

▶ A NEW CLIMATE INSTITUTE WILL HELP FLORIDIANS MANAGE CLIMATE RISKS . . . . . 1



▶ RECENT ADVANCES IN BIOCHAR TECHNOLOGIES MAY PROVIDE BIOENERGY SOLUTIONS . . . 3



▶ ABE HOSTS ALTERNATIVE ENERGY WORKSHOPS FOR 4-H HIGH SCHOOL STUDENTS . . . . . 5

# agricultural *and* biological *engineering*

ENGINEERING - MANAGING - PACKAGING

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## Managing Climate Risks

For the last few months ABE Distinguished Professor Dr. James W. Jones has been focused on developing the new Florida Climate Institute. Dr. Keith Ingram and Dr. Clyde Fraisse of the ABE department are working with Dr. Jones, as well as other faculty in IFAS and other colleges at UF and Florida State University.

“Cooperation between the two universities brings together the different scientific disciplines needed to address the many complexities of using climate change information to make more sustainable decisions and policies that will benefit Florida and Floridians in the future,” explains Jones.

This institute will build on the successful research and extension program on climate risk management that Dr. Jones co-developed with faculty from other universities in Florida, Georgia, and Alabama.

“A major aim of the institute is to provide information that Floridians need to respond to changes in climate and climate variability. Changes in climate in Florida have been different than global trends, and those differences are critically important for developing appropriate responses to changes in our region,” notes Jones.

The main goal of the institute will be to serve as a focal point for research, education, and extension programs to build adaptive capacity and resilience in Florida’s diverse natural and managed systems. The institute will conduct research to quantify Florida’s historical climate trends, to create seasonal, decadal, and longer term climate forecasts and scenarios for Florida based on best scientific methods, and to engage stakeholders in research, extension and education programs.



## Chair’s Message...Dr. Dorota Z. Haman



Greetings to all of you...alumni, friends and all the readers of our newsletter. Despite economic difficulties that surround us, the Department is doing very well and it is still a great time to be a graduate of ABE. Most of the students graduating this year have received good job offers, or decided to continue their education in graduate or professional schools. Our enrollment is up, with the total number of undergraduate students at 338 this fall. We have 178 engineering, 36 packaging and 122 AOM undergraduate students. Our graduate student number is 108, up from 89 in 2008, with 68 of them in the Ph.D. program. Both ABE programs have been rated #7 in the country by the U.S. News and World Report in its 2009 rankings.

Our faculty brought almost \$4 million of new funding in the FY 2009 even under these difficult economic conditions. The new \$2 million cellulosic ethanol pilot plant, a part of the Center for Excellence of the Florida Institute for Sustainable Energy, was opened last October in a newly built addition to Rogers Hall. Our faculty, staff and students continue to be recognized at University, state and national levels for their good work and numerous contributions to the profession.

Overall, it has been a good year! On behalf of our entire ABE family, I want to thank you for your continuous dedicated support of the Department and wish you a very good academic year 2009-2010. Please stay in touch with us. If you have something to share or want to get involved in Department activities, please contact me (352-392-1864, dhaman@ufl.edu). I always enjoy hearing from you.

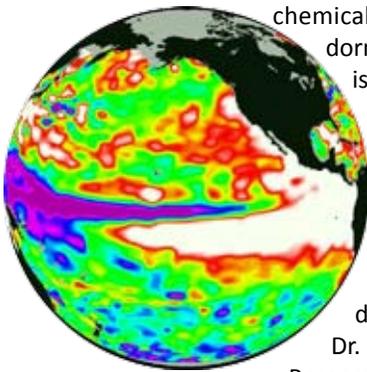
# AgroClimate

## Website continues to improve

The interactive website that farmers, growers and others rely on “continues to evolve”, notes Clyde Fraisse, a University of Florida assistant professor who helps coordinate the site.

Recent developments in AgroClimate include tools that allow growers to forecast the accumulation of growing degree-days and chill hours based on the current phase of the El Niño Southern Oscillation (ENSO) phase but also verify the current levels of accumulation at all stations belonging to the Florida Automated Weather Network (FAWN) operating in the state.

“This is a very important innovation since most weather networks track the accumulation of these variables but do not forecast them”, explains Fraisse. “With this information growers can decide in advance if they will need to apply chemical sprays that help break dormancy if insufficient chilling is predicted.”



