# Do plants grow faster if watered by milk, water, club soda or orange juice?

I have never done this experiment before and I was curious to find out the result

Plants are important in keeping all animals alive. They convert carbon dioxide to oxygen and they are the only ones that can do it naturally. It costs \$38 trillion to produce oxygen for 6 months but plants do this for free. Deforestation has increased significantly over the years and it has led to more carbon dioxide in the air as there are not enough plants to convert carbon dioxide to oxygen. We cut more trees down than we plant and it is going to lead us to a crisis. This experiment investigates which liquid is best for plants to grow fast.

Plants require 5 key things to survive: light, air, water, nutrients, and space to grow. Plants get light from the sun. Plants make glucose using a process called photosynthesis. The equation for photosynthesis is  $6CO2 + 6H2O \rightarrow C6H12O6 + 6O2$ . Plants need carbon dioxide for photosynthesis which is acquired from the air. Air is composed of various gases. They include nitrogen, oxygen, carbon dioxide, and other gases. 78.08% of the air is Nitrogen, 20.95% of the air is oxygen and the rest contains other gases. The nutrients that plants require are potassium, phosphorus, and nitrogen. If plants do not get these nutrients from the soil you can add fertilizer, it helps with the vital nutrients and helps the plant grow. Lastly, plants need space for the roots to grow.

Water is a compound, composed of one oxygen atom and two hydrogen atoms. Water covers 71% of the earth's surface and only 3% is fresh water. Most of the freshwater is ice. Water is scarce and it is the most vital thing we require in our daily lives. Water transports essential nutrients from the soil This experiment will also help try to see if there is another alternative liquid we can use to water plants and save water. Plants require water for photosynthesis. Water is absorbed by the roots of the plant and it is carried to the chloroplasts in the leaves. This is where photosynthesis takes place. The nutrients from fertilizers dissolve in water and get absorbed into the plant. Orange juice contains vitamin C. Scientists from the University of Exeter and Shimane University in Japan have proved that plants need vitamin C. Plants need vitamin C for protection from UV radiation but scientists are not sure whether plants can grow without it. In general, vitamin C is an antioxidant and is an essential nutrient involved in the repair of tissue.

Krest soda water is carbonated water: Water is infused with carbon dioxide under pressure. It contains nutrients that are important for plant growth such as phosphorus and nitrogen.

Cow milk is a good source of proteins and calcium. It also contains other important nutrients such as vitamin A, Vitamin B-6, Magnesium, Cobalamin, Cholesterol, Sodium, and potassium. Magnesium and potassium are essential for plant growth. Plants use potassium for the movement of water, nutrients, and carbohydrates in plant tissue. It plays a role in plant growth and development. Without magnesium, chlorophyll can not capture the sun's energy and this can affect photosynthesis as sunlight is necessary. Explain your methodology and procedures for carrying out your project in detail.

Control variable: the temperature, the pH of the soil, type of seedlings

Independent variable: The liquids used to water the plants.(water, krest soda-water, orange juice and milk)

Dependent variable: The height of the plants 1. Place all the seedlings in a place where they can get sunlight.

Measure the height of the 4 seedlings.

Measure 25cm<sup>3</sup> of Krest-club soda using the measuring cylinder and pour it in the seedlings and do this every day.

Measure the height of the seedlings every 5 days and record it.

2.Measure the height of the 4 seedlings.

Measure 25cm<sup>3</sup> of milk using the measuring cylinder and pour it in the seedlings and do this every day. Measure the height of the seedlings every 5 days and record it.

3. Measure the height of the 4 seedlings.

Measure 25cm<sup>3</sup> of water using the measuring cylinder and pour it in the seedlings and do this every day. Measure the height of the seedlings every 5 days and record it.

4.Measure the height of the 4 seedlings.

Measure 25cm<sup>3</sup> of orange juice using the measuring cylinder and pour it in the seedlings and do this every day.

