The Effect of Available Phosphate in a Hydroponic System on the Production of L-Ascorbic Acid in Brassica oleracea var. Acephala

Parks, Kathryn (School: Chattanooga School for the Arts and Sciences)

Nutritional deficiencies are a problem in the developed world, so it is crucial to discover methods to produce nutritious foods for a low cost and without damaging the fragile environment. One method to prevent said damage is to grow an abundance of crops in a hydroponic system, which prevents agricultural run-off, but this does not address the necessity of producing nutritious crops. Evidence suggested it possible to use altering levels of available phosphate to affect the production of l-ascorbic acid (vitamin C) in Brassica oleracea var. Acephala (kale) because phosphorus is relevant in the production of a variety of vitamins. To test this, a low-cost hydroponic system capable of growing six different sample groups in three different test groups was built. The samples were allowed to grow for only one month due to factors constraining testing time, such as a sudden heatwave and winter freeze. The samples were harvested and their l-ascorbic acid concentrations were measured. This was compared to the total plant volume collected. Based on the data, l-ascorbic acid correlates with the levels of available phosphate present, but these levels can be too high and lethal to a plant in the system. An ideal level of available phosphate results in plant matter high in l-ascorbic acid compared to the total plant mass collected. Still, even with a correlation shown, more trials are needed to prove causation, yet this suggests a possible method to create foods higher-than-typical in l-ascorbic acid for a low cost. Keywords: Hydroponic System, Brassica oleracea var. Acephala, L-ascorbic Acid

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