

(But guys, again you don't need to ANSWER IF THE QUESTION IS ALREADY BEYOND OF OUR STUDY. Again, the "Soil" part we were talking about was already in our Scope and Delimitation or our "Limitation". So you don't need to mention all of these. Just say that according to this theory, we can come to a conclusion that our PYROLYZED LBP FERTILIZER can really improve SOIL QUALITY.

How to address if the panelist will question us about this?

Question: "Did you measure soil quality improvement?"

- Thank you for that question, Ma'am/Sir. In our study, we did not directly measure soil quality parameters. Our focus was limited to the plant growth indicators, specifically plant height, stem diameter, and number of leaves. However, according to Soil Fertility Theory, pyrolyzed organic materials may improve soil quality. This aspect was beyond the scope of our study, but it is a valuable area that future researchers may explore further.

Question: "How can you say it improves soil if you did not test the soil?"

- That is a very good point, Ma'am/Sir. Our study did not directly analyze soil properties. Our conclusion was based only on the plant growth results that we measured. The discussion about soil improvement is based on existing theoretical support, particularly Soil Fertility Theory. Since soil analysis was outside the scope of our study, WE ACKNOWLEDGE this as a limitation and recommend it for future research.

Connection to Our Findings

Because the soil environment improved, the tomato plants were able to grow better, resulting in:

- higher plant height
- thicker stems
- more leaves

In simple terms:

- Better soil conditions helped the tomato plants grow more effectively. And again guys, soil testing is not part of our research measurements, but again, we can still use this as support that we can conclude, "tungod ani nga theory, even though wala ta ga test sa soil quality, ma support gihapon ni natu mung nganong ni succeed atung Pyrolyzed LPB fertilizer in term of that given growth parameters. Kay again, nag state ni sya nga theory nga ang mga BIOCHAR makahelp or can improve soil quality.

Question: "How do your theories support your findings?"

- Our findings are supported by Liebig's Law of the Minimum, which explains that plant growth depends on the nutrient that is most limited in the soil. The pyrolyzed banana peel fertilizer supplied essential nutrients like potassium, helping the plants grow better.

- Mitscherlich's Law explains that nutrients that are released gradually can be absorbed more efficiently by plants, which may explain the improved growth observed in our treatment.

- Soil Fertility Theory suggests that pyrolyzed organic materials improve soil conditions, allowing plants to absorb nutrients more effectively. These theories help explain why the tomato plants treated with pyrolyzed banana peel fertilizer showed better growth performance.

1. What is your study all about?

- This study investigates the effectiveness of pyrolyzed Lakatan banana peel (LBP) fertilizer compared with commercial fertilizer (MasterBlend 4-18-38) and a non-fertilizer control on the growth of tomato plants (*Solanum lycopersicum*).

- The research measured three indicators of plant growth:

- Plant height (cm)
- Stem diameter (mm)
- Number of leaves (manual counting)

- The goal of the study was to determine whether Lakatan banana peel fertilizer produced through pyrolysis can serve as an effective and sustainable alternative to commercial fertilizers.

2. Why did you conduct this study?

- This study was conducted to address two major issues:

- Agricultural sustainability
- Agricultural waste management

- Banana peels are commonly discarded as waste, yet they contain important nutrients such as potassium, phosphorus, and calcium, which are beneficial for plant growth (Haque et al., 2023).

- By converting banana peels into fertilizer through pyrolysis, this study explores a method to:

- reduce organic waste
- produce an eco-friendly fertilizer
- support sustainable agriculture

This aligns with previous research suggesting that organic waste fertilizers can improve plant growth while promoting sustainable agricultural practices (Liu, 2024).

3. Why did you choose this study?

- The researchers chose this study because:

- Lakatan banana peels are abundant agricultural waste in many communities.
- Commercial fertilizers can be expensive and environmentally harmful when overused (Niazi et al., 2023).
- There is increasing interest in organic fertilizers and biochar-based soil amendments in sustainable agriculture (Alam et al., 2021).

Therefore, the researchers aimed to explore whether banana peel waste can be converted into a useful and sustainable fertilizer for plant growth.

4. Why did you choose tomato plants?

- Tomato plants were selected because they have high nutrient requirements, particularly potassium, which plays an important role in plant growth, fruit development, and overall plant health (Tajer, 2024).

- Since Lakatan banana peels are naturally rich in potassium and other nutrients, tomato plants were considered suitable for evaluating the effectiveness of the pyrolyzed LBP fertilizer.

- In addition, tomato plants are commonly used in agricultural experiments because they grow relatively fast and clearly respond to nutrient availability, making them ideal for fertilizer comparison studies.

5. What research gap does your study address?

- The research gap addressed in this study is the limited experimental comparison between pyrolyzed Lakatan banana peel fertilizer and commercial fertilizers on tomato plant growth.

Previous studies have examined:

- organic fertilizers (Anuada et al., 2021)
- biochar soil amendments (So & Tan, 2018)

However, these studies did not specifically focus on Lakatan banana peel fertilizer as a pyrolyzed organic fertilizer source.

For example, the study by Balkrishna et al. (2024) compared organic fertilizer with a non-application treatment using red pepper (*Capsicum*), rather than tomato plants.

