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Aquaponics vs. Hydroponics: A Comparison of Tilapia Effluent and Conventional Fertilizers as a Hydroponic Nutrient

This project is an experiment comparing aquaponics and hydroponics. Aquaponics is the integration of recirculating aquaculture and hydroponics. The concept of aquaponics is that effluent produced by intensely cultured species of fish is rich in nutrients, similar to certain hydroponic solutions. If in a high enough concentration, these nutrients can be circulated through a hydroponic sub-system containing plants. This gives a producer a valuable second crop. For this experiment, two identical raft type hydroponic beds with four flowing channels were constructed. One bed was plumbed to circulate through a 95 liter aquarium, while the other was constructed to only circulate its solution through the bed. Tilapia, obtained from the Colorado Alligator Farm and Trinidad State Union College, were stocked into the aquarium. Bibb lettuce seeds were planted in foam germination cubes two weeks before the aquaponic was cycled, meaning bacterial populations were establishing. After two weeks, plants were transplanted to the aquaponic bed to determine if the system design was sufficient for lettuce growth. After a number of experimental trials, beds were improved to at least produce minimal growth. The hydroponic bed was put into service and seedlings were transplanted to it. After five trials, the hypothesis proved correct, hydroponics proved to be a more precise method of cultivating Bibb lettuce based on quantitative results. The hydroponics yielded 3,050.81 total grams of lettuce in five trials, as compared to the aquaponics system which struggled to produce 389.28 grams of lettuce with the present design and waste load.