

Layout of Environmental Science Research Report

Research Title : Comparison soil quality and growth of black taro with chicken and cow manure

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Abstract

This study investigated the relationship between soil quality and the growth of Black Taro (*Colocasia esculenta*) amended with chicken manure and cow manure at Wichienmatu School. The objectives were to (1) compare soil quality resulting from the application of chicken and cow manure, (2) compare the growth of Black Taro in both soil conditions and (3) examine the correlation between soil quality and plant growth under these amendments.

The results indicated that soil amended with cow manure exhibited higher acidity than soil treated with chicken manure. Conversely, the chicken manure treatment showed significantly higher soil moisture and higher levels of essential macronutrients (nitrogen, phosphorus, and potassium). These differences directly influenced the development of the Black Taro, suggesting that manure type plays a critical role in enhancing soil properties. The findings conclude that chicken manure is more effective than cow manure in improving soil fertility and promoting the growth of Black Taro in the study area.

Keywords: black taro, soil quality, chicken manure, cow manure

Origin and significance

Currently, the problem of agricultural production costs tends to increase. Therefore, making the most of local resources such as animal manure is one way to reduce costs and promote sustainable farming to be suitable by using as an experimental plant to study the relationship between soil quality and plant growth. Therefore, the team was interested in studying the relationship between soil quality and the growth of black taro in the soil where chicken and cow manure were added for study the differences in the growth of black taro in the soil where chicken and cow manure were added for study the relationship between soil quality and the growth of black taro in the soil where chicken and cow manure were added. Therefore, the organizers conducted a study on the relationship between soil quality and the growth of black taro in the soil where chicken and cow manure were added in Wichienmatu School.

Research Questions

1. How does soil quality differ between areas amended with chicken manure and cow manure?
2. Is there a significant difference in the growth of Black Taro between plants grown in chicken manure-amended soil and those in cow manure-amended soil?
3. How does the relationship between soil quality and Black Taro growth vary between the two types of manure amendments?

Research Hypothesis

1. The soil quality in areas amended with chicken manure differs significantly from areas amended with cow manure.

Independent Variable: Type of manure (chicken manure vs. cow manure).

Dependent Variable: Soil quality (e.g., pH, moisture, and nutrient levels).

Control Variables: Water volume, trial period, and environmental conditions.

2. Black taro grown in soil amended with chicken manure shows different growth rates by comparing to those grown in soil amended with cow manure.

Independent Variable: Type of manure (chicken manure vs. cow manure).

Dependent Variable: Growth of the Black Taro (e.g., leaf size, plant height).

Control Variables: Water volume, trial period, and environmental conditions.

3. The relationship between soil quality and Black Taro growth varies depending on whether chicken manure or cow manure is used.

Independent Variable: Type of manure (chicken manure vs. cow manure).

Dependent Variable: The correlation/relationship between soil quality and plant growth.

Control Variables: Water volume, trial period, and environmental conditions.

Study Area



Picture 1: The soil area where cow manure is filled



Picture 2: The soil area where chicken manure is filled.

This research was conducted at Wichienmatu School, Mueang Trang District, Khok Lo Sub-district, Trang Province. It is located at latitude 7.5032371 degrees north. Longitude: 99.6293169

Materials, equipment, research methods

1. Materials and equipment

1.1 Soil pH/Moisture Meter

1.2 Soil NPK Test Kit/Meter

1.3 Spade

1.4 Watering can

1.5 Garden Hose

1.6 Chicken manure

1.7 Cow manure

1.8 Measuring Tape

1.9 Hand Trowel

1.10 black taro

2. Research Methods

2.1 Soil Data Collection

Soil quality was assessed following the GLOBE protocols, focusing on soil moisture, pH (acidity/alkalinity), and macronutrients (N, P, and K). The procedures were as follows:

1. Two specific areas were designated for study: one amended with chicken manure and the other with cow manure. Soil samples were collected from three points within each area, resulting in a total of six samples to ensure data accuracy.
2. Soil acidity was measured in both areas using a soil pH meter. The probe was inserted to a depth of 10 centimeters. Measurements were taken at all six points.