Therefore, this study addresses that gap by evaluating the effectiveness of pyrolyzed Lakatan banana peel fertilizer specifically on tomato plant growth.

6. What is the gap or limitation in your study?

- One limitation of the study is the short duration of the experiment, which lasted only three weeks.

Because of this limited timeframe, the study was only able to measure early vegetative growth indicators, including:

- plant height
- stem diameter
- number of leaves

Other important plant growth parameters, such as:

- fruit yield
 - flowering stage
 - root development
 - chlorophyll content
- were not measured in this study.

These aspects may be explored in future research with longer experimental durations.

7. How did you analyze your data or how did you get these results?

- The data were analyzed using descriptive statistical analysis, specifically:
 - Mean (average)
 - Percentage increase over the control group
 - One-way ANOVA

Mean:

The mean was calculated to determine the average growth performance of each treatment. Using the mean helps summarize multiple measurements into a single representative value, making it easier to compare the treatments.

Example formula:

$$\text{Mean} = (\text{Pot 1} + \text{Pot 2} + \text{Pot 3}) \div 3$$

Percentage Increase Over Control Group:

The percentage increase over the control group was calculated to determine how much improvement occurred when fertilizers were applied compared to plants that received no fertilizer.

This method helps show the relative improvement in plant growth due to fertilizer treatment, which allows easier comparison between treatments.

A similar approach was used in the study of Balkrishna et al. (2024) when evaluating plant growth differences between fertilized and non-fertilized plants.

One-Way ANOVA:

A one-way Analysis of Variance (ANOVA) was used to determine whether there were statistically significant

One-Way ANOVA:

A one-way Analysis of Variance (ANOVA) was used to determine whether there were statistically significant differences among the three treatment groups.

This statistical test compares the means of multiple groups to determine whether the observed differences occurred by chance or were caused by the treatments applied.

Experimental Measurement Process

The experiment followed these steps:

1. Plant height, stem diameter, and number of leaves were measured twice a week for three weeks.
2. Each treatment group consisted of three replicate pots.
3. The measurements from each pot were recorded.
4. Mean values were computed for each treatment group.

This allowed the researchers to compare the overall growth performance among the treatments.

8. What did you discover from your study?

- The study found that pyrolyzed Lakatan banana peel fertilizer produced the best plant growth among the three treatments.

Plant Height:

Pyrolyzed fertilizer: 12.71 cm

Commercial fertilizer: 10.74 cm

Control: 8.16 cm

Stem Diameter:

Pyrolyzed fertilizer: 2.89 mm

Commercial fertilizer: 2.76 mm

Control: 2.02 mm

Number of Leaves:

Pyrolyzed fertilizer: 9 leaves

Commercial fertilizer: 8 leaves

Control: 6 leaves

These results indicate that pyrolyzed banana peel fertilizer effectively supports tomato plant growth, possibly due to its nutrient content and gradual nutrient release, which is consistent with Mitscherlich's Law of Diminishing Returns.

Previous research by Conde and De Asis (2021) also reported that organic fertilizers can perform better than commercial fertilizers in certain growth parameters, although their study focused on different plant indicators.

9. What is the significance of your study?

Answer:

The study is significant because it demonstrates that agricultural waste such as banana peels can be converted into useful fertilizer.

This contributes to:

Sustainable agriculture

Waste reduction

Cost-effective farming methods

10. Who benefits from your study?

- Farmers: They can use banana peel fertilizer as a low-cost alternative to commercial fertilizers.-Environmental sector bcuz using organic waste as fertilizer helps reduce:

- Waste accumulation
- Environmental pollution

- Researchers: The study provides new experimental data that future studies can build upon.

- Local communities: Communities with abundant banana waste can turn it into useful agricultural products.

11. Why did the pyrolyzed fertilizer perform better than the commercial fertilizer?

If you will explain this, please refer to chapter 4 of our research, and every point you want to say please support it with our given RRL, RRS and the 3 theories in THEORITICAL FRAMEWORK.

12. Why is the control group important in your experiment?

-The control group (no fertilizer) provides a baseline for comparison.

- It shows how plants grow without nutrient supplementation, allowing researchers to determine whether the fertilizers truly influence plant growth.

In our study, the control group recorded the lowest growth measurements, confirming that fertilizers play an important role in plant development.

13. What are the limitations of your study?

Possible limitations include:

- Short experimental duration (3 weeks)
- Limited number of samples
- Controlled pot conditions rather than field conditions

Future studies could:

- Extend the experiment period
- Include more replicates
- Test the fertilizer in real agricultural environments

14. Why did you choose pyrolysis instead of composting banana peels?

Answer:

Pyrolysis converts organic waste into biochar-like material, which has several advantages (Can you search our research if there is RRL, RRS that stated about pyrolysis? If there is, put it in here):

(Higher carbon stability

Better nutrient retention

Improved soil structure please check this up BASED ON OUR STUDY)

Compared to composting, pyrolyzed materials can remain in soil longer and improve soil fertility more effectively.

Why did you only use three pots per treatment?

Answer:

The study used three pots per treatment to allow comparison among treatments while considering the limitations in time, space, and resources. Although a larger sample size could improve statistical power, repeated measurements over the experimental period helped increase the number of observations used in the analysis.