

DEPARTMENT OF



AGRICULTURAL AND BIOLOGICAL ENGINEERING



Newsletter

Spring-Summer 2007

Engineering...Managing...Packaging

The Face of Change...Dorota Haman Takes the Helm

What do Dorota Haman and the Gator basketball team have in common?

They both made history in 2007!

Back-to-back National Championships for the team.

Back-to-back female Department Chairs for the Department of Agricultural and Biological Engineering (ABE)...and still the only women to ever lead an ABE department in the U.S.!

As Dorota Haman takes over from Wendy Graham, who was selected one year ago to head up the UF Water Institute, she reflects on the changes in the ABE department over the years.

"When I was hired in 1985, I was the only female faculty member in the department. Since then, the number of faculty has increased and it now includes six women. The direction of our research has evolved to include biological engineering, packaging science, and agricultural management. The changes in our faculty are a direct reflection of the changes in research focus," she explained.

Haman's personal area of expertise is irrigation and water management, and this is an area of critical need as Florida's population grows. As she becomes Chair, her faculty position will be replaced to continue this important area of research. She is not the only faculty in this field - research is active in the area of both landscape and agricultural irrigation,



and many opportunities are available to ABE students interested in this area. The department has seen significant growth in

the number of students interested in biological engineering and new faculty hires will enable the department to expand teaching and research in several related areas.

"We are already involved in the development of biofuel programs and have just hired a faculty member who specializes in nanotechnology. We are also hiring a faculty member who will focus on biosensors," said Haman. "Another important area is climate research, and we have a new program in that area. There's no question that the agricultural industry will be impacted by increased climate variability and we are working to prepare growers to deal with those challenges."

In addition to a growing enrollment in the undergraduate programs, the department has experienced a significant increase in graduate students, from 43 in 2000 to 84 in 2006. Haman notes that there are many reasons that students should choose ABE for their advanced studies.

"UF is an exceptional school, and the ABE department bridges two excellent colleges with programs in both the College of Engineering and the College

of Agricultural and Life Sciences. We have young, energetic faculty with well funded research projects, and those faculty are involved in exciting new areas of research, including plant-space biology, bioreactors, biofuels, nanotechnology, precision agriculture, robotics, remote sensing, and packaging science. We also have one of the best programs in land and water resources."

As she begins her leadership of the department, Haman says her goal is to facilitate the work of the faculty to make this the best ABE department in the nation.

"My goal is to do all I can to ensure that the Department of Agricultural and Biological Engineering retains and improves its reputation among the best and most recognized departments in the country and internationally," said Haman. "As Chair, I will strive to create an atmosphere where good ideas can thrive and will work to remove impediments to achieving program goals of faculty. I also plan to work with faculty towards increasing graduate enrolment, improve graduate student placement, and assure that our graduates are ready to function in a global economy".

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Fueling the Future



Sugar beets aren't a crop common to Florida...so what is a lab in the UF ABE Department doing with mounds of sugar beet tailings...the waste product generated by American Crystal Sugar in Minnesota?

Creating energy!

Working under a grant from the Xcel Energy Renewable Development fund, Pratap Pullammanappallil and his colleagues at the University of Florida are turning sugar beet waste products into fuel.



Pullammanappallil, Arthur Teixeira and their colleagues thought that UF's patented SEBAC technology, developed by David Chynoweth in the Department of Agricultural and Biological Engineering, would provide the solution to the mountain of wastes generated each day. Using SEBAC, sequential batch anaerobic composting, a waste stream is encapsulated, oxygen is removed and microorganisms are introduced that break down the wastes.

Much to their surprise, the sugar beet tailings did not react the same way as municipal wastes.

"What we found is that each waste stream is different," Pullammanappallil said. "So we came back to the lab, and we ended up doing new, original research."

Not only did the researchers adapt SEBAC to the sugar beet tailings, they also improved the process, greatly reducing the time necessary to break down the wastes, resulting in economic benefits as well.

The SEBAC II process produces a biogas that consists of 60 percent methane. The biogas can substitute for natural gas and offset the plant's natural gas fuel costs. Since it can be generated and used on-site, it buffers the plant from fluctuations in energy costs in an uncertain energy market.

"They can save 25 to 30 percent on their natural gas costs, while also saving on their disposal costs," Pullammanappallil said. "We estimate the savings to be \$1 million a year at each facility."

SEBAC and other renewable energy projects are in

demand because of a push to reduce U.S. dependence on imported petroleum. Such projects also draw federal support because waste-to-energy projects are needed for space exploration.

"This is a renewable source of energy, and in this case, it comes from something that was even being thrown away."

Speaking of wastes, what could be better than turning old kitchen grease into fuel for your car? That's exactly what Doug Renk, an ABE research assistant and biodiesel production facility manager is doing every day.

Renk is collecting discarded vegetable oil from restaurants on and around the campus and brewing it into biodiesel for use in the campus fleet. He hopes one day to have a self-sufficient unit that will turn a campus waste stream into a source of energy.

Renk's biodiesel facility gets 500 gallons of vegetable oil from campus restaurants every month, supplementing it with wastes from local restaurants.

"Until there's a use for a product, it's considered waste," Renk said. "Years ago, restaurants could not even give away their used vegetable oil. Now, people are offering to buy it from them."

The UF physical plant has pledged to buy 1,600 gallons of biodiesel monthly from the Agricultural and Biological Engineering Department,

About one gallon of used vegetable oil produces about one gallon of biodiesel in a 1-to-1 ratio according to Renk. So far, the department has had trouble keeping up with demand using only grease from campus, and moving toward self-sufficiency will take time.

"There simply isn't enough vegetable oil in Gainesville to wean the fleet off petroleum," notes Renk.

He sees the biodiesel facility becoming a learning center where students can come and learn to make biodiesel themselves.

"I am hoping this is something that can be left to UF as an enduring process," he said.

Seeds in Space



The long wait for the blastoff of the space shuttle Discovery finally paid off for Dr. Melanie Correll, as she witnessed the launch of her first experiment in space.

Correll, an assistant professor in the Agricultural and Biological Engineering (ABE) Department, is part of a collaborative effort between several universities (Miami University, Indiana University, University of Florida) and two space agencies, NASA (Ames) and ESA (European Space Agency) which will study how plants grow and respond to varying levels of light and gravitational accelerations.



The experiment entitled TROPI (for gravitropism and phototropism) consists of sending up dry seeds of *Arabidopsis thaliana* (thale cress) in small cassettes. The cassettes were designed by NASA (Ames) along with the team from Miami including Correll. The cassettes will be placed inside the European Modular Cultivation System (EMCS), a facility developed by the European Space Agency for biological investigations in microgravity. The EMCS is a large incubator that can control gas composition, lighting, humidity, and temperature.

According to Correll, "This truly was an international experiment and its success is due to all the hard work that people from around the world contributed to the project (NASA, ESA, N-USOC, Miami University, Indiana University, University of Florida)."

On July 4th and Sept 9th, 2006 a total of 1680 seeds from *Arabidopsis* went up to space on Space Transport System (STS) 121 and STS 115, respectively. During the month of November and December three, 5 day experiments were performed on these seedlings in an incubator facility for scientific studies called the European Modular Cultivation System (EMCS) on the International Space Station.

The experiments began when seeds were germinated by being watered remotely from ground support at the Norwegian User Support and Operations Centre (N-USOC) in Trondheim, Norway. The experiments were performed to study the interacting effects of light and gravity on plant growth.

The seeds were grown for 5 to 6 days and videotaped to determine germination rates, growth rates and to monitor curvature in response to red or blue wavelengths of light at different levels of gravitational acceleration. At the end of the three experiments, astronauts Thomas Reiter or Mike Lopez-Alegria removed the seed cassettes and placed the plants in the Minus Eighty Laboratory Freezer (MELFI).

