

Title of Research

A Comparison of Soil Quality in Areas with the Growth of Foxtail Palm, Banana, and Mango Trees at Ban Thung Na School, Trang Province

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Abstract

This environmental science research study entitled “*A Comparison of Soil Quality in Areas with the Growth of Foxtail Palm, Banana, and Mango Trees at Ban Thung Na School, Trang Province*” aimed to:

1. compare soil structure in areas where foxtail palm, banana, and mango trees grow;
2. compare soil temperature in those areas;
3. compare soil moisture; and
4. compare soil pH levels.

Measurements were conducted on soil structure, soil temperature, soil moisture, and soil pH. The results showed that soil moisture under mango trees was the highest (23.33%), possibly due to the wide canopy that provides shade and reduces water evaporation, as well as the lowland location near a pond. Soil under foxtail palm trees had the lowest moisture content (10.22%) because the palm has a sparse canopy and is planted in an open area near the football field, allowing direct sunlight to reach the soil and causing moisture loss.

Soil temperature showed a clear inverse relationship with soil moisture. Soil under foxtail palm trees had the highest temperature (30.22°C), corresponding to its low moisture content. Soil under banana trees had the lowest temperature (27.56°C). Although banana soil had lower moisture than mango soil, its temperature was lower, possibly due to water storage in the banana stem and leaf arrangement that effectively shades the soil surface. Additionally, banana trees were planted behind a school building, which helped block sunlight.

Soil pH values at all three sites ranged from strongly acidic to moderately acidic (5.44–5.67). Soil under foxtail palm and banana trees had the same pH value (5.67), while soil under mango trees was slightly more acidic (5.44). These pH levels are typical for soils in southern Thailand and are suitable for the growth of all three plant species (general optimal range: 5.5–6.5).

Keywords: Soil quality, soil structure, soil temperature, soil moisture, soil pH

Research Questions

1. Do soil structures differ in areas where foxtail palm, banana, and mango trees grow? How?
 2. Do soil temperatures differ in these areas? How?
 3. Does soil moisture differ in these areas? How?
 4. Does soil pH differ in these areas? How?
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Research Hypotheses

1. Soil structure differs among areas where foxtail palm, banana, and mango trees grow.
 2. Soil temperature differs among these areas.
 3. Soil moisture differs among these areas.
 4. Soil pH differs among these areas.
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Study Area

The study area was Ban Thung Na School, Mueang District, Trang Province (Latitude 7.6937, Longitude 99.7387). The area is a mixed garden with grass-covered soil. Soil quality measurements were conducted in areas where foxtail palm, banana, and mango trees grow.

Data Collection

Data were collected following soil measurement protocols focusing on soil structure, soil temperature, soil moisture, and soil pH.

Duration of Data Collection

Data were collected three times at one-week intervals from December 2025 to January 2026.

Materials and Equipment

1. Thermometer
 2. Soil moisture meter
 3. Light intensity meter
 4. Cu Smartlens
 5. GLOBE Observer Application
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Introduction

Soil plays a vital role in living organisms and the environment. It serves as a habitat for organisms and microorganisms, a water reservoir, and a foundation for agriculture and human livelihoods. Soil quality is therefore important for plant cultivation. Ban Thung Na School has a mixed garden with various plant species. The researchers were interested in comparing soil quality in areas where foxtail palm, banana, and mango trees grow.





Methodology

2.1 Soil Structure

Physical soil samples were collected and soil structure was studied by comparing soil charts in areas where foxtail palm, banana, and mango trees grow.

2.2 Soil Temperature

Soil temperature was measured using a thermometer at a depth of 10 cm. Data were collected three times at each site.

2.3 Soil Moisture

Soil moisture was measured using a multipurpose meter at a depth of 5 cm. Data were collected three times at each site.

2.4 Soil pH

Soil pH was measured using a multipurpose meter at a depth of 5 cm. Data were collected three times at each site.



Results

Soil Structure

Soil in all three study areas had a granular structure.

Soil Temperature (°C)

- Foxtail palm: 30.22
- Banana: 27.56
- Mango: 29.89

Soil Moisture (%)

- Foxtail palm: 10.22
- Banana: 17.78
- Mango: 23.33

Soil pH

- Foxtail palm: 5.67
- Banana: 5.67
- Mango: 5.44

Summary and Discussion

Soil moisture under mango trees was the highest due to canopy coverage and proximity to a water source, while soil under foxtail palm trees had the lowest moisture due to exposure to direct sunlight. Soil temperature showed an inverse relationship with moisture. Soil pH values were similar across all sites and reflected the same geological soil group.

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