



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

WichienmatuSchool



Abstract

This study investigated the relationship between soil quality and the growth of black taro (*Coccoloba esculenta*) amended with chicken manure and cow manure at Wichien Matu 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

Research Question

Asking 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?

Introduction

Nowadays, Black Taro is widely cultivated as a significant economic plant in Thailand, thriving particularly well in wetland areas found across various regions. Given the increasing abundance of livestock waste from the agricultural sector, our research team investigated the effects of integrating chicken manure and cow manure into the soil to enhance growth.

This study aims to analyze soil quality and the growth performance of Black Taro in areas amended with these two types of organic fertilizers. Furthermore, we examined the relationship between soil properties and growth rates within the grounds of Wichian Matu School to provide practical insights into sustainable agricultural practices.



Research Methods

Planning Investigations Describes the planning process

Research Hypotheses

1. The soil quality in areas amended with chicken manure differs significantly from areas amended with cow manure.
 2. Black taro grown in soil amended with chicken manure shows different growth rates compared to those grown in soil amended with cow manure.
 3. The relationship between soil quality and Black Taro growth varies depending on whether chicken manure or cow manure is used.
- Materials and Equipment
Soil pH/Moisture Meter, Soil NPK Test Kit/Meter, Spade, Watering Can, Garden Hose, Chicken Manure, Cow Manure, Measuring Tapes, Hand Trowel, Black Taro.

Research Methods

1. Soil Quality and Nutrient Study:
 - Soil pH: Measured at a depth of 10 cm using a soil pH meter in both chicken and cow manure areas (3 units per acre).
 - Nutrient Content (N, P, K): Measured directly in the soil using an NPK meter to compare nutrient levels between the two manure types.
2. Soil Moisture Study:
 - Soil Moisture: Measured at a depth of 10 cm using a digital soil moisture meter across all 6 sampling points to determine water retention.
3. Plant Growth Study:
 - Specimen Selection: Black Taro (*Coccoloba esculenta*) of similar initial size were monitored in areas amended with chicken manure versus cow manure.
 - Environmental Control: All plants were grown under the same environmental conditions at the study site to ensure a fair comparison.
 - Height Measurement: Plant height was measured from the soil surface to the highest leaf tip using a measuring tape.
4. Data Analysis:
 - All collected data were analyzed using Mean and Standard Deviation to compare the effectiveness of each manure type.

Carrying Out Investigations Describes what happened

This research was conducted on-site at Wichian Matu School. Following the soil amendment with chicken and cow manure, the initial phase coincided with the rainy season, characterized by continuous rainfall throughout the first week. This resulted in exceptionally high soil moisture levels, which accelerated plant growth; however, we observed that Black Taro in the chicken manure area exhibited more significant growth compared to the cow manure area.

As the frequency of rain decreased, causing a natural decline in soil moisture, we implemented a strict watering schedule, providing equal amounts of water to both experimental plots daily to maintain precise control over environmental variables. To ensure data accuracy and reliability, measurements were recorded every two weeks over a total duration of six weeks. This longitudinal approach allowed us to account for real-world environmental factors, such as fluctuating sunlight and precipitation, ensuring the validity of our findings.

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

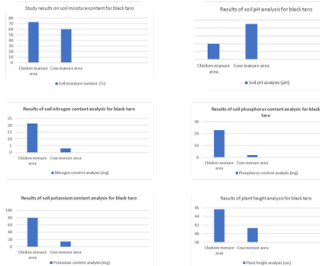
GLOBE Badges

1. Be a Scientist Badge: This project strictly follows the scientific method. We established a clear research question and hypothesis regarding the effects of chicken versus cow manure on Black Taro growth. By collecting multiple data points (6 samples per parameter) and calculating the Mean and Standard Deviation, we ensured that our conclusions are based on rigorous statistical analysis and objective observation.
2. Exploring the Environment Badge: Our investigation focuses on the interaction between two Earth spheres: the Pedosphere (soil quality) and the Biosphere (plant growth). By applying GLOBE protocols for soil pH, moisture, and nutrient analysis, we gained a deeper understanding of how organic amendments change the local environment and influence biological development in our study site.
3. Community Impact Badge: The findings of this research provide practical value to the local community in Trang province. By identifying the most effective organic fertilizer for Black Taro, we can offer evidence-based recommendations to local farmers and school gardeners. This promotes sustainable agricultural practices and helps community members optimize their resources for better crop yields.

Results

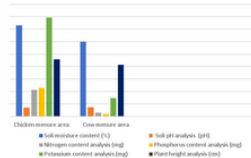
Analyzing Data

The results of the research on the relationship between soil quality and the growth of Black Taro at Wichian Matu School indicated that soil amended with cow manure had higher pH levels (more alkaline) than soil with chicken manure. However, the soil amended with chicken manure showed significantly higher levels of soil moisture, Nitrogen (N), Phosphorus (P), and Potassium (K) compared to the cow manure area.



Parameters (Measurement)	Chicken manure area	Cow manure area	Difference
Soil (pH)	7.0	7.5	0.5
Soil Moisture (%)	79%	60%	19%
Nitrogen (mg)	21.33	3.00	18.33
Phosphorus (mg)	23.00	2.00	21.00
Potassium (mg)	79.33	14.66	64.67
Plant Height (cm)	45.66	41.33	4.33

Study Results on the Relationship between Soil Quality and Black Taro Growth in Soil Amended with Chicken and Cow Manure



Discussion

Interpreting Data

1. Nutrient Superiority and Plant Growth: The most significant finding is the vast difference in macronutrients. Soil amended with chicken manure contained 21.33 mg of Nitrogen, which is 18.33 mg higher than the cow manure area (3 mg). This high nitrogen content, along with significantly higher Phosphorus (23 mg) and Potassium (79.33 mg), directly correlates with the plant height. The Black Taro in the chicken manure area reached an average height of 45.66 cm, outperforming the cow manure group by 4.33 cm. This confirms that the nutrient density in poultry waste is more suitable for the rapid vegetative growth of this species.
2. Moisture Retention: Chicken manure also improved the soil's physical properties, showing a moisture content of 79%, which is 19% higher than the cow manure area (60%). Higher moisture retention ensures a steady supply of water and dissolved nutrients to the roots, which is vital for the water-loving Black Taro.
3. Soil pH Balance: Although cow manure resulted in a higher pH of 7.5 (compared to 7.0 in chicken manure), the neutral pH of 7.0 in the chicken manure area is considered ideal for nutrient availability. The 0.5 difference in pH suggests that while cow manure is better for reducing soil acidity, chicken manure provides a more balanced environment for nutrient uptake in this specific study.

Conclusions

According to the study of the relationship of soil quality with the growth of black bond in the soil, the area where chicken manure and cow manure are added. In Wichian Matu School, 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.

Bibliography

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