

# **FROM TRASH TO GARDEN : THE USE OF FOOD WASTE TO GROW PLANTS**

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## **TABLE OF CONTENTS**

ABSTRACT	2
INTRODUCTION	3-4
<ul style="list-style-type: none"><li>• Background of the study</li><li>• Statement of the problem</li><li>• Hypothesis</li><li>• Objectives</li><li>• Significance of the study</li></ul>	
MATERIALS AND METHODOLOGY	5-6
RESULTS AND DISCUSSION	7-8
CONCLUSIONS AND RECOMMENDATIONS	9
BIBLIOGRAPHY	10-11
APPENDICES	12-14

## **ABSTRACT**

This project studies the efficiency of food scraps as organic fertilizer, and observes which of the following chosen food scraps is the most effective in speeding up the process of growing plants. Our project aims to develop sustainable ways to grow food for the population without using alternatives that can harm our environment. Our goal is to answer the question, which is better, in terms of speed, and how healthy our subjects grow.

We used monggo seeds, as they grow the fastest. And our method of comparing the normal growth is by planting a control plant / comparison plant that we did not add any food scraps with. Our food scraps, which are separated into two, decomposed and fresh. With grinded eggshells being soaked in vinegar for 10 minutes to dissolve some of its particles. We have 3 other food scraps we used, which are rice, banana peels and mango peels. The two peels we're chosen as they are commonly found in the streets and in the household. And the rice as it is part of daily life in this country.

We did the experimentation on a place conditioned for plants, and did our process of decomposition first, then after a week we planted the Basil seeds, but due to unseen circumstances (typhoon) the seeds drowned and our experimentation failed, so we decided to replant using Monggo Seeds. Which after 1 week, it was successful in showing results.

With our observations, we saw that the Fruit peels showed the most satisfactory results, as they had the highest growth rate compared to the other plants with other food scraps. With them growing 29.69% - 33.5% more than the control plant. So we conclude that fruit peels due to their high levels of Potassium, Calcium, Phosphorus and other elements. can fertilize plants.

# INTRODUCTION

## Background of the Study

Our modern era has a big problem, with innovations, which come with depletion, in which the resources we use are quickly running out. So our solution is to think of sustainable ways to continue progressing. It can be renewable energy, infrastructure innovations and such. There are many different sustainabilities, but what about our food? Our era's population is continuously growing, and with that, we have to find quicker ways to provide food. Many people have decided to use chemical alternatives, which are known to make plants grow faster, but with that, it comes with many negative consequences. First, is that Chemical Fertilizer, can degrade our environment even more, Second is that it uses chemicals that can affect the soil and the growth of the plant. Third is how it can promote pollution in many different ways, since they disrupt the balance of chemicals and can destroy the healthy microbes that live in the soil.

Chemical Alternatives are always preferred by those who want quick and fast answers, when in reality, it can damage the environment even more. When in reality, the answer lies from what we harvest from nature, deliver to our homes, and discard in our kitchens. The food scraps. It's way easier, cheaper and more accessible, rather than buying from the store, showing how sustainable it can be. Using food scraps, and composting them is what we call Organic Fertilizers, which are naturally produced, this means that they can promote soil health better, promote microbial growth, lessen the problem of decomposition/pollution and many more.

But the efficiency of these organic fertilizers depend on the nutrients found in them. The main nutrients or elements to support plant growth are Potassium, Phosphorus, and Nitrogen, along with others like calcium, and more. It can be that the Banana peels have Potassium and Phosphorus, and the Eggshells have Calcium and Phosphorus, but how can we truly know which one is more effective? Our S.I.P will explore and study these factors and the efficiency of different common food scraps.

## Statement of the Problem

With the rising problems of climate change and land conversion, our cities and provinces are becoming concrete jungles, where no dreams are made of. Trees and plants are becoming less common in our neighborhoods, causing temperatures to rise very fast, together with the greenhouse gases that we emit. The obvious solution is obviously plants, but by how fast our seasons change, and how fast time flies, together with more problems in climate and smaller nutrient values for plants. We need better boosts in growth.

Traditional fertilizers are often insufficient especially in facing problems, such as weather events, changing precipitation, temperature change, etc. Insufficiency can affect the growth of plants, especially since they are known to grow slower due to the nutrient imbalance, change in temperature, etc. To tackle the problem of climate change, we learned how to make our slow solutions faster, especially in the fast moving problems.



## **Hypothesis**

- If eggshells contain calcium and phosphorus, then the eggshells as fertilizer will be most effective
- If the decomposed material can create rich nutrients for plants, then the decomposed group of food scraps are more successful in growing the plants.

## **Objectives**

- Discover which food scraps made the most effect on growing the plants through the end record of the planting process.

## **Significance of the Study**

This study is made to be able to help our environment and at least make an action to restore our trees and plants that serves as a protection to all people. This can prove on which food scraps would be able to speed up and take effect on the growth of plants in which people could make use of. This research can be done simply at home and can be further investigated about the food scraps used that made a more successful result and the ones that did not.

## **MATERIALS AND METHODOLOGY**

### **Materials**

- Monggo seeds
- 8 Food scraps (1 newly scrapped, 1 decomposing for each)
  - 2 mangos (need only the peels: 1 for fresh, 1 for decomposed)
  - rice leftovers (1 for moldy, 1 for decomposed)
  - 2 bananas (need only the peels: 1 for fresh, 1 for decomposed)
  - 4 eggs (need only the eggshells: 2 for grinded, 2 for vinegar dissolved)
- 9 Plastic bottles to be cut into half and labelled as such:
  - Fresh Mango Peels
  - Fresh Banana Peels
  - Leftover Rice
  - Grinded Eggshells
  - Vinegar Soaked Eggshells
  - Decomposed Mango Peels
  - Decomposed Banana Peels
  - Decomposed Rice
  - Comparison plant
- Soil

### **Methodology**

1. Prepare the Decomposed food scraps
  - For Decomposed banana peels, mango peels, and rice
    - Prepare the peels and add to the blender
    - Add small amount of water and start blending or grinding them.
    - Once blended, strain them to remove the water and put it to designated bottle
2. Start Decomposing process
  - Add water to your compost bin. Compost should have a balanced amount of moisture. If you use water from the tap, let it sit for 24 hours to get rid of chlorine and other chemicals that will clean beneficial microbes in your compost.
  - When compost is ready for use, it will look dark and have an earthy smell.
3. Prepare the Fresh food scraps
  - For Fresh mango peels, banana peels, and leftover rice
    - Each food scraps should be blended with water and strained afterwards as well.
    - Then add to their designated bottles with labels.

4. Prepare the Eggshells
  - For Eggshells
    - For grinded eggshells: Add the eggshells to the blender and blend it until it's fully broken into small pieces.
    - For vinegar soaked eggshells: Also blend the eggshells, then add it into a container with vinegar. Let it sit for around 10 minutes, then strain the vinegar out.
    - Add the food scraps to their designated bottles with labels.
5. Once the eggshells, fresh group, and decomposed group of food scraps are ready for planting, start to add soil and monggo seeds to each bottle.
6. Also prepare one bottle labeled as “Comparison Plant” to be added with soil and monggo seeds without any food scraps.
7. Put them all close together and add the same amount of water every single day. Do the basic actions of taking care of a plant.
8. Observe, record, and document the process and the growth of the plants.



## RESULTS AND DISCUSSION

### Results

Recorded measures of plants at the end of the experiment:

Food Scrap	Stem length in cm	Number of leaves	Time it took to sprout
Fresh Mango Peels	12.8cm	still sprouting	3 Days
Decomposed Mango Peels	0cm	0	Did Not Sprout
Fresh Banana Peels	11.8cm	3	4 Days
Decomposed Banana Peels	13.5cm	0	3 Days
Leftover Rice	0cm	0	Did Not Sprout
Decomposed Rice	0cm	0	Did Not Sprout
Grinded Eggshells	4.8cm	0	1 week
Vinegar Soaked Eggshells	12.0cm	2	4 Days
No Food Scrap	9.0cm	still sprouting	5 Days



## **Discussion**

Based on the results of the experiment, we can analyze that the decomposed banana peel is seen to be the most effective food scrap as fertilizer, having the monggo plant to have a length of 13.5cm and sprouted in just 3 days. Which in comparison with the control plant, it grew 33.5% more. However, the eggshells as said in the hypothesis, did not have the expected results but it was still close and effective. As for its partner, the Vinegar soaked one, it showed pretty satisfactory results, growing 25% more than the control plant. Other than that, the decomposed mango peels and the rice group did not show any signs of plant growth.

