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### ABSTRACT

This research aimed to analyze the physical and chemical properties of soil along the Phayakham irrigation canal in Mueang District, Chiang Mai Province, and to assess its suitability for agricultural use. Soil samples were collected from three sampling sites at a depth of 10–15 cm and analyzed following the GLOBE Protocol.

The physical analysis showed that most soil samples had a granular structure, which supports good water drainage and aeration, while some locations exhibited a blocky structure. Soil color ranged from 7.5 YR 2.5/2 to 7.5 YR 3/2, indicating dark soil with high organic matter content. Soil consistency was generally friable. The average soil temperature was 25.4°C, and the average soil moisture content was 600 g/m<sup>3</sup>, which are favorable for plant growth.

Chemical analysis revealed that the average soil pH was 6.73, which is neutral and suitable for crops. However, soil fertility analysis showed that nitrogen (N) was at a very low level, while phosphorus (P) and potassium (K) were at moderate levels.

In conclusion, although the soil has good physical properties and suitable pH, it lacks essential nutrients, especially nitrogen. Therefore, soil improvement using organic or chemical fertilizers is recommended to enhance soil fertility and support optimal plant growth.

### METHODOLOGY

#### Soil Sampling

- Collect soil samples at 10–15 cm depth using a shovel.
- About 500 g of soil was collected from each site.
- Samples were stored in ziplock bags and labeled.

#### Physical Analysis

- Soil structure: observed using soil structure diagrams.
- Soil color: compared with the Munsell Soil Color Chart.
- Soil consistency: tested by hand squeezing.
- Soil temperature: measured using a soil thermometer.
- Soil moisture: measured using a soil moisture meter.

#### Chemical Analysis

- Soil pH: measured using a soil pH meter.
- Soil fertility: N, P, and K measured using an NPK test kit.

#### Data Analysis

- Compare values among samples.
- Analyze relationships between soil properties.
- Draw conclusions and recommendations.

### INTRODUCTION

Soil is an important natural resource that supports plant growth, agriculture, and ecosystems. At present, the Phayakham irrigation canal area is increasingly affected by urbanization, wastewater, and human activities. These factors may alter soil structure, pH, and nutrient availability. Therefore, soil quality assessment is necessary to evaluate whether the soil remains suitable and safe for agricultural use.

This study focuses on analyzing both physical and chemical soil properties to provide scientific data that can be used for land-use planning, soil improvement, and environmental conservation in the Phayakham irrigation canal area.

### MATERIALS AND EQUIPMENT

#### For soil sampling

- Shovel
- Ziplock plastic bags
- Labels
- Rubber gloves

#### For soil analysis

- Munsell Soil Color Chart
- Soil pH Meter (HI98103)
- Digital Soil Thermometer (TP101)
- Soil Moisture Meter (THG-200)
- Soil Nutrient Test Kit (Rapitest 1609)
- Soil sieve set

