

QUARTERLY PROGRESS REPORT

September 1, 2009 – November 30, 2009

PROJECT TITLE: Diverting Food Waste from Landfills

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COMPLETION DATE: August 31, 2010

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PROJECT WEBSITE ADDRESS: <http://biogas.ifas.ufl.edu/foodwaste>

OBJECTIVES:

1. Estimate food waste production throughout Florida.
2. Develop protocols for effective pretreatment of food waste for anaerobic digestion.
3. Construct a portable digester for professional and public outreach.

WORK ACCOMPLISHED DURING THIS REPORTING PERIOD:

Objective 1:

We will conduct work for this objective in future quarters. We will analyze available food waste collection data in the state by working with county recycling coordinators to determine how the reported numbers are estimated. We will also conduct food waste audits at different local businesses to estimate food waste generation by sector type (i.e. grocery stores, restaurants, etc.).

Objective 2:

We conducted preliminary enzymatic pretreatment studies, as follows:

1. We compared treating food with variable doses of bacteria/enzyme mixture to blending with a commercial blender. We assessed soluble chemical oxygen demand (SCOD), a measure of solubilized organic matter, over three days to determine the solubilization kinetics of the food waste. All samples showed an increase of SCOD over the course of the experiment. The samples with the bacteria/enzyme mixture showed an overall higher SCOD than the blended or control samples; however, the rate of increase over the three days was comparable among all samples.
2. We compared the bacteria/enzyme mixture to an enzyme cocktail. We conducted this experiment to see the effect of different enzyme treatments on food waste solubilization. The enzyme dosages were lower than the first experiment in order to simulate a more practical dosage of enzymes (in terms of cost). As with the first experiment, SCOD was measured across three days. Results indicated that the enzyme cocktail had a higher rate of solubilization than the control or bacteria/enzyme treatment. We will conduct further analysis of these two enzyme treatments in order to better understand the enzyme dynamics.

Future pretreatment work will include comparing different methods of grinding/blending to determine the solubilization kinetics of these mechanical pretreatment methods in order to discover an optimum technique for increasing food waste solubilization. We will conduct further enzyme studies including using isolated enzyme and other enzyme cocktails. Once solubilization methods have been examined, we will conduct anaerobic digestion studies on the pretreated food waste to determine the effects of pretreatment on the kinetics of methane production.

Objective 3:

We met with the engineer, who will be constructing the portable digester, in order to discuss design parameters. The scope of work and purchasing order were submitted to the university. We will conduct further meetings with the engineer to finalize the design. The design of the portable digester will incorporate pretreatment recommendations developed in objective 2.

INFORMATION DISSEMINATION ACTIVITIES:

- Ryan Graunke, graduate student, presented a poster at the *2009 Soil and Water Science Department Research Forum* at the University of Florida on September 11, 2009. The poster was entitled “Pre-treatment of Food Waste for Anaerobic Digestion”. The forum is an annual event held by the Soil and Water Science Department to showcase student research. It is attended by faculty, staff, administrators, students, and the general public. Ryan presented his preliminary experiments on the pretreatment of food waste to judges and interested individuals.
- We gave a presentation entitled “Anaerobic Digestion: Sustainable Energy and Nutrients from Food Waste” at the *2009 Florida Campus and Community Sustainability Conference* at the University of South Florida on October 8, 2009. This is an annual conference that discusses various aspects of sustainability throughout Florida. It is attended by individuals from universities, government, businesses, and the community. The presentation was part of a food, agriculture, and gardening session. The audience showed much interest in the project, and several individuals indicated that they would be interested in using anaerobic digestion in their own pursuits.
- A small food waste digester was brought to the *Agricultural Enterprise Workshop for North Florida* in Live Oak on November 5, 2009. We hosted a session to discuss on-farm applications of biogas including food waste, and demonstrated our food waste digester.
- Two tours of the laboratory facilities, including our small food waste digester, were given to University of Florida undergraduate classes. The classes were an environmental science class on October 14th and an organic crop production class on October 28th. Both classes contained between 30 and 40 students. By giving tours to undergraduate classes we hope to stimulate interest among the student body for the potential of food waste digestion in Florida.

TAG MEETING: November 19, 2009 – University of Florida, Gainesville, FL.