

Which Hydroponics Growing Medium  
Leads to the Fastest Seed Growth?

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## Purpose

The purpose of this experiment is to determine which hydroponics medium grows lettuce the fastest.

## Hypothesis

If the experimenter grows lettuce hydroponically, using three different growing mediums; coco-coir, perlite, and clay pebbles, then the plants in coco-coir will grow the fastest.

## Hydroponics

Which growing medium is best for growing hydroponics? The answer to that is unknown. According to multiple experiments, different growing mediums have worked for a diverse group of people. There are other types of growing mediums for hydroponics such as Coco Coir, Clay Balls, or Perlite. (Folds, 2018)

Coconut Coir first started being used in the 11th and 13th centuries A.D. Natives first used it, but Marco Polo first discovered it in his expeditions. He called it Indian Nut. Perlite is a common mining material that is a volcanic gas. They look like tiny white specks that are soft and easy to use. Clay Balls are exactly what it says. When water is poured on them, they expand. This allows moisture to run through them. (Espiritu, 2019)

Hydroponics is the practice of growing plants without using fertilizer or soil. Instead, it is grown with water and nutrients. Over the years, scientists have found better and more efficient ways to grow hydroponics style. Too much water will cause the plants to drown; not enough water may cause the plant to dry up. Many farmers have been drawn to the hydroponics style of growing. It can be less work and it would be a cleaner and more efficient way of growing. (Espiritu, 2019)

Some of the easiest plants to grow hydroponics style are lettuce, parsley, spinach, and other greens. Fruits and vegetables are also a popular choice. Just like growing in soil, growing plants with hydroponics can take many weeks. There are very sophisticated hydroponics farms which have huge systems of pipes with circulating water, air pumps and temperature control. But many home gardeners have found success growing hydroponically in their homes with simple, inexpensive, homemade systems. Some materials that are required for a simple homemade

hydroponics system include a pump to circulate the water, a growing light (which may not be necessary if there is ample sunlight), a styrofoam cooler, plastic cups, growing mediums such as coco coir or perlite, and of course seeds. The growing mediums are placed in the cup and seeds are added. The cups are placed in a cooler and after about four weeks, one may start to see the results. (D'Anna, 2020)

Although hydroponics has many advantages, it also has multiple disadvantages. These disadvantages include electricity issues. If the power goes out, then the pump will fail and stop circulating. Another is mold. If the garden is not taken care of properly, it will create mold and that can be dangerous. (Stewart, 2010)

The first examples of hydroponics dates back to the Hanging Gardens of Babylon and the Floating Gardens of China. There was a special system that flowed water through the plants and flowers. The world did not know this yet, but this was a new way of growing plants and flowers that would help a lot of people. Today, most people use hydroponics rather than just using soil. It is cleaner and easier to work with. (Espiritu, 2019)

A modern example of hydroponics can be found in DisneyWorld. A boat takes riders on a journey through the hydroponic gardens housed in "Living With the Land." Many of the vegetables, fruits and herbs used throughout the Disney Parks are grown there. There are even tour guides that can take people through the plants and explain what they are, where they are from, and how they help the earth. The attraction has a restaurant where diners can watch the boats go through the ride, and food is served with the plants that they grow. (Lynch, 2018)

The first person to discover the wonder of hydroponics was a man named Dr. William F. Gericke. At the time, he was working at the University of California in the late 1920's to the early 1930's. At first, none of his colleagues or students believed that he could do something like

that. Eventually, Dr. Gericke proved everyone wrong by growing a 25 foot tomato vine by just using water and neutrons. His colleagues were amazed by this and started growing their plants hydroponics style. (Espiritu, 2019)

A common question is if hydroponically grown vegetables are edible. The answer is yes. At the store, some vegetables are not cleaned before they are shipped. They could have dangerous particles on them that could really harm someone. With hydroponics, it is more efficient to grow vegetables hydroponically. (Glassman, 2020)

In conclusion, hydroponics may become the new face of the future due to its cleanliness and easy procedure. It does not need any kind of dirt or soil, only the growing mediums that are required. The right amount of light, water, and circulation are required in order to grow successfully. Vegetables are able to grow hydroponically. Hydroponics has been around for a really long time. In conclusion, hydroponics can be easier to manage than a traditional, messy garden in the soil. It is a modern, fun way to grow vegetables, herbs, houseplants and fruit!

