

# **Irrigation Show 2009**

**San Antonio, Texas, USA  
2 - 4 December 2009**

**ISBN: 978-1-6156-7910-2**

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

Copyright© (2009) by the Irrigation Association  
All rights reserved.

Printed by Curran Associates, Inc. (2010)

For permission requests, please contact the Irrigation Association  
at the address below.

Irrigation Association  
6540 Arlington Boulevard  
Falls Church, Virginia 22042-6638

Phone: 1-703-536-7080  
Fax: 1-703-536-7019

[www.irrigation.org](http://www.irrigation.org)

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2634  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# Table of Contents

## Agriculture

IA09-1000	<b>Crop Yield Predictor for Deficit Irrigation Scheduling</b> ..... 1 <i>Norman L. Klocke, Loyd R. Stone, Steven Briggeman</i>
IA09-1001	<b>Simple Charts for Modifying Crop Coefficients to Local Conditions</b> ..... 11 <i>Joseph C. Henggeler, Pat Guinan, John Travlos, Herda Farid</i>
IA09-1002	<b>Comparison of Irrigation Scheduling Methods in the Humid Mid-South</b> ..... 31 <i>Daniel K. Fisher, James E. Hanks, H.C. (Lyle) Pringle III</i>
IA09-1003	<b>A Simple Irrigation Scheduling Approach for Pecan Irrigation</b> ..... 38 <i>Zohrab Samani, Salim Bawazir, Max Bleiwweiss, Rhonda Skaggs</i>
IA09-1004	<b>AgriMet: Reclamation's Pacific Northwest Evapotranspiration Network</b> ..... 46 <i>Peter L. Palmer</i>
IA09-1005	<b>In Defense of Irrigated Agriculture</b> ..... 55 <i>Michael Dowgert</i>
IA09-1006	<b>Ag to Urban Water Transfers: Mitigation of Negative Effects Voluntary or Required?</b> ..... 63 <i>MaryLou M. Smith</i>

## Turf/Landscape

IA09-1007	<b>Irrigation Association Smart Water Application Technologies (SWAT) Scores and Water Conservation Potential</b> ..... 66 <i>Cecilia Romero, Michael D. Dukes, Mary McCready</i>
IA09-1008	<b>Maximizing effective Agronomics in landscapes with Soil Moisture Sensors</b> ..... 85 <i>Jon Peters</i>
IA09-1009	<b>Understanding Site Conditions and Customer's Perspective When Implementing Smart Irrigation</b> ..... 102 <i>Loc P. Truong</i>
IA09-1010	<b>Evaluation of Sensor Based Residential Irrigation Water Application on Homes in Florida</b> ..... 115 <i>Melissa Baum Haley, Michael D. Dukes</i>

## Water Management

IA09-1011	<b>The Inherent Drought Response Flexibility in Irrigated Landscapes</b> ..... 126 <i>Stephen Smith</i>
IA09-1012	<b>Using Infrared Thermography to Determine Crop Water Stress in Cotton</b> ..... 135 <i>Susan A. O'Shaughnessy, Steve Evett</i>
IA09-1013	<b>Application of Mechanized Irrigation for Rice Production</b> ..... 148 <i>Jacob LaRue, Craig Rolfes, Germani Concenco</i>
IA09-1014	<b>Water Conservation's Role in California Water Transfers</b> ..... 152 <i>Charles M. Burt</i>
IA09-1015	<b>Sand vs. Sand Filters: A Case For Reduced Backwashing</b> ..... 160 <i>Randy D. Delenikos</i>

## Turf/Landscape

IA09-1016	<b>Field Study of Uniformity Improvements from Multi-Stream Rotational Spray Heads and Associated Products - Preliminary Results</b> ..... 164 <i>Kent A. Sovocool</i>
-----------	---

IA09-1017	<b>LEED: It's Not Just Two Irrigation Points!</b> .....	180
	<i>Brian Vinchesi</i>	
IA09-1018	<b>Locating Field Wiring Faults in 2 Wire Systems</b> .....	183
	<i>Tony Ware</i>	
IA09-1019	<b>Lessons Learned from the Introductory Landscape &amp; Irrigator Training</b> .....	203
	<i>Mark A. Peterson, M.P.A., B.S., Dana Nichols</i>	
IA09-1020	<b>Conservation Design-Pipe Sizing with Low Flow Nozzles</b> .....	21'
	<i>Patrick Crais</i>	
IA09-1021	<b>Backflow Prevention and Irrigation Systems</b> .....	215
	<i>Bruce Rathburn</i>	