On Dec 22, 2006 STS 116 returned to Kennedy Space Center with half of the frozen plants and several of the video tapes to be analyzed further in the near future. Dr. Correll spent her holiday break in Norway at N-USOC as the scientific ground support to monitor and make real-time changes to the timeline of the last of the experiments. The remainder of the seedlings from this experiment are still frozen on the International Space Station and are awaiting their trip home.

"I really enjoyed working in Norway on this project," said Correll. "Currently, I have hundreds of frozen seedlings in my lab at UF that are ready to be analyzed for their gene expression. Preliminary data from downlinked images shows that seeds germinated and that the seedlings were responding to light signals."

Currently Rhea Pereira, an undergraduate student in the ABE department, is working on determining the best methods to extract genetic material from the plants. This will ensure that the valuable material from space will be used in the most effective manner.

"We hope to identify the differences in gene regulation for plants grown in a spaceflight environment compared to plants grown here on Earth and to learn, through our video tape images, how light and gravity are involved in regulating plant growth," explained Correll. "A ground control will be performed this year to compare experimental results between Earth- and space-grown plants."

Results will also help NASA scientists to grow plants for a plant-based life support system for long-term space missions. Plants will be needed for food, water recycling, and as a possible oxygen source on long-term space missions.

ABE Welcomes...

Visitors from Earth!

A unique student exchange program will pair undergraduate students from EARTH University, a private international undergraduate institution in Costa Rica, with graduate students in the University of Florida Agricultural and Biological Engineering Department to develop and ultimately design a project that ideally will apply techniques learned at UF to a problem relevant to Costa Rica.

Student interns from EARTH will be matched with a UF graduate student and project during the Fall semester at UF. The graduate student will prepare and coach the EARTH student in techniques and technologies that might be relevant for application in Costa Rica.

Upon returning to Costa Rica for the Spring semester, the EARTH students will develop a short proposal using the resources available on EARTH's main campus in the Caribbean region, or at a remote campus ("La Flor"), located on the Pacific coast. EARTH resources will be complemented with additional instrumentation or materials that UF would provide, in communication with the UF graduate student and advising faculty.

During the summer the UF graduate student mentors will travel to Costa Rica to team up with the EARTH students to develop the project under the advisors' supervision. The project results will be used by the EARTH student to write up and defend his or her senior project, and by the UF graduate student to develop a research/application component to the thesis or dissertation.

A web-based seminar will follow during the Fall semester to evaluate the program with participation of the students, advisors and administrators.

Associate Professors Rafael Muñoz-Carpena and Michael Dukes will coordinate the program in the UF Agricultural and Biological Engineering Department, pairing the EARTH interns with appropriate graduate students. The emphasis will be on providing students from both institutions with experience in resolving real-world problems.

"I believe our exchange idea fits EARTH and UF programs and objectives like a glove and will be straight forward to implement," added Muñoz-Carpena, a long time friend and



visitor of EARTH University. "We see this new program as a natural expansion of what we started more than 5 years ago that will represent a unique opportunity for international training of our UF graduate students".

He and Bruce Schaffer at the Tropical Research and Education Center hosted the first EARTH interns at UF more than 5 years ago. This initial collaboration with EARTH has now expanded and UF/IFAS regularly receives 3 to 4 students every year during the Fall semester. These students are placed at different RECs and campus departments.



"We are aware of the needs in Costa Rica and will plan to tailor the training of the interns toward solutions for problems in the local environment," notes Dukes. "We understand the EARTH/Central American requirement for practical problem solving and will emphasize that aspect in our collaboration."

According to EARTH Provost Daniel Sherrard, "The focus of our internship program is largely on exposing our students to the 'real world' of agriculture, agribusiness, rural development, etc. The possibility of a student beginning a project in his or her internship and then continuing during their fourth year, as well as the creation of a team with a UF graduate student is a great innovation."

"We appreciate the creativity and good ideas relative to internationalization of graduate education", stated David Sammons, Director of IFAS International Programs. His office is providing \$5000 in startup funds for the collaboration.

EARTH is a private, international non-profit university dedicated to education in the agricultural sciences and natural resources in order to contribute to sustainable development in the tropics by seeking a balance between agricultural production and environmental preservation.

