Comparison of Soil Quality Affecting Latex Yield in Rubber Plantations During the Summer and Rainy Seasons Na Khao Sia Subdistrict, Na Yong District, Trang Province

Researchers : Miss Thapanee Ontuk
Miss Thanchanok Sengsiang
Grade Level : Matthayom 5

Advisors : Ms. Sutheera Thacheen
Ms. Khwanjai Kanjanasrimek
School : Wichienmatu School, Trang Province

Abstract

This study aimed to compare soil quality factors affecting latex yield in rubber plantations during the summerand rainy seasons in Na Khao Sia Subdistrict, Na Yong District, Trang Province. The research was conducted by measuring soil quality parameters based on GLOBE protocols, including soil temperature, pH, moisture content, and fertility.The findings indicated that latex yield in rubber plantations was higher during the rainy season compared to the summer. The average soil temperature was higher in summer, while soil moisturelevels were greater in the rainy season. The soil pH in the rainy season was higher than in the summer. Regarding soil fertility, potassium levels increased during the rainy season compared to the summer, while nitrogen and phosphorus levels remained relatively stable across both seasons.

Introduction

Rubber trees are an important economic crop that significantly contributes to the country's economy. Rubber plantations generate substantial income for farmers (Rubber Research Institute, 2012). Rubber cultivation covers approximately 90% of the suitable land area in Thailand (Land Development Department, 2000) and can be grown in all regions of the country. However, soil quality and fertility vary by location and season.Soil quality is a key factor indicating soil fertility in rubber plantations and plays a crucial role in determining latex yield. Understanding how soil conditions impact latex production can help improve soil management practices to maximize yield. Natural rubber serves as a raw material for various industrial applications, from major manufacturing sectors to smaller industries. Processed rubber can be categorized into two main groups:1.Solid Rubber, such as block rubber, air-dried sheet rubber, and smoked sheet rubber.2.Liquid Rubber, which is used in products like adhesives, tire production, and everyday rubber-based items.Currently, rubber production is in high demand. However, studies show that latex yield varies among rubber trees, and soil conditions are one of the key factors influencing this variation. Planting rubber trees in unsuitable or infertile soil can negatively impact latex production. This research aims to study the impact of soil quality on latex yield in rubber plantations, providing insights that can help improve soil conditions for optimal rubber production.

Research Question

Does soil quality affect latex yield in rubber plantations during the summer and rainy seasons in Na Khao Sia Subdistrict, Na Yong District, Trang Province?

Research Hypothesis

Differences in soil quality affect latex yield in rubber plantations during the summer and rainy seasons in Na Khao Sia Subdistrict, Na Yong District, Trang Province.

materials and equipment

Research Methodology

1.Preparation Phase

1.)Identify the research topic and select the focus of the study.

2.)Conduct a literature review and gather relevant knowledge and theories related to the research.

3.)Define the objectives of the study.

2.Implementation Phase

1.)Develop a research work plan.

2.)Measure soil quality using the GLOBE methodology by assessing soil temperature, pH, moisture content, and soil fertility (N, P, K) during the rainy season (November to December) and summer season (January) as follows: 1.)Measure soil temperature at three points using a thermometer, record the temperature readings three times, and calculate the average.2.)Measure soil moisture using a moisture meter, record the moisture readings three times, and calculate the average.3.)Measure soil pH using litmus paper: Take 20 ml of soil and place it in a beaker, then add water to the beaker until the total volume reaches 50ml. Mix the water and soil thoroughly.Fold filter paper and place it in a funnel. Put the funnel with the filter paper into an Erlenmeyer flask, then pour the water-soil mixture onto the filter paper in the funnel without overflowing.Use litmus paper to measure the pH of the filtered water in the flask by dipping the litmus paper into the water, then compare the pH using a pH scale.

4. Measure soil fertility (N, P, K) using a soil N, P, K meter to record the nutrient levels in the soil.

Research Results

Table 1: Geographic Coordinates of the Study Area

Study area	Geographicalcoordinates	
	Latitude (N)	Longitude (E)
The river plantation area in Na Khao Sia Subdistrict, Na Yong District, Trang Province.	7.54631	99.69145

Table 3 shows the soil temperature values during the summer and rainy season

Soil sample	Soil temperature (Celsiusdegrees)							
	Summer season				Rainy Season			
	Trial 1	Trial 2	Trial 3	Average	Trial 1	Trial 2	Trial 3	Average
Spot 1	30.1	29.7	30.0	29.93	26.0	26.0	26.0	26.0
Spot 2	29.8	30.1	29.7	29.87	26.0	27.0	26.0	26.3
Spot 3	29.8	30.0	29.8	29.87	26.0	26.0	26.0	26.0

From Table 3, it was found that the average soil temperature at all three points during the summer was higher than the average soil temperature during the rainy season.

Table 4 shows the soil moisture values during the summer and raing seasons.