## Agriculture

IA09-1022	<b>Determination of Kinetic Energy Applied by Center Pivot Sprinklers</b> .....	275
	<i>Bradley A. King, David Bjorneberg</i>	
IA09-1023	<b>Performance Evaluation of Pressure Regulated Center Pivot Nozzle Packages</b> .....	292
	<i>Danny Rogers, L. Kent Shaw, S. R. Pragada, Mahbub Alam</i>	
IA09-1024	<b>Application of GPS for Precision Mechanized Irrigation</b> .....	301
	<i>Jacob L. LaRue, Bruce Kreikemeier</i>	
IA09-1025	<b>Using Wireless Networking and Remote Sensor Monitoring in Pivot Irrigation</b> .....	307
	<i>Dan Steele</i>	
IA09-1026	<b>Solar Powered Constant/Continuous Move Central Micro Pivot Irrigator</b> .....	318
	<i>Padmakar W. Kelkar, Vasant P. Joshi, Arun Bapat</i>	

## Water Management

IA09-1027	<b>Quantifying Effective Rain in Landscape Irrigation Water Management</b> .....	325
	<i>Steven Moore</i>	
IA09-1028	<b>Modeling Pecan Growth and Fertilization Under Nitrogen and Water Stress</b> .....	344
	<i>Ted W. Sammis, Vince P. Gutschick, Junming Wang, Manoj K. Shukla, Rolston St. Hilaire</i>	
IA09-1029	<b>Subsurface Drip Irrigation-Fertigation for Site-Specific, Precision Management of Cotton</b> .....	365
	<i>A. H. AbdelGadir, Mark Dougherty, John Fulton, Charlie Burmester, Chet Norris, Larry Curtis</i>	
IA09-1030	<b>Revisiting the Scheduling Coefficient</b> .....	381
	<i>Robert D. von Bernuth, Brent Q. Mecham</i>	

## Water Management

IA09-1031	<b>The Role of the Landscape Contractor to Conserve Water</b> .....	393
	<i>Richard Restuccia</i>	
IA09-1032	<b>Irrigation Efficiency Management as it Relates to Leed Certification</b> .....	398
	<i>John Murphy</i>	
IA09-1033	<b>Microirrigation for Sustainable Water Use: Research and Outreach Through a Multi-State Collaboration</b> .....	401
	<i>Dana O. Porter, Freddie Lamm, Larry Schwankl, Ken Shackel</i>	

## Agriculture: SDI in the Great Plains

IA09-1034	<b>Managing the Challenges of Subsurface Drip Irrigation</b> .....	409
	<i>Freddie R. Lamm</i>	

IA09-1035	<b>Using SDI to Effectively Irrigate with Biological Effluent</b> .....	433
	<i>Todd P. Trooien, David J. Hills, Freddie R. Lamm</i>	
IA09-1036	<b>Cotton Irrigation in Kansas</b> .....	440
	<i>Mahbub Alam, Danny H. Rogers, Thomas Roberts, L. Kent Shaw, Troy Dumler</i>	
IA09-1037	<b>Summary of Twenty Years of Kansas SDI Research</b> .....	446
	<i>Freddie R. Lamm, Danny Rogers, Mahbub Alam, Dan O'Brien, Todd Trooien</i>	
IA09-1038	<b>Treatment of SDI Emitters Clogged with Manganese Compounds</b> .....	469
	<i>James P. Bordovsky, Joseph Mustian</i>	
IA09-1039	<b>Impact of Management on the Life Expectancy of Drip Systems</b> .....	482
	<i>Juan Enciso, Warren Multer, Freddie Lamm</i>	
IA09-1040	<b>Effect of the Changing U.S. Economy on the Relative Profitability of Center Pivot Sprinklers and SDI Systems</b> .....	493
	<i>Dan O'Brien, Freddie R. Lamm, Danny H. Rogers, Troy J. Dumler</i>	

