# TITLE OF THE STUDY
# Comparative Evaluation of Pyrolyzed Lakatan Banana Peel Fertilizer, Commercial Fertilizer, and Non-Fertilizer Control on the Growth Rate of Tomato (Solanum lycopersicum) Plants

MAIN PROBLEM

The study investigates whether organic fertilizer made from Lakatan banana peels can be as effective or better than commercial fertilizer in promoting tomato plant growth.

Commercial fertilizers are effective but expensive and may harm soil when overused**, so alternative organic fertilizers are needed.

3. GENERAL OBJECTIVE

To determine the **effect of different fertilizer types on tomato plant growth specifically:

* Plant height
* Stem diameter
* Number of leaves

4. SPECIFIC OBJECTIVES

1. Compare plant height, stem diameter, and number of leaves among:

   * Pyrolyzed LBP fertilizer
   * Commercial fertilizer (MasterBlend 4-18-38)
   * No fertilizer (control)

2. Determine the percentage increase in growth compared to the control group.

3. Determine if there is a **significant difference among treatments using statistical analysis

5. NULL HYPOTHESIS

$H_0$:

There is **no significant difference in plant height, stem diameter, and number of leaves among tomatoes treated with:

* Pyrolyzed LBP fertilizer
* Commercial fertilizer
* No fertilizer

6. VARIABLES

Independent Variable**

* Type of fertilizer

  * Pyrolyzed banana peel fertilizer
  * Commercial fertilizer
  * No fertilizer

Dependent Variables**

* Plant height
* Stem diameter
* Number of leaves

7. RESEARCH DESIGN

Quantitative Experimental Research Design

Used to determine the cause-and-effect relationship between fertilizer type and plant growth.

8. RESEARCH SETTING

Location:
Zone 6, Patag Camp Evangelista, Cagayan de Oro City.

Tomatoes were planted in identical pots with:

* Same soil
* Same watering
* Same sunlight

This ensures thatfertilizer type is the only variable affecting plant growth.

9. DURATION OF THE STUDY

* February 2, 2026 – February 20, 2026
* Duration:3 weeks
* Observations recorded twice per week

10. KEY RESULTS

Plant Height Increase

* Pyrolyzed LBP fertilizer: 55.76% increase

* Commercial fertilizer: 31.62% increase
* Control: baseline

Stem Diameter Increase

* LBP fertilizer: 43.07%
* Commercial fertilizer: 30.69%

Number of Leaves

* LBP fertilizer: 34% increase
* Commercial fertilizer: 31% increase

11. CONCLUSION

The pyrolyzed Lakatan banana peel fertilizer showed better performanpe compared to commercial fertilizer and the control in:

* Plant height
* Stem diameter
* Number of leaves.

This indicates that banana peel biochar is a promising organic fertilizer for tomato production.

12. SIGNIFICANCE OF THE STUDY

The study benefits:

Farmers – cheaper fertilizer option
Environment – reduces agricultural waste
Agriculture sector – supports sustainable farming Students/researchers – reference for future studies

13. THEORETICAL BASIS

The study is supported by:
Liebig's Law of the Minimum
Plant growth is limited by the nutrient that is in the shortest supply.

14. POSSIBLE DEFENSE QUESTIONS

1. Why did you choose banana peel fertilizer
Because banana peels contain potassium, phosphorus, calcium, and magnesium which help plant growth.

2. Why tomato plants?
Tomatoes respond quickly to nutrient changes, making them ideal for growth experiments.

3. Why compare with commercial fertilizer?
To determine if the organic fertilizer can compete with commonly used chemical fertilizers.

4. Why is the control group important?**
It shows how plants grow without fertilizer for comparison.

5. Why only 3 weeks?
To observe early vegetative growth and initial fertilizer effects.