EARTH's campus is located in the Atlantic region of Costa Rica, 15 km from the city of Guapiles and at base of the Turrialba Volcano. The campus is surrounded by a tropical rain forest with diverse plant, animal and bird life. Nearby plantations produce bananas and other tropical crops. More information can be found at <http://www.earth.ac.cr/ing/index.php>.



Packaging Provisions... Food for the Frontlines

Keeping food fresh as it makes its way to your table doesn't pose much of a problem these days... unless your table is thousands of miles away in a hostile environment.

That's the challenge for the U.S. Military, but a solution may be as close as the UF/IFAS Center for Distribution and Retailing, which was established for exactly this type of multidisciplinary approach to solving complex problems.

CFDR Co-Directors Jean-Pierre Emond and Jeffrey Brecht recently presented their proposal to Florida Representative Cliff Stearns during a tour of the CFDR lab which is located in the ABE Department.

The proposal involves the use of wireless temperature sensors, remote monitoring, algorithms, and diagnostics, so the shelf life of rations can be automatically calculated using web-based computer models to expedite the flow of rations that have the least remaining shelf life.

"We'll also use similar technologies to evaluate the current efficiency of refrigerated cargo containers that are used to transport fresh foods," explains Emond. "These foods have a great, positive effect on soldier morale. Monitoring and mapping the refrigeration capabilities of this equipment can provide valuable data for early design and development of equipment improvements."

If funded, the project would be carried out at UF in cooperation with the U.S. Army Natick Soldier Systems Center and in collaboration with the University of Alaska, Anchorage.

Improving the efficiency of the DoD food supply chain and enhancing food quality and safety for our troops requires a combined effort from experts in many disciplines such as transportation, logistics, packaging, food science, postharvest science, food and resources economics, engineering and mathematical modeling.

"These efforts will greatly enhance the storage and distribution of combat rations for the DoD and perishable/semi-perishable foods for both the DoD and the commercial industry and the nation's food supply," notes Brecht. "Both soldiers and commercial consumers will be assured the highest quality and safest products at a more affordable cost because of the reduction in product waste."

Sustainable Solutions

Measuring garbage piles doesn't seem like the way to spend your time visiting another country, but for several ABE students and faculty involved in Engineers Without Borders (EWB), it was an eye opening experience.

Kratovo, Macedonia suffers from unemployment of nearly half of its citizens and lacks a sustainable system to manage its solid waste. As a result, solid waste is routinely disposed of in rivers running through the center of the city. Wild dumps are frequent in neighborhoods and the current landfill is not properly designed or maintained. There are serious concerns for the environment and health impacts on the community.

The group performed an initial assessment in May 2006, then returned in December to gather more data. During the trip, they took GPS data of the town, landfill, and collection routes to incorporate in an interactive GIS map. They are currently writing a feasibility study for a recycling plan complete with bins created in Kratovo and a collection station to store process and store PET bottles. The group is also working with Macedonian teachers and students to create an education plan to teach everyone about the benefits of recycling and a healthy environment. They are applying for several grants to fund the recycling program.

EWB also works with Sustainable Cambodia, a Gainesville based NGO working to promote sustainable development of rural Cambodian villages. In 2006 they asked EWB to start a project to design appropriate technologies capable of being manufactured in the country. These technologies are centered on increasing educational opportunities by reducing the manual workload on Cambodian children. Currently the project is focused on three areas: treadle pumps, biogas and plastics recycling. An assessment trip to implement these technologies as well as educate local communities on their manufacture and use is planned in the summer.

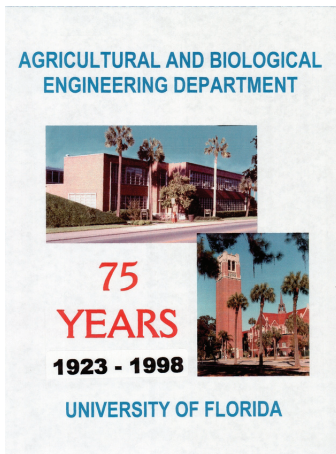


EWB has also shown involvement in local projects. Since December, they have been helping to construct a geodesic dome downtown that will be a soup kitchen and place of rest for Gainesville's homeless population. In addition, they are creating an interactive education program on recycling and sustainability to take to local schools.

