

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

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Hypothesis

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

Materials

1. **Wheat seeds (15g altogether and 5g in each cup)**
2. **3 same-size plastic cups (8g)**
3. **3 types of Soil (70g): Loam (Cup A), Sand (Cup B), Clay (Cup C)**
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 soil in each cup (Loam, Sand, Clay). Next, we labelled each cup as A, B, 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.**

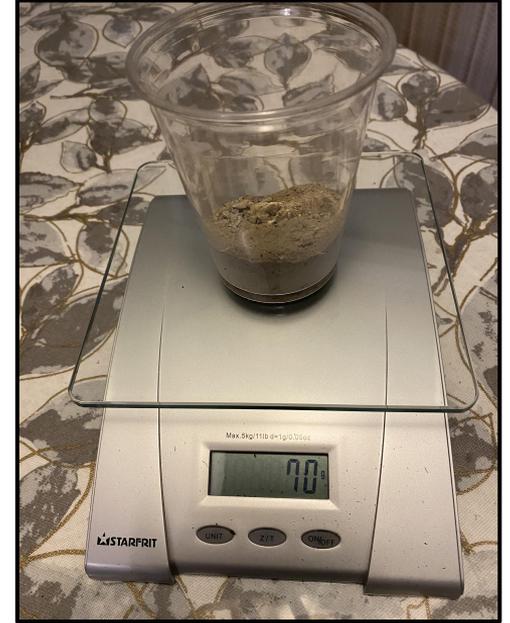
Pictures During the Procedure



Picture of Sand Soil (70g)



Picture of Loam Soil (70g)



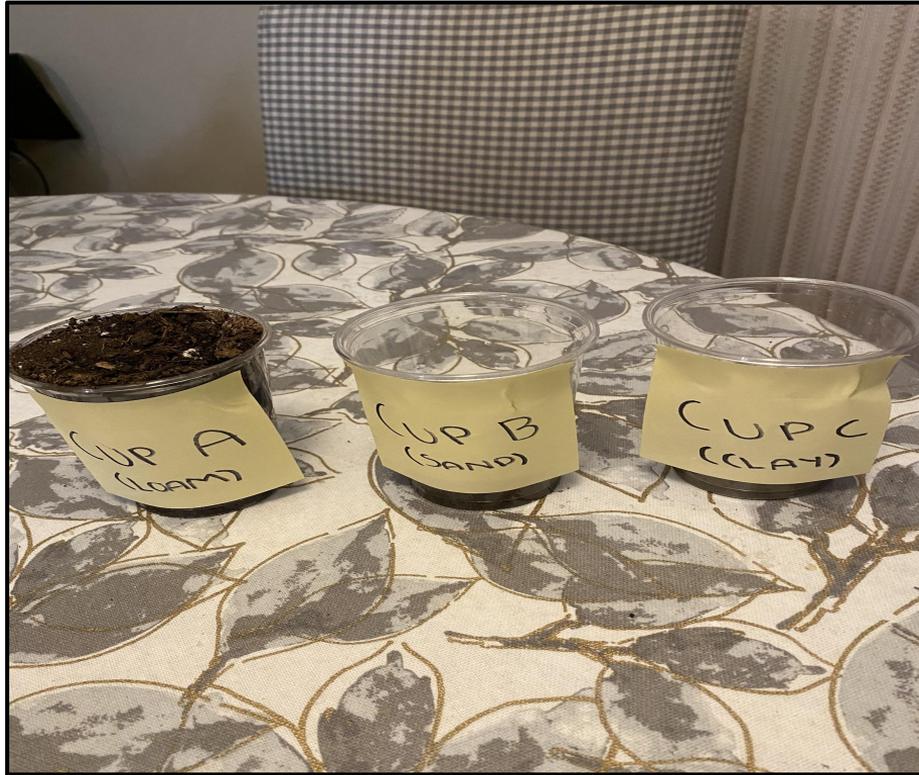
Picture of Clay Soil (70g)



**Overnight soaked wheat seeds (5g
in each cup)**



**Weight 5g of wheat seeds in
each cup (15g altogether)**



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

Research

What do plants need to grow?

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

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 even grow at all.

Important Vocabulary

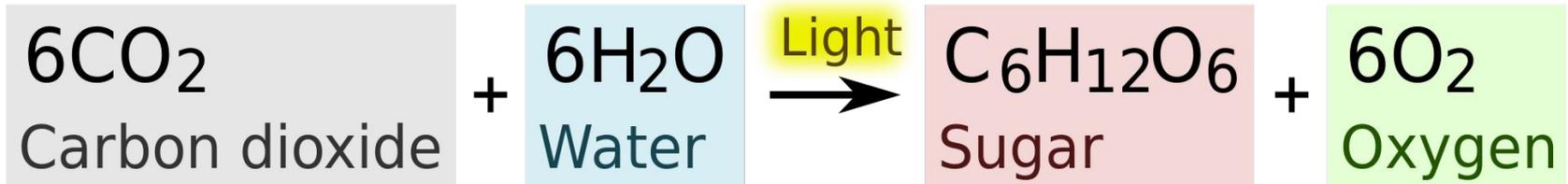
- 1. Soil:** Soil is a mixture of minerals and organic materials that covers much of the Earth's surface.
- 2. Minerals:** Minerals are bits of rock and organic materials.
- 3. Nutrients:** The elements that help the plants grow.
- 4. Fertile:** Able to produce crops and plants in a field.
- 5. Sand:**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

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

What is Photosynthesis?

