

Plant Growth in Response to Presence of Ground Coffee

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Abstract

The “fast plants,” also known as *Brassica rappa*, were planted with raw coffee grounds (Peet’s coffee). A Styrofoam container was utilized, separated into eight boxes, with four smaller cubes designated in each box. The left four contained the seeds planted with the coffee/soil mixture, while the right four acted as the control, containing only soil. The concentration of the coffee/soil mixture was approximately 1:1. They were allowed to grow for three weeks with adequate water supply. This experiment was produced in order to test the common notion that coffee can aid in the growth of plants. In other words, we hypothesize that through the incorporation of coffee grounds into the soil of the experimental group, those plants will grow faster and larger than those of the control group (with all other conditions i.e. water supply, etc. the same). Ultimately, it was found that the coffee, in fact, hindered the growth of the experimental group. The emergence of any growth at all was delayed, and any activity that did occur was significantly meager in comparison to that of the control group.

Introduction

According to the University of Illinois, though actual experimental research is scarce on this subject, there are benefits to using some sort of coffee solution when tending to plants. In collaboration with our hypothesis, the University favors the use of coffee in order to maintain a slightly acidic environment, which plants tend to prefer. Most brands of raw coffee tend to range from 6.5-6.8 on the pH scale, rendering it almost neutral, yet slightly acidic. In combination with tap water, which is slightly alkaline (in order to prevent bacterial growth), it would shift the total pH to maintain a slightly acidic habitat. In addition, the Ikora Journal (of Japan), further supports the claim that the

amino acids and other proteins contained within coffee shells have been shown to promote plant growth, while simultaneously preventing harmful bacterial proliferation (Pacific Research Consulting, 2002). Coffee is also known to contain magnesium and potassium, nutrients that plants require for optimal growth (Nelson, 2013). Though incorporating coffee grounds into the soil while planting is mentioned, it is suggested that brewed coffee, diluted with water (to look like a weaker tea) has been the most successful in facilitating plant growth. Thus, due to its virtually unexplored nature, our experiment strived to ascertain results from the integration of coffee grounds directly into the soil.

The plants were slow in sprouting, taking most of the first two weeks to see any kind of activity. When they did finally break through the top layer of the soil, their growth pattern was not noticeably different from that of the control group. If anything, the control group produced taller stalks and more angiosperms. This could be due to the high concentration of coffee utilized, resulting in stunted growth patterns (Nelson, 2013). Or perhaps, the high concentrations provided an environment that far exceeded the acidity level ideal for plant growth, rendering it toxic. In an article about optimal growth for rose plants, the author discusses that the plants do tend to thrive in slightly acidic conditions, supporting our initial research. However, if the quantities of coffee added are too large, the environment can become more acidic than viable for the plants to grow in (Marrison, 2006).

Methods and Materials

For our fast plant lab, we used the following materials: ground coffee, a pipette, the styrofoam tray, *Brassica rapa* seeds, and the felt water mat. We will be using all 32 compartments of the styrofoam tray. A wick system for automatic watering through the felt water mat will also be a component of the experiment, the felt mat will be placed slightly into the water inside of the container, which will wrap up and underneath the plants. Underneath the soil there will be a triangular felt piece which will aid in watering through the felt mat sucking up the water and into the plants. In eight compartments we will plant our seeds, simply use water, and the light source provided in lab, this would be the control group. In the other eight compartments, we will add a teaspoon of ground coffee to the soil every week until the experiment is complete. (The same light source will be used for each compartment throughout the entire experiment.) The growth and progress of the plant will be recorded each week, and the plants will be watered as needed. Our experiment tray is set up as follows. Each number represents a cell in which two seeds were placed.

Coffee		Control	
1	2	1	2
3	4	3	4
5	6	5	6
7	8	7	8
9	10	9	10
11	12	11	12
13	14	13	14
15	16	15	16

Results

The coffee experimentation group had very few growing plants. The cells that exhibited growth are shown below.