Measure the height of the seedlings every 5 days and record it.

## What were the result(s) of your project?

Day: 1

Liquid		Height of plant in cm			
	Plant 1	Plant 2	Plant 3	Plant 4	average
Krest-soda water	8.1	8.1	8.2	8.3	8.2
Milk	10.3	8.5	7.8	7.9	8.6
Water	10.3	7.6	9.6	10.1	9.4
Orange juice	8.0	7.4	7.2	10.6	8.3



# Day 5:

Liquid		Height of plant in cm			
	Plant 1	Plant 2	Plant 3	Plant 4	average
Krest-soda water	9.5	9.5	10.1	10	9.8
Milk	11.2	9.5.	7.5	9	9.3
Water	11.5	8.5	12.1	11.3	10.3
Orange juice	9.1	8.5	8.3	12.0	9.5



Liquid		Height of plant in cm			
	Plant 1	Plant 2	Plant 3	Plant 4	average
Krest-soda water	12	14.8	11.6	13.6	13
Milk	12.5	11.5	8.3	12.7	11.2
Water	17	13.1	17.6	17	17.5
Orange juice	9.2	9.6	10.2	13	10.5

# Day 15:

Liquid		Height of plant in cm			
	Plant 1	Plant 2	Plant 3	Plant 4	average
Krest-soda water	16	20	16.2	17.5	17.4
Milk	16.4	14.5	10.5	11.1	13.1
Water	21.5	14.6	19.6	18.5	18.6
Orange juice	10.11	11	11.5	12	11.1

# Day 20:

Liquid		Height of plant in cm			
	Plant 1	Plant 2	Plant 3	Plant 4	average
Krest-soda water	17.1	20.9	17.5	18.5	18.5
Milk	17.5	15.2	11.7	12	14.1
Water	23	16	23.2	19.2	20.6
Orange juice	11.4	12	13.1	13	12.4



## 4) What is your interpretation of these results?

- The average growth of the plant watered with water for 20 days is 11.2cm and the average growth of the plant watered with orange juice for 20 days is 4.1 cm. The average growth of the plant watered with milk for 20 days is 5.5cm and the average growth of the plant watered with krest-soda water for 20 days is 10.3cm. Plants grow best in water but they grow worst in orange juice.
- The theories and beliefs were proven right from my experiment. Plants grow the fastest if watered by water.
- The experiment would be more accurate if I had several runs for each each setting.

#### What conclusions did you reach?

My hypothesis is correct. I predicted that plants will grow fastest if they are watered by water and slowest if they are watered with orange juice.Plants watered by water grow the longest because water carries nutrients and dissolved sugars to the plant in the right amounts. Without water, plants would be malnourished and would not be able to support their weight and droop.All the substances that I used had a certain amount of water content . Orange juice is almost 90% water. Plants watered by orange juice did not grow long because orange juice is acidic so it would erode the coating of the plant, therefore the plants would be more vulnerable to bacteria. Orange juice contains sugar and this can build up in the soil and attract bacteria and insects. It will slow down the growth of the plant significantly. Milk is 87% water however it contains protein and fats, which make it difficult for the plants to absorb the water. Milk is more viscous than water therefore it is hard for the roots to absorb it and this leads to fungus. The soil also becomes hard. Krest soda-water is carbonated water. According to a study conducted at Colorado University Boulder, carbonated water makes plants grow quicker and produces green plants. Soda-water is made up of dissolved nutrients that can be easily absorbed by the roots of the plant. Nutrients in sparkling water might include magnesium, calcium, carbon, hydrogen, oxygen, sodium, sulfur, phosphorus, and potassium. Club soda is water with extra ingredients so it has similar properties. For example, they are both used for hydration. These nutrients are essential and that is why the plant watered with soda-water grew the second-fastest. This experiment concluded that water is essential for life and there is no alternative found yet. This information can be applied when someone wants start a growing crops in a farm.

### References

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