3. Soil moisture content was recorded using a soil moisture meter at a depth of 10 centimeters, conducted across all six sampling points.
4. Nitrogen (N), Phosphorus (P), and Potassium (K) levels were analyzed using a digital NPK meter, with measurements recorded six times (three per treatment area).

2.2 Data Collection on Black Taro Growth

The growth of the Black was monitored by measuring the plant height in both the chicken manure and cow manure treatment areas for the procedure as follows:

1. Two groups of Black Taro plants were designated: those grown in soil amended with chicken manure and those in soil amended with cow manure. For each area, three plants were randomly selected for height measurement, resulting in a total of six data points across both study areas.
2. A measuring tape was used to record the height of each plant. The measurement was taken from the soil surface to the tip of the highest leaf. This procedure was consistently applied to all specimens in both the chicken manure and cow manure groups.

2.3 Data analysis

1. Soil Analysis Soil moisture value Soil base acidity and soil nutrients using mean values and standard deviations.
2. A comparison between soil quality parameters and the growth of Black Taro in both chicken and cow manure-treated areas was conducted, utilizing Mean and Standard Deviation to identify differences.
3. The relationship between soil quality and the growth of Black Taro was examined through the analysis of Mean and Standard Deviation to determine the influence of soil properties on plant development.

Findings

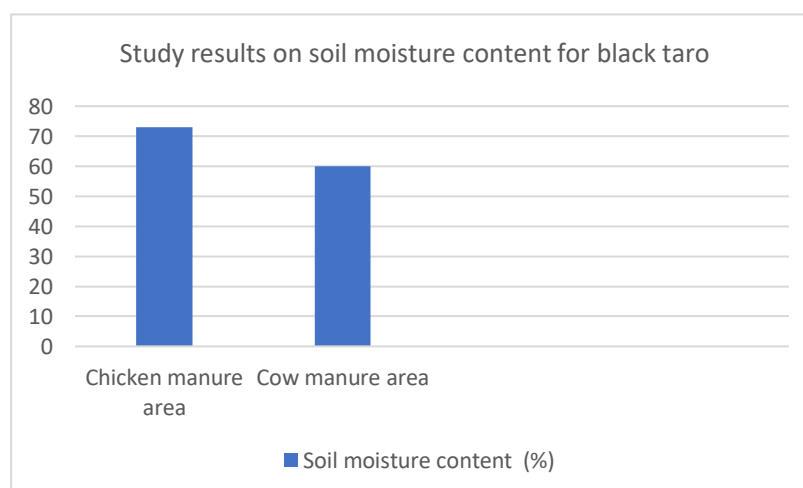
According to a study on the relationship between soil quality and the growth of black taro in the soil where chicken and cow manure are added, the results are as follows:

1. Soil moisture measurement studies

Table 1 shows a comparison of soil moisture values in the area where chicken manure and cow manure are added.

| No. | Chicken droppings | cow manure; |
|---------|-------------------|-------------|
| 1 | 100 % | 100 % |
| 2 | 70 % | 60 % |
| 3 | 50 % | 20 % |
| Average | 73 % | 60 % |

The results of the study compared the average moisture value in the soil where the black taro grows between the soil where chicken manure is added and the soil where cow manure is added.

