

NCDC216: A New Multistate Group – Water Management and Quality for Ornamental Crop Production and Health

Thomas Fernandez¹ John Lea-Cox² Gladis Zinati³ Chuanxue Hong⁴ Raul Cabrera⁵
Donald Merhaut⁶ Joseph Albano⁷ Marc van Iersel⁸ Thomas Yeager⁹ and Douglas Buhler¹

Michigan State University,¹ University of Maryland,² Rutgers University,³ Virginia Polytechnic and State University,⁴ Texas A & M University,⁵ University of California, Riverside,⁶ USDA-ARS, Fort Pierce - Florida,⁷ University of Georgia,⁸ University of Florida⁹

USDA-CSREES 2009 National Water Conference, St. Louis, MO

Further Information: JLC@umd.edu

Background

- The Nursery and Greenhouse industry ranks 5th (>\$14.6 billion) in US agriculture commodities and is in the top 5 commodities for 26 states (USDA, 2004).
 - Water issues, specifically irrigation scheduling, surface and groundwater water management, and water quality are topics of major concern to the ornamental plant industry even in "water-rich" states.
 - Drought, urban competition for surface and groundwater water reserves, salinity and runoff water quality, and increasing legislation at state and county levels are all increasing the need for ornamental crop producers to manage water more effectively.
 - Legislation regarding water use and/or quality has been implemented in California, Delaware, Florida, Maryland, Michigan, North Carolina, Oregon, and Texas.
- ⇒ **We have therefore established a USDA Multistate Group Development Committee (NCDC216), to focus our research efforts on water management and quality, for ornamental crop production and health**

Specific Issues

- Frequent irrigation in combination with high fertilizer and pesticide use can lead to significant losses of agricultural chemicals in runoff water that transports agricultural chemicals to containment ponds and/or off-site into groundwater or surface water (Briggs et al., 1998, 2002; Cabrera, 2005; Camper et al., 1994).
- Irrigation water management is the key to nutrient management in ornamental crop production and the reducing impact of runoff water on local water (Tyler et al, 1996; Lea-Cox et al, 2001; Ross et al, 2002).
- Recycling of water includes another set of issues for growers, primarily in the form of disease and salinity management.
- Emerging constraints on water use and quality means that the ornamental industry needs to find ways to manage water without detracting from production schedules and crop quality.
- Therefore, we need to approach the issue of water management through a multi-disciplinary approach on a national level, since few states have the depth of knowledge to truly integrate all these issues.

Primary Research Areas

The intent of this project is to develop and enhance multidisciplinary teams to include colleagues in horticulture, plant physiology, plant pathology, entomology, weed management, engineering and other fields, to address water use issues.

The primary subject areas for the group are:

1. Irrigation management including irrigation systems, scheduling, cultural practices to increase efficiency
2. Source water quality including current and alternate sources and their natural and introduced biotic and abiotic contaminants, how they affect intended uses, and water treatment to improve quality;
3. Runoff water management and quality including production effects on water quality, effects on the surrounding environment, effects on reapplication to a crop, runoff water treatment, and modeling;
4. Pest/crop health management, including the impact of recycled or reused water on plant production and worker safety and pest movement and control in recycled, reused and runoff water.

Significance to the Industry

- Irrigation is essential for many types of ornamental plant production.
- The quantity and quality of water available for irrigation has major consequences on the productivity and profitability of this sector of agriculture.
- The record 2006-2008 drought in the eastern US had a severe impact on the nursery industry in that region.
- The Great Lakes region is implementing water use policies in order to comply with the ratified Great Lakes-St. Lawrence River Basin Water Resource Compact.
- Drought and water conservation are not new issues in western states where availability has long been a limitation, but demographic changes are increasing competition between users.
- Ground and surface water quantity and/or quality is a national and global issue. Demand from industry, homeowners and agriculture is increasing in almost all areas of the US.
- Increased regulation and competition for water resources; calls for improved water application and runoff water quantity and quality in all regions.

Our Mission

Coordinate National Research and Extension Programs

This multistate Group is intended be an effective mechanism to integrate our research and extension efforts at the National level.



