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Precision Irrigation and Nutrient Management for Nursery, Greenhouse and Green Roof Systems: Sensor Networks for Feedback and Feed-forward Control

John D. Lea-Cox*, Univ of Maryland, College Park, MD; jlc@umd.edu
George A. Kantor, Carnegie Mellon Univ, Pittsburgh, PA; kantor@ri.cmu.edu
William L. Bauerle, Colorado State Univ, Fort Collins, CO; bauerle@colostate .edu
Marc van Iersel, Univ of Georgia, Athens, GA; mvanier@uga.edu
Colin Campbell, Decagon Devices, Inc., Pullman, WA; colin@decagon.com
Taryn Bauerle, Cornell Univ, Ithaca, NY; bauerle@cornell.edu
David S. Ross, Univ of Maryland, College Park, MD; dsross@umd.edu
Andrew Ristvey, Univ of Maryland, Queenstown, MD; aristvey@umd.edu
Doug Parker, Univ of Maryland, College Park, MD; dparker@arec.umd.edu
Dennis King, Univ of Maryland - Center for Environmental Studies, Solomons Island, MD; dking@cbl.umces.edu
Richard Bauer, Antir Software, Jarrettsville, MD; bt3rb@mindspring.com
Steven Cohan, Univ of Maryland, College Park, MD; scohan@umd.edu
Paul A. Thomas, Univ of Georgia, Athens, GA; pathomas@uga.edu
John M. Ruter, Univ of Georgia, Tifton, GA; ruter@uga.edu
Matthew Chappell, Univ of Georgia, Athens, GA; hortprod@uga.edu
Stephanie Kampf, Colorado State Univ, Fort Collins, CO; skampf@warnercnr.colostate .edu
Michael A. Lefsky, Colorado State Univ, Fort Collins, CO; lefsky@cnr.col ostate .edu
Lauren Bissey, Decagon Devices, Inc., Pullman, WA; lauren@decagon.com
Todd Martin, Decagon Devices, Inc., Pullman, WA; todd@decagon.com

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We have established a national transdisciplinary team to reduce irrigation water consumption and improve nutrient management in greenhouse and nursery production and monitor green roofs, while enhancing system performance, crop growth and quality. We are using a systems-based, multi-disciplinary approach to implement wireless sensor networks in orchard-type (field) environments, in 'open' nursery container-production and green roof systems, and 'closed' greenhouse environments. This presentation will provide a global overview of the project and the major objectives, including 1) developing the next generation of sensor networks and customizable software to meet irrigation monitoring and control requirements at the species level; 2) determining the performance and utility of moisture sensors for precision irrigation and nutrient management; 3) addressing spatial and temporal variability issues to optimize the numbers of sensors; 4) integrating micro-scale data with macro-scale models to predict short-term plant water use; 5) developing best management practices for irrigation and nutrient management monitoring, working with specialty crop partners to capture needs-based issues during on-farm system development; 6) quantifying improvements in water and nutrient management, nutrient runoff, plant quality and yield; 7) evaluating the private and public economic and environmental impacts of precision sensor-controlled practices, and identifying barriers to adoption and implementation of these practices. The outcome will be a commercially

available product for irrigation water management that is designed for diverse, intensive production environments, but broadly applicable to all high-value specialty crops.