Do the Different Types of Soil Affect the Plant's Growth?

Hypothesis: We think that our plants will grow more successfully in fertile soil (Cup A, Loam).

Materials

1. Wheat seeds (15g)
2. 3 same-size plastic cups (8g)
3. 3 Types of Soil (70g): Sand, Loam, and Clay.
4. Pencil
5. Water (100 mL)
6. Paper
7. Ruler
8. Electronic Kitchen Scale
9. Computer
10. Scissors
11. Measuring Cup
12. Eraser

Procedure:

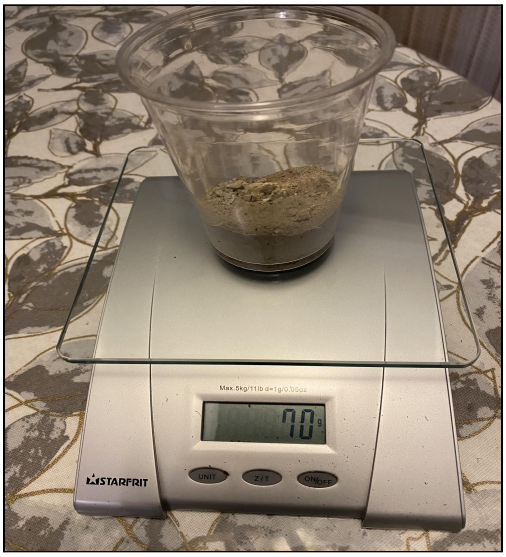
1. First, we soaked 15 grams of wheat seeds overnight.
2. Then, we poured 70 grams of each soil (Loam, Sand, Clay) into 3 cups. Next, we labelled each cup as A, B, and C respectively.
3. After that, we poured 100mL of water into each cup.
4. Next, we placed the 3 cups on the kitchen counter where the temperature is about 20 degrees celsius.
5. Lastly, we observed the plant's growth daily and recorded the following readings.

Pictures During the Procedure

Overnight soaked wheat seeds (5g)

5g of wheat seeds in each cup

Picture of Sand Soil (70g)



Picture of Clay Soil (70g)

Picture of Loam Soil (70g)

After planting seeds and pouring water we placed it on the kitchen counter (about the temp. 20 Celcius)

Research

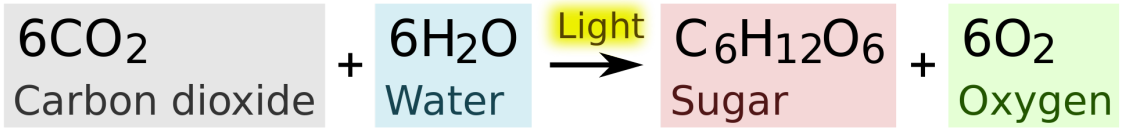
<u>What do plants need to grow?</u>

1. **Water**
2. **Soil**
3. **Sunlight/Artificial light**
4. **Fertilizer**
5. **NPK (Nitrogen, Phosphorous, Potassium)**

We have learned that plants need the right type of soil, if not given the right type of soil it may not grow well or not grow at all.

What is the Growth of Plants?

Plant growth is the process in which the plant grows to be a matured plant with a strong stern stem and healthy leaves. The growth process is enhanced by the nutrients and light energy that is used during the process of Photosynthesis.



The 3 Types of Soil Used and its Components

Types of Soil	Components
Loam	Sand (40%), clay (20%), and silt (40%).
Clay	Mica, iron, silicates, and aluminum hydrous-oxide are the most common minerals that are found in clay soil. There are other minerals like quartz and carbonate that are also found in clay soils.
Sand	Silica (Silicon dioxide) in the form of quartz, mica, and feldspar.

Important Vocabulary

1. Soil: Soil is a mixture of minerals and organic materials that covers much of the Earth's surface.
2. Minerals: Minerals are bits of rock and organic materials.
3. Nutrients: The elements that help the plant grow.
4. Fertile: Able to produce crops and plants in a field.
5. Sand: It is the largest soil particle.

