Abstract

Title of the research : The study and comparison of soil quality and abandoned shrimp pond soil used for oil palm cultivation in HatSamran District, Trang Province.

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A Study and Comparison of Soil Quality and Abandoned Shrimp Pond Soil Used for Oil Palm Cultivation in Hat Samran District, Trang Province, During December 2024 – January 2025 The objective of this study is to examine and compare the quality of normal soil and abandoned shrimp pond soil used for oil palm cultivation in Hat Samran District, Trang Province. Soil quality measurements were taken once a month, including pH, soil color, soil adhesion, soil fertility (measuring N, P, and K values), soil temperature, moisture content, and salinity. The study found that the soil in the abandoned shrimp ponds exhibited variability in nutrient content and salinity. The soil in the abandoned shrimp ponds had higher moisture content compared to normal soil. In contrast, normal soil was of better quality than the abandoned shrimp pond soil, with a pH ranging from 5.37 to 6.37, which is mildly acidic to neutral. This pH range is suitable for oil palm cultivation and aligns with research from the Surat Thani Oil Palm Research Center in 1972, that the ideal pH range for oil palm cultivation is between 5.0 and 6.0. Soil fertility elements include nitrogen (N), which supports leaf and stem growth, enhances greenness, and facilitates photosynthesis; phosphorus (P), to help in root development and overall plant growth, contributing to seed and flower production; and potassium (K), It helps regulate water usage in plants, supports photosynthesis, and contributes to sugar production in plants.

Keywords : Soil quality, soil quality of abandoned shrimp fields, oil palm

Introduction

Soil is a natural resource that is extremely important for the survival of life on Earth. Soil is made up of minerals, organic matter, water, and air, which played an important role in promoting plant growth, especially in agricultural activities that rely on soil to provide nutrients and water to plants. Each type of soil has different characteristics and properties. This affects the ability to support plants grown in that area.

The area of Haad Samran Sub-district, Trang Province has many characteristics. High hills canals and mangrove forests. In the past, farmers made a career of raising shrimp. Currently, shrimp farming is costly. However, the soil has been cultivated for a long time that may cause problems in cultivation, So the research team is interested in studying and comparing the quality of the soil and the soil of abandoned shrimp fields used to grow oil palm, such as the color of the soil. Retention Measuring the acidity and alkalinity of the soil Soil moisture, soil temperature,salinity and fertility to provide information to improve soil quality for farmers in the area.

objective

1. To study soil quality.
2. To study the quality of abandoned shrimp farm soil.
3. To compare the soil quality and soil quality of abandoned shrimp fields used for oil palm cultivation.

question

1. What is the soil quality?
2. What is the quality of the soil of abandoned shrimp fields?
3. What is the difference between soil quality and soil quality of abandoned shrimp fields used to grow oil palm?

hypothesis

1. Soil quality is of good quality.
2. The quality of the soil in abandoned shrimp fields is of low quality.
3. The soil quality is better than the soil quality of abandoned shrimp fields.

Materials and equipment and methods of conducting research

1. pH meter
2. distilled water
3. glassware
4. Equipment for preparing soil samples
5. Clay Comparison Book value N P K
6. Soil Bonding Calibration Plate
7. thermometer
8. Soil moisture meter
9. Soil salinity pen
10. A series of soil quality checks to determine the

GLOBE Measurement Methodology

Pedosphere (Soil) Measurement Methodology

Designation of Study Points

This study was conducted in the area of Haad Samran District. Trang Province will go to the area to collect soil samples for a period of 2 months. From December to January 2024, soil quality was measured by designating soil sampling points by collecting 3 points of oil palm planting soil and 3 points of soil in abandoned shrimp fields where oil palm was grown, with

equal spacing between the sampling points. The soil is collected at two soil depths: 5 centimeters deep and 10 centimeters deep.

