

Plant the Moon: Team Gernips- #1

Background

As a team we needed to grow a sustainable plant that could grow in regolith. Together, as a group looked through a variety of different fruits, vegetables, and plants to choose what we thought would grow the best. We wanted to find a plant that was edible, nutrient dense, and somewhat easy to grow. In the end we chose the German Turnip. We chose the German Turnip because it is the best in nutrients and growth time for what we need. When we figured out what plant we wanted to grow we still had lots to think about. We needed to figure out the kind of soil we wanted to use, compost, watering measurements, and our regolith mixture percentages. We chose to use a natural and organic planting mix, we chose this because this would help sustain maximum growth for our turnips. For compost we decided to use a small amount of used coffee grounds because we concluded that it would help with PH balance in the soil. Together we conducted that giving our plant 80ml of water every other day throughout the whole experiment would create optimal growth. Lastly, as a whole we chose the soil and regolith compositions to include a pot of 50% soil/50% regolith, 50% regolith/40% soil/10% compost, 50% soil/40% regolith/10% compost, 60% soil/30% regolith/10% compost, and 70% soil/20% regolith/10% compost. We chose all of these compositions because it is the best variety of soil, regolith, and compost. In Conclusion all of these variables will end in the maximum growth of our turnips and will help them thrive as they grow.

Experiment Design

First the supplies were gathered which included: 7 Plastic flowerpots (Diameter – 8in diameter and 8in deep), 1 bag of natural and organic potting mix, three and one fifth of a cup of coffee grounds, an indoor greenhouse (Measurements – 20in height, 23in width, and 51in length), three LED grow lights (only two were used), 7 watering bulbs, and our safety gear. Second, the supplies were moved outside and then our safety gear was applied. Next, the appropriate amounts of soil and regolith were added to each of the seven flowerpots (measurements in the list below) in the list below. The next day the appropriate amounts of coffee grounds were added to each flowerpot and then mixed all of the ingredients together by folding it in to ensure the mixture within the flowerpots had the best distribution. The next day water was added to moisten the mixture then the seeds were planted about an inch and three quarters deep. After the seeds were planted, the Ph was then checked, and the watering bulbs were filled with 80ml (about 2.70 oz) of water every two days. Then the green house was set up and the LED lights were zip tied to the top of it. The plants were then placed under the grow lights in a straight line to make sure they all get the same amount of light. The lights were put on the eight our setting to mimic the amount of sunlight they need. After everything was completed, every two days they were checked on to make sure they had enough water and did not get too much light. Every Friday after the watering bulbs were filled, the Ph of each pot was measured and then the tallest sprout was measured with a ruler in inches. After the data was collected, it was put into a chart to monitor the amount of growth each plant has.

Measurements for Each Pot:

- Pot One – 100% (8 cups) Regolith

- Pot Two – 100% (8 cups) Soil
- Pot Three – 50% (4 cups) Regolith and 50% (4 cups) Soil
- Pot Four – 50% (4 cups) Regolith, 40% (3 1/5 cups) Soil, and 10% (4/5) Coffee Grounds
- Pot Five – 50% (4 cups) Soil, 40% (3 1/5 cups) Regolith, and 10% (4/5) Coffee Grounds
- Pot Six – 60% (4 4/5) Soil, 30% (2 2/5) Regolith, and 10% (4/5 cup) Coffee Grounds
- Pot Seven – 70% (5 3/5 cups) Soil, 20% (1 3/5 cups) Regolith, and 10% (4/5 cup) Coffee Grounds

Hypothesis

If the German Turnip is planted in more soil and compost than regolith, then it will show better growth.

This is why we believe that the pot with the soil composition 50% soil 40% regolith and 10% coffee grounds will show the best growth.

