Title: Hydroponics

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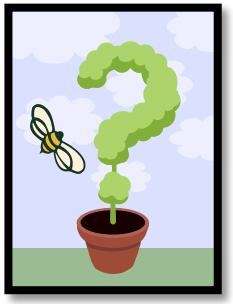


Question:

Can we grow plants without soil?

Hypothesis:

I predict that if I add the important nutrients in the water, the roots will absorb the nutrients, and the plant can still grow well without the need for any soil.

Materials required:

1. Two large test-tubes with stand
2. Water
3. Soil
4. Liquid plant nutrients
5. Four or Five bean seeds
6. Paper towel
7. Ziploc bag
8. Two sticks
9. Thread or ties

Procedure:

1. Wet the paper towel
2. Place 4 or 5 bean seeds on it, and fold it
3. Place the wet paper towel with the seeds, inside a Ziploc bag
4. Wait for 4 or 5 days until the seeds fully germinate
5. Fill one test tube with potting soil
6. Fill another test tube with water
7. Place two nicely sprouted seeds in each of the test tubes, as shown below:

8. Next, place it near the same window, so both the plants get equal sun-light.
9. Add half-teaspoon of liquid nutrients in the water test-tube.
10. Watch the plants grow every day, and record your observations
11. Every 5 days you will need to add the liquid nutrients in the water.

12. As my bean plants were growing fast and there were changes happening every day, I decided to record my observations every day at 6 PM, for ten days.

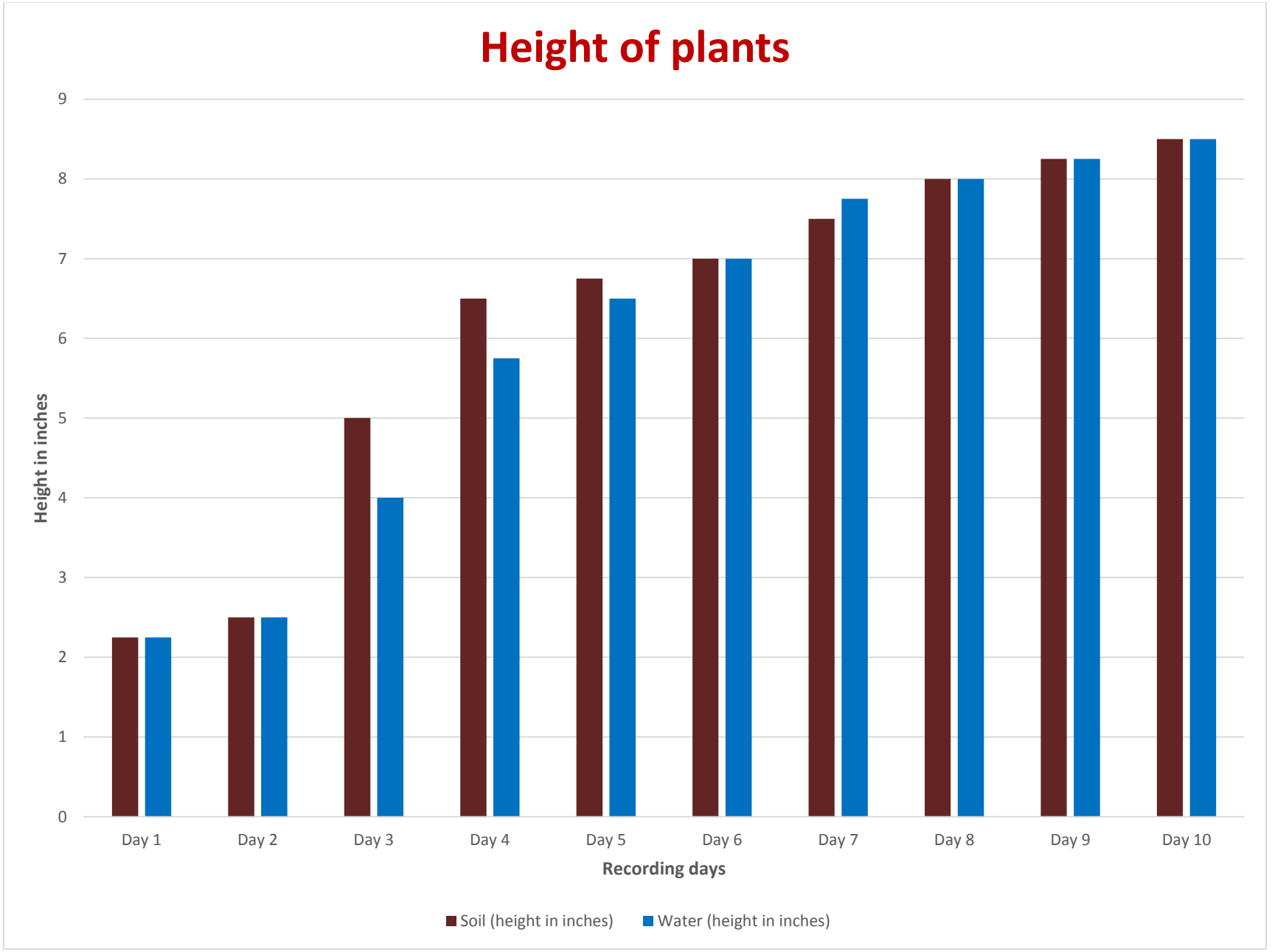
Surprising Result:

Immediate Root System Adaptation: **The roots in the soil goes deep down, but for the plant in the water, the roots spread out! This was a surprise, because I did not expect different types of root systems for the same bean plant type.**

Results: Data and Observations:

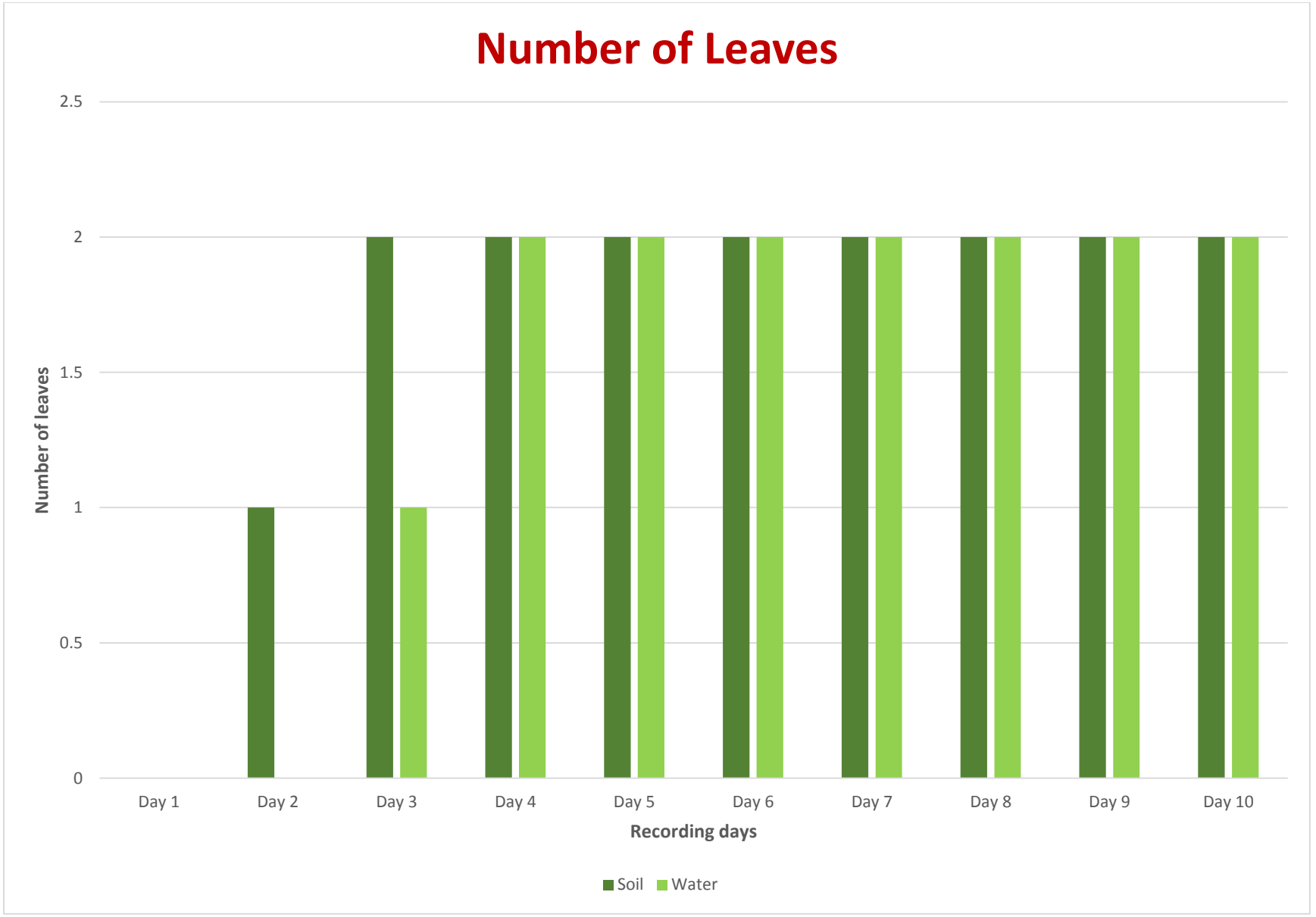
1. Height of plants:

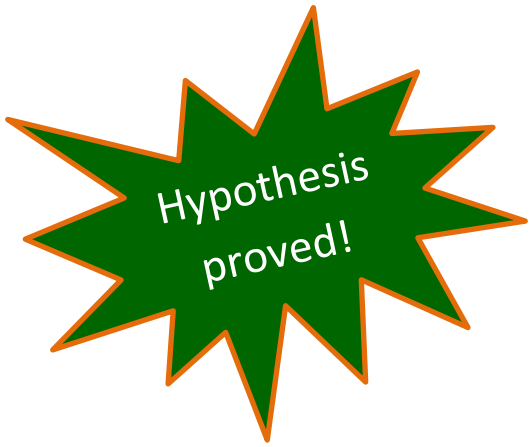
Recording day	Soil (height in inches)	Water (height in inches)
Day 1	2.25	2.25
Day 2	2.5	2.5
Day 3	5	4
Day 4	6.5	5.75
Day 5	6.75	6.5
Day 6	7	7
Day 7	7.5	7.75
Day 8	8	8
Day 9	8.25	8.25
Day 10	8.5	8.5



2. Number of Leaves:

Recording day	Soil	Water
Day 1	0	0
Day 2	1	0
Day 3	2	1
Day 4	2	2
Day 5	2	2
Day 6	2	2
Day 7	2	2
Day 8	2	2
Day 9	2	2
Day 10	2	2





Conclusion:

- The purpose of soil is to hold the plant in-place and provide nutrients.
- The purpose of the root system is to absorb the nutrients.

✓ Through my experiment, I was able to prove that as long as there are nutrients for the roots to absorb, there was no need for soil. The results I got, clearly shows that both the plants grew well almost at the same size, and both were heathly.