How it works

1. Preparatory stage
    1) Set up a study issue. Select the topic you want to study.
    2) Research Gather knowledge and theories related to the work.
    3) Determine the purpose of the study.
    4) Random sampling points are set in the area of the study area.
2. Procedure
    1) Make operational planning.
    2) Survey the area to be carried out.
    3) Soil quality measurement is carried out according to the GLOBE methodology as follows:

    The study route was divided into two points: soil where oil palm is grown and soil in abandoned shrimp fields where oil palm is grown. In the area of Haad Samran District, Trang Province

    1) Soil pH Measurement with pH Meter
        1. Using a pilot wood, the soil is drilled into it.14 By measuring the soil at several points.
        2. Bring pH meter Insert into the hole of the pilot stick.
        3. Record Results
    2) Soil Temperature Measurement
        1. Calibrate the thermometer. To ensure accurate readings.
        2. Determine the point where the soil temperature will be measured.
        3. Use ground pilot steel.
        4. Insert the soil thermometer in the pilot slot .
        5. Wait 2 minutes. Temperature readings 1st time, 2 bruises, recorded results.

3) Measuring soil color using a soil color comparison book.

   1. Take a grain of soil from each layer of soil and observe whether the soil is moist, dry, or wet. If dryness, make slices.

   2. The bead is divided into two parts, standing so that the sunlight shines through the shoulder to the soil color calibration book and soil sample that is being measured.

   3. Record the clay color value.

4) Soil Adhesion Measurement

   1. Remove the soil grains from the topsoil. If the soil is dry, moisten the soil layer using a spray of water, and then pull out the soil grains to observe the soil adhesion (repeat this for all layers of soil).

   2. Hold the soil between your thumb and index finger and gently squeeze the soil until it breaks.

   3. Record the characteristics of one of the samples.

5) Measuring soil fertility N P K Test Kit

   1. Soil fertility measurement takes dry and sifted soil. 20 g

   2. Tested in N P K Measurement Test Kit

   3. Record Results

6) 4. Measuring soil moisture using a moisture meter

   1. Use a pilot steel to drill down to the designated measurement point.

   2. Put the soil moisture meter in, wait 2 minutes, then record the result.

7) Soil salinity measurement using a Salinity Meter

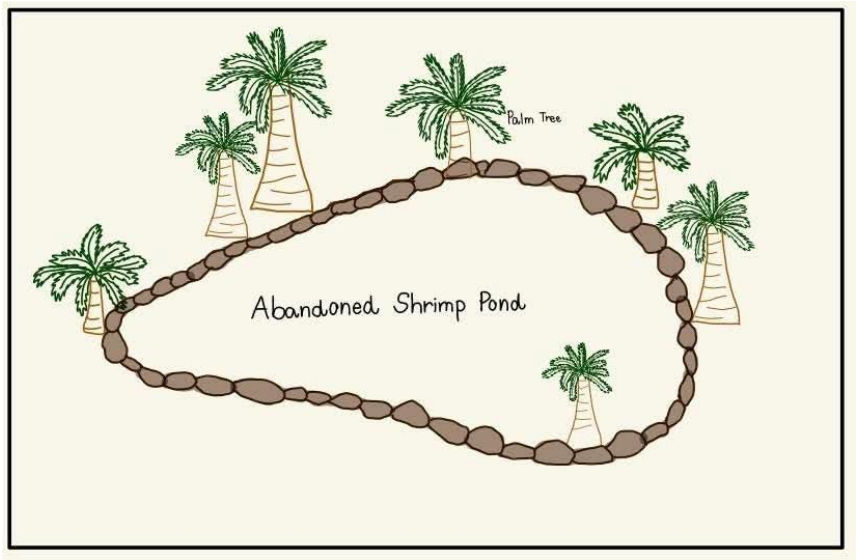
   1. Take soil from all designated measurement point areas and put it in the beaker.
   2. Add water to the beaker in a 1:1 ratio.
   3. Take a Salinity Meter to dip it to measure salinity.
   4. Wait for the value to freeze and save the result.

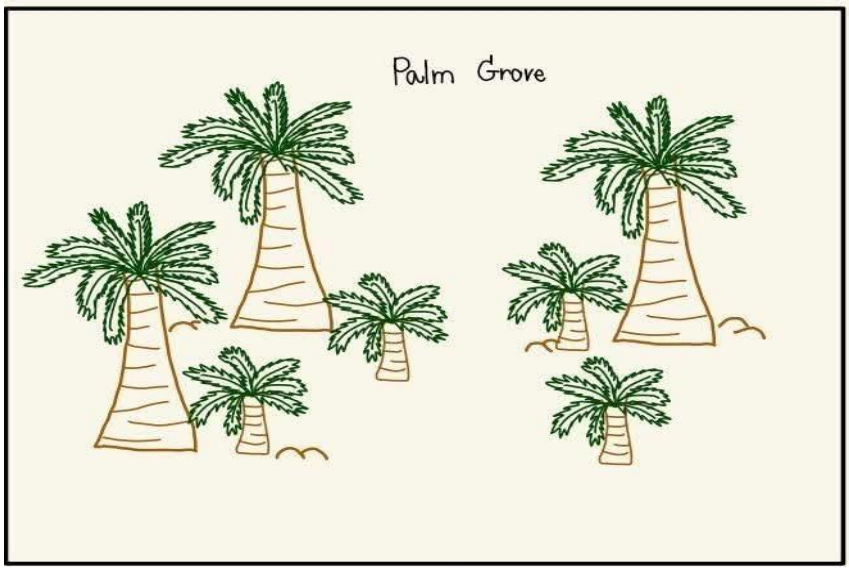
8) Send information GLOBE Data Entry

Results and conclusions

Geographic coordinates

zone	Geographic coordinates	
	Latitude(N)	Longitude(E)
Palm plantations	7.3753	99.6361





The photo shows a palm plantation.Results

1. Soil quality

1.1 Table of Record of Soil Color Codes and Soil Characteristics

Soil measurement area	Clay color code	Soil fixation
Abandoned shrimp pond soil	2.5Y 5/4	Dinsaman Neen
soil	2.5Y 6/4	Round

From the summary table of the experimental results, it is as follows:

Abandoned shrimp pond soil has a soil color code. 2.5Y 5/4 the characteristics of the soil are harmonious soil, while the soil is coded with soil color. 2.5Y 6/4 the appearance of the soil is a lumpy soil.

1.2 Soil Temperature Measurement Table Soil moisture, soil pH, soil fertility and soil salinity.

Soil measurement area	Measured value (average)		
	Soil Temperature(°C)	Soil Moisture()	pH Soil
Abandoned shrimp field soil point 1 depth 5 cm	28.25 ±0	5.5 ±0.5	6.37 ±0.295
Abandoned shrimp field soil point 1 depth 10 cm	29.5 ±0	8.5 ±1.5	6.06 ±0.725
Abandoned shrimp field soil point 2 depth 5 cm	26.5 ±0.5	4.5 ±0.5	5.62 ±0.790
Abandoned shrimp field soil point 2 10 cm deep	27.5 ±0	7.5 ±0.5	5.97 ±1.115
Abandoned shrimp field soil point 3 depth 5 cm	26.5 ± 0	4.5 ±0.5	4.84 ±1.255
Abandoned shrimp field soil point 3 depth 10 cm	25.5 ±0	8.5 ±0.5	5.72 ±4.760

Soil point 1 depth 5 cm	28 ±0.5	4.5 ±0.5	5.72 ±0.375
Soil point 1 10 cm deep	29.5 ±0.5	6 ±0	5.89 ± 0.035
Soil Dot 2 Depth 5 cm	26 ±0.5	1.5 ±0.5	5.37 ±0.490
Soil spot 2 10 cm deep	27 ±0.5	1 ±0	5.37 ±0.370
Soil point 3 5 cm deep	25 ±0.5	2 ±1	5.53 ±0.605
Soil point 3 10 cm deep	25 ±0.5	1.5 ±0.5	5.41 ±0.630

From the summary table of the results of the experiment.

The soil in the abandoned shrimp field has a higher temperature and moisture value than the soil. The pH of the soil is in the range of weak to neutral acidity to be suitable for cultivation.

1.3 Soil salinity measurement table and soil fertility measurement table

Soil measurement area	**Measured value (average)**			
	N	**P**	**K**	**Soil salinity (ppm)**
Soil Point 1 Depth 5 cm	0 ±0	0 ±0	1 ±0.100	209 ±154
Soil Point 1 10 cm deep	1.5 ±0.75	0.5 ±0.52	2 ±0.100	55 ±0
Soil Point 2 5 cm deep	2 ±0.85	2 ±0.90	2 ±0.100	242 ±182
Soil Point 2 10 cm deep	3 ±0.74	3 ±1.24	6.5 ±0.065	107.5 ±83.5
Soil Point 3 Depth 5 cm	0.5 ±0.80	2 ±1.51	1.5 ±0.150	58.5 ±5.5
Soil Point 3 10 cm deep	0.5 ±0.75	0 ±1.74	1 ±0.000	49 ±2.0
Soil Point 1 Depth 5 cm	1 ±1.94	1.5 ±2.03	5 ±0.050	10.5 ±9.5
Soil Point 1 10 cm deep	0.5 ±1.92	1 ±2.31	3 ±0.300	95 ±78
Soil Point 2 5 cm deep	0.5 ±1.86	0.5 ±2.58	2.5 ±0.150	70 ±4
Soil Point 2 10 cm deep	0.5 ±1.83	0.5 ±2.86	2 ±0.200	46 ±22
Soil Point 3 Depth 5 cm	2 ±1.80	0.5 ±3.14	6.5 ±0.065	78.6 ±53.5