Variables

Controls

In the experiment, many factors must stay the same to conduct the experiment. The environment in which the plants exist, whether it be 8 hours of sunlight, 80 milliliters (about 2.71 oz) of water, or stay the same to clearly test the diverse groups of soil composition. The

components of the different soil composition; lunar regolith, natural and organic potting mix, and coffee grounds as fertilizer, also get controlled for concise comparisons in growth of the kohlrabi in different compositions. The housing of the German turnips- the 8-inch pot size and the 20 by 23 by 51 (inches) greenhouse the plants live in, account for the size the plants grow to.

Independent Variables

The only factor that changes in the experiment is the composition of the soil. Each of the pots use varied amounts of soil, lunar regolith, and fertilizer to see changes in Kohlrabi growth. Varying composition of soil also allows for comparisons with pots whose composition contains higher amounts of lunar regolith compared to pots with more soil; Pots that hold specifically more soil than, lunar regolith show more growth since the plant grows naturally in earth.

Dependent Variables

Growth of the kohlrabi and Ph of each pot change based on the composition of each pot. These dependent factors change due to the varied nutrients each housing offers. Increasing the amount of lunar regolith in the pot greatens the level of Ph while lowering the growth of the plant. On the contrary, pots with more natural soil and fertilizer experienced larger plant growth with lesser levels of Ph.

Results

Good Afternoon! As our class took on the Plant the Moon Challenge we knew it would be not the easiest challenge but it definitely was worth it. Before we get into the results let me tell you a little about German turnips that could affect how the results came across. German turnips, also known as rutabagas, are a root vegetable that is commonly used in traditional German cuisine. These turnips are a cross between a cabbage and a turnip, and they have a sweet, slightly nutty flavor that makes them a popular ingredient in stews, soups, and casseroles.

In recent years, German turnips have gained popularity in other parts of the world as well, due to their unique flavor and versatility in the kitchen. They are low in calories and high in fiber, making them a healthy addition to any diet. One of the most interesting things about German turnips is their nutritional value. They are rich in vitamin C, potassium, and calcium, as well as antioxidants that can help to prevent cancer and other diseases. They are also a good source of iron, which is important for maintaining healthy blood cells. That concludes a background of what they are to humans.

The results we got was that the 70% humus-filled topsoil 20% regolith 10% fertilizer and 50% loamy, humus-filled topsoil 50% regolith showed the best results in growth. We tested the pots with different ratios of regolith fertilizer and potting soil. We did 6 pots of different proportions 100% regolith, 100% loamy, humus-filled topsoil, 50% loamy, humus-filled topsoil 50% regolith, 70% humus-filled topsoil 20% regolith 10% fertilizer, 50% regolith 40% humus-filled topsoil 10% fertilizer, and 60% humus-filled topsoil 20% regolith 20% fertilizer.

Discussion and Conclusions

The results of the experiment were unexpected. Progress of growth was seen through the first half of the growth period but slowed considerably or ceased altogether about halfway through. Most plants reached about four to five inches in height before beginning to maintain height or wither for the remainder of the growth period. This was a disappointing outcome, but we have formed a hypothesis regarding our plant's failure. The plants could likely not gather enough nutrients from the soil, causing their growth to halt. Another likely factor was overwatering. The plants were watered every other day, causing perpetual wetness. This likely rotted the roots of the plants. If another similar experiment were to be attempted it would be important to use soil with abundant amounts of fertilizer and water less frequently. The regolith has no useful material making the need for fertilizer paramount. It must also be kept in mind that water is not a viable substitute for fertilizer. In summary, more prevalent if drier, nutrient rich soil was present.

