CALIFORNIA SCIENCE & ENGINEERING FAIR
2018 PROJECT SUMMARY

Name(s)

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Project Number

38405

Project Title

Aquaponics vs. Traditional Soil Farming

Abstract

Objectives/Goals

The main objective of this experiment was to compare the growth of lettuce and basil plants in an aquaponics system versus traditional soil based farming, without the use of any additional nutrients, fertilizers or supplements. Additionally, water usage was recorded to see which growing method would use the least amount of water.

Methods/Materials

An aquaponics growing system was constructed utilizing a 20 gallon plastic tub to contain the fish and a 56 quart plastic tray to grow the plants along with various pieces of pvc pipe, an aquarium pump, clay balls for a growing medium and water. The soil system was created with a 56 quart plastic tray with drain holes added and potting soil. Over a six week period I recorded the growth of 25 lettuce plants and 27 basil plants and recorded water usage within both the aquaponics and soil based growing systems.

Results

There was 960% more lettuce growth in the aquaponics system than in the traditional soil system. The aquaponics system produced 518 grams of lettuce compared to only 54 grams from the soil. The aquaponics system used on average 2.88 more cups of water per week. The aquaponics system used a total of 92.25 cups of water during the six weeks of testing. The soil tray used 75 cups of water. The basil did not have any significant growth in either tray and was not weighed.

Conclusions/Discussion

The first two sections of my hypothesis were correct since the lettuce in the aquaponics system clearly outgrew the lettuce in the soil and the lettuce significantly outgrew the basil in the aquaponics system. The aquaponics system produced almost 10 times more lettuce than did the traditional soil based system. I believe this large difference in growth is directly attributed to a greater amount of available nitrogen produced in the aquaponics system than that in soil. Basil growth was limited in both systems and I believe this was because the ambient air temperature in my garage averaged around 52 degrees. From my research I found that basil requires warmer temperatures than lettuce. The last part of my hypothesis did not turn out to be correct since the aquaponics system used more water than the soil system. I think this was due to the water being used up by the lettuce plants. During my research I found that lettuce is made up of almost 95% water. Plus the lettuce leaves in the aquaponics system were much bigger and would cause greater evaporation to take place.

Summary Statement

I compared the growth rates of plants grown in an aquaponics system versus a soil based system without using harmful fertilizers or chemical additives, and determined the aquaponics system was much more effective in producing plant growth.

Help Received