A Walk Thru Time

To commemorate the 75th Anniversary of the Agricultural and Biological Engineering Department (1923-1998), a document was created to provide a historical record for alumni and friends. The complete scrapbook is now available thru the University of Florida's digital library and contains a look at the department's origin, contributions, faculty, curriculum and photographs.

You can link to the scrapbook from our website at: <http://www.uflib.ufl.edu/digital/temporary/AgEngAnniversary.pdf>



For more information about the scrapbook contact Dr. Allen Overman at 352-339-4568.



New Energy in AOM

Just as summer gas prices are revving up, a new course in Agricultural Operations Management (AOM) will explore the truth, and the myths, behind global energy.

Dr. Wendell Porter will introduce students to "**Global Sustainable Energy: Past, Present and Future**" in the Summer B term.

The course will help students gain insight into an industry that provides the foundation for modern civilization, including modern agriculture.

"Our curriculum will explore energy sources of the past, present and future, investigate the costs and consider new energy sources. I want to engage students in a discussion of the problems and solutions of energy issues across the globe," said Porter.

The course will be open to all undergraduate students at UF.

ABE Abroad!

The UF Department of Agricultural and Biological Engineering, in partnership with Fachhochschule(FH) Osnabrück—University of Applied Sciences, offers a 6-week study abroad program to Osnabrück, Germany. During the summer of 2006, thirteen engineering students, including 7 ABE undergraduates took advantage of the exceptional opportunity. Each of them earned 6 credits, 3 in Engineering Statistics and 3 in Design of Experiments. In addition, they learned about and visited several engineering technologies in the vicinity of Osnabrück, to include the Karman automobile manufacturing plant in Osnabrück that produces the Chrysler Crossfire and the CLK model for Mercedes.

Travel opportunities included Brussels, Berlin and Amsterdam.



ABE students involved in the 2006 program were Melissa Crouch, Michael Griffin, Nathan Johnson, Tiffany Maxwell, Lindsey Nolan, Rachel Speisman and Erin Trowbridge. Five students are registered for the 2007 trip.

Grad Student Recruitment Weekend

It's not unusual for undergraduate students to visit universities that they are considering for their graduate program, but it isn't every day that the university picks up the tab! That's why ABE Graduate Student Recruitment Weekend is such an incredible opportunity for highly qualified students across the country.

Each year, in partnership with the UF College of Engineering, the ABE department invites students to apply for an all-expense paid trip to UF in February where they meet one-on-one with faculty in their areas of interest, tour the department and the UF campus, socialize with current ABE graduate students and find out everything they want to know about the ABE graduate program.

In 2007 the department hosted eight students from outside of UF, in addition to four undergraduates currently in ABE at UF. The two days were packed with activities and meetings and visiting students seemed happy with their experience.

"I was really impressed, and almost overwhelmed by the amount of expertise and energy the department faculty members have," noted participant Tracy Kerchhof in a follow-up survey. "This weekend really gave me a lot to think about."

The department welcomes applications for the February 2008 event, so spread the word! Students can contact rsnyder@ufl.edu for information.



Accomplishments

2006 ASABE Award Winners

Dr. Kenneth Campbell is the recipient of the 2006 Hancor Soil and Water Engineering Award for his expertise and accomplishments in the area of soil and water engineering through research, teaching, technology transfer and service activities.



Dr. Robert Peart was awarded the 2006 Cyrus Hall McCormick-Jerome Increase Case Gold Medal Award for exceptional and meritorius engineering achievements. He was honored for his commitment and contributions to teaching and research in the application of computer simulation technology that has addressed a wide range of complex agricultural problems.



