

Vermicomposting (Veg vs. Non-Veg)

Science Fair Project Report

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Submitted by

Mohamed Uvaish. H

(Grade 7)

ARRAHMAAN INTERNATIONAL SCHOOL

(Creating the community of Excellence)



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Vermicomposting (Banana vs. Fish)

ABSTRACT

- It is estimated that in India nearly 700 million tonnes of organic waste are generated annually which is either burned or land filled.
- The large amounts of the waste are generated from the market area created the major environmental problems.
- Vermicomposting is the best biotechnology to reduce the load on the treatment and disposal of biodegradable waste.
- In the present investigation, the study is carried out to observe the rate of decomposition and growth of worms in banana waste and in the fish waste that found in the nearby market of my house and thereby obtained the nutrient rich organic manure.
- From my investigation I found that the rate of decomposition and growth of worms are high in banana waste.
- I wish to improve the fertility of my school garden through the vermicompost and lead as an example for my fellow friends in making organic vegetables.

INTRODUCTION

Waste has become a major problem to this world due to the increasing population, urbanization, intensive agriculture and industrialization. The problem of waste disposal from a myriad of industries, is becoming increasingly acute, the world over. Kitchen waste consists of considerable quantities of food processed and prepared for human consumption and all other constituents of the refuse like plastics and paper.

While people give attention to recycle inorganic wastes such as plastics, glass and papers, the organic waste can be recycled into compost. As such, composting of kitchen waste can be an effective method to reduce waste in landfills which helps to conserve the environment. The major problems associated with traditional thermophillic composting are the long duration of the process, the frequency of turning of the material, the material sometimes needs to be reduced in size to provide the required surface area, loss of nutrients during the prolonged composting process, and the heterogeneous nature of the product.

In recent times, interest in the use of a closely-related technique, known as vermicomposting (using earthworms to breakdown organic materials) has increased. In its basic form, this is a low-cost technology system that primarily uses earthworms in the processing or treatment of organic wastes. Certain species of earthworms can consume organic material residuals very rapidly and fragment them into much finer particles by passing them through a grinding gizzard, an organ that all worms possess. The earthworms derive their nourishment from microorganisms that grow upon these materials.

What Worms Need?

The Five Essentials

Compost worms need five basic things:

- A hospitable living environment, usually called “bedding”.
- A food source
- Adequate moisture (greater than 50% water content by weight)
- Adequate aeration
- Protection from temperature extremes



STATEMENT OF THE PROBLEM

In my school we are planting vegetables and flowers as a part of our hands on science activity. We decided to prepare organic vegetables using organic manure. I questioned myself why we have to buy manures from outside and decided to prepare vermi compost in our school ground itself.

Nearby to my house there is a big market of banana and fish where lots of banana and fish waste are getting wasted. I want to use the both in effective way.

I combined these two factors and thought to start vermicomposting using banana waste and fish waste and also very eager to know which will decompose at a fast rate and in which waste the worms grow fast and so started vermicomposting separately for banana and fish waste with the help of my science teacher.

HYPOTHESIS

The rate of decomposition and growth of worms are high in banana waste.

DESIGN OF STUDY

INDEPENDENT VARIABLE:

- Banana Waste and Fish waste

DEPENDENT VARIABLE:

- The rate of decomposition and growth of worms

CONTROLLED VARIABLES:

- Weight of waste
- Amount of earthworms
- Pit length, breadth and depth
- Sunlight, water, cow dung, soil

In my research, the amount of banana waste (stem, flower, peel of fruit) and fish waste (gills, intestine, lungs, bones and so on) are the controlled variables. I collected approximately 40 to 45 earthworms from the plantain garden behind my school and put equal amount of it in both the pits. So it is also under control. The rate of decomposition depends upon the growth of worms in pits so it is considered as depended variables. And then nature of the soil, the sunlight, amount of cow dung and the water used are constant.

