

A Comparative of Soil Quality in Oil Palm and Rubber Plantations in Trang Province



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Abstract

This research aims to compare soil quality in productive oil palm and rubber plantations by analyzing various soil parameters, including pH level, nitrogen, phosphorus, potassium content, soil temperature, moisture, color, and texture. The study reveals that the soil in rubber plantations is classified as sandy loam, whereas the soil in oil palm plantations is sandy clay loam. The soil in both locations exhibits a similar dark brownish-red color. The soil pH in rubber plantations is neutral, while in oil palm plantations, it is slightly alkaline. The nitrogen, phosphorus, and potassium content is higher in rubber plantations than in oil palm plantations. The average soil temperature in rubber plantations is lower than in oil palm plantations, whereas soil moisture is higher in rubber plantations. The findings highlight significant differences in soil quality between these two plantation types.

Keywords: Soil Quality, Oil Palm Plantation, Rubber Plantation

Introductions

Trang province is a key agricultural area in Thailand, particularly for economic crops like oil palms and rubber trees, which are major income sources for local farmers. However, continuous land use without soil restoration may lead to soil degradation. The different cultivation method such as chemical fertilizer use and water management—affect soil quality.

Studying soil quality is crucial for assessing the impact of these crops and helping farmers implement sustainable soil management strategies. Understanding soil conditions can contribute to better agricultural planning and productivity.

Research Questions

Do soil quality characteristics differ between productive oil palm and rubber plantations in Trang province?

Research Hypothesis

Soil quality in productive oil palm and rubber plantations differs in Trang province.

Variables

Independent variable: Soil from oil palm and rubber plantations in Trang province

Dependent variable: Differences in soil quality

Controlled variables: Testing methods and equipment used

Materials and Equipments



Soil fertility test



Test tube holder



pH paper



Thermometer

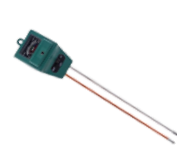
Glassware



Distilled water



Spray bottle



Spray bottle



Munsell Soil Color Book

Study Locations

Rubber Plantation: Mueang District, Na bin la Subdistrict, Trang Province (Latitude: 7.525963°N, Longitude: 99.660708°E).

Oil Palm Plantation: Na Yong District, Na Muen Si Subdistrict, Trang Province (Latitude: 7.6130969°N, Longitude: 99.6796038°E).



Rubber Plantation



Oil Palm Plantation

Research Methodology

1. Soil pH Measurement – Using pH test strips, measured three times and averaged.
2. NPK (Nitrogen, Phosphorus, Potassium) Measurement – Using a soil parameter sensor, measured three times and averaged.
3. Soil Temperature Measurement – Measured at 10 cm depth using a soil thermometer, three times and averaged.
4. Soil Moisture Measurement – Measured at 10 cm depth using a moisture meter, three times and averaged.
5. Soil Color Comparison – Using a soil color comparison chart.
6. Soil Texture Analysis – Based on field soil texture guides.

Research Findings

Soil pH Measurement

Location	Default depth-last	The pH value			Average
		1 st time	2 nd time	3 rd time	
Rubber Plantation	15 cm.	7	7	7	7
Oil Palm Plantation	15 cm.	6	6	6	6

Picture 1 Shows the average pH value of the soil in the rubber plantation area is higher than that in the oil palm plantation area.

Soil NPK measurement

Location	Default depth-last	Soil fertility	Measurement time			Average
			1 st time	2 nd time	3 rd time	
Rubber Plantation	7 cm.	Nitrogen	4	8	6	6
		Phosphorus	4	8	8	5.33
		Potassium	4	8	8	6.67
Oil Palm Plantation	7 cm.	Nitrogen	5	3	3	3.67
		Phosphorus	6	4	4	4.67
		Potassium	8	8	6	7.33

Picture 2 Shows the average NPK mineral content of the soil in the rubber plantation area is higher than that in the palm plantation area.

Soil Temperature Measurement

Location	Default depth-last	Soil Temperature (°C)			
		1 st time	2 nd time	3 rd time	Average
Rubber Plantation	10 cm.	28.00	31.00	31.00	30.00
Oil Palm Plantation	10 cm.	32.00	33.00	33.00	32.67

Picture 3 Shows the soil temperature in rubber plantations is lower than in oil palm plantations.

Soil Moisture Measurement

Location	Default depth-last	Soil Moisture			Average
		1 st time	2 nd time	3 rd time	
Rubber Plantation	10 cm.	8	9	8.5	8.5
Oil Palm Plantation	10 cm.	9.5	10	10	9.83

Picture 4 Shows the average soil moisture in the rubber plantation area is lower than in the palm plantation area.

Soil Color & Soil Texture Comparison

Location	Default depth-last	Soil Texture	Soil Color
Rubber Plantation	15 cm.	Sandy Loam (Coarse, slightly sticky)	Dark Brown with a Reddish Tint
Oil Palm Plantation	15 cm.	Sandy Clay Loam (Slightly soft, sandy, gritty)	Dark Brown with a Reddish Tint

Picture 5 Shows the soil color of rubber tree plantations and palm oil plantations is a dark brownish-red, similar to each other. However, the soil in rubber tree plantations feels rough to the touch and is sticky to the fingers, not slippery or sticky. In contrast, the soil in palm oil plantations feels slightly soft to the touch, with a sandy and gritty texture.

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Discussion and conclusions

The study found that the soil quality of the rubber plantation in Mueang District, Na Bin La Subdistrict, and the palm plantation in Na Yong District, Na Muen Si Subdistrict, revealed that the soil in the rubber plantation area is sandy loam, while the soil in the palm plantation area is clayey loam. The soil color in both areas is the same, being dark brown with a reddish hue. The pH level of the soil in the rubber plantation is neutral, while the pH level in the soil of the palm plantation is alkaline. The nitrogen, phosphorus, and potassium levels in the soil of the rubber plantation are higher than those in the soil of the palm plantation. The average soil temperature in the rubber plantation area is lower than that of the palm plantation, and the soil moisture in the rubber plantation area is higher than in the palm plantation. The research results indicate that the soil quality in both the palm and rubber plantations that have already produced yields in Trang Province differs in some aspects but is similar in others.