Another exciting development is a tool that is being tested with strawberry growers to help them decide when to apply fungicides. This tool, developed in cooperation with

Dr. Natália Peres at the IFAS-Gulf Research and Education Center, was

tested during the last season and a grower reported reducing the number of applications by half without any effect on fruit quality or yield.

“Our research has confirmed that dry winters such as the one we had in 2008-2009, a La Niña winter, do not favor the development of diseases and growers can reduce costs and improve the quality by reducing the number of fungicide applications,” said Fraisse. “This winter may be different as the Pacific Ocean is now transitioning into the El Niño phase that normally brings wetter and cooler winter and spring seasons”, he said.

The development of El Niño could indeed have dramatic impacts on the climate of the Southeast for the remainder of 2009 as El Niño hinders hurricane development in the Atlantic basin and leads to less active seasons.

Forecast Summaries are also now available on the website for the previous month’s weather for Florida, Georgia and North Carolina. The reports include data such as average temperature and rainfall, summaries of extreme weather events, and weather impact on agricultural production and practices.

“ **The development of El Niño could have dramatic impacts on the climate of the Southeast** ”

The Agricultural and Biological Engineering Department is an active member of the Southeast Climate Consortium, a world premier institution for the application of climate sciences to help agricultural producers manage risks associated with seasonal climate variability and longer-term climate changes. Most products of the Southeast Climate Consortium are available through an on-line decision support system developed by ABE faculty in collaboration with other institutes in the Southeast. The Consortium also issues regular climate and agricultural outlooks through e-mail lists, publications, workshops, and training courses.

“Target audiences include growers’ associations, commodity associations, managers of agricultural and natural resources operations, and extension agents”, Fraisse said.

The AgroClimate web site is a coalition of six universities—Florida State University, University of Florida, University of Miami, University of Georgia, Auburn University and University of Alabama-Huntsville.



## NSF/IGERT Research

# Days in the Delta

## ABE graduate student does research in Africa

Ph.D student Anna Cathey didn’t waste any time getting started on her research when she entered the ABE program. She traveled to southern Africa during her first semester at the University of Florida to learn about regional water issues. During this trip she spent time in the Okavango Delta and with researchers from the University of Botswana.

Anna is an ABE graduate student under Dr. Rafael Muñoz-Carpena and Dr. Greg Kiker. She applies hydrological and ecological models



to guide management decisions in southern Africa and is funded through the NSF IGERT traineeship: Adaptive Management of Water, Wetlands, and Watersheds and also through a recent NASA grant: Land Use and Climate Change Program.

The Okavango Delta is a large inland delta situated on the edge of the Kalahari Desert in Botswana. The Delta receives an annual flood pulse of water from Angola, which is a much more humid area. This flood pulse brings water to the area during the dry season and is very important for wildlife as well as humans. Anna’s research project developed from the summer field course and her time spent in the Okavango Delta. Her dissertation involves integrating hydrological and ecological models with uncertainty and decision analysis techniques in the Okavango. She is working with modelers, hydrologists, ecologists, and managers to develop a tool that can be used to facilitate adaptive management decisions.

# BioChar

## Addressing Global Warming

Turning trash into treasure sounds like a fairy tale, but ABE assistant professor Bin Gao is working to make that story come true.

Biochar, also known as “agrichar” or “biomass-derived black carbon”, is a charcoal produced from carbon-rich material which has received increased attention recently because it may provide an immediate solution to global warming caused by emissions of carbon dioxide (CO<sub>2</sub>) and other greenhouse gases. Recent advances in biochar technologies makes it possible to turn some solid wastes (trash) into value-added biochar and bioenergy (treasure).



“Unlike most carbon-neutral biomass energy systems, biochar technology is carbon-negative,” says Gao.

In the natural carbon cycle, the plant withdraws carbon from the atmosphere to grow biomass through photosynthesis. After the plant dies, however, plant biomass decomposes rapidly and emits an equal amount of CO<sub>2</sub> back into the atmosphere, which is a carbon neutral process.



“Instead of allowing the plant to decompose, biochar technology can be used to sequester the carbon by converting plant biomass into a much more stable form called “biochar”, notes Gao. “It stops the emission of CO<sub>2</sub> back to the atmosphere and stores it in virtually permanent soil carbon pools, which is a carbon-negative process.”

Biochar technology not only produces sustainable bio-energy, it has the potential to store massive amounts of carbon in soils for hundreds to thousands of years, so land application of biochar has been proposed as a novel approach to establish a significant, long-term sink for atmospheric carbon dioxide in terrestrial ecosystems. In addition, it can also improve the soil quality and enhance crop productivity.

