Comparison of Soil Quality Between the Botanical Garden Area and the Waste Burning Site Within Wichienmatu School

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Abstract

This research focuses on measuring and comparing soil properties between the botanical garden area and the waste burning site within Wichienmatu School. The objective is to study and analyze the soil quality in both areas by examining factors such as soil structure, moisture content, pH levels, fertility, temperature, and texture.

The results indicate that the soil in the botanical garden is primarily clay, while the soil in the waste burning area is a clay-loam mixture. The soil temperature in the botanical garden is lower than that of the waste burning site. Regarding pH levels, the soil from the botanical garden is generally neutral, whereas the soil from the waste burning site tends to be more alkaline. In terms of moisture content, the soil in the botanical garden retains less moisture compared to the soil in the waste burning area.

Soil fertility tests revealed that nitrogen levels in the botanical garden soil are significantly lower than those in the waste burning area. Similarly, phosphorus and potassium levels are also lower in the botanical garden soil compared to the waste burning site.

Keywords: Soil properties, Waste burning soil, Botanical garden soil, Wichienmatu School

Introduction

Background and Significance

Soil is a natural material formed from the weathering of rocks and minerals, along with the decomposition of plant and animal remains. It is influenced by environmental factors such as climate, landscape, and the time taken for its development. These processes result in different types of soil, which cover the Earth's surface as a thin layer, serving as a foundation for plant growth and a habitat for various organisms.

Soil quality varies across different areas, depending on its composition and mineral content. Soil is a crucial natural resource that supports life, particularly in agriculture, plant growth, and maintaining ecological balance. High-quality soil promotes fertility and sustains ecosystems. However, certain human activities, such as waste burning, can negatively impact soil properties by introducing pollutants, toxins, and heavy metals. These contaminants alter the soil's chemical, physical, and biological characteristics.

The botanical garden at Wichienmatu School is a well-maintained area where various factors are controlled to ensure soil fertility and ecological balance. Comparing the soil quality of this managed environment with that of an area affected by waste burning provides valuable insights into how human activities influence soil health. This study aims to highlight the differences between these two areas and emphasize the environmental impacts of waste disposal practices.

Research Questions

Is there a difference in the soil quality between the botanical garden area and the waste burning area within Wichienmatu School, Trang Province? If so, how do they differ?

Research Hypothesis

The soil in the botanical garden area at Wichienmatu School has a different quality compared to the soil in the waste burning area at the same school.

Materials and Equipment

Multipurpose meter

Distilled water.

Glassware

Soil preparation equipment.

Beaker

N P K meter

Soil thermometer

Soil texture and soil structure measurement manual

Research Methodology

1. Measuring Soil Structure

-Collect soil samples and record environmental data.

-Observe and analyze soil structure (size, shape, and type).

-Record findings on data sheets.

2. Measuring Soil Moisture

-Measure soil moisture at a depth of 7 cm in waste burning and botanical garden areas.

-Repeat 3 times and calculate the average.

3. Measuring Soil pH

-Measure soil pH at a depth of 5-7 cm in both study areas.

-Repeat at 3 points and calculate the average.

4. Measuring Soil Fertility

-Use an NPK meter to measure nitrogen, phosphorus, and potassium levels.

-Repeat 3 times and calculate the average.

5. Measuring Soil Temperature

-Calibrate the thermometer before use.

-Measure soil temperature at a depth of 5 cm at 3 points.

-Record data within 20 minutes.

6. Measuring Soil Texture

-Mix soil samples with distilled water and knead to assess texture.

-Compare with a soil texture guidebook and record observations.

