Research Title : Study on the Effects of Agriculture on Water and Soil Quality in Agricultural Areas, Bang Duan Sub-district, Palian District, Trang Province

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Abstract

Study on the Effects of agriculture on water and soil quality in agricultural areas Bang Duan Subdistrict, Palian District, Trang Province The objective was to study the effects of agricultural activities on water quality in canals and soil quality in agricultural areas. Water and soil samples were randomly collected from 3 study areas and quality measurements were carried out according to the guidelines of the GLOBE project, including pH, temperature, transparency, and dissolved oxygen content in the water. Anchorage, pH and Soil Structural Characteristics The results of the experiment showed that the water quality in the canal had an acid-alkalinity (pH) value in the range of 6–7 The average dissolved oxygen value in water is between 6.67–12.17 milligrams per liter and the average transparency value is in the range of 35.9–77.5 centimeters, indicating that the water is of good quality and suitable for the life of aquatic organisms. Soil quality It was found that the soil in the agricultural area is loamy and sticky. The soil pH is in the range of 5–6, indicating a weak to moderately acidic soil condition that may be caused by the continuous use of fertilizers and agrochemicals. The results of this study show that agricultural activities have a greater impact on soil quality than water quality during the study period, and the data obtained can be used as a guide for soil and water resource management, as well as the promotion of sustainable agriculture in the area.

Acknowledgments

Introduction

Agricultural activities are the cornerstone of food security and the main occupation of the local population. Bang Duan Subdistrict, Palian District, Trang Province, especially durian gardening. Palm Plantation These activities are closely related to soil and water resources as the main inputs of production. However, the expansion of intensive agricultural land and the use of chemicals. Fertilizers or pesticides in large quantities to increase yields often lead to unavoidable systemic effects. Improper agricultural management not only results in the deterioration of soil structure and properties, but also has a continuous impact on water sources through the process of erosion of the soil surface and the accumulation of residues, especially in agricultural areas near agricultural canals, which are the main waterways of the community. The runoff phenomenon has brought both soil sediment and chemicals from the plantation plot into the canal. This results in physical and chemical changes in water that communities must use together. In the context of climate change causing more severe water cycles. The link between agriculture and environmental quality in Therefore, it is complex and fragile. Therefore, the study of the impact of agriculture on water and soil quality is of great importance to understand the mechanisms of pollution transfer in the ecosystem and lead to the formulation of sustainable farming practices that can conserve both soil and water resources in the Palian district.

Objectives of the research

- To study the effects of agriculture on water quality in the Palian Canal area, Bang Duan sub-district. Palian District, Trang Province
- To study the impact of agriculture on soil quality in the agricultural area of Bang Duan sub-district. Palian District, Trang Province

Research Questions

- How does Agriculture affect the water quality in the Palian Canal area in the Bang Duan sub-district. Palian District, Trang Province?
- How does Agriculture affect soil quality in the agricultural area of Bang Duan sub-district. Palian District, Trang Province?

Research Hypothesis

- Agriculture affects the water quality in the Palian Canal area in the Bang Duan sub-district. Palian District, Trang Province
- Agriculture affects soil quality in the agricultural area of Bang Duan sub-district. Palian District, Trang Province.

Research Equipment and Methods

1. Beaker
2. Rope for indicating the boundaries of the study
3. Thermometer
4. Turbidity Tube
5. Litmus Paper
6. Dissolved Oxygen (DO)
7. Notebook
8. Soil Fixation Calibration Plate
9. Sample soil structure photo sheet
10. Water Spray
11. Ground Beef Field Inspection Guide
12. Needle or digital soil thermometer
13. Nails or pilot iron not less than 12 centimeters long.
14. Hammer
15. Plastic pipes for inserting a thermometer while measuring temperature, 7 and 12 centimeters long.
16. Calibration thermometer
17. Shoe, pickaxe or shovel
18. Tape measure
19. Metal canister for soil sampling with lid

