

# Drinks & the Beanstalks

Third Grade



# Background

- ❖ Plants are a very important part of our lives because they make the oxygen we breathe, they provide us and all other animals with food, they help us create medicine, and have led to many other discoveries that have helped us understand genetics and molecular biology and many more important life sciences.
- ❖ We survive because plants exist, and we need them to have a healthy planet. It is important to understand how to take care of them and make sure they thrive.
- ❖ A plant needs carbon dioxide, water, and light to grow. Plants don't actually need soil. I previously grew a lima bean without using soil, but not all plants can grow without soil since soil has different nutrients.
- ❖ I decided to see if plants would grow with different household drinks instead of just water. I wanted to see if plants would grow or grow differently with the different ingredients in the household drinks that I wanted to try. The ingredients would provide different nutrients and minerals to the plants and some of these ingredients may make the plants grow more; some may make the plants grow less; some may make the plants grow differently or not at all.

Question: How can typical household drinks affect plant growth compared to water alone?

Prediction: I hypothesize that 7-Up soda will promote greater plant growth due to the extra sugar

# Materials

- ▶ 1 bag of plant soil (Jiffy - Natural & Organic Seed Starting Mix)
- ▶ 1 package of bush beans (Sow Right Seeds)
- ▶ 1 plant light (Patriot Lighting Plant Grow Light)
- ▶ 1 L tap water
- ▶ 1 L coffee (Stok Cold Brew Coffee)
- ▶ 1 L of soda (7-Up)
- ▶ 1 L of orange juice (Schnucks brand)
- ▶ 1 L of whole milk (Schnucks brand)
- ▶ 1 large plastic container to mix soil
- ▶ 1 kitchen measuring cup
- ▶ 15 clear small plastic cups
- ▶ 15 large plastic cups

# Procedures

1. Label cups with liquid names (water 1, water 2 etc.), setup table and plant light in a humidity- and temperature (70°F)-controlled living room. Make 3 drainage holes in bottom of clear cups for excess liquid and place in larger cup to collect run-off.
2. Mix 3 cups of plant soil by hand with 200 mL of each of the following drinks in a plastic container:

Ingredients	HOUSEHOLD DRINKS				
	Tap Water	Coffee	Milk	Soda	Orange Juice
Water	Yes	Yes	Yes	Yes	Yes
Caffeine	No	Yes	No	No	No
Sugar	No	No	Yes	Yes	Yes
Calcium	No	No	Yes	No	No
Vitamin C	No	No	No	No	Yes

3. Add premixed soil/drink into pre-labeled cups then plant bush beans at planting depth of 1" (per manufacturer recommendation), one bean per cup, and 3 cups per drink variable.
4. Add 60 mL of each drink every 2-3 days for a total of 2 weeks before terminating experiment
5. At end of experiment, remove plants from cups, shake off excess soil, and weigh whole plants with roots using a kitchen scale



# Constant Conditions

- Independent variable: type of household drink
- Dependent variable: plant growth assessed by whole plant length and weight
- Constant conditions:
  - Used the same amount of soil for planting
  - All beans came from the same package
  - All beans were planted at identical depths
  - All plants received drink at the same time and date with the same volume of drink
  - All plants were kept at the same temperature and humidity
  - All plants were under the same light
- Control: All comparisons of growth were made against seeds receiving only water

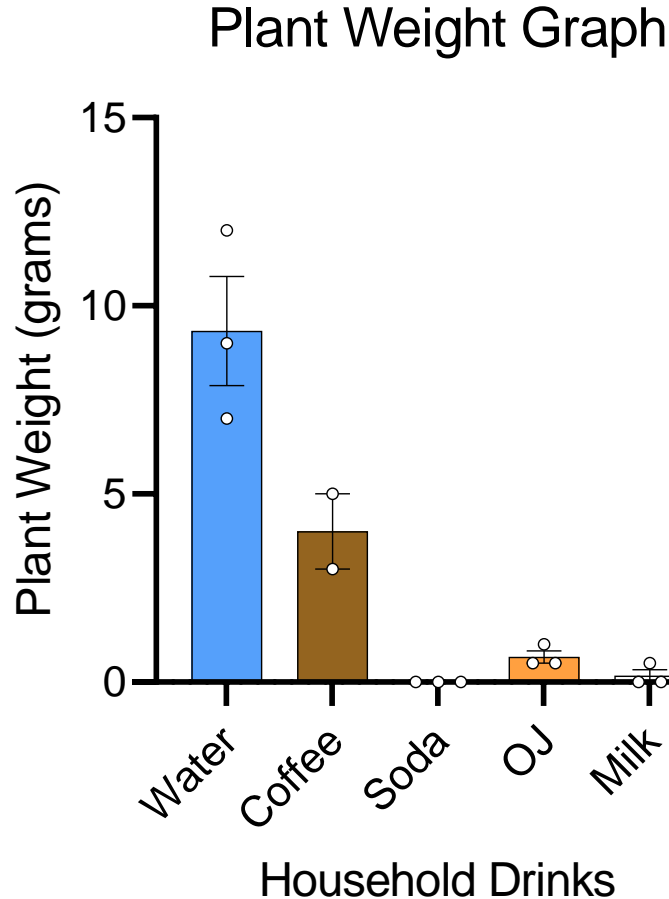
# Data

Table of plant weight in grams for each household drink after 2 weeks

Household Drink	Bean 1	Bean 2	Bean 3	Average (gm)
Water	9	7	12	9.3
Coffee	3	0*	5	4
Soda	0	0	0	0
Orange Juice	0.5	1	0.5	0.7
Milk	0	0.5	0	0.2
*Omitted due to a bad bean				

## Data (continued)

- This graph compares plant weight measured in grams to the type of household drinks a bean seed received for 2 weeks.
- This graph shows that beans receiving water had the biggest weight, followed by coffee, orange juice (OJ), milk, and last by soda.