Research Results

Table showing results from soil color measurements

Soil Color Botanical Garden		Soil Color Waste Burning Area	
Botanical Garden 1	Brown	Waste Burning Area1	Black
Botanical Garden 2	Brown	Waste Burning Area2	Black
Botanical Garden 3	Brown	Waste Burning Area3	Black

Table showing results from soil structure measurements

Soil Structure Botanical Garden		Soil Structure Waste Burning Area	
Botanical Garden1	Rounded Clumps	Waste Burning Area1	Rounded Clumps
Botanical Garden2	Rounded Clumps	Waste Burning Area2	Rounded Clumps
Botanical Garden3	Rounded Clumps	Waste Burning Area3	Rounded Clumps

Table showing results from soil testing

Soil Structure Botanical Garden		Soil Structure Waste Burning Area	
Botanical Garden1	Rounded Clumps	Waste Burning Area1	Rounded Clumps
Botanical Garden2	Rounded Clumps	Waste Burning Area2	Rounded Clumps
Botanical Garden3	Rounded Clumps	Waste Burning Area3	Rounded Clumps

Table showing results from soil temperature measurements

Soil Temperature Botanical Garden		Soil Temperature Waste Burning Area	
Botanical Garden1	27.5	Waste Burning Area1	27
Botanical Garden2	27	Waste Burning Area2	29
Botanical Garden3	26	Waste Burning Area3	28
Average	26.83	Average	28

Table showing the results of soil acidity-alkalinity tests

Soil pH Botanical Garden		Soil pH Waste Burning Area	
Botanical Garden1	7.5	Waste Burning Area1	8
Botanical Garden2	8	Waste Burning Area2	6
Botanical Garden3	7.5	Waste Burning Area3	7
Average	7.67	Average	7

Table showing results from soil moisture testing

Soil Moisture Botanical Garden		Soil Moisture Waste Burning Area	
Botanical Garden1	8	Waste Burning Area1	8
Botanical Garden2	7	Waste Burning Area2	8
Botanical Garden3	7	Waste Burning Area3	10
Average	7.33	Average	8.67

Table showing results from soil nitrogen testing

N Botanical Garden Soil		N Waste Burning Area Soil	
Botanical Garden Soil1	18	Waste Burning Area1	41
Botanical Garden Soil2	14	Waste Burning Area2	26
Botanical Garden Soil3	12	Waste Burning Area3	26
Average	14.67	เฉลี่ย	31

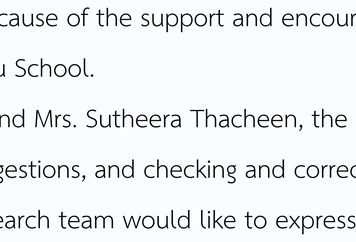
Table showing the results of soil phosphorus testing

P Botanical Garden Soil		P Waste Burning Area Soil	
Botanical Garden1	34	Waste Burning Area1	38
Botanical Garden2	22	Waste Burning Area2	25
Botanical Garden3	31	Waste Burning Area3	41
Average	29	Average	34.67

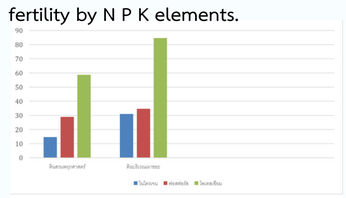
Table showing the results of potassium testing in soil

K Botanical Garden Soil		K Waste Burning Area Soil	
Botanical Garden1	86	Waste Burning Area1	109
Botanical Garden2	43	Waste Burning Area2	63
Botanical Garden3	47	Waste Burning Area3	82
Average	58.67	Average	84.67

Bar chart comparing average values of temperature, pH and soil moisture.



Bar chart comparing the average soil fertility by N P K elements.



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Summary and Discussion of Research Results

From the measurements of soil structure, soil temperature, soil pH, soil moisture, and soil fertility, it can be concluded that the soil in the botanical garden area is clay, while the soil in the waste burning area is loamy clay. The soil temperature in the botanical garden area is lower than that of the soil in the waste burning area. In terms of pH, the soil from the botanical garden area has a neutral average value, while the soil in the waste burning area has a basic average value. The moisture content in the soil from the botanical garden area is lower than that of the soil from the waste burning area. Regarding soil fertility, the nitrogen content in the soil from the botanical garden is much lower than in the soil from the waste burning area. The phosphorus content in the soil from the botanical garden is lower than in the soil from the waste burning area, and the potassium content in the soil from the botanical garden is much lower than in the soil from the waste burning area.

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