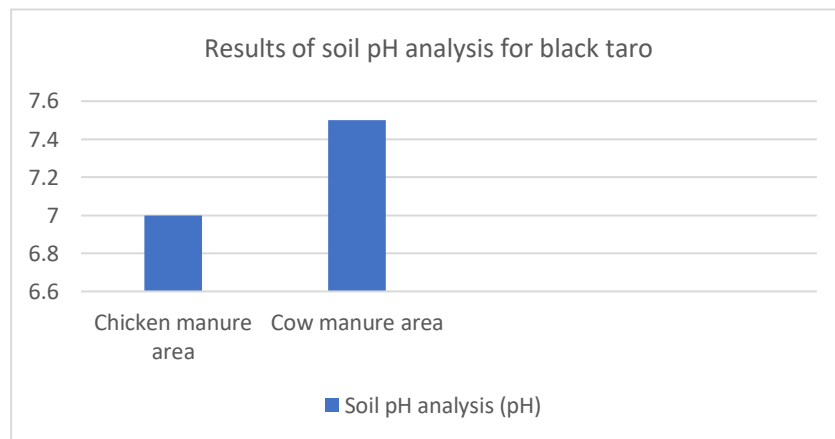


2. Studies on the measurement of soil acidity

Table 2 shows a comparison of the acidity-base in the soil at the area where chicken manure and cow manure were added.

| No. | Chicken manure(pH) | Cow Manure(pH) |
|---------|--------------------|----------------|
| 1 | 7 | 7 |
| 2 | 7 | 7.5 |
| 3 | 7 | 8 |
| Average | 7 | 7.5 |

The results of the study compared the average acidity base in the soil where the black taro grows between the soil where chicken manure is added and the soil where cow manure is added.

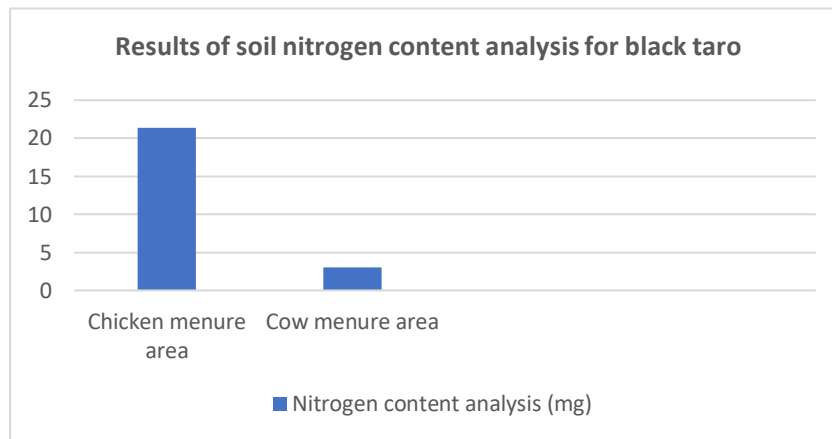


3. Soil nitrogen measurement studies

Table 3 shows a comparison of the nitrogen element in the soil at the area where chicken manure and cow manure were added.

| No. | Chicken droppings (mg) | Cow manure (mg) |
|---------|------------------------|-----------------|
| 1 | 27 | 2 |
| 2 | 15 | 3 |
| 3 | 22 | 4 |
| Average | 21.33 | 3 |

The results of the study compared the average nitrogen content in the soil where the black taro grows between the soil where chicken manure is added and the soil where cow manure is added.

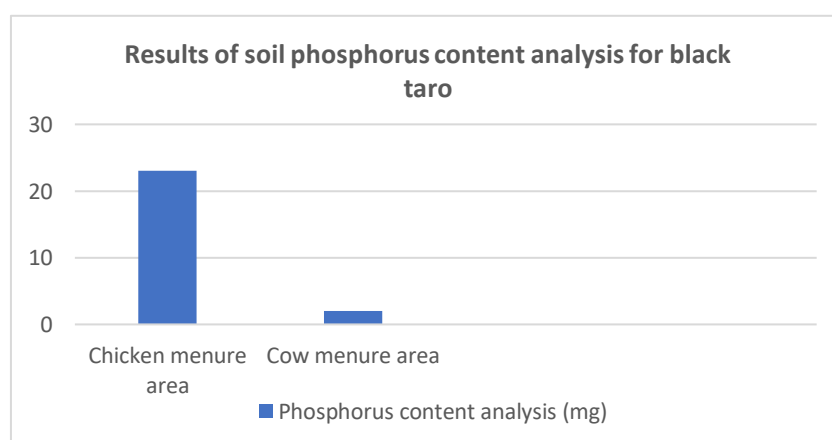


4. Study on the measurement of phosphorus in soils

Table 4 shows a comparison of phosphorus in the soil at the area where chicken manure and cow manure are added.