**Unlike most carbon-neutral biomass energy systems, biochar technology is carbon-negative**

# Bio-Fuels Lab Opens

With great fanfare the new cellulosic ethanol pilot plant in Rogers Hall was dedicated on October 10, 2008.

Dignitaries and guests were on hand for a first-hand look at the equipment and process which will convert the inedible parts of plants into fuel ethanol.



The pilot plant uses a conversion process developed by microbiologist Lonnie Ingram, director of the Florida Center for Renewable Chemicals and Fuels. Ingram developed genetically engineered bacteria that can break down the inedible portions of plant material.

The ABE Department will be adding a faculty member in the biofuels research area who will work in the pilot plant.

## ABE Alumnus Earns Recognition

# Dale Zimmerman receives Professional Engineer Award

The American Society of Agricultural and Biological Engineers has named ABE Alumnus Dale Zimmerman, PE, 2009 Professional Engineer of the Year in recognition of his outstanding contributions and service to clients, colleagues, students, and society as a design engineer and leader of an engineering consulting firm.



Zimmerman is president of Mock, Roos & Associates, Inc., a 54-year-old consulting engineering firm in West Palm Beach, Florida, and has served as the president since 1991. His firm’s engineering projects have included stormwater management, irrigation, water reuse, pump stations, potable water and wastewater systems and treatment, water wells, best management practices, animal waste management, water quality monitoring, geographic information systems (GIS), and roadways.

A 44-year member of ASABE, Zimmerman has provided leadership to various technical and professional engineering organizations. He has served in officer positions in the Florida Section and as a member of the Society’s Board of Directors and is a currently a Foundation Board Trustee.

# Two AOM students go the distance

## Fargo Bound

When duty calls students sometimes have to step outside their comfort zones...literally! Doug Renk is a research assistant who acquired industrial experience in Morehead Minnesota, right across the border from Fargo North Dakota.



That's where the ABE bio-process lab set up a large bioreactor that gasifies tons of sugar beet scraps to demonstrate the effectiveness of converting this waste to renewable natural gas.

"Nothing prepared me for the skin-ripping prairie winds, except maybe the layers of Coast Guard issue clothing that I packed," said Doug. "My face cover turned ice white within minutes of loading feedstock material which I quickly brought inside to avoid it freezing into 40 pound blocks of beet ice."

All the hard work and frosty appendages paid off as Doug returned to Fargo in August for a full-time position with American Crystal Sugar.

**Nothing prepared me for the skin-ripping prairie winds.**

## Energy in Ecuador

When Marco Pazmino, ABE visiting professor, invited students to participate in an energy project in Ecuador, AOM student Jaime Chavez headed back to his home country to join the course.

Professor Ron Besser addressed the issue of CO2 emissions, concentration calculations, power cogeneration, solar photovoltaic cells and their components, and world wide energy consumption and trends.



All the students participating were required to take an energy case and provide an engineering system which would fit the parameters and reduce fossil fuel and its derivatives as energy. Jaime was assigned to the Anaerobic Digestion Group.

"Our challenge was to design a system which used a minimum of 30% of foodwaste from a town of 50,000 people in the state of New Jersey and convert it into energy," explained Jaime.

After solving the challenge of building an anaerobic digester system using the food waste from the school's cafeteria, they designed a system which generated 16MW of electricity using the minimum amount of garbage as well as generating value added fertilizer.

# Happy Trails to ABE Friends

It's never easy to say goodbye to friends and co-workers, but a wave of retirements has struck the ABE Department this year.

In March advisor extraordinaire Mary Hall said a fond farewell to dozens of guests who gathered to wish her a happy retirement. Mary spent her last few months in the department training Robin Snyder to take on the advising role.



At the end of June the department bid farewell to accountant Jeanette Wilson and technician Larry Miller both of whom had worked in the department for many years.



AOM alumni should have many fond memories of club meetings and classes led by professor J. Wayne Mishoe, who chose the end of July to say his farewell to the ABE family.

We hope to see all of these friends at our holiday celebrations so it's only goodbye for now.

## Connect with Alumni and Friends

# ABE's on Facebook

Speaking of friends, you can never have too many so we invite you to join the new ABE Facebook group. Just search for the ABE-UF Alumni and Friends group on the Facebook search bar. Then invite your other ABE friends to join. It's a way to search for classmates and catch up on current and former students, faculty and staff.