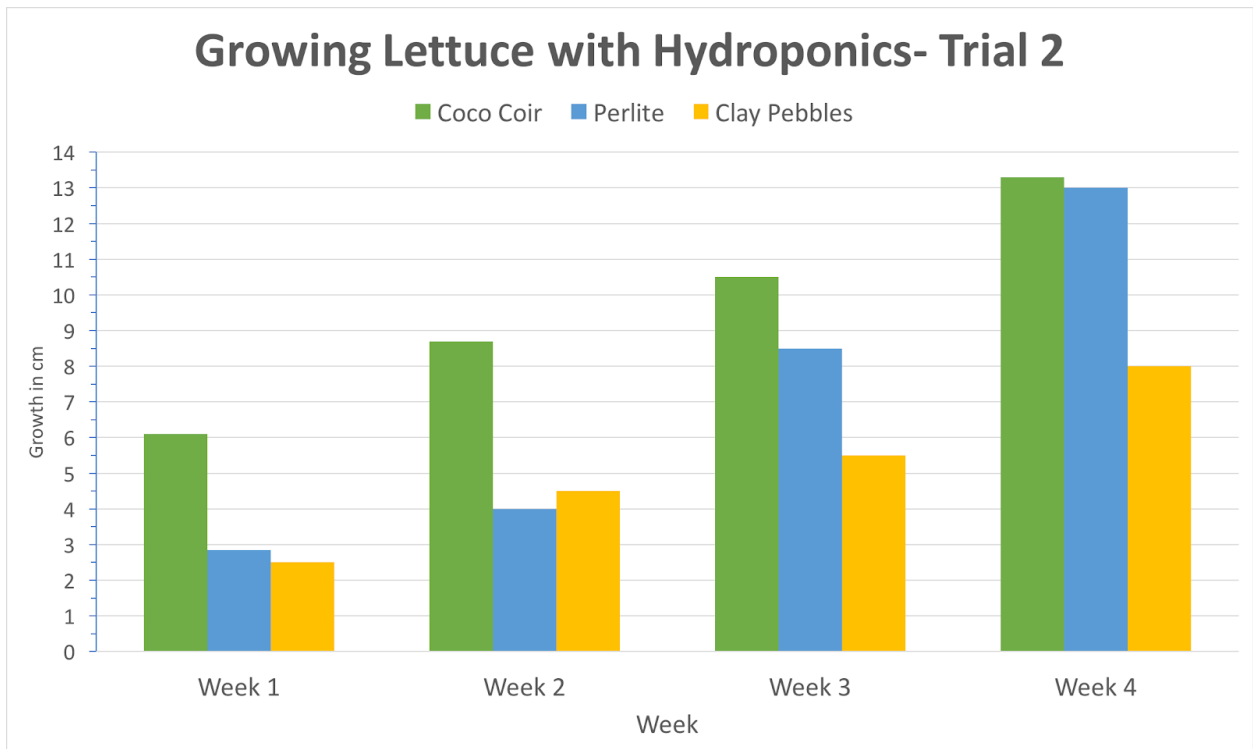
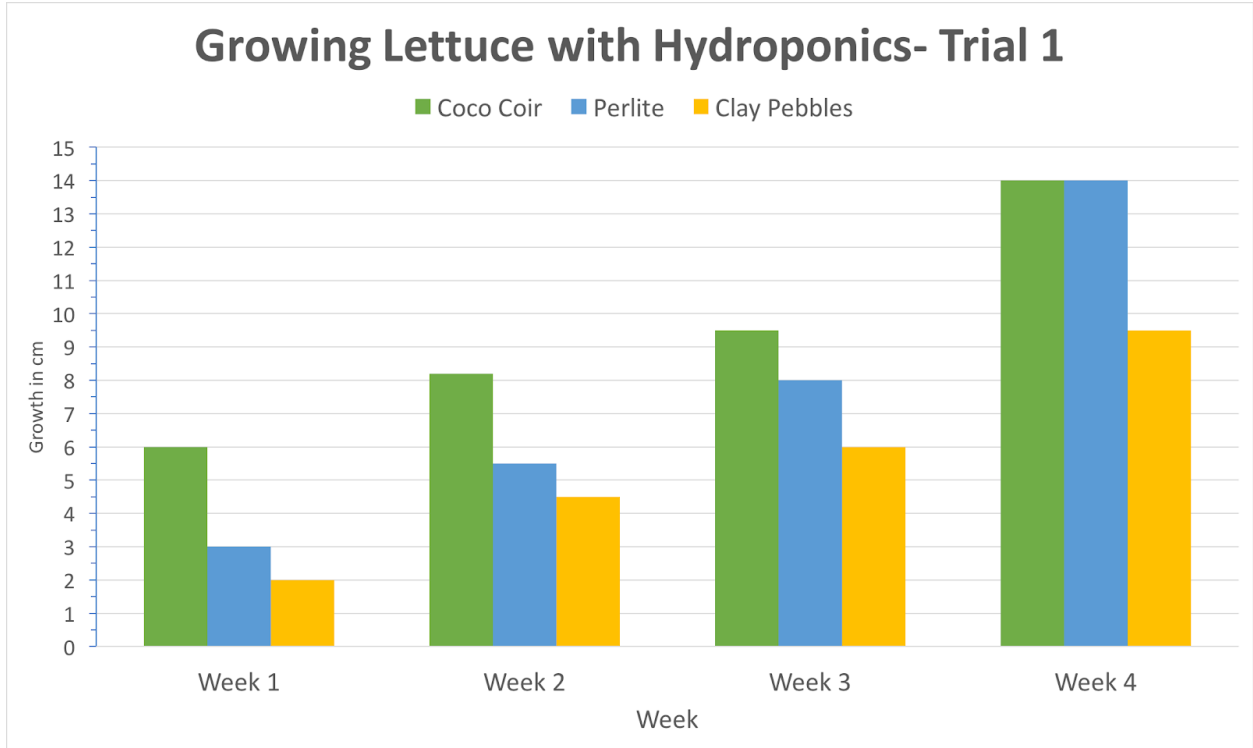
## Materials