20. Plastic bag for collecting soil samples with rubber band
21. Soil incubator
22. A 1-position decimal scale can weigh at least 400 grams.
23. Heat-resistant gloves or pliers.
24. Glassware
25. Distilled water
26. Equipment for preparing soil samples
27. Soil moisture meter

Designation of study points

- **Study Area:**
  - Canal water in the agricultural area of Bang Duan District, Palian, Trang Province, 10 meters away from the water discharge point.
  - Soil in agricultural area, Bang Duan District, Palian, Trang Province, 10 meters
- **Sampling:** Designate water and soil sampling points 3 Each point is 3 meters apart and collected in the same position in 2 times.

How the research is conducted

1. Research Preparation Stage

1. Set up a study point and choose a topic:
2. Study, research and gather knowledge:

- o Review of GLOBE Water Quality Measurement Methods from GROBE PROTOCAL
- o Review of the method of measuring soil quality according to the principles of GLOBE from GROBE PROTOCAL
- o Review of the GLOBE Principle Cloud Cover Measurement Methodology from GROBE PROTOCAL

3. Define the objectives and assumptions.
4. Determine a random sampling point in the study area.

2. Implementation Stage

1. Operational Planning:
   - o Prepare equipment and check readiness before going to the site.
   - o Determine the schedule and date to visit the survey area.
2. Survey the area and collect samples:
   - o Travel to the place where the study will be conducted.
   - o Collect water samples from each planned point.
3. Measure water quality according to the GLOBE guidelines:

   - o pH Measurement with pH Paper

     Rinse the container with sample water 3 times, add a moderate amount of sample water, dip in pH paper, measure the pH of the sample water (read how to measure from the pH paper used), compare the color of the pH paper with the color strip attached to the pH paper used for the measurement.
   - o Water temperature

     Immerse the thermometer in water about 10 centimeters deep for about 3 – 5 minutes. Read the thermometer at eye level, with the bulb up, the thermometer must still be in the water. Dip the thermometer for another 1 minute. For the 2nd and 3rd measurements, the thermometer reader was changed. Read the temperature in degrees Celsius. Take all measurements 3 Repeats
   - o Dissolved Oxygen Content Measurement

     Rinse the sample collection vial with sample water 3 times before collecting the sample. To collect water, immerse the specimen collection bottle under water by filling it up and covering it under water. If you try to turn the bottle upside down, a gas bubble occurs,

empty the water and start collecting the water sample again to perform all checks. The average value should be in the range specified by the test set.

- o Measure transparency

  Prepare equipment including a turbidity tube and a container for collecting water samples. Collect water samples from the water source to be studied by avoiding stirring the sediment at the bottom of the water source. Pour the sample water into the transparency tube slowly to avoid air bubbles. Fill with water to the point where the black-and-white stripes cannot be clearly seen. Read and record the water altitude value from the scale on the transparency tube. Repeat the measurement at least 2-3 times and then find the average value to increase the reliability of the experimental results. Use the water transparency value obtained to analyze the relationship with water quality according to the principles of the GLOBE project.

4. Measure the amount of clouds according to the GLOBE guidelines.
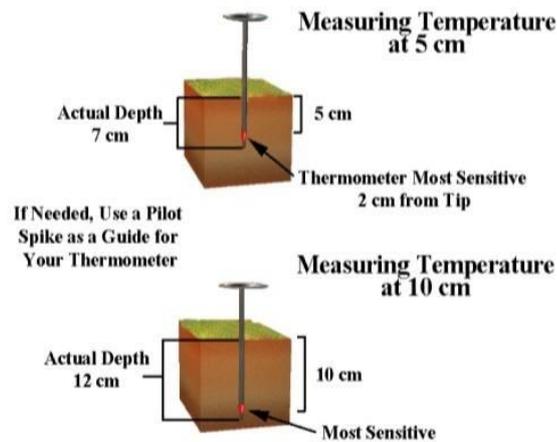
   - o Cloud Cover
     - 4 people standing with their backs to each other. Our shoulders collided with
     Shoulder of a friend
     - Raise your arm at a 90-degree angle.
     - Approximately cloud cover in the area where each person is located. The coverage area is set at the level of the eye to the level above the head and from the left arm to the right arm.