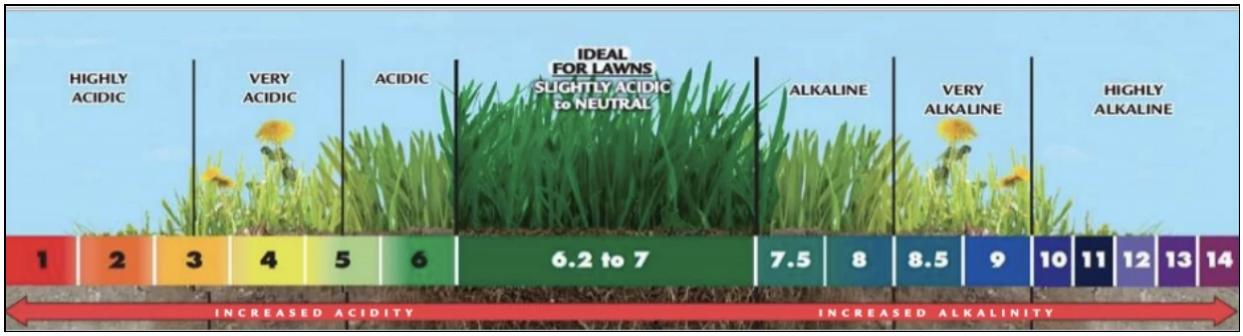
6. Clay: It is the smallest soil particle which is retaining water much more than other particles.
7. Loam: It is a mixture of multiple soil particles.
8. Main Macronutrients of Soil **NPK:** Nitrogen, Phosphorous, Potassium.
9. Main Micronutrients of Soil Copper, Chlorine, Iron, Magnesium.

What is the pH value of Soil?

Soil pH measures the acidity or alkalinity of the soil.

Soil can be classified into its own pH value:

- **Soil is neutral if pH is 6.5-7.5**
- **Soil is alkaline if pH is over 7.5**
- **Soil is acidic if pH is less than 6.5 and if soil pH is less than 5.5 it is considered strongly acidic**



Variables

Controlled Variable	Independent Variable (Manipulated Variable)
*Cup Size *Amount of Water (100mL) *Amount of Temperature (about 20 degrees Celsius) *Amount of Sunlight/Artificial Light *Soil Quantity (70g) Amount of Seeds in each cup (5g)	*Type of Soil Cup A: Loam Cup B: Sand Cup C: Clay

Responding Variable

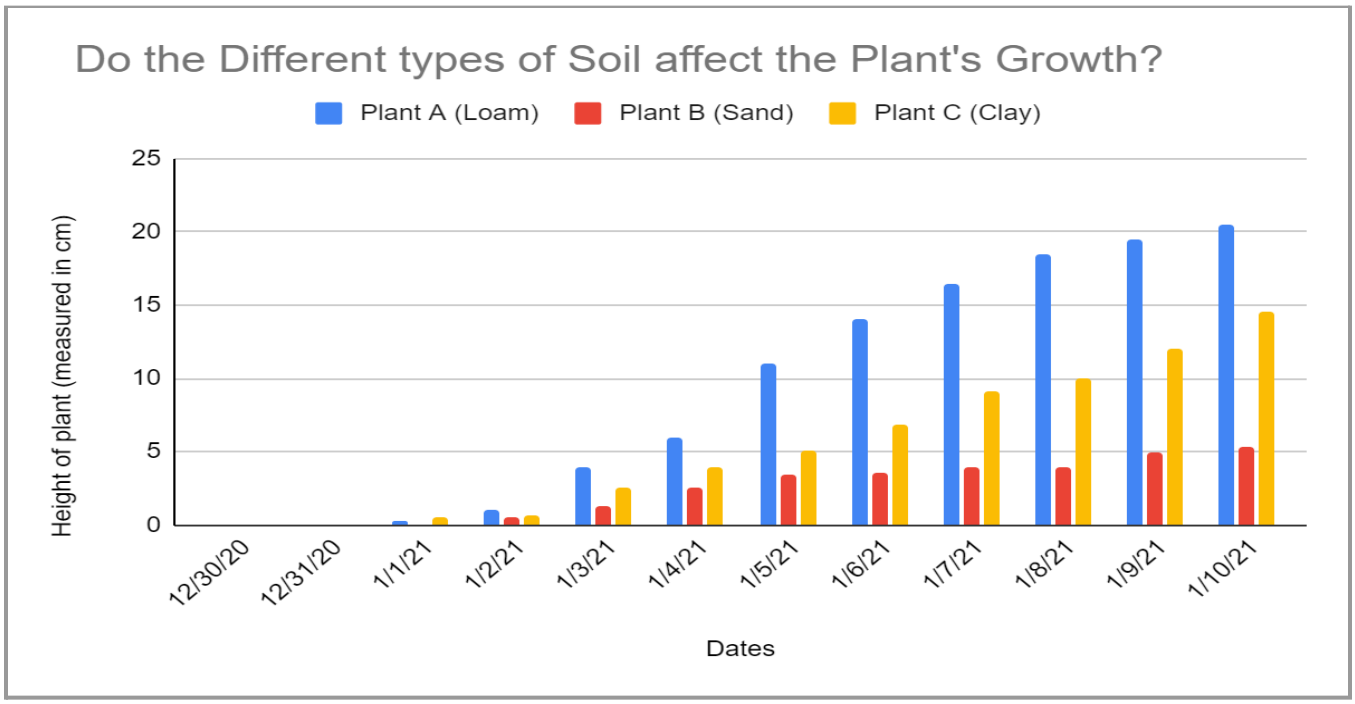
(Dependant Variable)

