Study on Soil Quality in an Oil Palm Plantation in Areas with Accumulated Palm Leaves and Palm Fronds, Thung Khai Subdistrict, Yantakhao District, Trang Province

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Abstract :
This study examines soil quality in an oil palm plantation in Trang Province, focusing on fertility, structure, moisture, temperature, and nutrient content (N, P, K). The soil is sandy loam with loose adhesion. Soil temperature and moisture levels vary with depth, with higher moisture under palm fronds. Nutrient levels decrease with increasing distance from fronds. The findings highlight the role of palm fronds in maintaining soil quality, which is crucial for sustainable palm cultivation, especially in drought-prone areas.

Introduction : The study focusesa on soil quality in an oil palm plantation in Trang Province, where drought conditions impact palm growth. Farmers use mulching with organic materials like palm fronds to retain soil moisture. Prolonged dry seasons can harm palm development, reducing yield. The research analyzes soil characteristics, including nutrients (N, P, K), pH, moisture, and structure, to understand how palm fronds influence soil quality and support sustainable palm farming.

Research Question:
Does the accumulation of palm fronds affect soil quality?

Hypothesis :
The accumulation of palm fronds affects soil quality.

Materials and Equipment :
1. Beaker
2. Chemical balance
3. Measuring spoon
4. Field guide for soil texture classification by hand feel method
5. Soil thermometer
6. Soil moisture and pH meter
7. Measuring tape
8. Soil fertility test kit
9. Tissue paper
10. Soil aggregation comparison chart
11. NPK soil test meter

Research Methodolog :
Designate study points in the palm garden area, Thung Khai Subdistrict, Yan Ta Khao District, Trang Province.
Coordinates are 7.483109°N, 99.645900°E.

Study soil sample collection in order to study soil quality :
1. Check the soil structure By collecting soil samples as desired and examining them with a soil structure sample diagram, recording the results
2. Measure the temperature of the soil. By using a soil thermometer Embroidered to the surface of the soil and depth 15 cm. Read the values and save the results
3. Measure soil moisture by using a soil moisture meter. Embroidered to the soil surface and depth 15 cm. Read the values and save the results
4. Measure acidity-base (pH) using a pH meter in the soil. Embroidered on the soil area to be tested. Read the values and record the results
5. Measure the N,P and K elements of the soil by taking the NPK detectors and placing them in the collected soil sample and reading the values and recording the results

Research results

Soil collection point	1	2	3	Average value	SD
Soil texture (surface)					
Under the palm	Sand mixed with water	Sandblasted	Sand mixed with water	Sand mixed with water	
Tail 30 cm.	Sand mixed with water	Sand mixed with water	Sand mixed with water	Sand mixed with water	
Tail 60 cm.	Sand mixed with water	Sand mixed with water	Sand mixed with water	Sand mixed with water	
Soil texture (15cm.)					
Under the palm	Gummy and sandy	Gummy and sandy	Gummy and sandy	Gummy and sandy	
Tail 30 cm.	Sand mixed with water	Sand mixed with water	Gummy and sandy	Sand mixed with water	
Tail 60 cm.	Sand soil	Sand mixed with water	Sand mixed with water	Sand mixed with water	
Soil temperature (soil surface)					
Under the palm	22	22.3	22	22.1	0.17321
Tail 30 cm.	23	23	22.8	22.93	0.11547
Tail 60 cm.	23	24	23	23.33	0.57735
Soil temperature (15cm. deep)					
Under the palm	22	22	21	21.67	0.57735
Tail 30 cm.	21	22	22	21.67	0.57735
Tail 60 cm.	24	23	23	23.33	0.57735
Moisture value (surface)					
Under the palm	1	1	2	1.33	0.57735
Tail 30 cm.	0	0	1	0.33	0.57735
Tail 60 cm.	0	0	0	0	0
Moisture value (15 cm. deep)					
Under the palm	2	1.5	3	2.17	0.76376
Tail 30 cm.	1.5	2	1.5	1.67	0.28868
Tail 60 cm.	1	1.5	1	1.17	0.28868
pH value					
Under the palm	7.6	7.5	7.3	7.46	0.15275
Tail 30 cm.	7.6	7.4	7.3	7.43	0.15275
Tail 60 cm.	7.5	7.4	7.2	7.36	0.15275

N,P,K value (15cm depth)

Soil collection point	N			P			K			Average	SD
	Point			Point			Point				
	1	2	3	1	2	3	1	2	3		
Under the palm	1	0	0	1	0	0	2	1	1	0.67	0.70711
Tail 30 cm	1	0	0	1	0	0	2	1	1	0.67	0.70711
Tail 60 cm	2	1	0	0	0	0	4	2	1	1.11	1.36423

N,P,K (surface)

Soil collection point	N			P			K			Average	SD
	Point			Point			Point				
	1	2	3	1	2	3	1	2	3		
Under the palm	1	2	3	0	3	5	2	7	13	4	3.96863
Tail 30 cm	0	0	1	0	0	1	0	1	5	0.89	1.61589
Tail 60 cm	0	0	0	0	0	0	0	0	2	0.22	0.66667

Conclusion and Discussion :
The study found that soil under palm fronds is classified as clayey loam with sand, while soil further away is sandy loam. Soil temperature and moisture are highest under palm fronds and decrease with distance. Nutrient levels (N, P, K) are also highest under the fronds, indicating that palm frond accumulation improves soil quality.

Reference documents :

- Sources of information on soil quality studies
Department of Land Development (2007) Final Research Report: The Effect of Ground Cover on the Chemical and Physical Properties of Soil in Oil Palm Plantations
Searched from : https://e-library.ldd.go.th/library/Research/Fulltext/bib10504.pdf