The Efficacy of Anaerobic Digester Effluent for Use as a Fertilizer in Hydroponics: Asha Gittens and Carley Kiiskila

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Summary

Anaerobic digestion is the process where microorganisms break down organic matter without oxygen. This produces biogas commonly reduced to biomethane and a byproduct called digestate. This nutrient rich sludge is often discarded despite its possible agricultural applications. This research project investigates the possible application of biogas digestate as a fertilizer for nutrient deficient soils and as an additive in hydroponic systems in hopes of addressing the soil quality problems present in Barbados. Using cabbage plantlets germinated from seed as testing plants two experiments were conducted, one with 16 plants in pots, and the other with 9 plants in the hydroponic. For the potted plants four concentrations of digestate were tested; 0, 0.25, 0.50, and 1 kilogram. These plants were placed in a 4-by-4 grid with each test group running diagonally to assure varying light levels per group. With this experiment there was significantly more growth with the 0.25kg plants. The 1kg and 0.5 kg test groups and the group with no added digestate experienced high mortality, suggesting over and under fertilization. This indicates that a small dose of digestate improves plant growth. Additionally, some plants were affected by pests such as leaf miners and giant African snails. In the hydroponic, 1kg of digestate tea was added to the system. Of the 9 plants, 1/3 survived the duration of the trial. Suspected causes of death for the hydroponic plants include potassium deficiency, lack of root oxygenation and limited light accessibility. Those that had the best placement responded positively to the digestate tea in a nutrient film hydroponic setting. However, to properly access the uses of digestate fertilizer in hydroponics further experimentation would be required.