### **Turf/Landscape**

IA09-1041	<b>Water Reduction 101</b> .....	506
	<i>Michael L. Carr CID</i>	
IA09-1042	<b>A Review of IA's New Landscape Auditing Guidelines</b> .....	511
	<i>Brian Vinchesi</i>	
IA09-1043	<b>Evaluation of Uniformity Measurements from Landscape Irrigation Auditing</b> .....	516
	<i>Charles Swanson, Guy Fipps, James McAfee</i>	
IA09-1044	<b>Effect of Sub-surface Drip Irrigation and Shade on Soil Moisture Uniformity in Residential Turf</b> .....	524
	<i>Douglas L. Kieffer, Tom Campbell</i>	
IA09-1045	<b>Ragle Park Water Conservation Program</b> .....	534
	<i>Peg Aguilar</i>	
IA09-1046	<b>Evaluation of Irrigation Smart Controller for Salinity Control</b> .....	540
	<i>Ram Dhan S. Khalsa</i>	
IA09-1047	<b>Sustainable Landscape Design Strategies for Maximizing Rainwater Use and Irrigation Efficiency</b> .....	554
	<i>T. Barnabas Kane.</i>	
IA09-1048	<b>Crop Coefficients for Drip-Irrigated Xeriscapes and Urban Vegetable Gardens</b> .....	568
	<i>Daniel Smeal, Michael K. O'Neill, Kevin A. Lombard, Richard N. Arnold</i>	

### **Agriculture**

IA09-1049	<b>Importance of Reclaimed Water in Florida</b> .....	580
	<i>Larry R. Parsons, Ph.D.</i>	
IA09-1050	<b>The Advantages of Closely Spaced Emitters</b> .....	587
	<i>Inge Bisconer</i>	
IA09-1051	<b>Tensiometer Controlled Automated Irrigation System for Christmas Tree Production</b> .....	597
	<i>Pascal Nzokou, Nicholas Gooch, Bert Cregg</i>	
IA09-1052	<b>Assessment of Drip Irrigation in Morocco</b> .....	618
	<i>Abdel F. Berrada</i>	
IA09-1053	<b>Comparative Study of Bell Pepper Response to Subsurface Drip Irrigation and Surface Drip Irrigation Under Different Water and Nitrogen Coupling Conditions</b> .....	638
	<i>Qinghua Kong, Guangyong Li</i>	

## Agriculture

IA09-1054	<b>NRCS Irrigation Toolbox</b> .....	662
	<i>Doug Toews, Peter Robinson, Clare Prestwich, Pat Willey</i>	
IA09-1055	<b>Tools a NRCS Field Office Might Use to Help an Irrigator</b> .....	668
	<i>Jon Whan</i>	
IA09-1056	<b>Variable Rate Peanut Irrigation Management in the Eastern Coastal Plains</b> .....	677
	<i>Kenneth C. Stone, Phil Bauer, Warren Busscher, Joseph Millen, Dean Evans, Ernie Strickland</i>	
IA09-1057	<b>Benefits of Pressure Regulation in Irrigation</b> .....	684
	<i>Theodore G. Santiesteban</i>	
IA09-1058	<b>Soil and Nutrient Losses from Small Sprinkler and Furrow Irrigated Watersheds in Southern Idaho</b> .....	695
	<i>David Bjorneberg, Brad King, Nathan Nelson</i>	
IA09-1059	<b>Irrigation Control with Feedback Loops</b> .....	705
	<i>Benjamin Zur, Gal Ben-David, Zvi Zur</i>	

## Water Management

IA09-1060	<b>Prelude to Change: Defining Roles in Landscape Water Management</b> .....	724
	<i>Kenneth W. Cook</i>	
IA09-1061	<b>Return On Environment (ROE) - A New Evaluation of Filtration Systems</b> .....	730
	<i>Jim Lauria</i>	
IA09-1062	<b>Directed Manipulation of Crop Water Status Through Canopy Temperature-based Irrigation Management</b> .....	735
	<i>James Mahan</i>	
IA09-1063	<b>Irrigation Scheduling by Soil Water Potential</b> .....	750
	<i>Clinton C. Shock</i>	
IA09-1064	<b>Rainwater Catchment Systems</b> .....	759
	<i>Billy Kniffen</i>	