Photosynthesis is a process in which green plants and other certain organisms use the energy of light to convert carbon dioxide and water into simple sugar glucose.



What is the pH value of Soil?

Soil pH measures the acidity or alkalinity of the soil.

Soil can be classified into their 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 is considered strongly acidic



The 3 Types of Soil 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.

Variables

Controlled 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)**

Independent Variable

(Manipulated Variable)

- *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

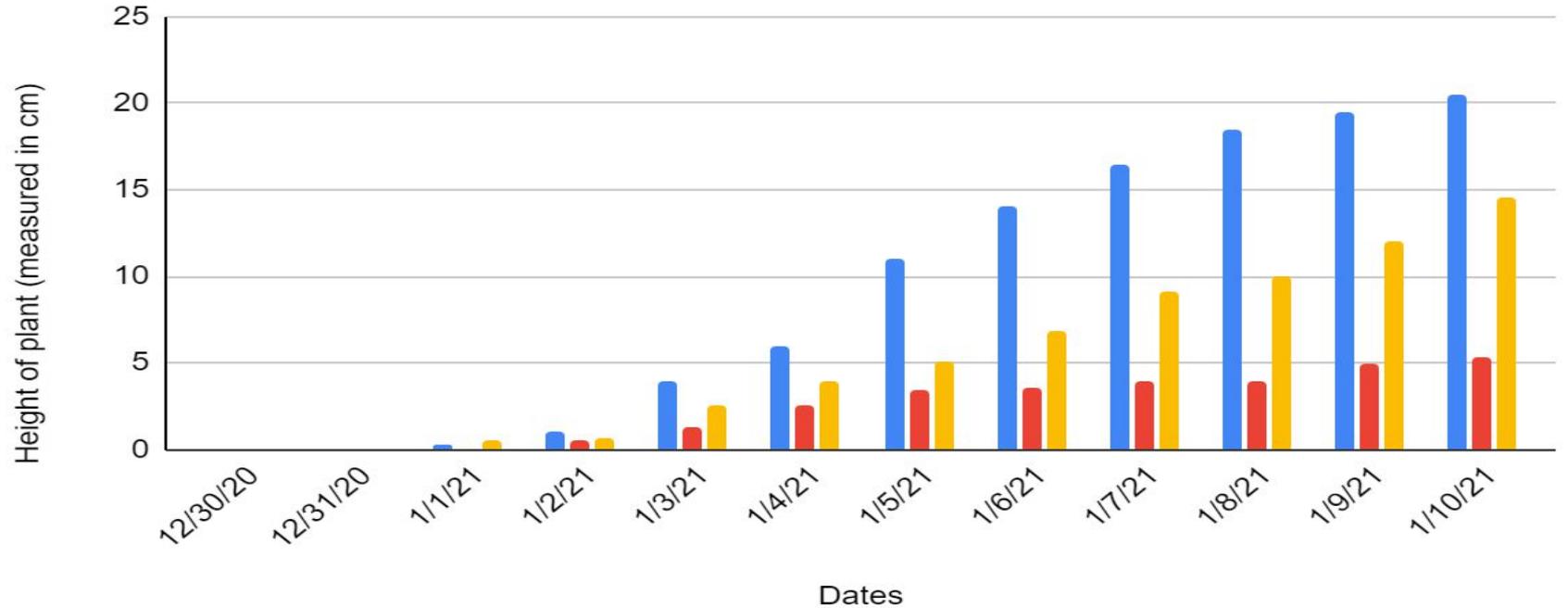
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8.	Jan 6, 2021	14	3.6	6.9
9.	Jan 7, 2021	16.5	3.9	9.1
10.	Jan 8, 2021	18.5	4	10
11.	Jan 9, 2021	19.5	5	12
12.	Jan 10, 2021	20.5	5.3	14.5

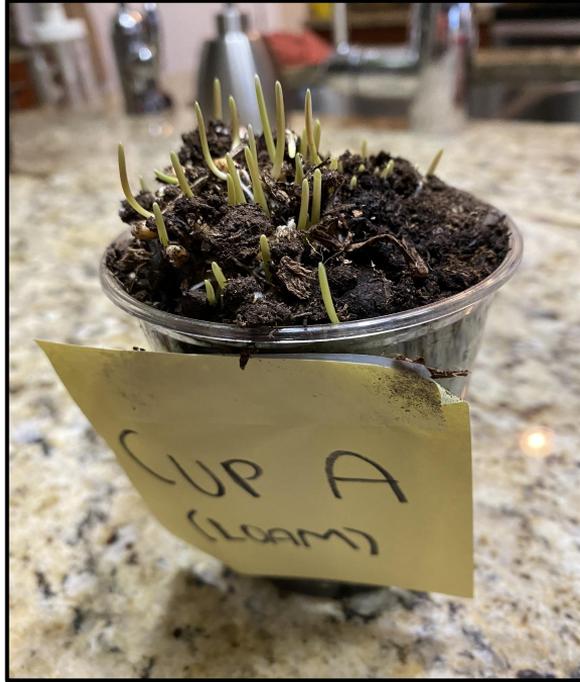
Graph

Do the Different types of Soil affect the Plant's Growth?

Plant A (Loam) Plant B (Sand) Plant C (Clay)



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: 3.4cm
(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 C 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 of soil (6.5-7.5) rather than Cup B (Sand) and Cup C (Clay).

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.

Conclusion

In conclusion, all plants need the 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 weighing 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.

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