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Wrapped around Trellis designs for Aquaponics systems

Senior Project

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The Esther G. Maynor Honors College

University of North Carolina at Pembroke

By

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Biology: Zoology and environmental concentration

Department of Biology

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Abstract

There are many benefits of using aquaponics to grow crops, one big benefit is that crops can be grown all year round, since aquaponics can be put in green houses. Another benefit is that there is no weeding, and you don’t have to worry about the health of the soil. It also reduces the amount of water being used because the water in the system is being recycled and reused. So, it helps with the global water problem. Another important benefit is the accelerated growth of the plant, this is because plants have access to nutrients and natural fertilizer 24 hours, also the constantly regulated water source helps the lants grow faster as well. Aquaponics systems also help to reduce carbon footprint since you do not need acres farmland, with aquaponics system you can build them in areas prone to drought, rocky and areas with poor nutrient soils. One of the main benefits of aquaponics systems is that the farmer can have two incomes, they can sell the crops that they grow, and the fish can be sold to food manufacturers. Overall, there are a great deal of benefits of aquaponics systems. There are some cons of aquaponics, one is that you can only grow certain types of crops, mainly leafy vegetables like lettuce, Basil. Root and tubers vegetables do not grow good in aquaponics system, since they prefer growing in soil. Grains also cannot well in aquaponics, and you can try to grow some, but it will be more work and more expensive. Another problem is the cost of electricity, with aquaponics you are relying on 2 life forms. Furthermore, taking care of fish could pose many different problems for example fish are sensitive to temperature changes. So, a farmer would have to invest in water pumps, coolers, and heaters to help keep the temperature constant. The system is being ran 24 hours, the larger the system the higher the cost. It is also can be costly to set it up and getting it started, since you must buy the tanks, fish, plants, a growing media and all the pumps, it is therefore expensive to upscale as well. Upscaling will cost more in labor, electricity, and materials. Another main issue is hiring or learning the technical skills needed to run and maintain an aquaponics system. A technician would have knowledge on water testing, plumbing, knowledge of plants and knows about basic fish physiology. Speaking if the fish, with aquaponics systems you cannot have the tanks overcrowded and depending on the size of the tanks, you may be only able to have a couple of fish. One big flaw with aquaponics systems is that if one part fails then the whole system fails, since it is a closed looped system.

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**Hypothesis**

My experiment is addressing the problem of only being able to grow certain crops on large scale aquaponics systems. For my experiment I looked at a way of designing a Trellis that could be used on a large-scale aquaponics. The type of plants I was forced on was plants that need some type of trellis to support them as they grow. I am testing out two different types of trellis. I hypothesis that the Roller back Trellis would work best.

**Experiment**

For the experiment I decided to make a prototype of the aquaponics system to mimc the floating raft side the system. The prototype was based off the design of a floating garden done by Florida State(video referenced below). The plant that we decided to use in the experiment intdeterminate cherry tomatos, since they will need a trellia they continue to grow. We used 8 plants and did 4 for the control, 2 for the twine trellis and 2 for the rollerback trellis. Then we will wait and see how the plants grow and see which trellis would be a more practical approach to use on a large scale aquaponics system.

**Conclusion**

My experiment had a late start this spring because of the weather, so I do not have any data yet. I can only hypothesis the results at this point. I think the roller back trellis will work the best because it can be adjusted as the plant grows, and the grower can control the amount of tension put on the plant. I think it will be great to for Aquaponics systems, because it does not add weight to the floating beds. I will not get my results until the end of the summer. I feel like this experiment was important because plants that would do well in a aquaponics system but because they need extra structural support , they can not be used. This experiment could help expand the range of the type of plants that can be grown on aquaponics systems.

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