



THE IRRIGATOR NEWSLETTER



Feature story: OCU... **Smart Irrigation in Orange County**

The University of Florida has teamed up with Orange County Utilities in association with the South Florida and St Johns River Water Management Districts and the Water Research Foundation to evaluate the water conservation potential of SMS and ET irrigation

controllers on various landscapes and soil types in Orange County. Irrigation water use by these technologies will be compared to normalized irrigation water use of properties with typical irrigation control. At least 120 commercial and residential customers will be divided into the following treatments:

- Contractor training and installation of devices
- Contractor training and installation of devices with subsequent team follow-up visits
- Properties without Smart Controllers (non-treatment group)
- Central controlled irrigation properties

If smart controllers are adopted as a water-saving measure, then irrigation contractors will require training concerning installation and management of the technology. As a part of this study, UF is developing a training protocol for smart controller installation and all contractors associated with this project will be trained before any smart devices are installed for this project. The targeted results of this study aim to benefit **Continued on page 3**

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Did you know... In 2005, Floridians paid an average potable water charge of \$15 per month compared to \$49 per month for cable television and \$59 per month on soda and other drinks.

A note from

Dr. Michael Dukes...



Welcome to the second issue of the IrriGATOR newsletter! This issue reflects a transitional period for our research team. We are excited to showcase a new project and researcher, but also delighted about recently completed projects and team members advancing in professional pursuits. Despite how the team changes or grows, the focus of providing irrigation research results for real world application remains constant. Happy reading,


Michael D. Dukes

Highlights: Recently Completed Projects

EVALUATION OF EXPANDING-DISK RAIN SENSORS FOR APPLICATION IN CENTRAL FLORIDA



This research investigated the accuracy, dry-out period, potential water savings, and maintenance requirements of three brands of rain sensors with thresholds from 3 mm to 13 mm in a virtual test.

Accuracy was determined by comparing threshold to amount of rainfall occurring when the sensor stopped virtual irrigation. Accuracy of the sensors ranged from 27% to 97%. All of the sensors dried out 79% of the time within 24 hours of cutting off virtual irrigation. The study period was relatively non-rainy, but still had average potential water savings of 23% for a twice-weekly irrigation schedule. Water savings were very similar to other rain sensor research performed at UF. When testing the longevity of the sensors, results showed that the Mini-Clik should be replaced every year while the Irritrol RSF 1000 and Toro TWRS sensors required replacement after three years. However, the any sensor should be replaced if changes to the threshold setting are required after three months of use. [1]

SURVEY OF RETENTION BASIN PERFORMANCE

This study compared design infiltration rates of stormwater basins equally divided between residential and FDOT sites located in Alachua, Leon, and Marion counties to measured rates using a double ring infiltrometer (DRI) to determine if the basins were operating as designed. Of the 40 basins measured using DRI, compared to the designed rate:

- 40% of basins infiltrated at a slower rate
- 25% had equal rates
- 35% of basins infiltrated at a higher rate

Additionally, the FDOT basins had a high proportion of basins with actual rates greater than designed. This was likely due to larger basin sizes and diversity of vegetation from less frequent maintenance. [2]



We would like to thank the following agencies for funding this research:

[1] Florida Ag Expt. Station

[2] FL Dept. of Environmental Protection

EVALUATION OF SOIL AMENDMENTS FOR COMPACTION MITIGATION

This study researched the affects of soil amendments such as compost and fly ash as mitigation measures for soil compaction using 42 lysimeters filled with sandy loam and fine sand. The soils were compacted to levels representative of North Central Florida based on bulk densities and infiltration rates. Nutrients such as nitrogen and orthophosphorus were sampled from the runoff and leachate. Tilling the top 10 cm of soil decreased runoff compared to the compacted soils independent of compost. However, adding amendments of compost or fly ash without tillage did not reduce runoff and the fly ash actually increased runoff. Despite decreased runoff from tillage, nutrient loadings were essentially redirected in the soil as evidenced by increased nutrient leaching. [2]



AND THE AWARD GOES TO...

Best Website! American Society of Agricultural and Biological Engineers, 2010 Educational Aids Blue Ribbon Award for the website, <http://irrigation.ifas.ufl.edu>.

Outstanding Paper! Soil and Water Conservation Society, 2010 Best Paper Research Award for Impact and Quality of a Paper Published between 2005 - 2009 for authoring the following: Gregory, J. H., M. D. Dukes, P. H. Jones, and G. L. Miller. 2006. Effect of urban soil compaction on infiltration rate for low impact development. *Journal of Soil and Water Conservation*, 61(3):117-124.

Michael Dukes, Associate Professor, was chosen for the University of Florida Research Foundation Professorship, 2010-2012. This award acknowledges distinguished current research program over the most recent five years.

Eban Bean, PhD student, received First Place in the Graduate Student Paper Competition at the 2009 Florida Section of the ASABE. Including both an abstract and oral competition. His paper was entitled "Survey of Retention Basin Hydraulic Performance in Florida."

Melissa Haley, PhD student, received the 2009 Vam C. York Scholarship from the Agricultural Women's Club. This is a competitive scholarship eligible to CALS students that show scholastic achievement through their research, academic performance, and community involvement.