| No. | Chicken droppings (mg) | Cow manure (mg) |
|---------|------------------------|-----------------|
| 1 | 29 | 3 |
| 2 | 15 | 3 |
| 3 | 25 | 2 |
| Average | 23 | 2 |

The results of the study compared the average phosphorus content in the soil where the black taro grows between the soil where the chicken manure is added and the soil where the cow manure is added.

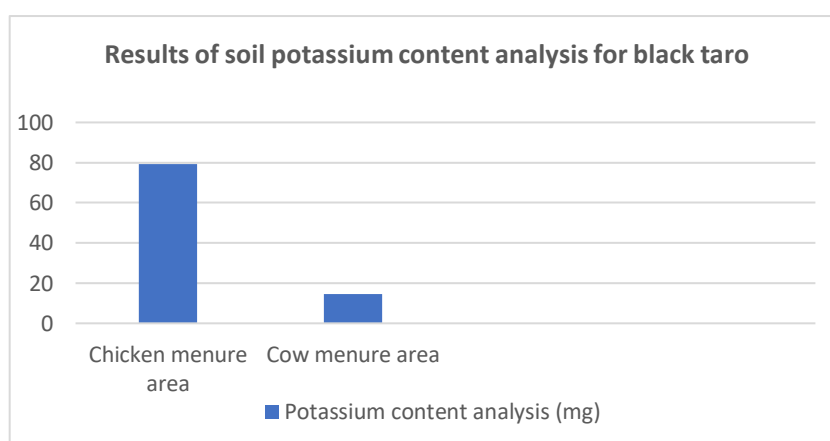


5. Study on the measurement of potassium in soil

Table 5 shows a comparison of potassium in the soil at the area where chicken manure and cow manure were added.

| No. | Chicken droppings (mg) | Cow manure (mg) |
|---------|------------------------|-----------------|
| 1 | 119 | 11 |
| 2 | 52 | 18 |
| 3 | 67 | 15 |
| Average | 79.33 | 14.66 |

The results of the study compared the average potassium content in the soil where the black taro grows between the soil where chicken manure is filled and the soil where cow manure is added.