Use the ABEinfo@ufl.edu e-mail address to send address, e-mail and employment updates to the department. We try hard to keep track of our alumni, so be sure to drop us a line. If you prefer to keep in touch by mail just fill out and send in the form at the back of the newsletter.



# Packaging Research

## Nanocomposite materials in high barrier multilayer films

This work is being sponsored by the US Army Food Laboratory and is seeking to improve oxygen barrier properties of multi-layered flexible films used in meals-ready-to-eat (MRE) packaging.

Dr. Bruce Welt stated, "The goal of this project is to attempt to eliminate the foil layer using advanced polymers incorporating nanoparticles."

Specific aims of this project are to evaluate specific blends of nano-materials in order to achieve synergistic results.



Ayman Abdellatif

## Designing modified atmosphere packages

Modified atmosphere packaging (MAP) is commonly used to package ready-to-eat produce such as lettuce and salads. MAP requires gas exchange properties of the package to be matched to gas consumption and production of packaged produce. When this match can't be made, manufacturers turn to perforations to enhance gas exchange. ABE's packaging lab developed a new application that combines fiber optic oxygen sensors with an environmentally controlled, well mixed vessel.



Jin Woo Kwak

Dr. Bruce Welt said, "The apparatus provides a simple and inexpensive way to measure gas transmission rates of perforated films."

# Faculty Invest in High Performance Computing

New Research Tool

IFAS was not always involved with the campus-wide supercomputer, but when Rafael Muñoz-Carpena, ABE associate professor, was approached about spearheading a move to get IFAS involved, he saw the benefits right away. The HPC is a unique facility run by the faculty and overseen by a faculty board. Researchers support expansions and updates of software and hardware by earmarking money from their grants specifically for supercomputing. The faculty funds are then matched by different tiers of university administration and other colleagues to update or expand the capabilities of the HPC. Rafael



Muñoz-Carpena organized a group of several ABE faculty members that could benefit from the use of HPC and who easily found ways to use the HPC on an almost daily basis. The HPC can run models of how components of a complex system might interact. For example, in studying water resources, a model might include forces of nature, impacts from people and how much water is present in a region. Each component would come with its own variables and uncertainties, but all the "what-if" scenarios could be considered by using a supercomputer. This group of faculty invested \$35K of money from their research programs that grew to \$150K through Department and IFAS Research Dean's matches providing one fifth of funds needed for the latest HPC Phase III addition. This facility helps with the type of computer problems that can't be solved with a regular computer: problems of climate change, changes over large areas and times, huge mathematical models and genetic decoding.

# 4-H Explores Energy at ABE

Summer Workshops

It's not unusual to see a group of high school students excitedly touring the UF campus, but this year a group of students were energized in a different way. They attended the annual 4-H Congress and spent several days learning about alternative energy in a series of workshops offered by the ABE Department.

This was the 2nd summer that faculty in the ABE department offered six hands-on workshops to the 4-H participants.



Dr. Art Teixeira coordinated the event and even facilitated the workshop on biogas production. ABE graduate students also worked closely with the students on the activities.



In addition to the student participants a group of five teachers from St. Augustine High School attended the workshops to develop their future plans to teach green energy.

Workshop topics included Solar Energy, Wind Energy, Biogas Production, Biodiesel Fuel Production, Bio-ethanol Production and an Integrated Solar-Wind-Biodiesel System.

"The overall experience provided us with a list of exciting, relevant alternative energy science fair project ideas for our students," said instructor Gail Cullum.

