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

CONTAINMENT
Adsorptive Mineral Substrate Amendments
Granometric Automated Irrigation Control

REMEDATION & REUSE
Bacterial-Based Bioreactor

OUTREACH AND IMPACTS
It has been demonstrated that clay amended substrates can reduce water application (80,000 gal/acre) and reduce leachate volume (40,000 gal/acre)

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.

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