## **CONCLUSIONS AND RECOMMENDATIONS**

### **Conclusions**

To summarize, the fruit peels yield very abundant growth. The fruit peel with the most growth would be the Banana peels, as both the fresh variant and the decomposed variant, showed significant growth, whilst the Fresh Mango peels also had abundant growth. Although its partner, the decomposed mango peels, yielded no growth. There were also other scraps that did not have any growth. Which are the rice scraps, and the grinded eggshells only managed to grow a small amount.

If we take into consideration the different chemical components of the food scraps, both of the fruit peels have high amounts of potassium, and phosphorus, which is a very important element to grow plants. So if we conclude our findings, we can conclude that fruit peels can be very efficient in growing plants.

### **Recommendations**

We would suggest one thing that can possibly be done, which is if we could combine different food scraps, to combine the components of the food scraps, so we could have some type of product that can grow plants quicker.

There are also many things that we missed, which is the time given for the plants to grow, and the food scraps to properly decompose. If we manage to do that, we could have a proper comparison of fresh scraps and the decomposed scraps. Additionally, the plants weren't given enough time to bloom some type of flower or grow a fruit (in our case beanstalks) So we could really test and observe which food scrap is more effective.

With this knowledge we gathered from the experiment, fruit peels that is discarded everyday can be used for a good purpose. If we our landfills happen to collect a number of fruit peels, we can make our own fertilizer using the fruit peels.

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## APPENDICES

### APPENDIX A: Documentation



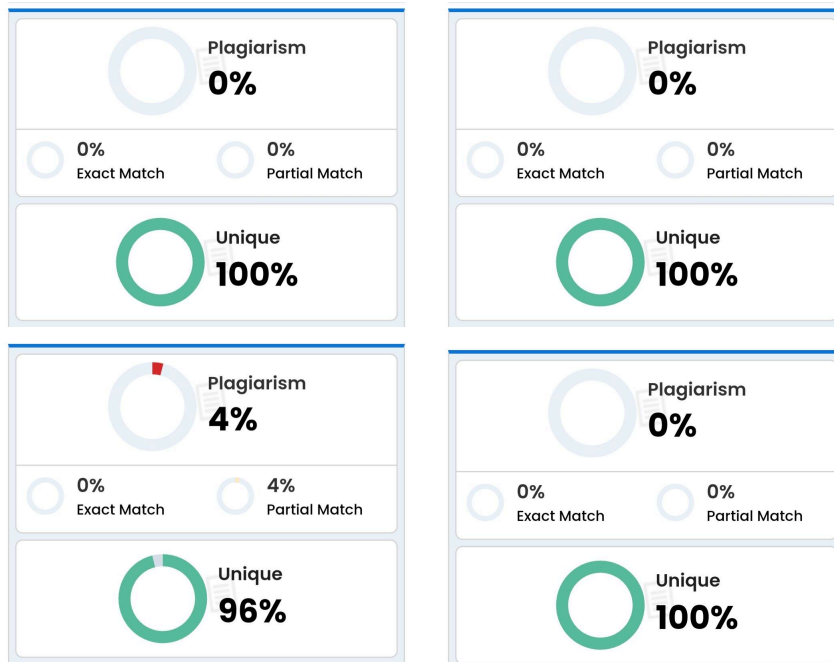






## APPENDIX B: Percentage of Plagiarism

In order : abstract, introduction, materials and methodology, results, conclusion and recommendations



## APPENDIX C: Percentage of AI-Generated Content