- 1 Styrofoam cooler
- 1 black plastic garbage bag
- 1 table
- 1 camera
- Scissors
- 1 Exacto Knife
- Coco-coir
- Clay Pebbles
- Perlite
- 1 notebook
- 1 pen
- 1 sheet of labels
- 6 clear plastic cups
- 18.9 liters of tap water
- 59mL liquid plant food
- 24 lettuce seeds
- 1 window
- 1 submersible water pump
- 1 open empty can



## Procedure

1. Use an empty soup can to trace six circles on the lid of a styrofoam cooler.
2. Use the same can to cut out those circles.
3. Use an exacto knife to cut off excess styrofoam.
4. Create two labels for each growing medium and use them to label the plastic cups.
5. Cut three small triangles on the bottom of each cup.
6. Line the cooler with a black plastic garbage bag and fill the Styrofoam container with lukewarm tap water.
7. Add 59mL Miracle Grow Liquid Plant Food to the cooler 1 time per week.
8. Prepare coco-coir by soaking the brick in water, then squeezing excess water out.
9. Add 1 cup of coco coir in each of two plastic cups labeled “coco coir,” and do the same for perlite and clay pebbles.
10. Plant lettuce seeds in each of the six cups.
11. Place the Styrofoam lid upside down in the cooler.
12. Place each cup in a cutout circle in the lid of the cooler.
13. Measure and record growth each week for 4 weeks.



## Results

All of the plants grew successfully. But the one that grew the fastest, and most successfully, was the coco coir. Seeds growing in perlite and clay pebbles also grew well, but at a slightly slower rate.

## Conclusion

The independent variable in this experiment was the different growing mediums that were used. Those growing mediums were coco coir, perlite and clay pebbles. The dependent variable was the amount of growth in each plant, and a comparison was made between the three mediums. The experimenter predicted that the coco coir would grow the best and she was right. Coco coir provided a good base to hold the seeds, so the seeds did not slip to the bottom of the cup. Therefore, the growth could be seen almost as soon as the seeds sprouted because they were close to the surface of the growing medium. The perlite did the second best. It held the seeds well, and new growth was seen quickly just like the coco coir, but it did not grow as tall in the first couple of weeks. Out of the three mediums, the clay balls were the least successful, although they still had plenty of growth. The experimenter suspects that the clay balls could not hold the small seeds as well as the other growing mediums. In the clay balls, the small seeds sunk lower in the cup. They still grew quite well, but just not as fast as the other mediums. It could be that the growth started lower in the cup, giving the appearance of less growth. The results were very similar in both trials that were conducted. If the experimenter was to do this experiment again, she might try using sphagnum moss or another material in the bottom of each cup to help hold the growing medium and to prevent seeds from slipping down into the cup. She also might conduct the experiment for a longer period of time to see if the clay balls just started out a little slower than the other mediums, yet still had equally successful growth. In conclusion, the experimenter's hypothesis was correct which was that the coco coir would do the best.

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