Soil Point 3 10 cm deep	2.5 ±1.7	3 ±3.46	9.5 ±0.095	103.5 ±86.5

From the summary table of the results of the experiment.

Soil nutrients vary from point to point and depth.

The potassium value (K) has a minimum value of 1 and a maximum of 9.5, indicating the mineral condition in each area.

Summary of the experiment

The study found that the abandoned shrimp pond soil exhibits variability in nutrient content and salinity. The soil in the abandoned shrimp pond has higher moisture content compared to normal soil. Normal soil, with a pH range of 5.37 to 6.37, is mildly acidic to neutral, for better quality for oil palm cultivation. This is consistent with research from the Surat Thani Oil Palm Research Center in 1972, which stated that the ideal pH range for oil palm cultivation is between 5.0 and 6.0. Soil fertility elements include nitrogen (N), which supports the growth of leaves and stems, enhances greenness, and facilitates photosynthesis; phosphorus (P), to help in root development and overall plant growth, contributing to seed and flower production; and potassium (K), It helps regulate water usage in plants, supports photosynthesis, and contributes to sugar production in plants.

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Organizers

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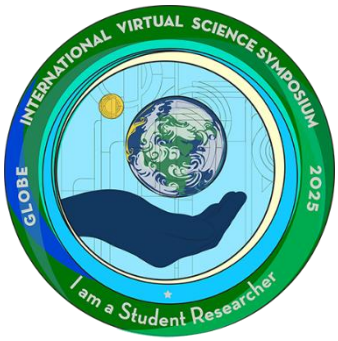
OPTIONAL BADGES

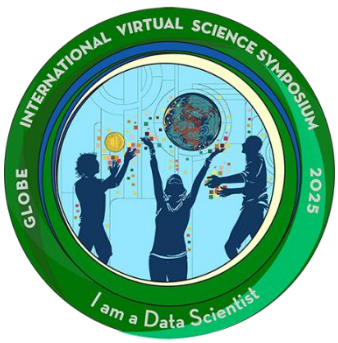


1) I AM A STUDENT RESEARCHER

My group chose this badge because our group's research aims to systematically study and compare the quality of soil and soil in abandoned shrimp fields used in oil palm cultivation. It starts by questioning the factors that affect soil quality. Then, we planned an experiment to collect soil samples to measure soil quality, such as soil pH, soil temperature, soil color, soil characteristics, soil fertility, soil moisture and soil salinity, as well as to rationally analyze the data to conclude the results that can be scientifically referenced. This research not only enhances knowledge about soil quality. It can also be used as a guide for farmers who want to improve soil quality management to achieve better yields and minimize impact on the ecosystem and surrounding organisms.

2) I AM A COLLABORATOR

Conducting research on soil quality studies and comparing the soil quality and soil quality of abandoned shrimp fields used for oil palm cultivation requires the cooperation of team members from the design of the experiment. The division of responsibility for sampling from various points to data recording and analysis of results. We work together as a system. Consultations and ideas were exchanged to find the best way to study soil quality. In addition, it has received support from farmers and soil quality experts. This helps us better understand the environmental factors that affect soil quality. This partnership has enriched our education to be applied to practical solutions.



3) I AM A DATA SCIENTIST

Our research focuses on the analysis of data related to soil quality and soil of abandoned shrimp fields used in oil palm cultivation using chemical and physical measurements of the soil. Then, the data obtained was compared with soil quality standards to determine the relationship and trend of various factors. We use statistical analysis and visualization through graphs and tables to visualize changes in soil quality, which

allows for effective forecasting and planning of soil management. Therefore, this research is not only to collect data but also to use the data to solve problems and develop the soil more efficiently.

Appendix