# Data: Representative images of beanstalks after 2 weeks of receiving household drinks

Water



Coffee



Soda



Milk

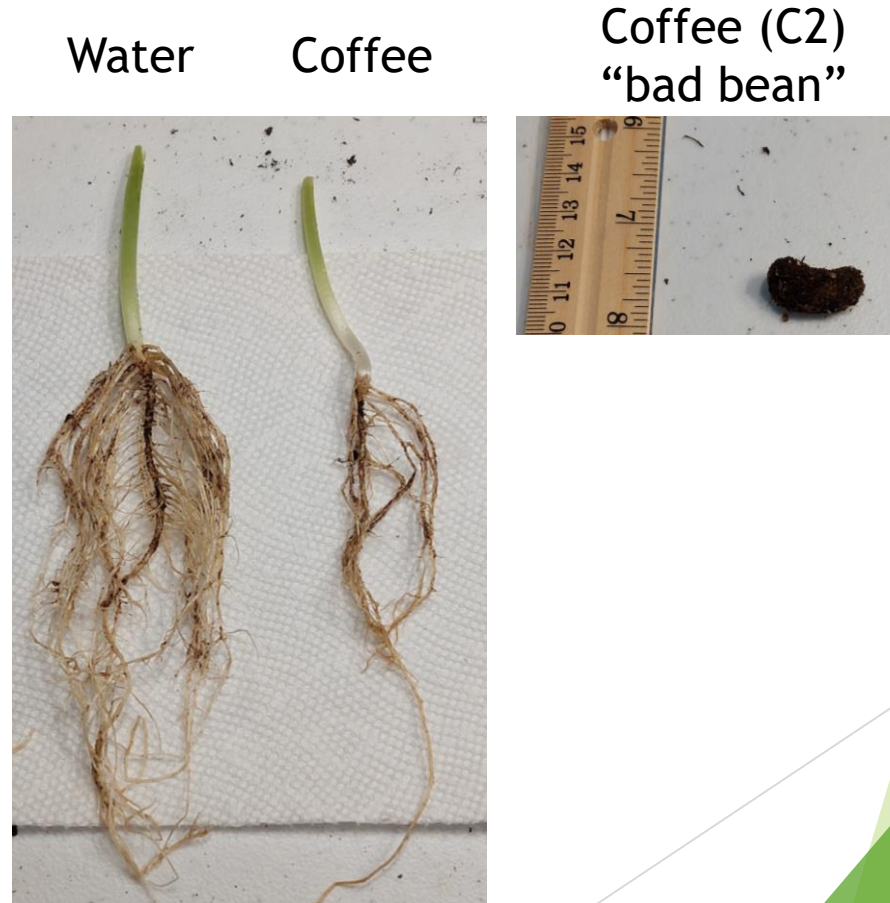


OJ



# Data: Images of extra observations

- Image (left) showing extensive root system in Water compared to Coffee
- Image (right) showing Coffee suspected of being a bad bean due to no signs of growth



# Conclusions

- ❑ I confirmed that water is the best household drink of the ones we tried to help plants grow because the plants that received water grew the biggest and tallest of all the plants. I am confident of these findings because I weighed them.
- ❑ I also observed that the beans receiving water had the biggest network of roots.
- ❑ I am also sure that water is the best household drink to help plants grow of the ones we tried because we tried drinks with different ingredients in different cups and labeled the cups to know what drink we were pouring in each cup.
- ❑ We also used the same drink three times, watering our plants with the same drinks in three different cups for each drink to help confirm the results and make sure that the results were not due to random chance.
- ❑ Coffee was the next best household drink of the ones we tried to help plants grow.
- ❑ Coffee is made up of water and caffeine, and I think coffee itself could help the plants grow since it may provide the beans with helpful nutrients and minerals to grow.

# Reflections

- ❖ Understanding how to care for plants is important because humans depend on plants to live. Now I know that water is the best household drink to help plants grow.
- ❖ I did not expect the plants that received milk to cause the entire experimental area to smell of rancid milk. If I were to do this experiment again, I would improve it by setting up the experiment in a room that we aren't in as often and is more secluded.
- ❖ Next, I would want to see the impact that different types of light (red, blue) or shades of light have on plant growth. I would also like to try mixing water with exact amounts to nutrients/minerals such as sugar, calcium, caffeine, and vitamin C because its possible that the plant either got too much or too little of these nutrients/minerals that may affect plant growth.
- ❖ Lastly, I recommend that the only household drink a plant should receive is plain water because giving anything may cause mold to grow or even worse, make your house smell!

# Bibliography

- <https://www.nybg.org/blogs/science-talk/2014/06/why-study-plants/#:~:text=Fossilized%20plants%20provide%20energy%20in,the%20health%20of%20the%20plant%20net>
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