



WORM POOP! A GARDEN ECOSYSTEM EXPERIMENT

BY GRANT SCHOOL 5TH GRADERS

GRANT ELEMENTARY SCHOOL



INTRODUCTION

At Grant Elementary School, 5th graders received funding to design experiments and research how to grow healthy plants. We decided to study how different soil types can affect a garden ecosystem. We learned about organisms affecting garden ecosystems and experimental design systems. Our work will help other learners and gardeners in the community.

Scientific Question: How does changing the type of soil affect the growth of a Rainbow Chard (*Beta vulgaris*) plant? We are learning what type of soil Rainbow Chard grows best in so we can inform the community about healthy soils for plants.

METHODS

Scientific Question

How does changing the type of seed starting soil affect the growth of a Rainbow Chard plant?

Independent Variables

- ❖ 100% Jiffy Organic Seed Starter
- ❖ 100% Vermicompost from the classroom worm bin
- ❖ 50% mixture of vermicompost and seed starter

Constants

- ❖ Type and amount of light and water the plants receive
- ❖ Amount of soil and the same seed starting pots
- ❖ Plant location in same south window and plants were rotated
- ❖ Rainbow Chard seeds from the same packet of seeds

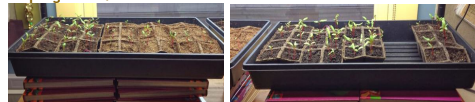
Dependent Variables

- ❖ Number of chard sprouts
- ❖ Length of the hypocotyl
- ❖ Number of foliage leaves
- ❖ Length of the longest leaves
- ❖ Width of the widest leaves



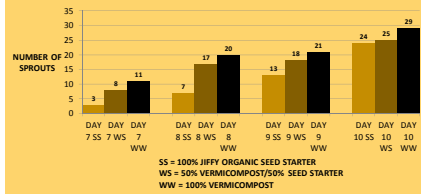
Hypotheses

1. Scientists believed the vermicompost would support the best chard growth because it may have more nutrients and we observed it remained moist better than the seed starter. Scientists thought the vermicompost replicated the plants' natural habitat.
2. Some scientists hypothesized the mix would support the best chard health because it has a mixture of nutrients from both soils.
3. Other scientists thought the plants in different soil types might start out differently but have similar growth as they progressed.

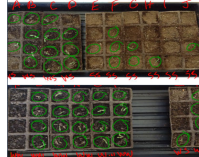


RESULTS

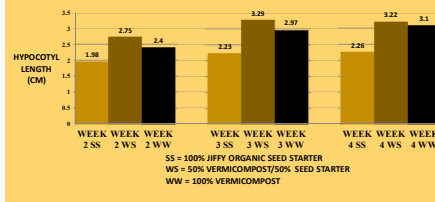
NUMBER OF CHARD SPROUTS IN 3 DIFFERENT SOIL TYPES



1. Every day, the 100% vermicompost had at least 3 more sprouts than the other soils.
2. By day 10, the seed starter had almost caught up: 3 sprouts to 24 sprouts.



HYPOCOTYL LENGTH OF CHARD PLANT IN 3 DIFFERENT SOIL TYPES

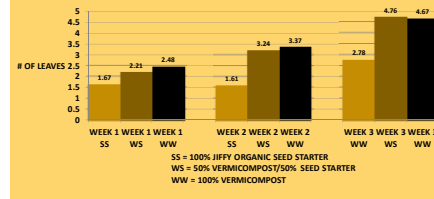


1. The soil mix had the longest hypocotyl every week by at least 0.12 cm.
2. The largest hypocotyl growth was the vermicompost (0.7 cm). The hypocotyls all grew only a small amount.



RESULTS

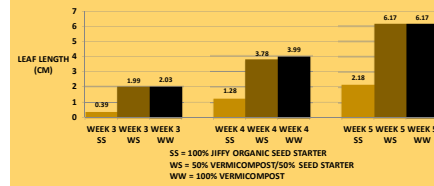
NUMBER OF FOLIAGE LEAVES ON CHARD PLANTS IN 3 DIFFERENT SOIL TYPES



1. The mixed soil grew the most leaves every week and had the most leaves in week 5.
2. The seed starter plants decreased leaves from week 3 to week 4 and had the least amount every week.
3. The mix and vermicompost soils had almost 2 times as many leaves than the seed starter by week 5.

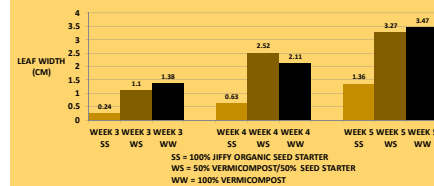


LEAF LENGTH OF CHARD PLANTS IN 3 DIFFERENT SOIL TYPES



1. The seed starter's leaf length was more than half the length of the other soil types every week.
2. The vermicompost and mixed soil had about the same length of leaves and both ended up with 6.17 cm average longest leaf.

LEAF WIDTH OF CHARD PLANTS IN 3 DIFFERENT SOIL TYPES



1. Even though the vermicompost had the widest leaves overall (3.47 cm), the mixed soil leaf width grew the most (2.17 cm).
2. The seed starter's leaf width was more than half the width of the other soil types every week.

CONCLUSIONS, WONDERINGS, AND THOUGHTS

Overall:

Plants planted in soil with vermicompost had the most sprouts, longest hypocotyls, most leaves, longest leaves, and widest leaves. This is probably due to the vermicompost having more nutrients ready for the plants and we observed the vermicompost holding water better. We wonder why the seed starter results were so low, especially in the leaf number, length, and width.

Sprouts:

Vermicompost grew the most chard sprouts. Plants planted in vermicompost may end up being healthier and larger because they grew quicker and earlier. We wonder if worms in the plant soil after planting helped the plants continue to grow.

Hypocotyl Length:

We wonder if the vermicompost would have the longest hypocotyl after week 5 because it had the most growth. We also wonder if a longer hypocotyl is a sign of a healthy plant because our longest hypocotyl plants started to droop under the weight of the leaves.

Leaf Number:

We wonder if the seed starter plants would catch up and have the same amount of leaves, the same way it caught up with number of sprouts.

Leaf Length/Width:

Vermicompost and mix had similar results. We wonder what other percentages of vermicompost would do well. Could we use less vermicompost and get a similar result?

We advise gardeners growing cool season vegetables, like chard, incorporate at least 50% vermicompost into their soil.

ACKNOWLEDGEMENTS

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