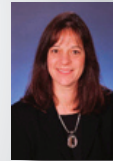
Dr. Fedro Zazueta was awarded the ASABE Outstanding Leadership Award for his efforts and successes promoting the use of information technology in agriculture. He was also selected as the 2006 Florida Chapter of Gamma Sigma Delta nominee for the International GSD Distinguished Service to Agriculture Award.



Bernard Cardenas-Lailhacar was awarded second place for his M.S. Graduate Student Research Paper. The award recognizes excellence in the conduct and presentation of research to build the knowledge based needed by engineers who design equipment, facilities, and processes for the sustainable operation of a biological system.



Dr. Wendy Graham received the 2006 Distinguished Achievement Award from the ASABE Florida Section, which is awarded to an individual who is active in the state section and in the profession of Agricultural Engineering. She has been a member of ASABE for 16 years



Dr. Lawrance Shaw received the 2006 Special Recognition Award from the ASABE Florida Section, which is presented to an individual who is a leader in the Agricultural Engineering profession. The award recognizes Dr. Shaw's outstanding representation of the profession through his work.



Dr. Direlle Baird received recognition from the Florida Section for 40 year membership in ASABE.



Kevin Wright received the 2006 Outstanding Student Award from the ASABE Florida Section. Kevin is a recent graduate of the ABE program and is currently employed by the SRWMD.



Irmak Ayse, James W. Jones and Shirkant Jagtap were presented with a 2006 Honorable Mention Paper Award at the annual ASABE meeting. The paper was titled "Evaluation of the CROPGRO-Soybean Model for Assessing Climate Impacts on Regional Soybean Yields". ASABE Paper Awards are selected annually from papers of engineering merit published during the prior year in ASABE publications.

Other Notable Awards:

Dr. Jim Jones was selected as a recipient of the 2006 Michael P. Malone International Leadership Award by The National Association of State Universities and Land Grant Colleges (NASULGC) Commission on International Programs. Dr. Jones was also named a Fellow by the Soil Science Society of America (SSSA). The award is presented to members who have made outstanding contributions in their area of specialization.



Dr. Sanjay Shukla was awarded the Dallas Townsend Extension Professional Enhancement Award. The award recognizes extension faculty with a term professorship for creative contributions and outreach programs. Candidates must have a distinguished current Extension program which places them among the leaders in their programming area.

Dr. Wendell Porter was selected as a 2006 Outstanding Educator in the College of Agricultural and Life Sciences. Dr. Porter was nominated by AOM student Roger Gayle. The award recognizes faculty whose support and guidance helped students accomplish their academic goals..



ABE accountant Mary Garvin received a 2006-07 Superior Accomplishment Award from the Institute of Food and Agricultural Sciences (IFAS).



Elsa Susana Sepúlveda Bustos, under an exchange program with the University of Florida, became the first graduate from the Doctoral Agricultural Engineering program at the University of Concepción, Chile. Ms. Sepúlveda, specializing in Water Resources in Agriculture, was not only the first woman to obtain the Ph.D. but also the first doctor in the discipline from a Chilean University.



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Just Browsing... ABE Website Evolves

It's no secret that the web has become the primary source of information for anyone under the age of 30 (and probably for many people over that age!). So it seemed more important than ever to make sure the Agricultural and Biological Engineering Department provided information in a user-friendly manner and that it stays up-to-date. We also updated our internet address to www.abe.ufl.edu.

In March the new ABE website debuted and feedback has been positive from students, faculty and staff. The site was organized with prospective students as the primary target audience, but contains information for current and former ABE stakeholders, including alumni profiles, internship information, student resumes, links to employers, links to UF website and links to this and past ABE newsletters.

We'd love to hear your reaction to the new site, and we'd also love to get updates on your current mailing and e-mail address. It's hard to keep up with all of our alumni, so help us out! Take a minute now and send an e-mail to Robin Snyder at rsnyder@ufl.edu and catch us up with where you're living and working. If you don't have e-mail access, then drop us a line or pick up the phone and we'll be happy to get that update from you. The address is at the top of this page, and you can call Robin or Mary Hall at 352-392-1864.

We look forward to hearing from you!



www.abe.ufl.edu