Effectiveness of Plant Growth in Vertical Aeroponics vs. Horizontal Raft Aquaponics

Zehner, Sadie (School: Berwick Area High School)

A food desert is defined as an area where 30% of citizens live more than 1 mile from a grocery store. Factors like shipping cost, shipping time, and shelf life, cause store owners say imported produce is “not worth selling”, creating food deserts in cities. To address this problem, store owners can use the solution of aquaponics. While studies have been conducted on aquaponics/hydroponics and vertical/horizontal systems there is limited research on vertical aeroponics vs. horizontal aquaponics, which lead me to evaluating the plant growth efficiency of these two systems. To control this study, a system combining these components was designed. First, fish waste is converted to nitrates in a bio-filter and are pumped to aeroponic towers and rained over the vertical plants’ roots. The water is then purified by the plants, returning clean water to the tank. Floating on the tank is the raft component, where plants take nutrients from the tank. To find the effectiveness of plant growth, shoot height and number of leaves were measured weekly and the basil was dried to constant mass in a dehydrator and mass was recorded. I expected the vertical component to produce the same biomass as the raft; however, after performing a two-sample t-test, it can be concluded that vertical aeroponic towers are more growth efficient compared to the raft when growing basil. Since consumers utilize basil leaves, the component that produces more leaves and a higher dried biomass would be considered more growth efficient. Variables: Independent- horizontal/vertical Dependent – height/leaves/dried-mass

Awards Won: