

Irrigation Water Retention and Recycling at Greenleaf Nursery Company

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INTRODUCTION

Greenleaf Nursery Company was founded in 1946 by Harold and Rebecca Nickel as a retail nursery in Muskogee, Oklahoma. In 1958, a wholesale production nursery was started in Park Hill, Oklahoma. Since that time, the retail nursery has been closed and the wholesale production has grown. Currently, Greenleaf Nursery Company consists of four wholesale divisions: the Oklahoma Division (500 acres in production), the Texas Division (300 acres in production), the Hidden Lake Division (150 acres in production), and the North Carolina Division (32 acres in production). The Oklahoma, Texas, and North Carolina Divisions are 98% containerized nursery production and 2% field production. The Hidden Lake Division is 100% field production.

Since 1989, the Oklahoma State Department of Agriculture (OSDA) has been monitoring nutrients and pesticides in runoff from ornamental nurseries in the Illinois River Basin (an Oklahoma designated Scenic River) to establish baselines for nursery effluents (von Broembsen, 1998). The voluntary compliance agreements between the nurseries and OSDA have been described previously (Andrews, 1995). In 1989, Greenleaf Nursery Company began a comprehensive pollution prevention program, with the cornerstone being the construction of an irrigation water retention and recycling system.

IRRIGATION WATER RETENTION AND RECYCLING SYSTEM

Construction on Greenleaf Nursery Company's irrigation water retention and recycling system started in 1992 and will be completed in late 1998. The entire system consists of eight retention basins with a total storage capacity of 70 million gal of water. There are 16 km (10 miles) of 25- and 30-cm (10- and 12-inch) pipelines tying the system together. The system was built by an in-house staff at a total cost of approximately \$2 million. By phasing in the construction of this system, it has allowed adjustments to be made and spread the capital outlay over a number of years.

The propagation area water comes directly from the nursery water supply (Lake Tenkiller) and the water is chlorinated prior to storage and use. The production area of the nursery has been divided into areas where fresh and recycled water will be used. From in-house studies, approximately 45% of all water applied will be recaptured in the retention basins.

PLANT PATHOGEN MANAGEMENT IN RECYCLED WATER

A primary concern with recycling irrigation water is the potential that water-borne plant pathogens will be recycled back onto crops resulting in an increase in plant diseases. If this occurs, then the nursery would be forced to decontaminate recycled water.

In 1997, Oklahoma State University began sampling irrigation water on the nursery on a monthly basis to monitor pre-recycling levels of *Phytophthora* spp., a deadly water-borne plant pathogen. Samples were taken from the irrigation water source (Lake Tenkiller), runoff from production blocks, and water in retention basins. In 1998, this study continued. Additional sampling sites were added to monitor pathogen levels in recycled water being applied to plants.

Results of this study indicate that water-borne plant pathogens are present in the retention and recycling system, but there have been no increases in plant diseases. Crops that are highly susceptible to water-borne plant pathogens (dogwood, rhododendron, and yews) have been grouped together on the fresh water side of the nursery to prevent disease outbreaks. The large storage capacity of this system allows water to settle and be held for varying lengths of time. This allows the water-borne plant pathogens to settle out and/or be subjected to biological and physical degradation. At this time, the nursery is relying on these management strategies to minimize plant pathogen movement and preclude the necessity for decontamination of recycled water.

CONCLUSION

The Oklahoma Division of Greenleaf Nursery Company has been growing "Predictable Quality" containerized nursery plants for 40 years on the bluffs above Lake Tenkiller, one of Oklahoma's most heavily used recreational lakes. In 1989, a comprehensive pollution prevention program was started at this location to protect the local environment and natural resources.

As a result of the irrigation water retention and recycling system, conversion to slow-release fertilizer and a state-of-the-art integrated pest management program, Greenleaf Nursery Company received the U.S. Environmental Protection Agency's Environmental Excellence and Pollution Prevention Awards.

LITERATURE CITED

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