# Accomplishments and Awards

## ASABE Awards



**Dr. Mike Dukes**  
Florida Section Young  
Engineer



**Dr. Brian Boman**  
Florida Section Professional  
Engineer



**Maggie Lanigan**  
Florida Section Outstanding  
Student



**Dr. Ken Campbell**  
Florida Section  
Distinguished Achievement  
Award



**Dr. Kati Migliaccio**  
Outstanding Reviewer,  
Soil & Water Division  
& Florida Section  
Young Extension Worker



**Eban Bean and David Kaplan**  
ASABE Graduate Student Paper Awards



**Dr. Rafael Muñoz-Carpena**  
Florida Section Special  
Recognition



**Dr. Guillermo Baigorria**  
Florida Section  
Young Researcher

## Faculty Awards



**Dr. Greg Kiker**  
Human and  
Ecological Risk  
Assessment  
(HERA) Paper



**Dr. Ray  
Bucklin**  
Elected to the  
2008 Rural  
Builder Hall of  
Fame



**Dr. Reza  
Ehsani**  
Int'l Soc. For  
Hort Sci. Medal  
as Co-convenor  
for ISHS  
Symposium



**Dr. Wendy Graham**  
Distinguished  
Leadership Award of  
Merit



**Dr. Art Teixeira**  
International Award  
of Merit



**Dr. Kati  
Migliaccio**  
Richard Jones  
Outstanding  
New Faculty  
Research  
Award



**Dr. Rafael  
Muñoz-Carpena**  
IFAS International  
Achievement  
Award



**Dr. Melanie  
Correll**  
Theta Tau  
Engineering  
Honor Society  
recognition honor  
for mentors

## Staff Awards



**Cheryl Porter and Steve Feagle**  
IFAS Superior Accomplishment

## Student Awards

**Cecilia Amador**

Doris Lowe and Earl and Verna Lowe Scholarship, Marilyn Little Scholarship and  
Manny Fernandez Graduate Student Scholarship

**Nicholas Crookston**

Italian Packaging Paper Competition and Robert Sheffler Packaging Innovation Competition  
ISTA R. David LeButt Scholarship and Robert Sheffler Packaging Innovation Competition

**Melissa Germain**

Ag Women & Vam York Scholarship

**Melissa Haley**

Richard F. Heaney Memorial Scholarship (IBPA)

**Magalie Laniel**

Herlong Endowed Scholarship

**Peter Larbi**

CALS University Scholar

**Samantha Smith**

Rotary Foundation Ambassadorial Scholarship

**Nathan Wangusi**

James Davidson Graduate Travel Scholarship

**Zuzanna Zajac**

**Alumni Update**

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I'd like to support ABE with a gift of:



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Tell us what you've been up to:



(Career, Professional Awards, Leadership Positions, etc).

\_\_\_\_\_  
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UF-ABE Department  
Robin Snyder  
PO Box 110570  
Gainesville, FL 32611

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- Dale and Joyce Anne Zimmerman



## ABE Undergrads Study Water Resources in Brazil

*The program is organized through cooperative agreements signed across participating US and Brazilian institutions*

ABE undergraduates students will have a unique opportunity to study abroad through an undergraduate exchange program led by ABE associate professor Rafael Muñoz-Carpena. It's part of a new US Dept. of Education FIPSE grant with Virginia Tech focused on "Water Resources studies in the USA and Brazil". The grant funds two main activities.

“ The courses are taught in English and contain a strong emphasis on global water resources engineering issues and technology ”

The first one is a full semester undergraduate exchange program between the US and Brazil. During the next three years a total of 6-8 ABE undergraduate students selected on a competitive basis will have the opportunity to study in

Brazil with credit granted at UF upon return, thus ensuring that students stay on track on their ABE programs. In exchange, a similar number of undergraduate students from the Brazilian institutions will be hosted by ABE for a full semester of coursework study.

The second activity is a semester intensive program that teaches two ABE undergraduate water resources courses in Brazil. Twenty students from the five US and Brazilian institutions participate each summer on this 7-week intensive course taught at different locations in Brazil by Dr. Muñoz-Carpena (UF/ABE) and Dr. Conrad Heatwole (Virginia Tech). The first week of the program in Brazil consists of an intensive

Portuguese language and Brazilian culture immersion program. Upon successful completion of the courses, ABE students will be granted 6 credit hours for the equivalent courses in ABE.

### Study Abroad Exchange

Assistant professor Dr. Clyde Fraise is involved with the FIPSE Study Abroad program which constitutes collaboration between two Universities in Brazil (UFRGS and UFPA) and two US Universities (Texas Tech and University of Florida). Each of the four participating universities will send a total of eight students to study abroad within the project period, so a total of 32 students will participate in the program. This program is directed at undergraduate students that will be spending one semester abroad and taking 2-3 courses.

The 3-year FIPSE program is supported at UF through the IFAS College of Agricultural and Life Sciences (CALS) Global Gators-Study Abroad programs and the UF International Center.

The experience is combined with intensive language training both at UF and in Brazil.



Many of the hands-on teaching methods and field visits adopted in the summer course focus on data from the Brazilian site conditions and the Tropics, where modern engineering design methods are applied to address water conservation and pollution control issues. The program provides a unique opportunity for UF undergraduate students to enhance not only their engineering training, but also their understanding of global issues in water resources.