*Height of the Plant

Daily Log

Number of Readings	**Date**	Cup A (Loam) (Length in cm)	Cup B (Sand) (Length in cm)	Cup C (Clay) (Length in cm)
1.	**Dec 30, 2020**	0	0	0
2.	**Dec 31, 2020**	0	0	0
3.	**Jan 1, 2021**	0.3	0	0.5
4.	**Jan 2, 2021**	1	0.5	0.7
5.	**Jan 3, 2021**	4	1.3	2.5
6.	**Jan 4, 2021**	6	2.5	4
7.	**Jan 5, 2021**	11	3.4	5.1
8.	**Jan 6, 2021**	14	3.6	6.9
9.	**Jan 7, 2021**	16.5	3.9	9.1
10.	**Jan 8, 2021**	18.5	4	10
11.	**Jan 9, 2021**	19.5	5	12
12.	**Jan 10, 2021**	20.5	5.3	14.5

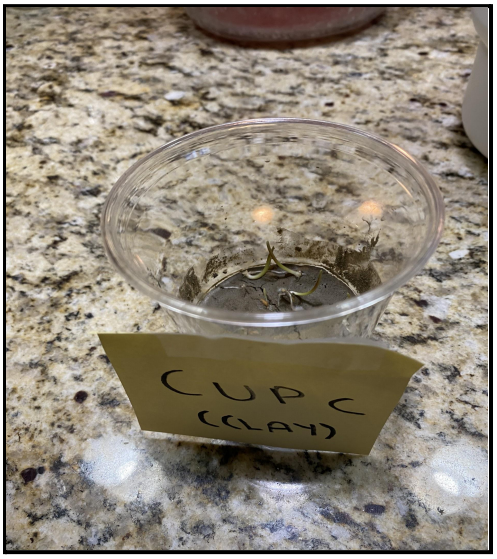
Graph


Do the Different types of Soil affect the Plant's Growth?
Plant A (Loam)
Plant B (Sand)
Plant C (Clay)
Height of plant (measured in cm)
25
20
15
10
5
0
12/30/20
12/31/20
1/1/21
1/2/21
1/3/21
1/4/21
1/5/21
1/6/21
1/7/21
1/8/21
1/9/21
1/10/21
Dates

Plants Growth on 4th Day

Cup A Growth: 1cm
(Loam)

Cup B Growth: 0.5cm
(Sand)



Cup C Growth: 0.7cm
(Clay)

Plants Growth on 7th Day

Cup A Growth: 11cm (Loam)

Cup B Growth: 3.4 cm (Sand)

Cup C Growth: 5.1cm (Clay)

Plants Growth on 9th Day

Plant A Growth: 16.5cm (Loam)

Plant B Growth: 3.9cm (Sand)

Plant B Growth: 9.1cm (Clay)

Observations

Cup A having Loam has more growth than Cup B (Sand) and Cup C (Clay). We also observed that Cup A (Loam) has a more green pigment and a greater number of leaves as compared to Cup B (Sand) and Cup C (Clay).

Result

We observed that Cup A (Loam) has more growth than Cup B (Sand) and Cup C (Clay) because Cup A has more nutrients and balanced pH value (6.5-7.5) rather than Cup B (Sand) and Cup C (Clay).

Conclusion

In conclusion, all plants need proper soil to grow. In our experiment, we found out that soil with the proper nutrients and controlled pH makes the plant grow better, but if the soil does not have the proper nutrients and controlled pH value, it might not grow well or not grow at all.

How can we Improve our Experiment?

To improve our experiment, we can take a bigger container and better quality of sand and clay soil for better growth in our plants. We can also fill the cup with soil to the top rather than measuring the amount of soil. Lastly, we can place the plants in an area with more presence of sunlight which can lead to better growth for the plants.

Fun Facts

1. It takes 500 years to produce just less than an inch of topsoil, which is one of the most productive layers of the soil.
2. Soil consists of 45% minerals, 25% water, 25% air, and 5% of organic matter for good topsoil.
3. Worms enrich the topsoil by feeding on the organic material in the soil and converting it into nutrients for plants. As the worms move through the soil it becomes more absorbent and better aerated too.
4. Soil is at the bottom of the food chain, yet it is the cornerstone of life on Earth.
5. One handful of soil contains hundreds of millions of bacteria and tiny organisms.

References

1. https://kids.britannica.com/kids/search/articles?query=soil&includeLevelOne=1&page=1
2. https://www.iowaagliteracy.org/Article/Plant-Growth-in-Different-Soil-Types
3. https://www.qld.gov.au/environment/land/management/soil/soil-properties/ph-levels#:~:text=Most%20soils%20have%20pH%20values,6.5%20to%207.5%E2%80%94neutral
4. Mrs. Kahlon's Teachings
5. Parampreet Kaur/ Mother