**ATENEO DE DAVAO UNIVERSITY**
**Junior High School**

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2ND Quarter
Grade 9 Science

# SCIENCE INVESTIGATORY PROJECT PROPOSAL

## DETERMINING THE EFFECTIVENESS OF THE VERMICOMPOST TO INCREASE THE GROWTH RATE OF THE BABY BOK CHOY

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***Submitted by G9 Borgia Group 3B on <Submission Date>***


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## I. INTRODUCTION (Refer to separate PT instructions file)

### A. BACKGROUND AND SIGNIFICANCE OF THE STUDY

Composting benefits both communities and the environment by reducing waste, enhancing soil quality, and having a positive effect on society. Composting is essential for the environment and the community because it enables people to dispose of their organic waste and allow it to decompose so they may use it as fertilizer. Another advantage is that people may help spread this optimistic view by imparting knowledge to others, especially to their young children, who will eventually be the generation responsible for protecting the environment. Water saving is just one of the many advantages of composting, which also helps in soil moisture retention and decreases outflow. Recycling organic materials benefit the environment while reducing landfill space. Composting can reduce the amount of methane, a potent greenhouse gas, produced by organic waste in landfills. Methane emissions are reduced significantly when organic waste, especially leftover food, is composted. Composting reduces, and in some cases, it eliminates, the need for chemical fertilizers. This composting effort can help the community or establishment that my PT group is working with because it will allow them to contribute to preserving our environment by preventing erosion and reducing discharge. Once our experiment is finished, they can use the compost in their homes or communities and use it on their plants, which will let them spend less. They can use this activity to contribute to environmental preservation.

### B. STATEMENT OF THE PROBLEM

Can the vermicompost fertilizer help in boosting our baby Bok Choy's growth rate?

### C. HYPOTHESIS

If we use the vermicompost compost on our Baby Bok Choy, then our plant's growth rate will be boosted.

### D. REVIEW OF RELATED LITERATURE

Independent Variable- Vermicompost

Benefits of vermicomposting

- A type of compost that is richer in Nitrogen, Potassium, and Phosphorus without the use of any harmful chemicals.
- Vermicompost is 100% organic because it uses organic materials like worm and/or cow manure, left over foods, and paper
- In addition, vermicompost also stabilizes and regulates your plants' growth rate.

Dependent Variable- Height of the baby bok choy plant

Baby bok choy growth rate

- The growth rate of the baby bok choy plant will improve depending on the nutrients it's getting.

## II. METHODOLOGY

### A. VARIABLES

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| **Independent Variable** | The vermicompost |
| **Dependent Variable/s** | The height of the baby bok choy plant. |

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|---|---|
| **Constant or Controlled Variables** | • Type of soil<br>• Location on where you will conduct the experiment<br>• Type of plant which is baby bok choy<br>• Number of plants used in making the experiment<br>• Amount of sunlight exposure<br>• Amount of water<br>• Temperature |

**B. TREATMENTS / SET-UP**

Add or remove treatment/set-up columns based on the experimental design.

| Treatment/Set-up | Control Set-up | Experimental Set-up 1 |
|---|---|---|
| Description | Find a spot where the sunlight directs, fill the pot that is at least 6 inches deep with ¾ of soil, 1 baby bok choy plant, at least a 6-inch deep container (used as a pot), 0.5 kg of seed starting soil mix, and spray water a week. | Find a spot where the sunlight directs, fill the pot that is at least 6 inches deep with ¾ of soil, 1 baby bok choy plant, at least a 6-inch deep container (used as a pot), 0.5 kg of seed starting soil mix, ½ cup of **vermicompost** and spray water a week. |
| No. of Trials or Replicates | 3 trials. | 3 trials. |

