How Magnetic Fields Impact Plant Growth

Abstract

Plants go through a process called photosynthesis, a way that people could improve this process and save time is by using a magnetic field. A magnetic field can increase plant growth during the germination process. Stimulating its growing process and environment, the magnetic field can give the plants more nutrients and that causes them to grow taller, larger and healthier.

How Magnetic Fields Impact Plant Growth

Studies show that the Magnetic Fields (MF) has an effect on plants growth when in the process of germination. The MF affects the plants while growing making them more tolerant to the changing environment. The electromagnetic fields stimulate the seed and during the germination process it can increase the speed of growth.

The magnetic fields help the plant grow, according to our research the magnetic fields are made of neodymium, you can find this element on the periodic table of elements, the symbol is Nd. Neodymium is a rare-earth metal which belongs to the series lanthanide (Gregerson, 2026). It was discovered by Carl Auer von Welsback back in 1885.

Characteristics of this rare earth metal are malleability, ductile, and silvery-white in color. Neodymium oxidizes in the air forming an oxide, (Nd_2O_3). This particular element contains 7 isotopes, five of which are stable. High strength magnets are its primary application and used in several diverse industries.

When compared to other elements, in the igneous rocks of Earth's crust, it is found to be more than twice as abundant as lead and about half as plentiful as copper (Gregerson, 2026). Two out of the seven are radioactive and carry a total of 3 radioactive isotopes. As mentioned before, there are several industries neodymium is used in. You can find it in high performance electric motors and generators. Spindle magnets for the computer hard drives and wind turbines.

During the growth process the magnetic field increases the solubility and ionization of minerals in the soil. It is most known as a strong magnet made out of exactly neodymium or alnico. A static magnetic field ameliorates soil water stress in seedlings of maize. This means the type of magnet is making the soil stress help the seed grow more than normal seeds.

Method

We have 3 raised garden beds that we used, same size and height. When we planted the seeds the same soil was used, the same seeds in each and planted at the same time. During the growth process they had the same amount of sunlight and were watered at the same time. In garden bed A we buried 5 magnets in the soil, garden beds B and C did not get magnets buried when seeds were planted. However at the 5 week mark, we added magnets to garden bed B and still none in garden bed C. We were so astonished with the speed of growth in bed A, we wanted to see if the same would happen with garden bed B by adding them late. Nothing changed right away in bed B.

During our observations, the magnets definitely impacted the growth of the plants in bed A. The plants grew faster, taller and healthier. On our last 3 observations however, in bed B there seemed to be a difference in growth speed all the sudden after 8-10 weeks. Bed C was growing but not at the rate A and B were.

We believe this happened because we added the magnets after germination (5 weeks later) in bed B. Although that happened, bed A grew tremendously faster since we added the magnets as we planted. On day 22, you can definitely see the difference in the speed rate of all beds, if this were a race, bed A would have won.

Assessments and Measures

The electromagnetic radiations coming from the sun stimulate the growth and development of plants through the process of photosynthesis. The geomagnetic field of the Earth can influence basic biological functions. The magnetic field can help develop plants faster than usual.

MF can enhance the intake of water, nutrients, photosynthesis, carbohydrates, proteins and enzymes, which can impact the growth of the plant. In the same case, MF protects plants against salinity by increasing the intake of water. By protecting the plants from salinity it helps the plants grow more efficiently.

The context can be reduced in the MF treated plants. But the Mf treatment in these plants can change proteins and lipid profile in the harvested seeds. The levels of elements N Nitrogen, K magnesium, Ca calcium, Mg magnesium, Fe iron, Mn manganese, Na sodium, and Zn zinc which are increased but the Cu copper and Na sodium remain the same. However, Mf Tangent is treated the strawberry plants. Mf can affect the membranes and the Ca plus is signaling the plants cells and has many magnetics effects in the living organism.

Magnetic fields have been found to interact with seeds and plants and accelerate metabolism, which improves germination. By using MF, it protects plants from stunted growth caused by different lights and temperature conditions. MF can also protect plants from insect attacks.

Discussion

For us students this was an extraordinary experiment. It has helped us see the difference between from the beginning of the growth until now and the speed of which the plants grew with the magnets. Conducting this experiment was out of our comfort zone, however this made us think outside of the box and provide different thoughts on the outcome. Our biggest take away from this experiment was that if there was a famine and food was scarce, this would be such a contribution to the agricultural industry when planting our lettuce, carrots, cauliflower etc. and would help keep food on the table for the people.

References

Gregerson, E (2026) *Science: Chemistry Neodymium*. Britannica: Neodymium | Rare Earth Element, Uses & Properties | Britannica

Radhakrishan, R (2019) Magnetic field regulates plant functions , growth and enhances tolerance against environmental stress. PMICI: PMC6745571: 31564775