QUARTERLY PROGRESS REPORT

December 1, 2009 – February 28, 2010

PROJECT TITLE: Diverting Food Waste from Landfills

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COMPLETION DATE: August 31, 2010 **PHONE NUMBER:** (352) 392-8699

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:
Work for this objective will be conducted in future quarters. Discussions within the laboratory have focused on finding ideal locations to conduct food waste audits. One possible location will be local grade schools. The relatively controlled environment of a school cafeteria will facilitate the waste audit. Working with schools could potentially lead to an on-site anaerobic digester at the school. This will also be an important public outreach activity.

Objective 2:
Pretreatment work in this quarter focused on examining mechanical pretreatment methods. Four pretreatment methods were initially examined; the four mechanisms used were a blender, a food processor, a meat grinder, and a laboratory homogenizer. These were compared to a control of whole food waste comparably sized to what is produced on-site at restaurants. Food waste used in these studies was a synthetic food waste, composed of bread, cheese, beans, potato, broccoli, and apple.

From visual inspection, the blender showed the greatest particle size reduction. However, soluble chemical oxygen demand (SCOD) and pH over the course of seven days showed similar changes among all treatments. All treatments showed greater SCOD and lower pH than the control. Immediate pH in all treatments was acidic as organic acids in the food waste became solubilized. Managing the pH to maintain neutrality will be of particular focus in future studies.

An in-sink food waste disposal was also used for grinding food waste. Particle size reduction was comparable to pretreatment with the blender. The disposal had the advantage of a much higher through-put than any other pretreatment method and required minimal water compared to

the blender. Based on these findings, an in-sink disposal has been incorporated into the design of the portable digester.

Future studies will utilize the portable digester as well as scale models of the digester to examine the dynamics of solid and solubilized food waste within the digester and the effects on pH. This will help to determine optimum retention time and loading rate for operating the digester.

Objective 3:
Further meetings were held with the engineer to finalize the portable digester design. A small model was developed to illustrate the design. The digester will be constructed of plywood and fiberglass for low cost and maximum portability. Pretreatment on the trailer will include an in-sink food disposal with effluent recycling. The design includes media for biomass immobilization in order to increase substrate to biomass contact and allow a shorter retention time.

INFORMATION DISSEMINATION ACTIVITIES:

- Dr. Wilkie delivered a presentation entitled "Anaerobic Digestion of Organics" at the *Florida Department of Environmental Protection and Southern Waste Information Exchange (SWIX) Food Waste Recycling and Composting Workshop* on December 9 in Orlando.

- Ryan Graunke volunteered at the *US Composting Council's Annual Conference and Trade Show* on January 24-27 in Orlando. Presentations at the conference included discussions of successful and developing food waste diversion programs throughout the country. This is a potential conference at which to present this project next year.

- Tours of our laboratory were given to two UF undergraduate environmental science classes (EES 3000L) on February 9 and 11. Each class consisted of about 15 students. Class tours are an integral part of sharing information on activities at the laboratory and on this project with fellow students.

- On February 10, a group of UF public health researchers toured our laboratory and learned about the opportunities of small-scale anaerobic digestion. This group is conducting work to bring sustainable development to Haiti. Anaerobic digestion has significant benefits for developing countries where availability of energy and nutrients is limited and waste disposal presents severe public health and environmental problems.

- On February 21, a group of Haitian natives worked with laboratory members to learn about the anaerobic digestion process and construct a small digester to bring back to South Florida for their own experiments. They will be working with communities in Haiti to digest agricultural waste, such as sugarcane bagasse.

- Students from the laboratory collected food waste from a Green Team Captains meeting held by the UF Office of Sustainability on February 17. Catered events and meetings are held frequently at the University and produce a substantial amount of food waste.

Collecting the food waste from these meetings helps create awareness of this often-ignored source of food waste.

- Ryan Graunke and Scott Edmundson, both graduate students at the laboratory, participated in the *Annual Education Fair* at Newberry Elementary School. The fair consisted of several sessions through which classes rotated. They brought a small food waste digester and food waste grinder for demonstration. By demonstrating to young children the benefits of food waste diversion, we are teaching the future generation that there are sustainable alternatives to business-as-usual.

TAG MEETING: February 15, 2010 – University of Florida, Gainesville, FL.