CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
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Project Number
31331

Project Title
Hydroponics vs. Aquaponics: Can Fish Waste Provide Enough Nutrients to Sustain Plant Growth?

Abstract

Objectives/Goals
Growing plants in water not only allows food to be grown in parts of the world which cannot support soil farming,it also produces a higher yield without the extensive use of pesticides.If this system is integrated with fish culture,it can create a sustainable method of farming,whereby the waste of one biosystem serves as food for the other biosystem.My objective was to find out if fish wastes contain enough nutrients to sustain plant growth and to find which plants will be supported by this system.I hypothesized that aquaponics will sustain plant growth,but plants grown hydroponically will have a higher and healthier yield.

Methods/Materials
I used Thymus x citriodorus(golden lemon thyme)and Salvia officianalis(golden sage)seedlings.I planted 3 of each type of seedlings in a hydroponic system,aquaponic system,and control system(soil).I used 2 ebb and flow systems to provide nutrients to the seedlings.The hydroponic seedlings received nutrients from a mixture of Micro 6-0-0,Bloom 0-6-5,and Grow 2-1-6 diluted in 4 gallons of water.The aquaponic seedlings received nutrients from 4 gallons of fish pond water.Both systems were programmed to flood nutrients at the same time and for the same duration.The length and general health of the seedlings were recorded over several days.The experiment was repeated with Ocimum basilicum(basil lettuce leaf)and Lactuca Sativa(lettuce grand rapids)seedlings.

Results
My results showed that while hydroponics supported all seedlings,aquaponics sustained thyme,sage,and basil.Lettuce did not survive in aquaponics.Basil showed 15% more average growth in hydroponics as compared to aquaponics.Sage averaged a growth of 43% in aquaponics,only 1% less than hydroponics.Thyme however peaked in aquaponics system.Its average growth in aquaponics was 52% compared to 28% in hydroponics.

Conclusions/Discussion
My results show that pond water does contain enough nutrients to sustain plant growth.Nutrient-rich effluent from fish tanks can be used to fertigate hydroponic systems which would otherwise be contaminants building up to toxic levels in the tanks.This finding has real world application as every person depends on agriculture for survival.However,the current agricultural practices, with fertilizers and pesticides,cause harm to our earth,flora, and fauna.Hydroponics and aquaponics provide us with an environmentally friendly way of farming that produces healthier,greater,and faster yields.

Summary Statement
My project explores the possibility of using fish wastes to provide nutrients to plants.

Help Received
Hakone Gardens provided pond water. South Bay Hydroponics provided supplies and guidance for growing plants hydroponically.