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Bioenergy School Fuels Summer for Student Interns

By Gabriel Espinosa and Stephen Matthews, 2007 Bioenergy School Interns

Exciting developments in experiential learning were taking place in the heat of the 2007 summer as a group of undergraduate students participated in the second annual UF/IFAS Bioenergy School.

The Bioenergy Summer School is an interactive research internship program that explores the concepts of bioenergy and sustainability and allows students to acquire an understanding of renewable energy through hands-on experience with a range of bioenergy projects. Sustainability topics such as waste management, climate change, agricultural dilemmas, and social awareness were incorporated into discussions led by the Bioenergy School founder, Dr. Wilkie, and a number of guest speakers. Funding for the Wilkie Summer School was provided by the Office of the IFAS Dean for Research, with additional support from SNRE. As students in the school, we gained first-hand experience with biogas, biodiesel, and bioethanol—the major players in the emerging field of bioenergy.

Bioenergy interns working with their biodigester (From left: Stephen Matthews and Gabriel Espinosa). *Photo courtesy of Ann Wilkie*

In order to bridge the gap between theory and practice, we conducted two group projects, as well as a series of individual projects. Our first group project was a waste audit of the daily Krishna lunch. We gathered all the waste produced from the popular vegetarian lunch at the Plaza of the Americas for one week and then sorted, documented, composted, and converted it into bioenergy. Collecting and sorting waste from up to 400 people a day can be messy, but we were unfazed. After collecting the waste, we inventoried all of the plates, forks, cups, and napkins, and weighed the food waste produced each day. The paper waste was composted, while food waste was fed into an anaerobic digester constructed from a 40-gallon barrel, to produce combustible biogas.

Not only can you generate bioenergy from wastes, but you can grow it! To understand the basic biology and science of bioenergy crops, we planted an Energy Garden consisting of test field plots of two oilseed crops, peanuts and sunflowers. Peanuts are

currently the main oilseed crop produced in the southeastern region and sunflowers were chosen for their high oil yield. Vegetable oil from oilseeds is used to produce biodiesel, a biological substitute for diesel fuel. To learn more about the production of biodiesel, we made biodiesel in the laboratory from an array of vegetable oils and visited a local biodiesel co-op that produces biodiesel from waste vegetable oil obtained from local restaurants.

The fixed-film anaerobic digester at the UF/IFAS Dairy Research Unit produces biogas from dairy manure. *Photo courtesy of Ann Wilkie*

To develop our personal interests, consistent with our educational backgrounds, our individual projects included growing a plot of our own food alongside the group biofuel crops. This facilitated our discussion about the food supply and the potential for conflict between food and fuel production. Other projects included the cultivation of *Jatropha curcas*, conversion of biosolids into biogas, and design and operation of biodigesters.

To see biogas production first-hand, we traveled to the IFAS Dairy Research Unit (DRU) in Hague, Florida, where we saw flushed dairy manure used as a feedstock for biogas production in Dr. Wilkie's fixed-film anaerobic digester. We visited the UF motorpool to see the fleet-vehicle fueling station for E85 ethanol and B20 biodiesel. We also traveled to two major bioenergy conferences: the Florida Farm to Fuel Summit in St. Petersburg and the Southeastern Bioenergy Conference at the University of Georgia's Tifton campus. At the conferences, we interacted with bioenergy researchers and policy makers as they met to discuss the technology and economics of biofuel production processes, as well as future plans for bioenergy and biorefineries in Florida and the bioenergy potential for the southeast region.

We exited the program with a new-found understanding of the depth and breadth of sustainability concepts and the field of bioenergy, and an appreciation for the ethical considerations involved with large and small-scale bioenergy production. The summer school brought together students of different academic and cultural backgrounds and taught us how to be better stewards of the environment. Empowered with this newfound knowledge, we look forward with confidence to a renewable future.

For information regarding the 2008 UF/IFAS Bioenergy Research Summer Internship Program, contact Dr. Wilkie in the Soil and Water Science Department:
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For more information regarding the 2007 experience, visit the Bioenergy Internship website **http://biogas.ifas.ufl.edu/Internship** or contact Gabriel Espinosa and Stephen Matthews:

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