Soil sample	Soil moisture (percentage)							
	Summer season				Rainy season			
	Trial 1	Trial 2	Trial 3	Average	Trial 1	Trial 2	Trial 3	Average
Spot 1	2.0	3.0	3.5	2.83	2.0	2.5	2.0	2.17
Spot 2	3.0	3.0	2.5	2.83	2.5	4.0	2.5	3.00
Spot 3	2.0	3.5	2.0	2.50	4.0	3.0	6.0	4.33

From Table 4, it was found that the area with the highest soil moisture was Point 3 during the rainy season, followed by Point 1 and Point 2 during the summer, and Point 2 during the raing season. Next was Point 3 during the summer, while the area with the lowest soil moisture was Point 1 during the raing season.

Table 5 shows the soil pH values during the summer and rainy seasons.

Soil sample	Soil pH							
	Summer season				Rainy season			
	Trial 1	Trial 2	Trial 3	Average	Trial 1	Trial 2	Trial 3	Average
Spot 1	7	6	6	6.67	6	6	6	6.00
Spot 2	6	6	5	5.67	4	5	5	4.67
Pot 3	7	6	7	6.67	6	7	6	6.33

From Table 5, it was found that the average pH values at all three points during the raing season were higher than the pH values during the summer.

Table 2: Comparison of Soil Texture, Soil Structure, and Soil Color during the Summer and Rainy Seasons

Soil sample	Summer season			Rainy season		
	Clay	Soil color	Soil structure	Clay	Soil color	Soil structure
Spot 1	loamy	brown	round-shaped	loamy	brown	round-shaped
Spot 2	loamy	brown	round-shaped	loamy	brown	round-shaped
Spot 3	loamy sandy soil	brown	round-shaped	loamy sandy soil	brown	round-shaped

From Table 2, it was found that the clay texture, soil color, and soil structure during the summer and raing seasons were similar.Point 1: The soil texture is loam, the soil color is brown, and the soil structure is granular.Point 2: The soil texture is loam, the soil color is brown, and the soil structure is granular.Point 3: The soil texture is sandy loam, the soil color is brown, and the soil structure is granular.

Table 6 shows the soil fertility values during the summer and raing seasons.

Soil sample	Soil nutrient levels of N,P,K					
	Summer season			Rainy season		
	N	P	K	N	P	K
Spot 1	2	2	7	2	2	14
Spot 2	0	0	2	1	0	2
Spot 3	0	0	1	0	0	2

From Table 6, it was found that during both the summer and raing seasons, Point 1 had equal nitrogen and phosphorus values of 2, and during the raing season, the potassium value was higher than in the summer. For Point 2, nitrogen was higher during the raing season than in the summer, while phosphorus values were the same (0) in both seasons, and potassium values were also the same (2). For Point 3, nitrogen and phosphorus values were both 0 during both the summer and raing seasons, and potassium was higher during the raing season than in the summer.

Table 7 shows the latex production values during the summer and raing seasons.

Area	Latex yield in rubber plantations							
	Summer season				Rainy season			
	Trial 1	Trial 2	Trial 3	Average	Trial 1	Trial 2	Trial 3	Average
Rubber plantation	38.5	48	39.5	42	50.5	51	49	50.17

From Table 7, it was found that the latex production during the raing season was higher than in the summer. The average latex production during the raing season was 50.17, while the average during the summer was 42.

Conclusion and Discussion of the Research Findings

From the study comparing soil quality and its effect on latex production in rubber plantations during the summer and rainy seasons, it was found that the temperature during the summer was higher than during the rainy season. The moisture content was higher during the rainy season due to the increased rainfall. The pH value was also higher during the rainy season compared to the summer. Regarding soil fertility, the potassium content significantly increased during the rainy season and was higher than in the summer, while nitrogen and phosphorus levels remained relatively constant in both seasons. Latex production during the rainy season was higher than in the summer. It can be concluded that soil quality affects latex production, and the soil quality during the rainy season is better than in the summer, leading to higher latex production in the rainy season.

Acknowledgements

The research titled "Comparison of Soil Quality Affecting Latex Yield in Rubber Plantations During the Summer and Rainy Seasons in Na Khao Sia Subdistrict, Na Yong District, Trang Province" has been successfully completed thanks to the generous guidance and support from several individuals.First, I would like to express my sincere gratitude to Mr. Sakda Paisomboon, the Director of Wichienmatu School, for approving the budget for this research project. I also wish to thank Teachers Sutheera Thachin and Khwanjai Kanjanasrimek for their valuable advice, suggestions, and assistance in improving and correcting the research with great attention to detail.My heartfelt thanks go to Wichienmatu School for providing the necessary equipment and laboratory facilities for conducting the research, which contributed significantly to the success of this project.

This research is dedicated to all those who have supported and guided me, including those who authored the textbooks and documents referenced in this study. I am deeply grateful to all of them.

References

(Soil Measurement Principles)GLOBE THAILAND

Pimpanth Jermsawasdi. 2006. Handbook of Basic Pedology and Soil Science. 11th edition. Department of Pedology, Faculty of Agriculture, Kasetsart University, Bangkok.

Wirot Impithak. 1980. Soil Fertility Conditions in the Research Area. Issue 4, Department of Pedology, Faculty of Agriculture, Kasetsart University, Bangkok.

https://km.raot.co.th/uploads/dip/userfiles/7