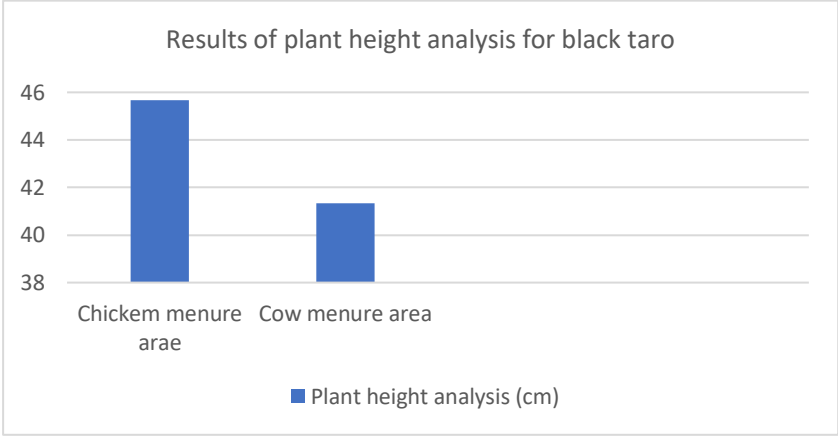


6. Study on the measurement of the height of the black taro

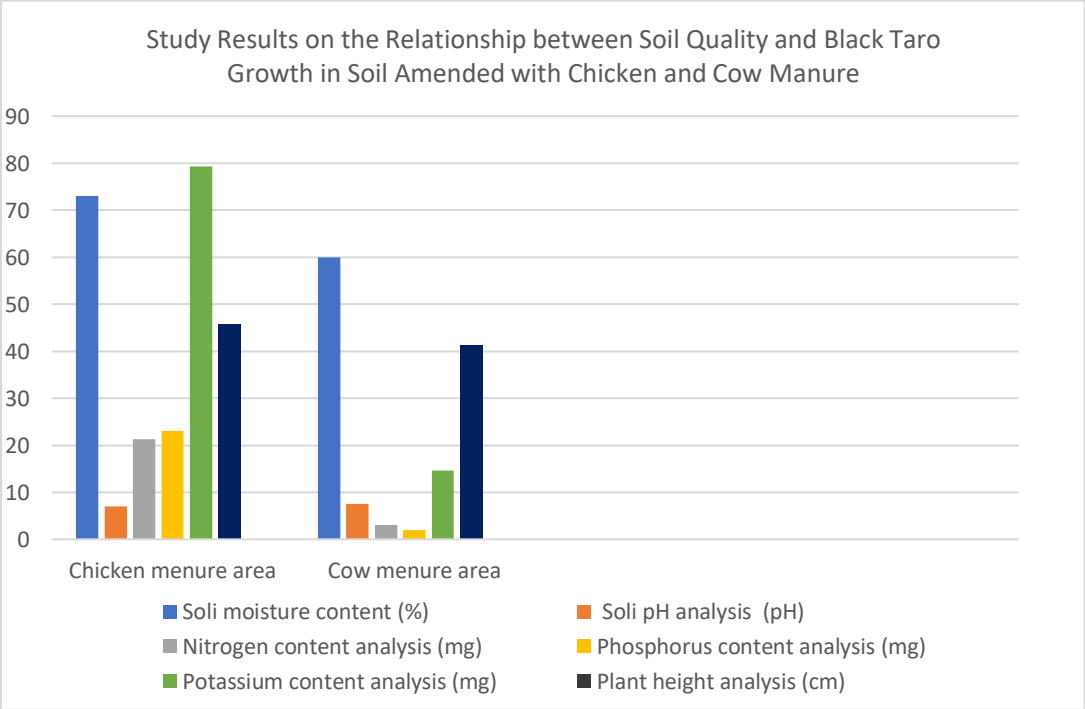
Table 6 shows a comparison of the height in the soil at the area where chicken manure and cow manure were filled.

| No. | Chicken manure(cm) | Cow manure(cm) |
|---------|--------------------|----------------|
| 1 | 27 | 26 |
| 2 | 42 | 37 |
| 3 | 68 | 61 |
| Average | 45.66 | 41.33 |

The results of the study compared the average height of the black taro between the soil where chicken manure was filled and the soil where cow manure was filled.



7. Study on the relationship of soil quality with the growth of black taro in the soil in the area of Chicken and cow manure are added.



Summary and discussion of the results of the study

According to the study of the relationship of soil quality with the growth of black bon in the soil, the area of chicken manure and cow manure are added. In WichienmatuSchool, it was found that the soil in the area where cow dung was added was valuable. The acidity is higher than that of the soil with chicken manure, but the soil with the addition of chicken manure has a higher soil moisture, nitrogen, phosphorus and potassium than the soil where the cow manure is added.

Acknowledgments

Conducting environmental research on "The study on the relationship between soil quality and the growth of black bon in the soil where chicken manure and cow manure were added in the WichienmatuSchool" was successfully completed. Dr. Apirak Songrak, Rajamangala University of Technology Srivichai, Trang Campus, who provided knowledge about soil quality measurement. Collecting data on the growth of black bon Thank you to Mrs. Kwanjai Kanchansrimek for helping to provide the equipment for the measurement, as well as the consultant who gave advice on the preparation and provided information in the preparation well. Thank you to my friends and team members for their assistance in this independent study.

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