5. Measure soil quality according to the GLOBE guidelines.

   1. Soil Temperature Measurement:
      - o Before excavating for samples, use a thermometer to measure the temperature at the soil surface.
      - o Using a drill rod or small shovel, drill into the soil at a designated point and use
      The thermometer measures the temperature at a depth of 10 centimeters and 20 centimeters, respectively.
      - o Record the temperature values in the data log form immediately.

Measuring Temperature at 5 cm

Actual Depth 7 cm

5 cm

Thermometer Most Sensitive 2 cm from Tip

If Needed, Use a Pilot Spike as a Guide for Your Thermometer

Measuring Temperature at 10 cm

Actual Depth 12 cm

10 cm

Most Sensitive

2. Soil sampling for moisture and pH analysis:

    o at At each sampling point, use a shovel to dig a hole.

    o Soil samples are collected at a depth of 10 centimeters and placed in a plastic bag .

    o From the same hole, dig even deeper and collect a soil sample at a depth of 20 centimeters and place it in another plastic bag.

    o Clearly label the bag, such as "Point 1 Experimental Area. Depth 10 "Point 1 Experimental Area depth 20 cm;

    o Repeat the entire process for every remaining specimen collection point.

3. Soil moisture analysis

    1. Prepare the Soil Moisture Meter and check the readiness of the unit before use.

    2. Select a soil sampling site in the study area that represents the area and remove grass clippings, leaves, or soil surface cover.

    3. Insert the probe of the Soil Moisture Meter into the soil vertically to the required depth, without shaking or moving the device while measuring.

    4. Wait for the value displayed on the instrument face or screen to stabilize.

    5. Read and record the soil moisture value that appears to show the soil moisture level at that time.

    6. Repeat the measurement for at least 2–3 times at the same point or nearby, and then the obtained value is calculated to find the average.

    7. Soil moisture values are analyzed together with environmental factors and agricultural activities according to the guidelines of the GLOBE project.

6. Soil sequestration measurement

1. Take the soil granules from the topsoil. If the soil is dry, moisten the soil layer using a spray of water and pull out the soil granules, observing the fixation of the soil (repeat this for all layers of soil).

2. Hold the clay grain between your thumb and forefinger, gently squeeze the clay grain. until it breaks into parts.

3. Record the fastening characteristics of one of the samples.

7. Soil Structure Measurement

1. Soil samples are collected by various methods used to study soil characteristics. Record basic information such as the environment.

2. Place the undisturbed soil on your hands. Observe the soil at hand in detail and observe the structure of the soil, which has many forms of soil structure, as shown in the soil structure diagram.

3. Measure the size, shape, and record the data in the data sheet of measurement and soil characteristics.

4. Frequency of data collection 1 time at each study point

Analysis and conclusion of research findings

1) Use the data obtained to analyze and compare the relationship.

2) Make a graph showing the average of the comparison data.

3) Summary of Experiment Results

findings

Table 1 shows the geographical coordinates studied.