Impacts

Improving water management and quality for ornamental plant production and health in the United States will have many important impacts, including:

1. A reduction in total water use through more efficient practices;
2. Improved technology for irrigation scheduling;
3. Reduced fungal infestations and fungicide applications;
4. Improved crop production through increased water and nutrient use efficiency;
5. Reduced surface water runoff and potential off-site pollution from fertilizers and other agricultural chemicals;
6. Improved resource use efficiency and profitability for growers;
7. Enhanced crop health and consumer confidence stemming from more sustainable practices.

Water Use by the Industry

- Most field (in soil) producers of trees and ornamentals use irrigation water at some point during the growing season, since the cost-benefit ratio of maximizing plant growth is apparent to most producers.
- While supplemental irrigation is beneficial in field production it is essential for container production of ornamental plants.
- Container substrates need to be well drained and container volume limits the amount of water that can be stored. This results in frequent irrigation applications and large amounts of water used.
- In a recent survey, over 75% of nursery crops in 17 states (AL, CA, CT, FL, GA, IL, MI, NJ, NY, NC, OH, OR, PA, TN, TX, VA, WA) were grown in containers and require irrigation, often daily (USDA, 2007).
- In Florida, container nurseries annually apply 56 to 120 inches per acre per year in addition to the 40 to 60 inches of average annual rainfall.
- In Alabama, container nurseries were estimated to use 9.9 to 13 billion gallons of water in 1985 (Fare et al., 1992); Container nursery production in Alabama has almost tripled since 1987 (USDA, 1992, 2002).

Multistate Goals

The goals of this national group are to provide a forum for representatives from all land-grant and other institutions to develop multidisciplinary approaches to:

1. Improve water efficiency and crop productivity in the industry while minimizing the risk of nutrient- and chemical-rich irrigation runoff water releasing into natural waterways
2. De-couple crop health risk with recycling irrigation to promote water resource conservation and protection through understanding aquatic ecology and water treatment innovation, and
3. Investigate alternative water sources such as treated municipal waste water.

This national effort to address water resource challenges for the ornamental industry should ensure a more efficient and coordinated utilization of assets, and target research and extension programs to address critical production and environmental issues.

Literature Cited

1. Briggs, J. A., M. B. Riley, and T. Whitwell. 1998. Quantification and remediation of pesticides in runoff water from containerized plant production. *J. Environ. Qual.* 27:814-820.
2. Briggs, J.A., T. Whitwell, R.T. Fernandez and M.B. Riley. 2002. Effect of integrated pest management strategies on chlorothalonil, metalaxyl and thiophanate-methyl runoff at a container nursery. *J. Amer. Soc. Hort. Sci.* 127:1018-1024.
3. Cabrera, R.I. 2005. Challenges and advances in water and nutrient management in nursery and greenhouse crops. *Agric. Mediterr.* 135: 147-160.
4. Camper, N. D., T. Whitwell, R. J. Keese, and M. B. Riley. 1994. Herbicide levels in nursery containment pond water and sediments. *J. Environ. Hort.* 12:8-12.
5. Fare, D.C., C.H. Gilliam, and G.J. Keever. 1992. Monitoring irrigation at container nurseries. *HortTech.* 2:75-78.
6. Lea-Cox, J. D., D. S. Ross and K. M. Tefteau. 2001. A Water and Nutrient Management Process for Container Nursery and Greenhouse Production Systems. *J. Env. Hort.* 19(4): 226-229
7. Ross, D. S., J. D. Lea-Cox, and K. M. Tefteau. 2001. The Importance of Water in the Nutrient Management Process. *Proc. Southern Nursery Assoc. Res. Conf.* 46:588-591.
8. Tyler, H.H., S.L. Warren, and T.E. Bilderback. 1996. Reduced leaching fractions improve irrigation use efficiency and nutrient efficacy. *J. Environ. Hort.* 14:199-204.
9. USDA. 1994. 1992 Census of agriculture. USDA, Washington, D.C.
10. USDA. 2004. 2002 Census of agriculture. USDA NASS, Washington, D.C.
11. USDA. 2007. Nursery crops 2006 summary. USDA NASS, Washington, D.C.