CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
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Project Number
J2012

Project Title
Is Your Plant Reaching Its Full Potential ?

Abstract

Objectives/Goals
The rate of growth of plants will vary depending on the effectiveness of substrate to facilitate the absorption nutrients & water. My objective is to measure & compare plant growth in 4 different substrates: Coconut Fiber/Perlite, Hydroponic Beads, an Aquaponic system, & soil, and demonstrate more effective, energy-efficient ways of growing produce using sustainable environmentally-friendly resources. These growth substrates will be more ecologically effective alternatives to support Third World & urbanized countries alike.

Methods/Materials
The experiment consists of 4 sets of containers (w/ 3 containers per set), each w/ different growth substrates, to measure & determine the greatest plant growth. The 4 substrates are a Coconut Fiber/Perlite substrate, Hydroponic Beads/Water substrate, an Aquaponic system, and Soil. Plants were grown & observed in each set of containers for approx 6 wks & the plant growth was compared to show which was the most effective growth substrate.

Results
The substrate with Coconut Fiber/Perlite yielded the most growth; the Hydroponic Bead substrate followed; the Aquaponic system was 3rd; the soil substrate was lowest yielding. These results demonstrate alternate substrates are more effective for nutrient absorption than soil. The two most cost-effective & energy-efficient substrates were the Aquaponic system & the Coconut Fiber/Perlite which are inexpensive & made from recycled materials.

Conclusions/Discussion
Soil is the least efficient medium to grow plants. Nutrient absorption is lowest & the energy required to produce is high. Although Hydroponic Beads are a very efficient & effective growth medium, the energy required to produce the ceramic hydroponic beads is very high, making this a very effective growth medium but a higher carbon footprint. Aquaponics is a very effective & efficient growth medium w/ a very low carbon footprint. It relies on a symbiotic relationship between the fish consumption of plant decay & the discharge of nitrogen which then provides the plant w/ nutrients. Coconut Fiber/Perlite substrate is a very efficient & effective growth medium. The energy footprint is very low as it is also a recycling of readily available organic materials.

Summary Statement
My project's goal was to find out alternate plant substrates, which not only yield the highest growth in plants, but are also more cost-effective, energy efficient and environmentally friendly to sustain growing populations and urbanization

Help Received
Father assisted in the substrate set-up for the project; Mentor provided substrate materials ; Mother helped with project board layout ; Father assisted in final typing and applications.