Photos

Preparation



buliding the
Greenhouse



Grow setup



Planning the
seeds



Putting in dirts



Putting in
regolith

Feb. 24, 2023



control 100%



40-50-10
growth



50-40-10
rowth



50-50
growth

Mar. 3, 2023



control 100
growth



40-50-10
growth



50-40-10
growth



50-50 growth



60-30-10
growth



70-20-10

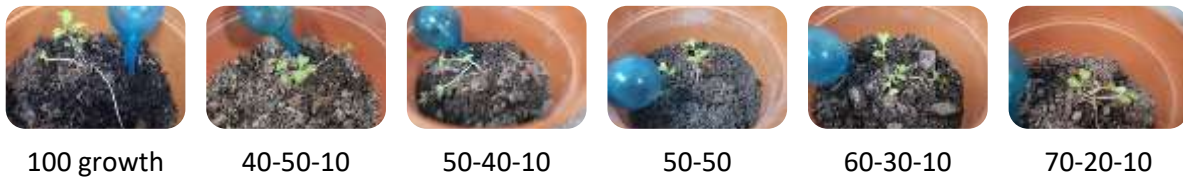
Mar. 10, 2023



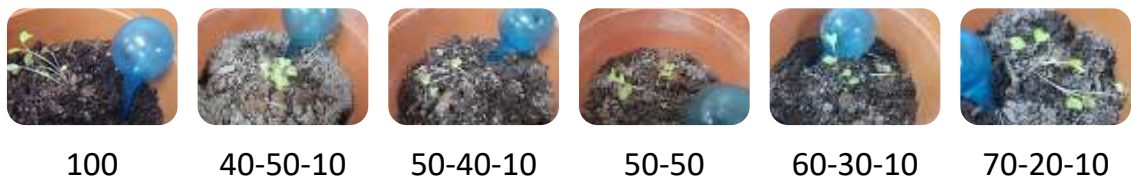
Mar. 17, 2023



Mar. 24, 2023



Mar. 31, 2023



Apr. 7, 2023



100



40-50-10



50-40-10



50-50



60-30-10

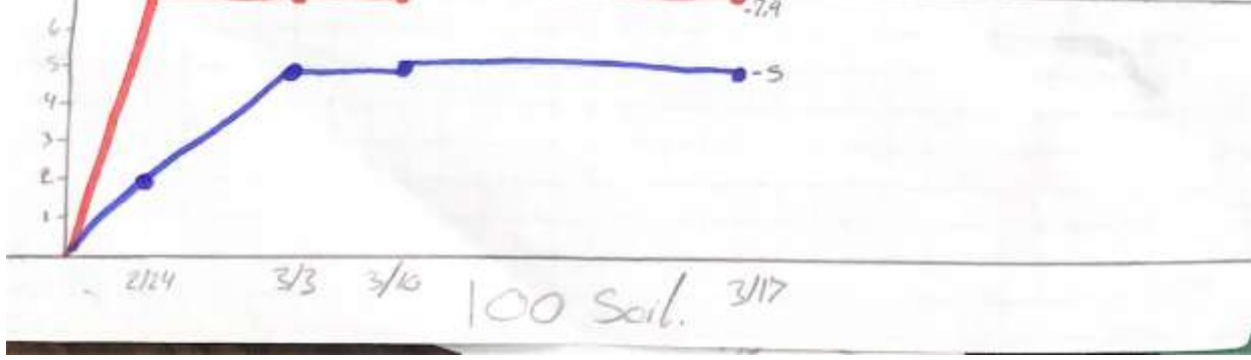
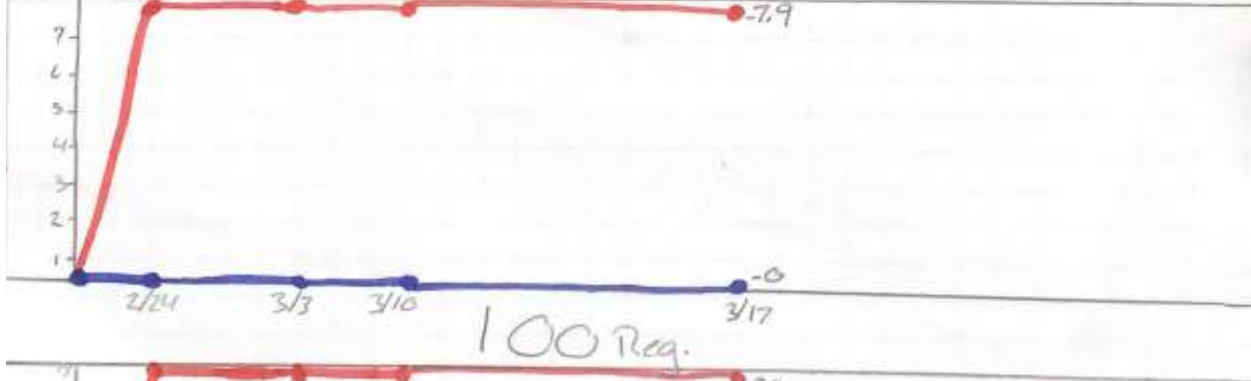
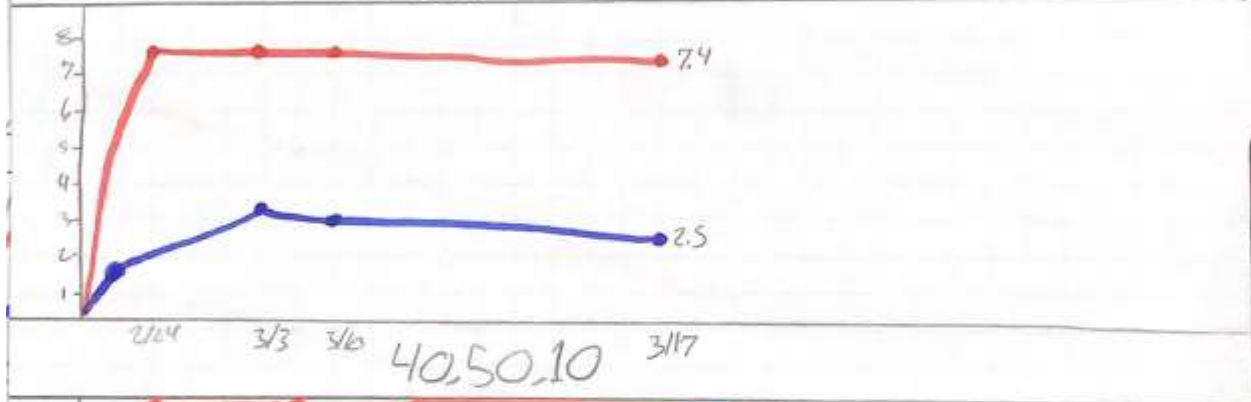
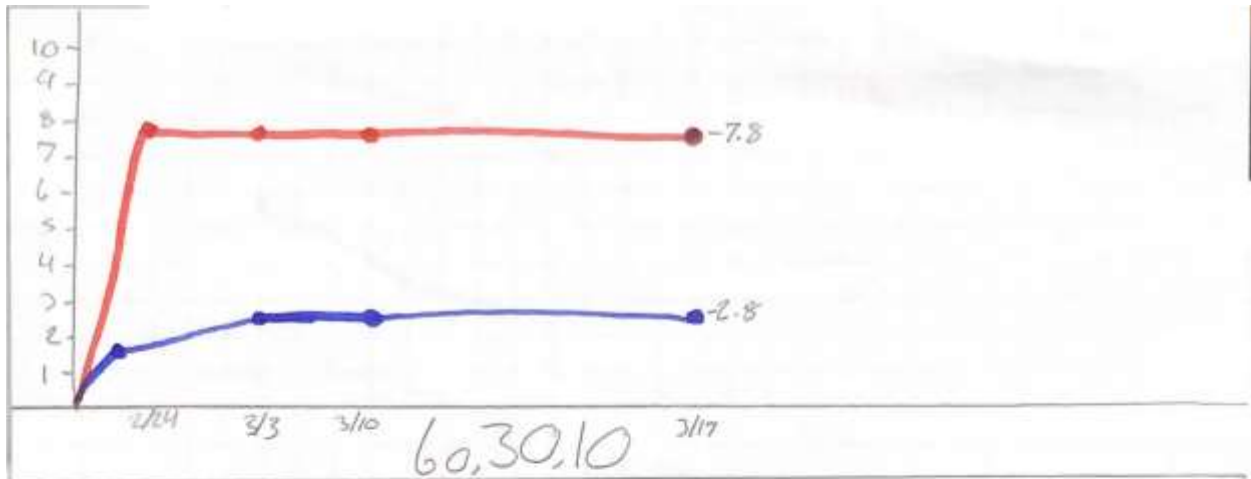


