



Success Story - Water Resource Management in the Nursery Industry

Situation

The high cost of land in New Jersey has led to a shift towards non-traditional agricultural sectors such as the production of ornamentals at container nurseries. This surge in nursery production has resulted in a 100% increase in nursery product sales in the past five years. As the number of nurseries continues to rise in New Jersey, so will the need for best management practices (BMPs) that provide effective economic benefits for this industry.

Overhead irrigation is typical of container nurseries, as is the impermeable liner that the nursery is built upon. Reportedly, only 12% to 50% of irrigation water is intercepted by the planting container when using overhead irrigation. The unused water can lead to large amounts of runoff, which decrease the overall water use efficiency of such an operation and can result in polluted runoff impacting local waterways. To improve water efficiency at nursery production facilities, irrigation water can be reused by way of a tailwater recovery system. This system is a BMP that collects, stores, and transports irrigation tailwater for reuse. Typically, these systems consist of stone lined waterways, inlets, piping, and a stone lined storage pond. Benefits of these systems include conservation of irrigation water supplies through capture and reuse of runoff, improvement of offsite water quality, and minimization of soil erosion and sediment transport. Several existing tailwater recovery systems in New Jersey have improved irrigation efficiency by 25% to 30% through water reuse. The drawback is that reuse of irrigation water may lead to the spread of fungus and disease. Chlorination and bromination are common disinfection processes that the grower will use prior to the reuse of irrigation water. This is an additional cost to the grower and includes having to work with hazardous chemicals.

Actions

The Rutgers Cooperative Extension (RCE) Water Resources Program (WRP) has developed several projects with the goal of reducing the environmental impact of the nursery industry and improving and promoting irrigation water reuse.

- In 2003, the WRP, in partnership with the Salem County Soil Conservation District, worked with a private nursery operation to help improve water quality of the nearby receiving waters. To mitigate the nutrient-rich tailwater discharge at the facility, the WRP converted an old and unused irrigation pond into a subsurface flow constructed wetland. More than 5,000 native wetland plants were installed at this irrigation pond so that overflow from the tailwater system could be naturally treated by the wetland through adsorption, biological assimilation, microbial activity, decomposition, volatilization, and sedimentation. After modifying the existing conditions to create the constructed wetland, one year of monitoring data demonstrated that the retrofit was effective in reducing the average concentration of total phosphorus in the receiving waters.
- In response to this concern, the WRP has recently been funded by the 2006 United State Department of Agriculture (USDA) Conservation Innovation Grants (CIG) Program. Under this CIG project, the WRP will create a network of geotextile reinforced vegetated swales that collect surface runoff from the nursery and route it to a tailwater recovery system. The vegetated swales will gently slope towards the tailwater recovery system and will include turf grass and native warm season grasses for nutrient and pathogen removal. Similar to the drainage swales, the pond will be vegetated to enhance nutrient removal. Natural processes including biological assimilation, adsorption, infiltration, and sedimentation will be relied upon to treat the nursery runoff prior to reuse. Groundwater will be added to the recovery pond to dilute nutrients and pathogens that may accumulate in the pond. Construction is anticipated to begin this fall, and success and impacts will be documented.

Impacts

As the demand for clean water continues from both growing residential areas and increased agricultural markets, the need for improved water use efficiency will be a priority. With the design, construction, and monitoring of a constructed wetland, the WRP has demonstrated that there are inexpensive and efficient ways to reduce the impact of nursery runoff on the water quality of natural waterways. This small constructed wetland (approximately ¼ acre) was designed to treat overflow from a tailwater recovery pond that received runoff from approximately 20 acres of nursery operation. This wetland was shown to remove approximately 15 pounds of phosphorus per year based upon the data collected by the WRP. Continued monitoring of this system will help the WRP determine exactly how cost effective these types of systems can be.