CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)

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Project Number

S1902

Project Title

A Fishy Situation: A Study to Test the Efficiency of Aquaponics Farming Meathods

Abstract

Objectives/Goals

In a world where population sizes are increasing exponentially, and farmland is decreasing, there is a need for more efficient and space saving farming methods. If plants are fertilized using the dissolved nitrogenous waste from fish, then growth rate will increase and water consumption will decrease when compared to traditional farming methods.

Methods/Materials

2 fish tanks were fashioned out of 12 gallon tote boxes.Fish tanks were filled with water. Ten goldfish were then placed in each tank. The 5 gallon tote boxes were filled with a growing medium made of small clay beads. Vegetable seeds were planted in growing sponges to ensure that the seeds would not wash out when the grow beds are watered. Using PVC pipes, a siphon was constructed to give the aquaponics grow bed proper drain and fill times. It took 4 minutes for the grow bed to fill with water and 40 seconds to drain. A submersible pump was placed in the aquaponics tank and a hose was attached to bring fish waste to the grow bed. A fluorescent lamp was suspended 4 inches above the plants and turned on every day for 12 hours to provide a proper light cycle for the plants. Every day before the light was turned off, a picture was taken of each of the grow beds to accurately document growth. The fish in both tanks were fed 20-25 flakes of food twice per day. Plant height was measured in millimeters; plant volume and pigment were observed.

Results

A rating system was created based on plant height, plant volume and general pigmentation. These ratings were recorded on a weekly basis (+1 for positive change, 0 for no change and -1 for negative change). The cumulative scores established a rating of overall plant health with a maximum total of 56. By the end of two months, the aquaponics system had a cumulative weekly rating score of 42, whereas the control system had a cumulative score of 16. The control fish tank plus the water necessary to grow the plants used 152.53 L, whereas the aquaponics system used 79.50 L of water during the two month study period.

Conclusions/Discussion

The data shows that the aquaponics system produced a more healthy plant. All of the plants grew taller and had more volume in the aquaponics system compared to the control system. Along with overall plant health, during the study period, the aquaponics system used 73.03 L less water than the control system and filtered the water better based on visible water clarity.

Summary Statement

A study to test the efficiency of aquaponics farming methods

Help Received

Larry Wright, for aiding in the design of the project; Liz Wright, for helping with the board and notebook design; Kaitlin Wright for helping with graphs and analyzing data; Maria Caballero for acquiring materials and supplies; The AV Hydroponics Center for helpful advice