### FINDINGS

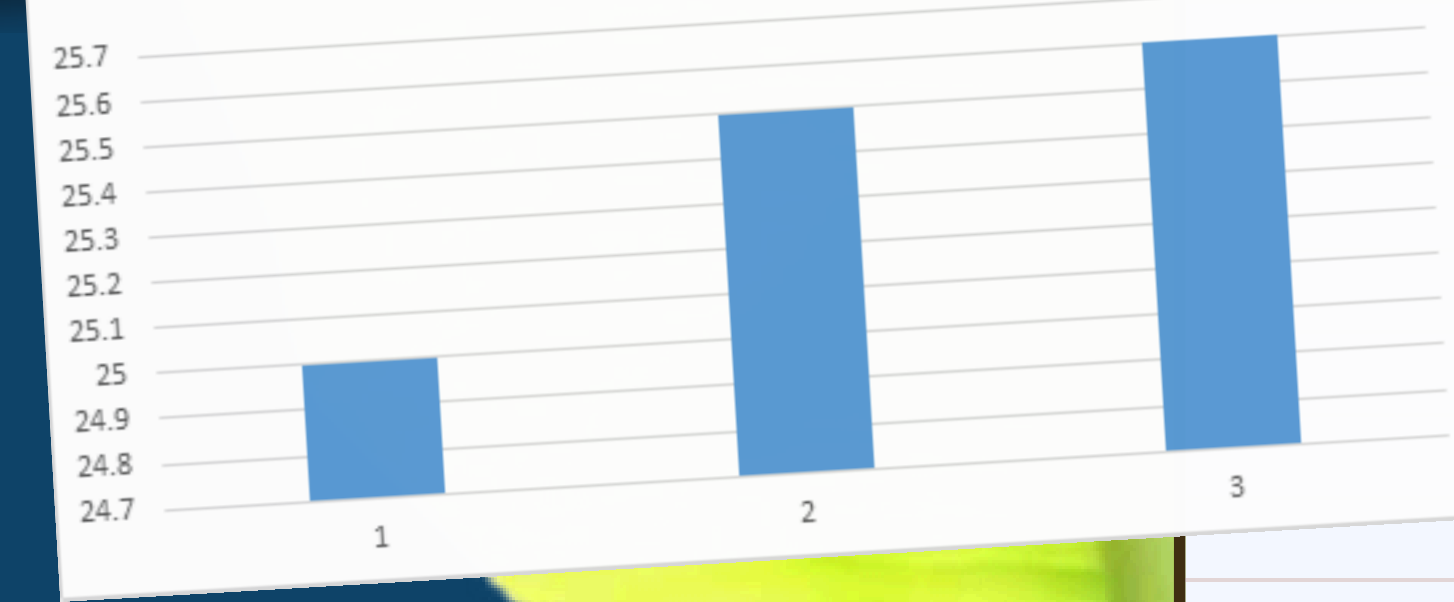
#### Physical Properties

- Soil structure:
  - Sample 1 → Blocky
  - Sample 2 → Granular
  - Sample 3 → Granular
- Soil color:
  - 7.5 YR 2.5/2 and 7.5 YR 3/2
  - Indicates high organic matter content
- Soil consistency:
  - Sample 1 → Compact
  - Samples 2 and 3 → Friable
- Soil temperature:
  - 25.0 – 25.6 °C
  - Average: 25.4 °C
- Soil moisture:
  - 550 – 650 g/m<sup>3</sup>
  - Average: 600 g/m<sup>3</sup>

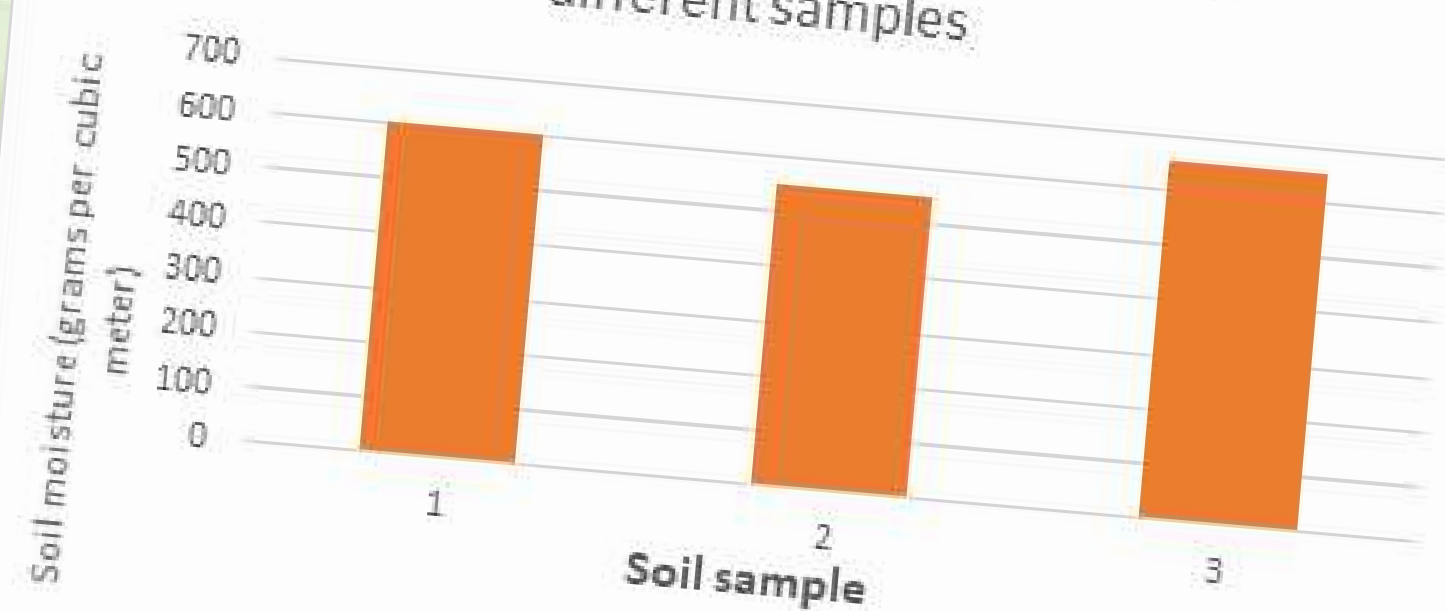
#### Chemical Properties

- Soil pH:
  - 6.5 – 6.9
  - Average: 6.73 (suitable for crops)
- Soil fertility:
  - Nitrogen (N): Very low
  - Phosphorus (P): Moderate
  - Potassium (K): Moderate

Graph showing soil temperature (°C) in different samples



Graph showing soil moisture content in different samples



### OBJECTIVES

1. To analyze the physical properties of soil, including soil structure, soil color, soil consistency, soil temperature, and soil moisture.
2. To analyze the chemical properties of soil, including soil acidity–alkalinity (pH) and soil fertility (N, P, and K).
3. To assess the suitability of the soil in the study area for agricultural use and environmental conservation.

### RESEARCH QUESTIONS

1. How do the physical and chemical properties of soil affect soil fertility?
2. How can soil quality be improved to make it suitable for plant cultivation?

### HYPOTHESES

1. Soil pH affects soil fertility.
2. Soil moisture influences soil temperature.
3. Dark-colored soils tend to be more fertile than light-colored soils.
4. Soil consistency affects water and air permeability.
5. The availability of N, P, and K is influenced by organic matter and soil pH.

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### CONCLUSION AND DISCUSSION

The soil in the Phayakham irrigation canal area has good physical characteristics, such as suitable soil structure, dark color indicating high organic matter, appropriate soil temperature, and adequate soil moisture. The soil pH is in the optimal range for plant growth. However, nitrogen levels are very low, and phosphorus is only moderate. This nutrient deficiency may limit plant growth and productivity. Therefore, soil improvement through organic fertilizers or chemical fertilizers containing nitrogen and phosphorus is necessary to enhance soil fertility and support sustainable agriculture.

