Research Reports

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

1. Sieved soil sample
2. Soil fertility test kit for determining N, P, and K values
3. Distilled water
4. Teaspoon
5. Test tube or cup holder
6. Soil characteristic measurement record sheet
7. pH paper or pH meter
8. Glassware
9. Equipment for soil color testing
10. Soil color comparison chart
11. Spray bottle
12. Soil thermometer (needle-type or digital)
13. Nail or guiding rod at least 12 cm long
14. Hammer
15. Plastic tubes for holding the thermometer while measuring temperature (7 cm and 12 cm long)
16. Standard reference thermometer
17. Wrench for adjusting the thermometer dial

18. Clock or timer
19. Digital scale with 0.1 g precision, capable of measuring at least 400 g
20. Field soil texture assessment manual

Research Methodology

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).

Part 1: To Study the Soil Acidity and Alkalinity in Productive Oil Palm and Rubber Plantations in Trang Province

Part 2: To Study the Soil Nutrients (NPK) in Productive Oil Palm and Rubber Plantations in Trang Province

Part 3: To Study the Soil Temperature in Productive Oil Palm and Rubber Plantations in Trang Province

Part 4: To Study the Soil Moisture in Productive Oil Palm and Rubber Plantations in Trang Province

Part 5: To Study the Soil Color in Productive Oil Palm and Rubber Plantations in Trang Province

Part 6: To Study the Soil Texture in Productive Oil Palm and Rubber Plantations in Trang Province

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

Table 1 Shows the soil pH values in rubber plantations located in Mueang District, Na Bin La Subdistrict, and in oil palm plantations located in Na Yong District, Na Muen Si Subdistrict.

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

According to the table, the average pH value of the soil in the rubber plantation area is higher than that in the oil palm plantation area.

Table 2 Show the mineral content of Nitrogen, Phosphorus, and Potassium (NPK) for the rubber plantation in Mueang District, Na Bin La Subdistrict,and the oil palm plantation in Na Yong District, Na Muen Si Subdistrict.

Location	Default depth-last	Soil fertility	Measurement time			Average
			1st time	2nd time	3rd time	
Rubber Plantation	7 cm.	**Nitrogen**	4	8	6	6
		Phosphorus	4	6	6	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

According to the table, The average NPK mineral content of the soil in the rubber plantation area is higher than that in the palm plantation area.

Table 3 Show the soil temperature of the rubber plantation in Mueang District, Na Bin La Subdistrict, and the oil palm plantation in Na Yong District, Na Muen Si Subdistrict.

Location	Default depth-last	Soil Temperature (°C)			
		1st time	2nd time	3rd 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

According to the table, The soil temperature in rubber plantations is lower than in oil palm plantations.

Table 4 Show the soil moisture of the rubber plantation in Mueang District, Na Bin La Subdistrict, and the oil palm plantation in Na yong District, Na Muen Si Subdistrict.

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

According to the table, The average soil moisture in the rubber plantation area is lower than in the palm plantation area.

Table 5 Show the soil type and color of the rubber plantation area in Mueang District, Na Bin La Subdistrict, and the oil palm plantation in Na Yong District, Na Muen Si Subdistrict.

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

According to the table, 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.

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.

Acknowledgment

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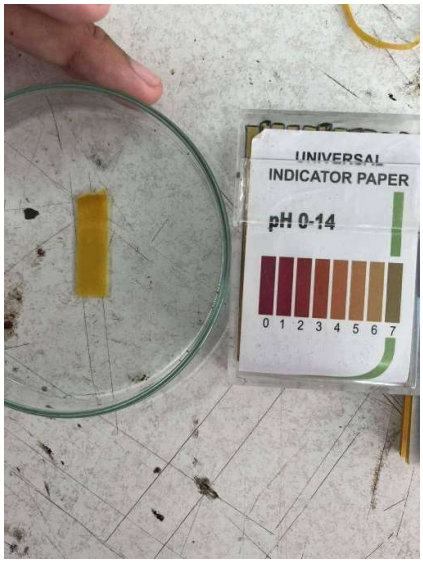
Appendix


Soil Parameter Sensor
6
SET


Soil Parameter Sensor
4
SET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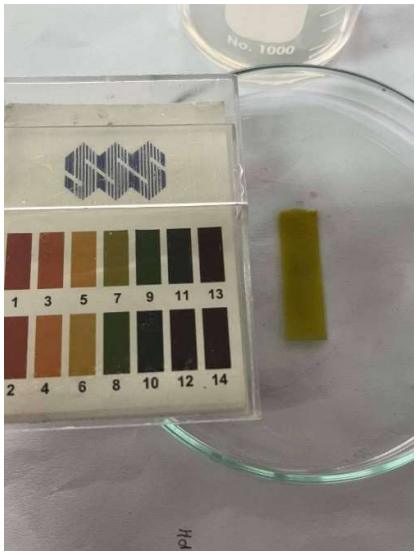
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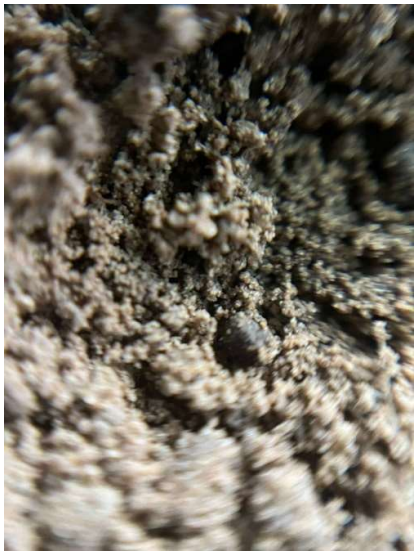


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