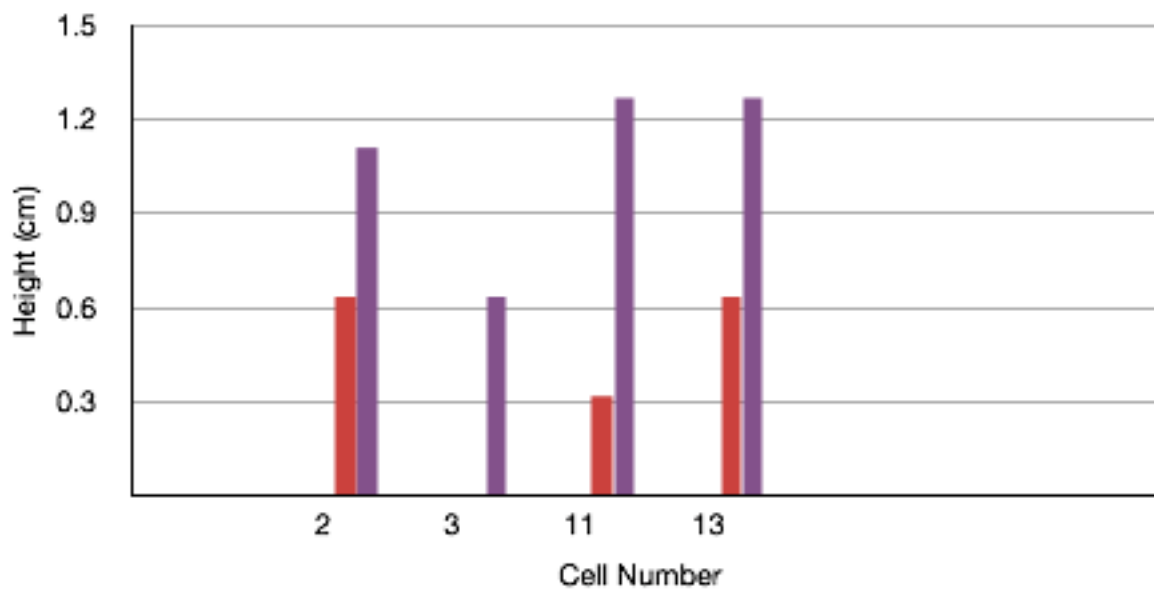
		Height of Coffee Plants (cm)			
		October 28	November 4	November 8	November 14
Cell Number	2	0	sprouting	0.635	1.11125
	3	0	0	0	0.635
	11	0	0	0.3175	1.27
	13	0	0	0.635	1.27

The control plants had much more growth than those plants exposed to coffee grounds.

The cells that exhibited growth are as follows.

		Height of Control Plants (cm)			
		October 28	November 4	November 8	November 14
Cell Number	1	0.635	1.27	1.27	1.27 (flowers present)
	4	0.635	2.54	4.445	15.875 (flowers present)
	6	1.27	3.175	5.08	12.7 (flowers present)
	9	0.635	2.54	4.445	13.335 (flowers present)
	11	1.27	3.175	3.81	12.7 (flowers present)

Coffee Plants



■ Oct 21, 2013 ■ Oct 28, 2013 ■ Nov 4, 2013
■ Nov 8, 2013 ■ Nov 14, 2013

		Height of Control Plants (cm)			
		October 28	November 4	November 8	November 14
	13	0	0	0	1.905
	15	0	0	1.27	4.445



Note the height of the control group(the left compartments) compared to the plants that had coffee grounds mixed into their soil (the right compartments).

Discussion

After running the experiment, it was found that those plants that had coffee grounds in their soil and were regularly watered, were very delayed in their growth.

Plants that were placed in regular soil and watered had a higher growth rate.

The other side of the argument is that caffeine can retard the growth of plants. Once again, experiments consist of using pop or coffee in order to test the results. The issue with this is that other ingredients may also effect how the plant grows. So even though it may be possible that the caffeine is slowing down the growth of the plant, it could be another ingredient that is causing problems as well. Some have found that adding coffee to a plant helps it to grow faster than if using water alone. But again, this may be the case because of the potassium and phosphorous that is also included. (Caffeine Addiction, 2008)

After informally observing the experiments of our peers, we noticed our overall plant growth seemed stunted. We suggest that those trying the experiment use less coffee grounds in the soil, or make sure to have a more watered-down coffee concentration (Marrison, 2006).

Conclusion

It was found that the growth of the control group plants, which contained just soil alone seemed to grow just fine. For some reason, not all of the control group plants grew at the same rate. This could be due to error while planting, or bad seeds. The total amount of control group plants that grew were about seven out of sixteen. With the experimental plants that had an equal ratio of dirt, and ground coffee, only four grew to the size of .5 inches. However, the growth of these plants were about two weeks late compared to the normal growing time of the standard conditions. Overall, the experimental ground coffee

plants barely grew. For the ones that did grow, their size does not compare to the size the regular fast plant grow. It can be concluded that grounded coffee mixed with dirt does not produce a faster growing process.

References

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