MATERIALS:

- Fish waste and Banana waste
- Soil , Water and Cow dung
- Garden spade
- Knife to cut the waste

PROCEDURE:

- Located a spot in school yard that receives a lot of direct sunlight and a place that is not close to the school as it may emit an unpleasant smell as it decomposes.
- Dig a hole in the ground with a garden shovel that is 2 to 3 feet deep by 3 feet wide.
- Start with banana waste in one pit and fish gills in another pit. Then add a layer of cow dung as fertilizer in each pit. Add a layer of soil and repeat the layers in order in each pit. Stop when your compost reaches 1 foot above the compost pit.
- Water the compost pit until the ingredients are soaked.
- Add equal amount of red earthworms to each pit.
- Turn the ingredients in the compost pit twice per week with a shovel to provide proper aeration. Add water at this time to keep the pile moist.

Observe the decomposition rate and the growth rate of earthworms at frequent intervals.







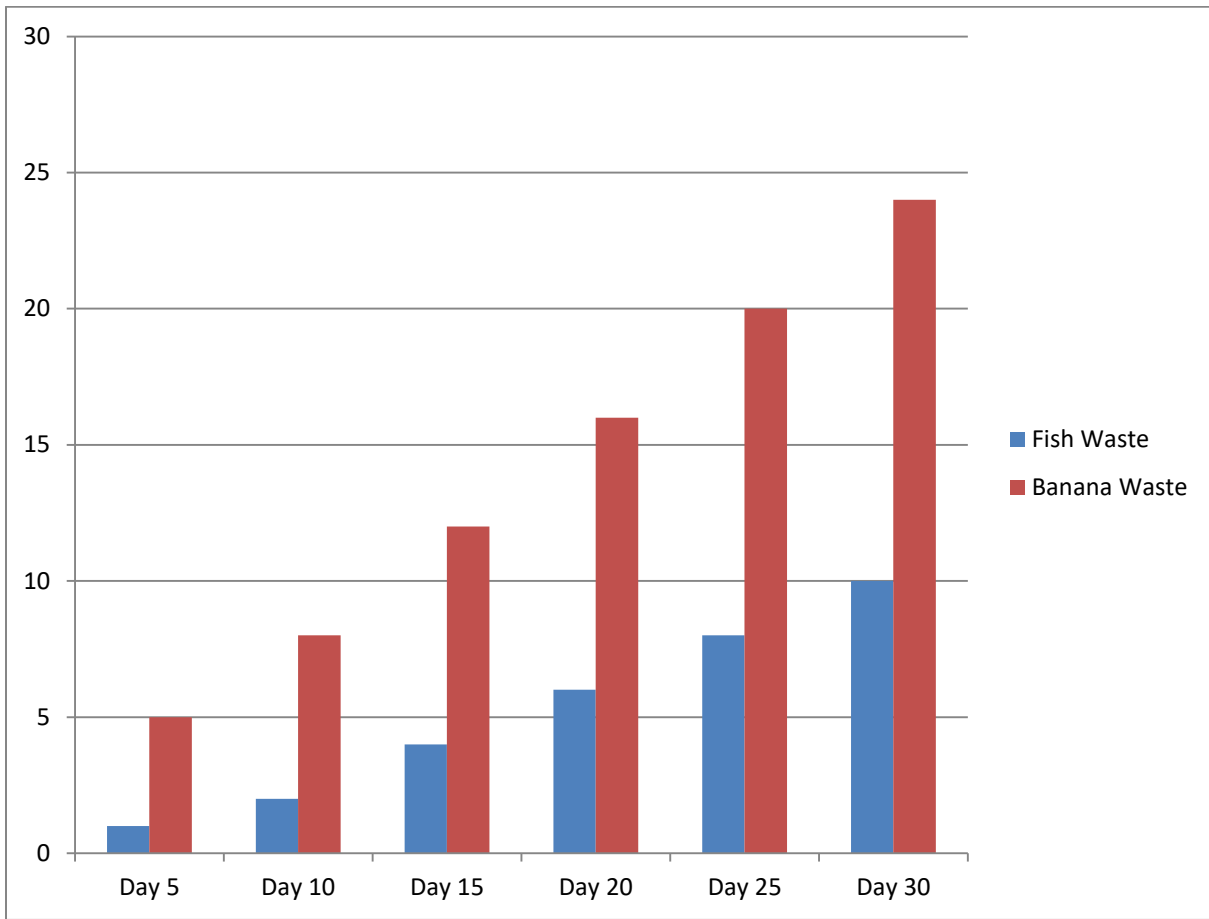
COLLECTION OF DATA

Observations:

- Rate of decomposition
- Rate of growth of worms



COMPARISON BETWEEN THE VEG AND NON VEG WASTE



RESULT

Fish waste pit	Banana waste pit
<ul style="list-style-type: none">• House flies attracted towards the fish waste and lot of house flies larva starts to grow.• Termites also started to develop in the fish waste pile. Also lots of small insects were observed.• Very bad smell was felt near the fish waste pit.• Fish gills and bones were not decomposed even after twenty five days.• To avoid the house flies we cover both the pit with neem branches and it works well.• Except the fish gills and bones other fish waste decomposed.• When I turned the soil in the fish waste pit, the soil looks in ash colour.• The soil in the pit is easy for me to turn (becomes loosen soil) and also when I water the pit, it is easily absorbed.• The rate of growth of earth worm is less.	<ul style="list-style-type: none">• Insects were seen but in fewer amounts compared to fish waste.• When I turned the soil in the banana waste pit, I felt difficult to turn. The soil becomes very tight and the water gets stagnated when I pour. To let the water inside I turned the soil a lot at a time.• The soil changed into blackish colour.• The rate of growth of earth worm is observed more than the fish waste.• The banana waste decomposed at a fast rate than the fish waste.

DISCUSSION

S. No	Features of the pits	Fish waste	Banana waste
1.	Soil	The soil was very loose.	The wastes mixed well with the soil and get tightened.
2.	Water Absorption	Since the soil is very loose, water easily flowed deep into the pit. Rate of absorption of water is slow and less.	Since the soil was tight, it didn't allow the water to flow deep inside the pit. Water stagnated for sometime. To let the water inside, I turned the soil harder than the fish waste. Rate of absorption of water is fast and more.
3.	Appearance of soil	Soil appeared ash in colour.	The soil appeared black.
4.	Odour	Very bad smell had been felt especially when turning the fish waste soil.	Normal waste smell had been felt.
5.	Effect of Insects	Lot of small insects and house flies were seen.	Insects are seen but in fewer amounts compared to fish waste.
6.	Growth of worms	Rate of growth of worms are seen in lower amount.	Rate of growth of worms are seen in higher amount.
7.	Rate of decomposition	Except the fish bones and gills all the other parts of the fish decomposed but on the whole the rate of decomposition is lower.	The banana waste decomposed at a faster rate.

APPLICATION

Vermicompost is nothing but the excreta of earthworms, which is rich in humus and nutrients.

- Vermicompost is rich in all essential plant nutrients.
- Provides excellent effect on overall plant growth encourages the growth of new shoots / leaves and improves the quality and shelf life of the produce.
- Vermicompost is free flowing, easy to apply, handle and store and does not have bad odour.
- Used to improve soil environment and waterholding capacity and prevents soil erosion.
- .Vermicompost contains earthworm cocoons and increases the population and activity of earthworm in the soil.
- It neutralizes the soil protection.
- It prevents nutrient losses and increases the use efficiency of chemical fertilizers.
- Vermicompost is free from pathogens, toxic elements, weed seeds etc.
- Vermicompost minimizes the incidence of pest and diseases.
- It enhances the decomposition of organic matter in soil.
- Vermicompost is essentially what ends up being applied to plants in the garden. Ultimately, vermicomposting results in rich, black, earthy-smelling compost that will help your garden enjoy healthy growth.
- I will use the manure in our school garden to cultivate organic vegetables.

CONCLUSION

- My hypothesis, “The rate of decomposition and growth of worms are high in banana waste” has been proved.
- At the end of the month there was no population of worms in the fish waste pit. There was up to 2-3 worms only there. On the banana waste pit there was lot of worms nearly upto 30-35 worms I observed. Then I understood that the vegetarian waste, the banana waste is good for farming and agriculture.
- I will use the banana waste vermin composting in my school garden.

FUTURE ENHANCEMENT

- To continue the vermicomposting process and thereby provide natural manure to my school garden and lead as an example to all my school students in order to motivate them to cultivate organic vegetables at their home itself.
- Also to find the best way to decompose the fish waste and use the waste in useful way.

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