Publications: Hot Off the Press

A New Controller Publication

Irrigation Scheduling Performance by Evapotranspiration-Based Controllers

By S.L. Davis and M.D. Dukes
Agricultural Water Management 2010

This study determined the capability of ET-based controllers to schedule irrigation compared to a theoretically derived soil water balance model based on the Irrigation Association Smart Water Application Technologies (SWAT) protocol to determine the effectiveness of irrigation scheduling.

Treatments were randomized across field plots with four replications of each:

- Weathermatic SL1600
- Toro Intelli-sense
- ETwater Smart Controller 100
- Time-based treatment determined from local recommendations
- Reduced time-based treatment that was 60% of time-based treatment

Results showed that:

- All treatments applied less irrigation than required for all seasons, May 2006 – Nov 2007
- ET controllers averaged half of the irrigation theoretically required per event
- Irrigation adequacy decreased when the ET controllers were allowed to irrigate any day of the week, but was not affected by rainfall
- Scheduling efficiency decreased in the rainy season indicating that site specific rainfall has a significant effect
 - Max decrease of 29% by a timer with rain sensor
 - Average decrease of 20% for the ET controllers

Additionally, results were largely impacted by the following program settings:

- Crop coefficients
 - Controllers used default values
 - Theoretical requirement used location-specific values
- Soil type defines the soil water holding capacity of the soil



A complete collection of the UF-IFAS ABE Irrigation Research publications is on our website!

OCU, cont. from page 1 utilities located in Florida and the Southeast that want to see actual “real world” performance results of “smart” technologies before recommending smart controllers as a conservation measure to their constituency. Additionally, any utility with a large service area of in-ground irrigated accounts will benefit from this scientifically controlled study that focuses on management practices and hardware improvements in irrigated landscapes. This study also evaluates the management and usability of the technology by homeowners and irrigation managers.

UPCOMING EVENTS

Project team members will be presenting their research projects at upcoming conferences.



Water Smart Innovations
October 6-8, 2010
Las Vegas, Nevada



TMDL 2010
November 14-17, 2010
Baltimore, Maryland

Annual International Meeting
August 7-10, 2011
Louisville, Kentucky



IA / ASABE Irrigation Symposium
December 5-8, 2010
Phoenix, Arizona



Environmental and Water Resources Congress
May 22-26, 2011
Palm Springs, California

What's up with the Research Team

Where are they now...

Our congratulations go to **Lincoln Zotarelli** for recently accepting an Assistant Professorship in the Horticultural Sciences Department at UF! While a part of the IrriGATOR research team, Dr. Zotarelli worked as a postdoctoral research scientist focusing on water management of ag crops using soil moisture sensors. His research also involved evaluating the impact of irrigation and fertilizer management on plant production, crop physiology and nitrate leaching. In his new job, Dr. Zotarelli began soil moisture and water table monitoring in seepage-irrigated potato at the Cowpen Branch Facility in Hastings, FL. His statewide research and extension program will focus on optimizing irrigation and fertilization management of potatoes as well as other vegetable crops while aiming to assist growers in water conservation and nutrient resource management while maintaining production levels.

Our congratulations also go to **Eban Bean** for earning his PhD degree in August! Dr. Bean was a unique member of the IrriGATOR research team in that he focused on research areas indirectly related to irrigation such as infiltration, stormwater runoff, and low impact development (LID) during his studies. After graduation, Dr. Bean joined the private sector by accepting a position at Geosyntec Consultants based in Kennesaw, GA where he will continue to work as a water resources engineer in the area of stormwater treatment.

Our last graduate, **Leah Meeks**, earned her Masters of Engineering degree in August. While an IrriGATOR, her research focused on evaluating expanding-disk rain sensors for application in central Florida. This research continued the previous expanding-disk rain sensor studies originally led by Bernard Cardenas-Lailhacar at UF. In August, Leah entered the PhD



Meet Mackenzie!

We would like to welcome the newest addition to the IrriGATOR research team, **Mackenzie Boyer**, who began the PhD program in the Agricultural and Biological Engineering department at UF this fall! Mackenzie, who likes to go by Kizzy, obtained a BS in Civil Engineering at Carnegie Mellon University in Pittsburgh, PA and went on to get an MS in Environmental Engineering at University of North Carolina at Chapel Hill. Kizzy chose to work in consulting for six years, specializing in municipal water and wastewater treatment design, at nationally-recognized firms Black & Veatch and CH2M HILL. While employed at these firms, Kizzy became a registered professional engineer in North Carolina and Florida and a LEED Accredited Professional. Kizzy's current research plans focus on residential outdoor irrigation practices in southwest Florida. Stay tuned for more details on her project and PhD goals as they develop!



If you would like to contact Kizzy, or anyone else on the IrriGATOR research team, please see the contact details on our website <http://abe.ufl.edu/mdukes>

program in Civil and Environmental Engineering at Utah State University. She is currently working on a remote sensing project in the Mojave Desert and involved with university extension. Her dissertation research concentrates on the applications of canal systems and water planning in agricultural areas in the western United States.

Thank you for all of your hard work and being an integral part of the IrriGATOR research team! We wish you the best of luck in your future endeavors!

If you are interested in receiving this newsletter, please email irrigation@ifas.ufl.edu

Further information can be found on our website <http://abe.ufl.edu/mdukes>

