CALIFORNIA SCIENCE & ENGINEERING FAIR
2019 PROJECT SUMMARY

Name(s)

Christina Walley

Project Number

J1828

Project Title

Nutrient Density of Plants: Aquaponics or Soil?

Abstract

Objectives

The goal of my project was to determine whether aquaponics grown plants will grow larger and more nutrient dense than soil grown plants watered with water from the aquaponic system.

Methods

Aquarium: Set up an aquarium and run the pumps and filters continuously to start cycling the tank. Check water chemistry for ammonia, nitrite, and nitrate levels every few days. After the water chemistry stabilizes, acclimate and add the tilapia to the tank. Monitor tank parameters very closely and feed the fish daily. Plants: Purchase 24 chard plants. Gently brush off the dirt from the roots and dip the root ball in water to take off leftover soil. This way all plants are placed in the same condition in their growing media. Divide and place the plants into two groups of 12 plants each. Place the plants in their respective pots, and cover the root ball with the growing media. Place the 12 aquaponics plants in the grow bed. The 12 potted plants should be next to them. Water all plants with water from the fish tank as needed. Test: Do the data collection as soon as possible after harvest. Use a tape measure to record the length of the tallest leaf and the width of the widest leaf per plant. Count the number of leaves per plant. Pick a leaf from each plant, extract juice from it, and place a drop of juice on the daylight plate of the refractometer. Look for the color change on the scale. Take the reading, and record the data.

Results

The aquaponics plants had 14% (1.16cm) taller leaves, 30% (2.17) more leaves, and 13% greater sugar content present in the juice.

Conclusions

Swiss chard grown in an aquaponic systems grew larger and are more nutrient dense. The results of my experiment support my hypothesis because the plants in the aquaponics system, were on average 1.16 cm taller, the leaves were 1.38 cm wider, had 2 more leaves and had Brix readings on average 13% higher. I started with 12 plants in each group, but I did lose 6 of my soil plants as well as 4 aquaponics plants to heat and insects. The 6 soil plants left were healthy, so to be fair, I selected 6 from the aquaponics system to test instead of testing all 8. I would have done a few things better, mainly starting earlier, and having replacement plants of the same age,and I would have built a greenhouse to protect the plants.

Summary Statement

The results of my project were that the aquaponics grown plants were bigger, and had a higher sugar content than the soil plants; higher sugar readings can correspond to higher nutrient density.

Help Received

My Dad taught me about fish and aquariums, he helped me design and build the aquaponics system. My teacher reviewed my project and gave me lots of guidance.