Using the Effluent of Anaerobically Digested Tomatoes to Fertilize Plants

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Abstract:

Anaerobically digesting tomato culls recycles a waste product and provides renewable energy, also producing effluent which can be used to fertilize plants. Using the effluent to grow tomato plants would provide a source of fertilizer for tomato growers. Tomato culls were obtained and anaerobically digested to produce effluent. The effect of effluent was compared against commercial fertilizers. Plants receiving effluent of anaerobically digested tomato culls as fertilizer had comparable growth to plants receiving chemical and organic fertilizers.

Introduction:

As the world population approaches nine billion, food producers will be faced with increasing food production without an increase in field space and with decreasing soil quality (Smil 2001). An alternative fertilizer, such as biofertilizer made from the effluent of an anaerobic digester, could potentially reduce the need for synthetic fertilizers and reduce the energy used in the production process. Biofertilizer would also create a complete system within the anaerobic digestion cycle, which would create a use for the effluent in the anaerobic digestion process (Ulusoy *et al.* 2009). Finding a use for the biofertilizer produced from anaerobic digester effluent would be beneficial to both creating a sustainable cycle for the whole anaerobic digestion process as well as creating an alternative fertilizer that does not rely on the use of fossil fuels for its production (Liedl 2006).

Method:

Tomato culls were anaerobically digested to be used as a fertilizer treatment. Five treatments were used in this experiment: a synthetic NPK fertilizer (Miracle-Gro), a traditional organic fertilizer (fish emulsion), and three rates of anaerobically digested effluent (ADE) were tested. There was a sixth group with no fertilizer applied that served as a control group for this experiment. Three sweet pepper plants per group were tested. The height of each plant was measured every third day and the number of leaves were counted.

Results

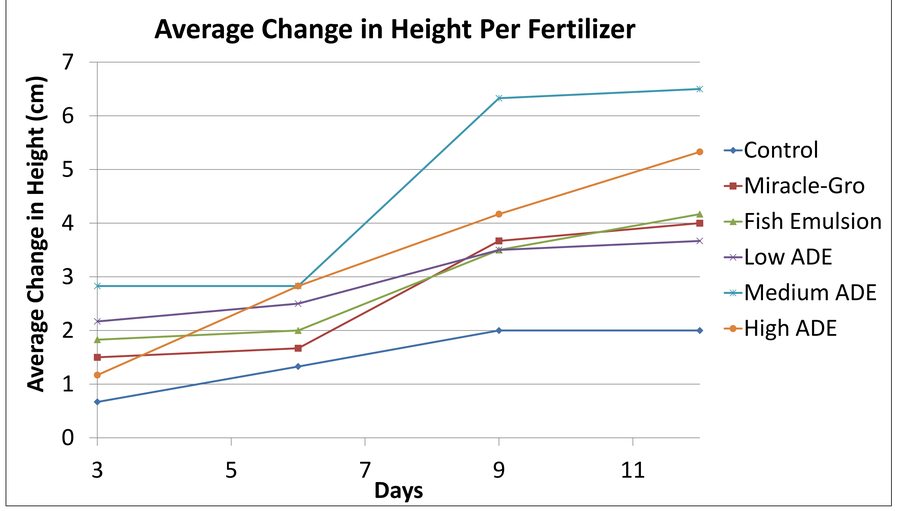

Figure 1: Average Change in Height Per Fertilizer

Figures 2-5. (Clockwise): Weighing tomatoes to be digested, adding fertilizer, adding effluent, layout of plants

Conclusion:

Medium and high ADE treatments appear to be the most effective fertilizers. The high effluent rate showed the most consistent growth over the twelve day period. The plants with Miracle-Gro and fish emulsion both yielded comparable results, with slightly less change in growth than the effluent treatments. Therefore, it was determined that anaerobically digested tomato effluent can be successfully utilized as a fertilizer.

Future Research:

- Use effluent from a digester fed tomato culls continuously for at least 6-8 weeks, with effluent being removed weekly.
- Increase the sample size with more plants.
- Compare plant growth using the total dry weight of the plant after the growth period ends
- Longer growth period will allow a more thorough assessment.
- Several applications of fertilizer treatments

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