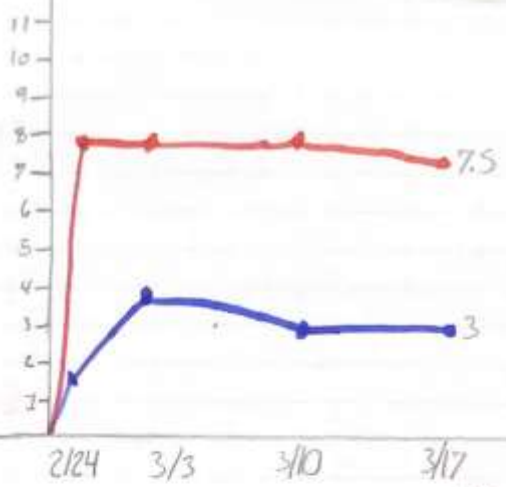
70-20-10



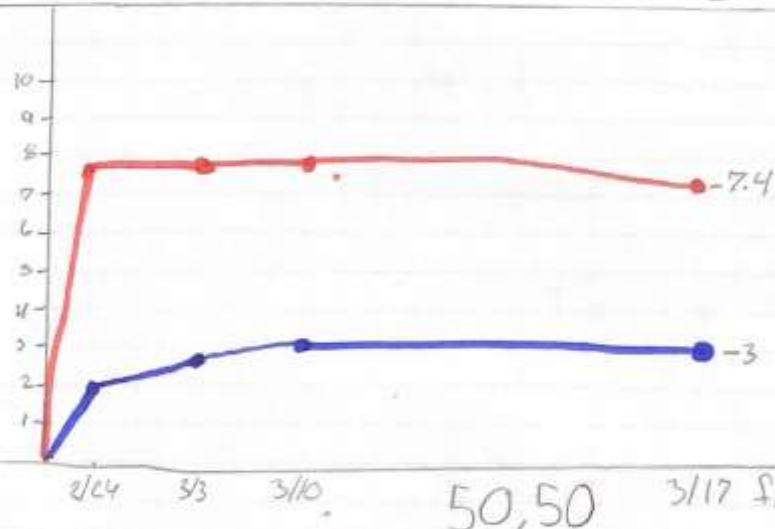
final setup

Graphs

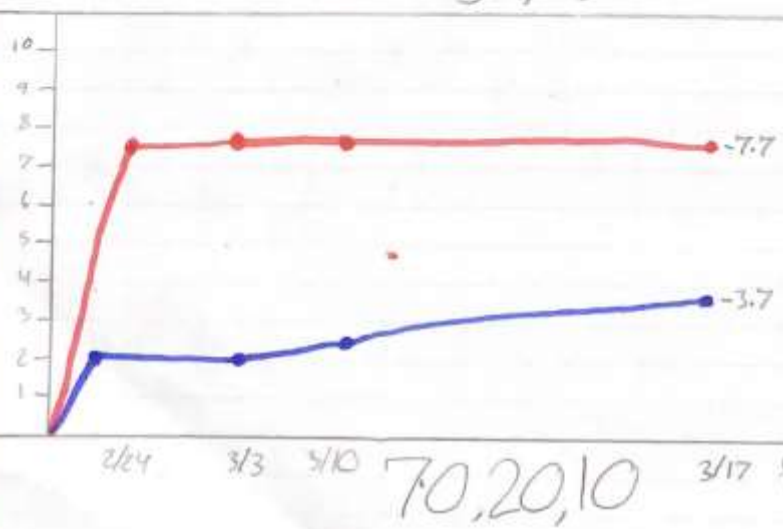




50,40,10



50,50 3/17 final measurement



70,20,10 3/17 final measurement