

Juno Catlin 2022 Research Paper

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Abstract

This study is important because it might show a more efficient way to grow plants faster and taller. Previous studies have shown plants that use magnets have a higher germination rate and grow taller and healthier. My hypothesis/research objective is that the ring magnet will help the plant grow taller, faster. This was researched by using petri dishes, germination paper, and magnets to help grow the radish seed. Even though my data does not suggest that magnetism could be a better and smarter way to grow plants healthier and taller. My data shows that magnets could be a better way to grow the plants healthier instead of taller.

Introduction

Sometimes plants don't grow fast or tall enough. So using magnets could be a simpler way to grow the plant taller, faster. For example plants and fungi both have negative gravitropism, which causes the roots to move down. Plants also have phototropism in which plants are attracted to light, partly because the sun has magnetic forces too. So roots grow down to get water, and plants grow high to get more sun.

Magnets are made up of iron, nickel, or cobalt, which is needed for photosynthesis. (Frontiers, 2020). There are many processes for creating magnets, but the most common method is called Powder Metallurgy. In this process, iron, nickel, or cobalt is made into a fine powder. Then it is compacted and heated to cause densification. Even though many magnets are man made there are many that are natural (Dowling Magnets, 2017) Lodestone is a type of magnet that is all natural. It was the first awakening to study the magnetic world. (Buy Magnets, 11/18/22)All magnets have north and south poles. Opposite poles are attracted to each other, while the same poles repel each other. When you rub a piece of iron along a magnet, the north-seeking poles of the atoms in the iron line up in the same direction. The force generated by the aligned atoms creates a magnetic field. (National Geographic, 2022). In most substances, there are an equivalent amount of electrons spinning in opposite directions. This cancels out their magnetism. That's why materials such as cloth and paper are weak in magnetism. In substances such as iron, cobalt, and nickel, most of the electrons spin in the same direction. Spinning, the electrons circle the nucleus. Their movement generates an electric current and causes each electron to act like a

tiny magnet. (National Geographic, 2022). The iron in these magnets help the plants get a good flow of oxygen to keep it healthy, resulting in the healthy color green. (Greenway Biotech, 201

Hypothesis

My hypothesis is that the large magnet will make the radishes grow the tallest because of how strong the magnetic field is. I think that the bigger magnet will help the plant grow taller because it will help with the phototropism and gravitropism.

Methods

In this project there are three methods.

Preparation. I used 9 petri dishes, 3 ring shaped magnets, germination paper, and radish seeds. First I cut out 9 circles of germination paper to fit in the petri dishes. Then I dampened the circles and laid them flat in the petri dishes. I placed a seed in the middle of each of them.

Experimental group 1. For the first method I put the ring shaped magnet around the seed as shown in the models below.

Experimental group 2. For the second method I use four small magnets for each petri dish. I had to use another ring magnet on the bottom to space out the magnets and keep them separated. I placed them as shown below and placed them around the seed.

Experimental group 3. For the third method I did not use any magnets. I just used a seed so that at the end I can compare and contrast.

I will have three sets of each group. I watered them everyday in the afternoon.

Example:

Method 1/Petri dish A



Method 2/Petri dish B



Method 3/Petri dish C

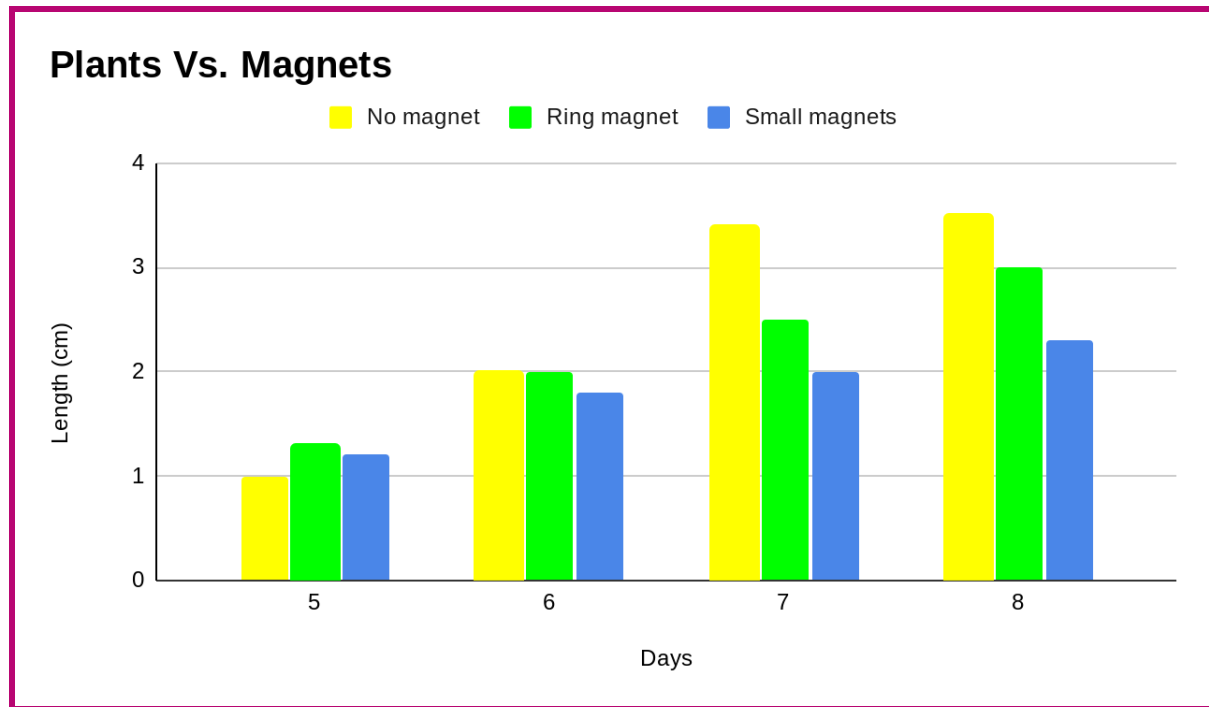


Method 3/Petri Dish C



Results

| Days | No magnet | Ring magnet | Small magnets |
|-------------------|-----------|-------------|---------------|
| Day 5 | 1cm | 1.3cm | 1.2cm |
| Day 6 | 2cm | 2cm | 1.8cm |
| Day 7 (a week) | 3.4cm | 2½cm | 2cm |
| Day 8 (final day) | 3½cm | 3cm | 2.3cm |



As you can see the no magnet column overall had the highest measurements, and the small magnets had the shortest measurements, ring magnets did have some better features.

Discussion

Overall the plants without the magnets had the tallest height out of the other column but the ring magnet did have some better features. The plants with the ring magnet had larger roots, and were budding much more at the top. Even though the plant had limited space compared to the other plants it still grew larger roots than the others. The non magnet plants were skinnier and had less budding than the other plants. The small magnet plants were too constricted so I had to use a ring magnet underneath, but when I did that it made the magnetic field turn away from the plant.

Overall the no magnet plant won the tallest height but the ring magnet plant was healthier and greener than the others.

Limitations

I did have some limitations to this project. First the petri dishes were small so sometimes the plants would touch the top of the cover. Secondly the magnets being with the plants did not provide much space for them to grow. And like I said the small magnets could not help the plants grow because its magnetic field was focused on the magnet below it.

Future Studies

The next logical step in this situation would be to transfer the plant from the petri dish to a pot or soil. If I did further research the outcome would be good for the ring magnet plants, and even better for the small magnet plants.

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