

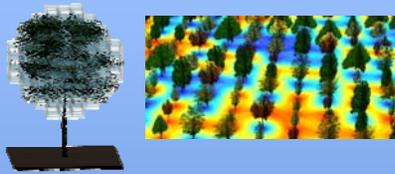
Comprehensive Nursery Production Technologies for Water Quality Protection and Conservation

“From the fertilizer that leaves the growers' hand. . . to the runoff that leaves the nursery”

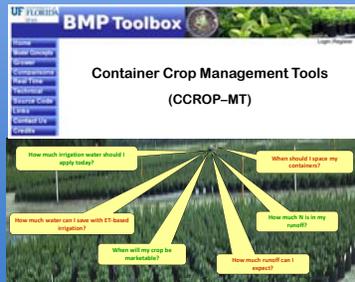
The broad objectives of the project are to develop economically feasible production systems and management practices that promote water conservation and protect water quality while sustaining or improving crop quality, production, and profitability. Specific objectives include: improving water and nutrient use efficiency, capturing and recycling runoff, and remediating runoff containing excess nutrients and residual pesticides prior to offsite discharge. To achieve these objectives, the research team has engaged in research that addresses problems associated with (1) production inputs, (2) production systems, and (3) production outputs. Together, the project takes a **whole-systems approach** to environmental resource management. Growers can use multiple decision support tools to manage inputs, specifically a web-based simulation tool and crop models ensuring efficient use of nutrients and water while estimating runoff quantity and quality. As an example, runoff volume and quality can be calculated at the container level when growers take a systems approach to predict plant growth and water and nutrient requirements with the Container Crop Resource Optimization Program (CCROP). Growers can also change current management strategies to maximize nutrient and water use efficiency and minimize runoff for containerized nursery crops by using an automated, weight-based irrigation method along with substrate composition. Lastly, nursery runoff undergoes remediation for excess nutrients prior to offsite discharge or onsite containment for irrigation recycling using mixed constructed wetland systems, bacterial-based bioreactor systems for nitrate-nitrogen removal, and algae turf scrubber systems.

PREVENTION

Predictive Models to Estimate Plant Water Use



Web-based Simulation Tool (CCROP) for Managing Resources in Container Nurseries



CONTAINMENT

Adsorptive Mineral Substrate Amendments



Gravimetric Automated Irrigation Control

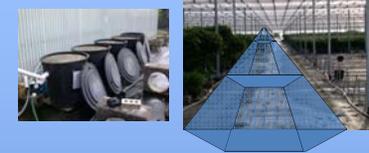


Nitrogen and Phosphorus Plant Accumulators



REMEDICATION & REUSE

Bacterial-Based Bioreactor



Algal Turf Scrubber (ATS)



Constructed Wetlands & Mineral Adsorbents



A beta version a web-based production simulator model is currently in testing and proofing under commercial nursery conditions



Precision irrigation systems using predictive models or automated gravimetric irrigation control are currently under evaluation at a commercial nurseries.

OUTREACH AND IMPACTS



It has been demonstrated that clay amended substrates can reduce water application (90,000 gal/acre) and reduce leachate volume (40,000 gal/acre)



Four bacterial-based bioreactors are operating at two nurseries for real-world assessment of the technology

A nursery in Georgia has installed two constructed wetlands that were designed based on the information generated from this project



To learn more, visit Clemson University (<http://tinyurl.com/sustainable-nursery>) or the Horticulture Research Institute (<http://tinyurl.com/ERMpdf>) website to view papers that summarize this project.



Joseph Albano , Lead & ADODR , Jim Owen, Sarah White, Bill Bauerle,, Tom Yeager, Ted Bilderback, and Chris Wilson