

QUARTERLY PROGRESS REPORT

September 1, 2010 – November 30, 2010

PROJECT TITLE: Diverting Food Waste from Landfills

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OBJECTIVES:

1. Continue lab-scale experiments to optimize food waste digestion.
2. Conduct food waste audits at local schools.
3. Demonstrate anaerobic digestion at local schools.

WORK ACCOMPLISHED DURING THIS REPORTING PERIOD:

Objective 1:

Pretreatment experiments are nearing completion. Experimental protocols have been developed, and current experiments are testing solubilization of food waste with different particle sizes and different pretreatment methods. These experiments elucidate the short-term solubility of food waste with and without pretreatment in a simulated anaerobic digester environment. The current results are promising, with pretreated food waste reaching 60-70% solubilization within 6 hours. This was achieved through using a meat grinder with a 0.5 cm-hole plate and using an enzyme cocktail to simulate enzymes found in an anaerobic digester. These results are being compared with using a meat grinder with 1.0 cm-hole plate, an in-sink disposal, and hand-chopped pieces (to simulate no pretreatment). Our initial conclusions are that mechanical pretreatment increases substrate availability for native microbes and enzymes during anaerobic digestion. This will, in theory, facilitate the overall digestion of food waste and increase methane generation rates.

To study the full impact of pretreatment on anaerobic digestion and methane generation, biochemical methane potential (BMP) assays will be conducted to measure the rate and extent of methane production from food waste, with and without pretreatment. These assays will test whether increases in solubilization kinetics result in corresponding increases in methane generation kinetics.

Objective 2:

The focus during this quarter has been conducting waste audits at local schools and restaurants. The purpose of these audits is to better understand food waste production across different sectors of the economy and compare them with data from other waste audits. This will help us to gain clarity on the full scope of the amount of food waste that is sent to landfills in Florida.

We selected three local schools in order to represent a variety of school types. The three schools were Oak Hall Academy, J.J. Finley Elementary, and Loften High School. Oak Hall is a private K-12 school which does not have a full-service cafeteria; rather, lunch is provided by the students or catered with box lunches from various restaurants. During the audit, food waste was only collected from the lunch room for the middle (grades 6-8) and upper (grades 9-12) schools, representing 355 students. J.J. Finley Elementary School is a public elementary school (grades K-5) and was the largest school that we audited, with 436 students. They have a full-service cafeteria and the majority of students received lunch from the cafeteria rather than bringing lunch from home. Breakfast was also served; however, the food waste from breakfast was not significant. Kitchen waste was not collected from J.J. Finley, as we were informed by the staff that there was virtually no food waste from the kitchen. Loften High School is a smaller public high school (with 271 students) that houses the Professional Academy Magnet, a vocational/technical program. Loften also has a full-service cafeteria that served lunch and breakfast but, as with J.J. Finley, breakfast was not a significant source of food waste. Kitchen waste was able to be audited from Loften. The duration of each waste audit was as follows: 5 days for Oak Hall, 9 days for J.J. Finley, and 10 days for Loften. The waste audits were performed by collecting all cafeteria waste and then sorting and categorizing at our laboratory.

Three different types of restaurant were also selected for waste audits: Rolls ‘n Bowls, Satchel’s Pizza, and The Top. Rolls ‘n Bowls is a sushi/pan-Asian, quick-serve restaurant. Satchel’s Pizza is full-service pizza restaurant. The Top is a full-service restaurant serving a variety of food. Each restaurant waste audit was performed for 2 weeks, and consisted of both dining and kitchen waste (except Rolls ‘n Bowls where only kitchen waste was audited). For the kitchen waste audits, food waste was source-separated by the staff in the kitchen. Dining waste consisted of all waste removed from the tables. It was then brought to our laboratory and sorted.

Objective 3:

We are currently in the process of starting up the portable, food waste anaerobic digester that was completed in the previous quarter. The portable digester will be used to demonstrate anaerobic digestion of food waste to students and staff at one or more local schools.

INFORMATION DISSEMINATION ACTIVITIES:

- We developed and printed a project brochure that we can distribute at conferences and events. We also developed a large project banner to use in project displays and exhibits.
- September 10, 2010
We presented a poster entitled “Energy and Nutrient Resources from Organic Wastes for Small Farms” at the *11th Annual Soil and Water Science Research Forum* in Gainesville, Florida. This forum provided an opportunity to share our research on diverting food waste from landfills with a large group (approximately 100) of faculty and students. Our presentation was framed to have relevance to their own research.
- October 8, 2010
We visited the facilities of Organic Dynamics, LLC in Pompano Beach. Organic Dynamics is a company that will be producing organic fertilizer from food waste. The

purpose of the visit was to share with the company the possibilities of obtaining bioenergy in addition to fertilizer from food waste through anaerobic digestion.

- October 19-21, 2010
We demonstrated the portable food waste digester as part of the IFAS exhibits at the *2010 Sunbelt Agricultural Exposition* in Moultrie, Georgia. At this 3-day event, we had the opportunity to share our research with hundreds of individuals. There was much interest in using food waste as a source of both energy and fertilizer, particularly among the agricultural community. The portable digester was important in demonstrating a functional-scale food waste digester.
- November 2 & 3, 2010
We gave laboratory tours to two classes in Environmental Sciences and Humanities Lab (EES 3000L). Each class consisted of 15 undergraduate students. The tours included demonstrations of food waste digestion in action and discussions of how food waste pertains to bioenergy and sustainability.
- November 19, 2010
We delivered a lecture to 25 undergraduate students in the Agriculture and Environmental Quality class (ALS 3133). The lecture consisted of discussion of food waste digestion, its benefits, and its role in the larger bioenergy and sustainability picture.