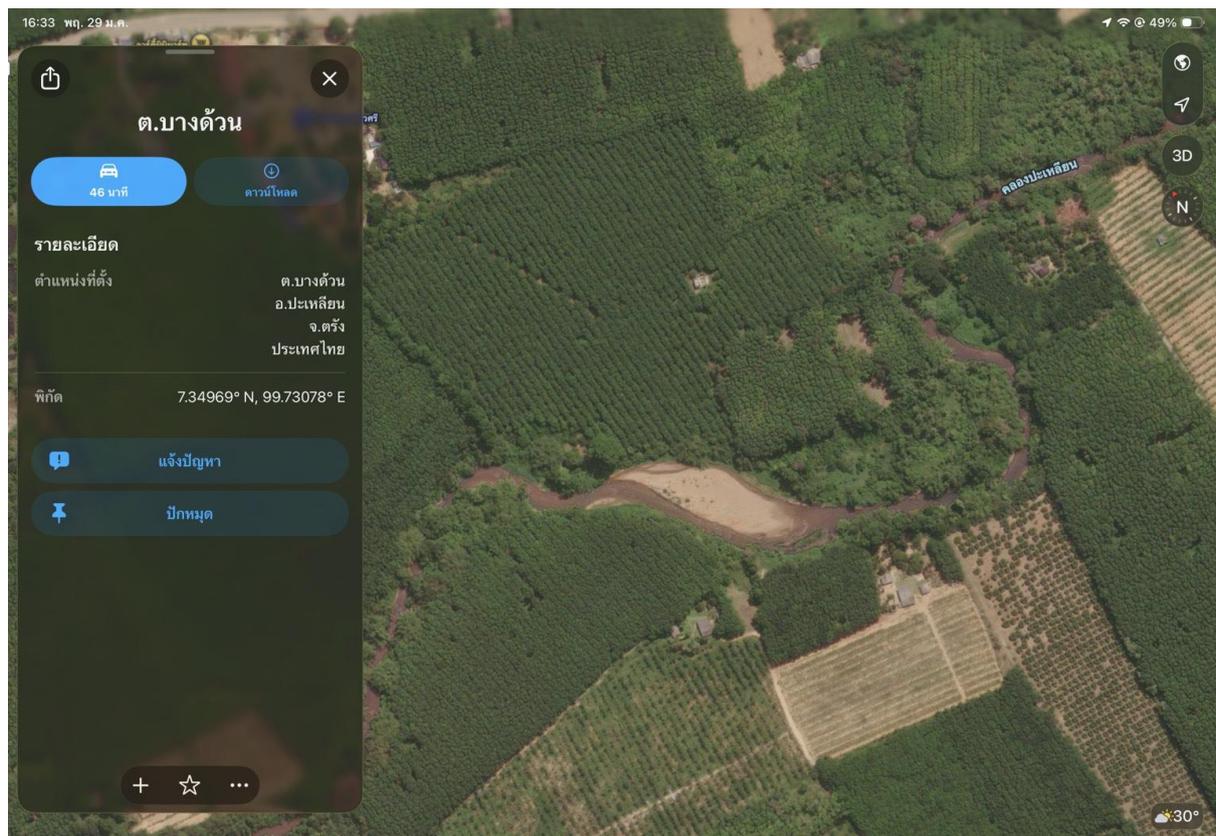| Districts	Geographical coordinates	
	Latitude (N)	Longitude (E)
Bang Duan Palian, Trang Province	7.34969°	99.73078°

Table 2 record of water pH temperature D.O. transparency measurement results

No.	Point	Transparency Average (cm)	Average pH	Average temperature (C)	Average D.O. (mg/L)
1	Above the agricultural area	39.2	7	27.67	6.83
	Agricultural area	35.9	6	26.67	6.67
	Under the agricultural area	40.2	7	26.67	6.67
2	Above the agricultural area	63.5	6	29.67	11.5
	Agricultural area	70.1	6	30.67	11.67
	Under the agricultural area	77.5	7	29.67	12.17

Summary of Table 2 from the 1st Water Quality Study Point 1 has an average transparency of 39.2 cm, an average pH7 with an average temperature of 27.67℃, a mean D.O. of 6.83 mg/L, an average transparency of 35.9 cm, an average of pH 6, an average temperature of 26.67 ℃, an average of D.O. of 6.83 mg/L, an average transparency of 40.2, an average pH of 7, an average temperature of 26.67°c, and an average of D.O. of 6.67 mg/L.

According to the water quality study, point 2 had an average transparency of 63.5 cm, an average pH of 6 with an average temperature of 29.67℃, an average temperature of 11.5 mg/L, point 2 had an average transparency of 70.1 cm, an average pH of 6 with an average temperature of 30.67 ℃, an average temperature of 11.67 mg/L, and an average

transparency of 77.5 with an average pH of 7 with an average temperature of 29.67°C, and an average of D.O. of 12.17 mg/L.

Table 3 record of Temperature and Humidity Measurement Results Soil pH Fixation Soil structure

No.	Point	Average temperature (C)	Average humidity	Soil anchorage.	Average pH	Ground beef	Soil structure
1	Above the agricultural area	35.33	10%	Tight	6	Crumbly and sticky.	Tablets
	Agricultural area	36.33	10%	Tight	5	Crumbly and sticky.	Tablets
	Under the agricultural area	36.33	10%	Tight	6	Crumbly and sticky.	Tablets
2	Above the agricultural area	33.33	10%	Tight	7	Crumbly and sticky.	Tablets
	Area	32	10%	Tight	5	Crumbly and sticky.	Tablets

	Under the agricultural area	31.67	10%	Tight	7	Crumbly and sticky.	Tablets

Summary of Table 3 from the 1st Soil Quality Study Point 1 has an average temperature of 35.33°C, humidity of 10%, soil anchorage is tight, pH 6, soil texture is loamy and sticky. The soil structure is granular. Point 2 has an average temperature of 36.33°C, humidity of 10%, soil adhesion is tight, pH 5, soil texture is loamy and sticky. The soil structure is granular. Point 3 has an average temperature of 36.33°C, humidity of 10%, soil adhesion is tight, pH 6, soil texture is loam, sticky. The soil structure is granular.

From the 2nd Soil Quality Study Point 1 has an average temperature =33.33°C, humidity = 10%, soil adhesion is firm, pH = 7, and the soil texture is loamy and sticky. The soil structure is granular. Point 2 has an average temperature of =32°C, humidity = 10%, soil adhesion is firm, pH = 5, and the soil texture is loamy and sticky. The soil structure is granular. Point 3 has an average temperature = 31.67°C, humidity = 10%, soil adhesion is tight, pH = 7, and the soil texture is loamy and sticky. The soil structure is granular.

Summary and discussion of research findings

1. Summary of Performance

According to a study on the effect of agriculture on water and soil quality in agricultural areas at Bang Duan Subdistrict, Palian, Trang Province by randomly collecting samples at 3 points, each 3 meters apart and measuring the parameters according to the GLOBE project standards .

Water Quality was found that the water in the canal had a very good dissolved oxygen (D.O.) value with an average value of 10 - 12.5 mg/L and an acid-alkalinity (pH) in the range of 6 - 7, which is neutral to mildly acidic, which is considered to be a water quality that is still abundant and suitable for the life of aquatic animals.

Soil quality was found that the soil in the agricultural area is loamy and sticky. It has a tight attachment and a grainy soil structure. However, the acidity-alkalinity of the soil is measured

between 5 and 6, indicating that the soil is moderately acidic to weakly acidic. While the moisture value of the soil was measured at a constant level throughout the survey.

2. Discussion of performance

According to the study, the results can be discussed according to the hypothesis and objectives set that agriculture in Bang Duan sub-district has a significant impact on soil quality. The pH of the soil is 5 - 6 may be mainly due to the accumulation of chemical fertilizers and pesticides for a long time. As a result, the accumulation of positive charges of hydrogen in the soil causes the soil to deteriorate and become acidic, which, if the soil is not improved with lime or organic fertilizer to affect the long-term absorption of nutrients by plants.

Water quality: Although it is hypothesized that the water may be turbid and affected by chemicals, the results of D.O. measurements above 10 mg/L and relatively stable pH indicate that the aquatic ecosystem in this area for a good self-healing mechanism. This causes agricultural residues to be diluted along the river. However, the difference in pH in soil and water is an indicator that agricultural activities have a greater impact on soil resources than water resources at the time of the study.

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