also sustains the lives of a wide variety of organisms that help maintain balance in nature. Soil functions as a reservoir for nutrients, water, and energy, and also provides a habitat for living organisms and the cycling of organic matter, thereby supporting biodiversity within ecosystems.

The diversity of soil organisms, such as earthworms, termites, insects, larvae, and other organisms, is an important factor contributing to soil quality and ecosystem functioning. Nutrient cycling, organic matter decomposition, and the restoration of soil structure are all outcomes of the activities of soil organisms. These relationships reflect the importance of soil organisms to soil health and overall ecosystem integrity.

Studies on soil organisms also enhance understanding of soil management and conservation in order to maintain soil properties that are suitable for sustaining life within ecosystems. Environmental factors such as moisture level, temperature, and soil pH influence the distribution and functioning of soil organisms. Appropriate management of these environmental factors is therefore essential for maintaining long-term soil health.

This study aims to gain an understanding of soil properties, namely pH value, moisture, and soil structure, that affect the diversity of soil organisms in Thung Khai Botanical Garden.

Therefore, the researchers are interested in studying the relationship between soil properties and the diversity of soil organisms in a tropical rainforest within Thung Khai Botanical Garden, Trang Province. The findings are expected to enhance knowledge of important natural processes and to support the planning and implementation of sustainable natural resource conservation in the future.

Research Question

In Thung Khai Botanical Garden, Trang Province, is there a relationship between soil properties and the diversity of soil organisms in a tropical rainforest?

Research Hypothesis

In Thung Khai Botanical Garden, Trang Province, there is a relationship between soil properties and the diversity of soil organisms in a tropical rainforest.

Materials and Research Methodology

Independent Variables : - Soil quality, including:

- Soil pH
- Soil moisture
- Soil temperature
- Soil structure

Dependent Variable : - Diversity of soil organisms

Controlled Variables : - Time and season of sample collection

- Methods of soil and organism sampling
- Size of the sampling area
- Analysis of soil properties such as pH, temperature, soil structure, and moisture
- Research area

Materials

1. Soil sampling tools

- 1) Shovel
- 2) Soil sample collection bags

2. Instruments for measuring soil properties

- 1) pH indicator paper
- 2) Soil moisture meter
- 3) Thermometer
- 4) Soil structure chart

3. Tools for collecting soil organisms

- 1) Sampling funnel
- 2) Transparent plastic containers
- 3) Random sampling grid
- 4) Camera

Research Procedure

Determination of Study Sites

The study sites were designated within the tropical rainforest area of Thung Khai Botanical Garden, Trang Province, at latitude 7.46962° North and longitude 99.64234° East.

Part 1: Study of Soil Properties

1.1 Select three nearby tropical rainforest sites within Thung Khai Botanical Garden.

1.2 Use a random sampling grid to determine soil sampling locations in order to obtain unbiased data.

1.3 Collect soil samples and place them in sample collection bags.

1.4 Analyze soil structure using a soil structure chart.

1.5 Measure soil temperature using a thermometer.

1.6 Measure soil moisture from the soil samples using a soil moisture meter.

1.7 Mix soil and water samples at a ratio of 2:1 and measure the pH using pH indicator paper.

1.8 Record the obtained data in tables.

Part 2: Study of Soil Organism Diversity

2.1 Place the random sampling grid on the study area.

2.2 Observe characteristics and record photographs of the organisms found.

2.3 Separate soil organisms, count their numbers, and classify the types of soil organisms.

2.4 Record the obtained data.

Research Results

Measurement of Soil Properties

Table 1 shows the soil quality.

Sampling Point	pH Value	Moisture	Temperature	Soil Structure
1	7	79	28	Granular Structure
2	6	76	29	Granular Structure
3	7	81	27	Granular Structure
Average	6.66	78.66	28	

From the table

it was found that the soil in the tropical rainforest had a granular structure, with an average pH value of 6.66, an average moisture level of 78.66, and an average temperature of 28 degrees Celsius.

Table 2 shows the diversity of organisms found

No.	Organisms Found	Quantity
1	Millipede	1
2	Ant	≈ 200
3	Termite	≈ 1,000

No.	Organisms Found	Quantity
4	Scavenger (Detritivore)	2
5	Short-jawed Beetle	1
6	Cicada Beetle	2
7	Earthworm	18
8	Pill Bug (Woodlouse)	1

From the table

it was found that a total of eight species of soil animals were identified, namely millipede, ant, termite, scavenger (detritivore), short-jawed beetle, cicada beetle, earthworm, and pill bug.

Conclusion and Discussion

From the study, it was found that the soil quality in the tropical rainforest exhibited a granular soil structure. The soil had an average pH value of 6.66, indicating slightly acidic conditions, with high relative moisture and an average temperature of 28 degrees Celsius. A total of eight soil animal species were identified: millipede, ant, termite, scavenger (detritivore), short-jawed beetle, cicada beetle, earthworm, and pill bug.

Recommendations

It is recommended that future studies investigate the effects of air quality in tropical rainforests on the diversity of living organisms.

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