**C. EXPERIMENTAL DATA TO BE MEASURED OR OBSERVED**

| Experimental Measurement or Observation | Description of Measurement or Observation | Significance of Observation |
|---|---|---|
| Height of the Baby Bok Choy | Height of the Baby Bok choy will be measured in cm every week | As it is part of the dependent variable; the growth of the Baby Bok Choy. |
| Color and Shape of the leaves of the Baby Bok Choy | an upright clump of dark green leaves, each with a very thick white or light green stalk. | To keep in check that the vermicompost is working and the plant is healthy. |
| cm grown per week | an average consistent growth of 0.8 to 1 inch per week | to see if the plant is facing any long term deficiencies like lack of proficient water or sunlight |
| form and shape of the main stem | the plants body parts are healthy and clear of any dark spots, canker and downy mildew | to see if plant may have contracted a disease that may negatively affect the growth process of the plant |

**D. MATERIALS AND EQUIPMENT NEEDED**

Add rows to the table if needed.

| Materials and Equipment | Quantity Needed | Description of Use | Specifications or Criteria for Materials and Equipment |
|---|---|---|---|
| Earthworms | 2kg | Compost starting material | Epigeic earthworms; Eisenia andrei and Eisenia fetida |

| | | | |
|---|---|---|---|
| Loam soil | 10kg | For plants and compost | Seed starting soil |
| Litmus paper | 1 pack | To know the ph level of the soil and the bok choy | Red litmus paper |
| Shovel | 1 | For planting, mixing the starting compost material and mixing the compost with the soil. | n/a |
| Plant pots | 6 | For planting the baby bok choy | For every pot there is a planted baby bok choy that is evenly placed. |
| Storage box | 1 | For composting. | at least 6 inches deep and 7 inches wide |
| Measuring tape | 1 | To measure the growth of the Bok Choy | |
| Spray bottle | 1 | for watering the plants | To give the plants a sufficient level of water. |
| baby bok choy seedlings | 2 packs | Test plant for the experiment | To know what and how the baby bok choy seedling can live and to see the result after experimenting. |
| Shredded paper | 10 shredded paper | For the bedding | By using shredded paper it is less toxic and it adds organic matter to the soil. |
| Gloves | 5 pair | To ensure safety and to be sanitary | To avoid and speed up planting if gloves are used. |
| Measuring cups | 1 set | for measuring the soil | To provide enough soil and just the right amount of placement in the soils. |

## E. PROCEDURES FOR TESTING AND GATHERING/OBTAINING DATA

Remove the row if the section is not applicable to the research.

| Section | Step-by-Step Procedure |
|---|---|
| Producing or Sourcing the Compost Material | The materials required for the composting process are 2kg earthworms which is the essential material for this experiment, bok choy seedlings about 20 seeds, we also need loam soil, about 4kg; we could buy this in the garden store, and also purified water wherein we can get this from our respective homes.<br>Our compost equipment will consist of a mini shovel, measuring tape, storage box, planting pots, gloves, watering spray, and measuring cups; we can buy this in hardware. and for the litmus paper, we can buy it in the pharmacy<br><br>**VERMICOMPOSTING**<br>Get a plastic storage container, poke some holes in the lid, and shred some. You can use cardboard or newspaper as bedding; dampen it with water, then sprinkle on some loam soil. You'll also need some earthworms, so go to the backyard and collect those. Feed the worms plant-based kitchen scraps and eggshells; avoid meat, greasy food, and dairy products; always bury the food beneath the bedding; add more dry bedding as needed if they aren't entirely covered by it. Because food scraps can occasionally attract flies, one method of harvesting the compost is to only feed one side of the bin for a few weeks before |

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| | scooping out the other side to use. In addition, you can distribute the compost in a well-lit area, wait 30 minutes, and then restore the worms to a new bin after skimming off the top of the compost a few times.<br><br>According to the sources, vermicast could turn waste Depending on the density of the waste and the maturity of the earthworms, casting organic wastes takes 22–32 days (regular composting requires 30–40 days, followed by 3–4 months of curing). Furthermore, earthworms consume garbage and subsequently excrete castings, which are granules of nutrient- and organically-rich soil that is dark, odourless, and useful for improving the soil. Compared to compost, earthworm casts are a ready-to-use fertilizer that may be applied at a higher pace due to the nutrients' preferential release rates for growing plants.<br><br>*Vermicasting (or Vermicomposting): Processing Organic Wastes Through Earthworms*. (n.d.). Retrieved October 26, 2022, from http://omafra.gov.on.ca/english/engineer/facts/10-009.htm<br><br>*Start Vermicomposting Business at Low Investment*. (2021, July 30). Discover Agriculture. https://discoveragriculture.com/start-vermicomposting-business-at-low-investment |
| Sourcing and Preparing the Test Plants and Plant Soil | After gathering all supplies needed, six containers, seed starting soil, bok choy seeds, and vermicompost. After preparing all the materials, Prepare three containers before we plant our test plants. Add the compost mixture on top of the soil, then combine the mixture. Next, sow the seeds in the six containers (fill the container first with ¾ of soil and sow the seeds, then slightly cover it.) Therefore, we slowly cover the seeds with the soil and ensure the seeds are planted correctly in the soil and compost mixture. Give each planter about ½ cup of water, ensuring not to drown the seeds completely. |
| Making observations and/or measurements about the Compost | After gathering all of the necessary supplies,<br>Measure out the materials one by one and place them in the container.<br>Observe the mixing process and how the compost will blend while composting.<br><br>After composting, examine how the soil-compost mixture turns out.<br><br>Before adding the compost and soil, wait for all of the compost elements to break down. |
| Dosage and Frequency of Compost Application to the Test Plants | Add the mixture once every month to ensure that the soil is healthy and the seedlings will grow. In set up one, it will be 64 grams (½ cup); in set up two, it will be 128 grams (1 cup); in set up three, it will be 302.4 grams(1 ½ cups). all of the set-ups with varying dosages will have 3 trials each. |
| Making observations and/or measurements about the Test Plants | Once a week, observation and measurement will take place. We will measure the Bok Choy's height and the quantity and quality of the leaves. Compost should be observed, too—Water the plant after each observation and measurement.<br><br>BABY BOK CHOY'S HEIGHT |

| CONTROLLED SET-UPS | 1ST WEEK | 2ND WEEK | 3RD WEEK | 4TH WEEK |
|---|---|---|---|---|
| Pot 1 | | | | |
| Pot 2 | | | | |
| Pot 3 | | | | |

| EXPERIMENTAL SET-UP | 1ST WEEK | 2ND WEEK | 3ED WEEK | 4TH WEEK |
|---|---|---|---|---|
| Pot 1 | | | | |
| Pot 2 | | | | |
| Pot 3 | | | | |

| Observation | 1ST WEEK | 2ND WEEK | 3RD WEEK | 4TH WEEK |
|---|---|---|---|---|
| pot 1 | | | | |
| pot 2 | | | | |
| pot 3 | | | | |

## III. BIBLIOGRAPHY


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*The phosphorus cycle*. (n.d.). Science Learning Hub. https://www.sciencelearn.org.nz/resources/961-the-phosphorus-cycle - This link refers to the steps of the cycle of the phosphorus, the steps, the role of phosphorus to the plants.

*Soil Management*. (n.d.). https://www.ctahr.hawaii.edu/mauisoil/c_nutrients02.aspx - This link refers to the soil mineral type, the amount of clay, then the greater amount of aluminum of soil.

*The classification and definition of biomolecules* https://www.britannica.com/science/biomolecul- this link of information references the classifications and consistent and facial claims about biomolecules and the chemical structure
Health Benefits of Bok Choy. (2020, November 11). WebMD. https://www.webmd.com/diet/health-benefits-bok-choy - this link of information references factual claims about the the health benifits of a Baby Bok Choy

## IV. VISUAL DOCUMENTATION OF INITIAL SIP SET-UP

(Refer to separate PT instructions file)

### VERMICOMPOSTING


shred some paper for the bedding


damp the bedding with water


Put soil on top of the damped bedding



Then put the earthworm.


Put loam soil.


Then put dry bedding.


Sprinkle loam soil on top of the bedding.