



WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: TN4101

Title: Constructed Wetland Cleanup of Pirtle's Container Nursery Runoff

Focus Categories: Wetlands, Water Quality

Keywords: wetlands, wastewater treatment, water quality monitoring, runoff

Start Date: 03/01/2001

End Date: 02/28/2002

Federal Funds: \$24,104

Non-Federal Matching Funds: \$48,210

Congressional District: Tennessee, 6th

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Abstract

Smithville, TN, March, 2000. Funding for this project was provided by the 319 Nonpoint Source Program, administered by the Tennessee Department of Agriculture (TDA) through the U.S. Environmental Protection Agency (EPA). The wetland was demonstrated to nursery growers as a treatment technology on October 24, 2000, for treatment of their runoff water. However, it has not adequately been monitored to determine pesticide and nutrient removal efficiencies. The gravel constructed wetland is 70 x 20 feet and 1.5 feet deep. It holds approximately 5,000 gallons of water and has approximately 170 clumps of bulrush, 10 cattail and several juncus plants growing in the gravel media. The wetland collects water from irrigation and rainfall runoff from 2.4 acres of container nursery plants. It is estimated that 20,000 gallons of runoff per two hour irrigation event enters a distribution flow box at the entrance of the wetland over a 4-hour period. There is a 10-inch pipe in the center of the distribution box which allows water to bypass the wetland when runoff flow is greater than the wetland's hydraulic conductivity. The bypass pipe goes directly into a pond which is used for irrigation water. The treated wetland effluent also goes into the pond.

This treatment technology was also evaluated at Baxter, TN for eight years using 14 constructed wetland cells. Results demonstrate greater than 60% removal of pesticides, nitrogen and phosphorus at two-day hydraulic retention times. To demonstrate removal of chemicals, it is required to both determine pesticides, nitrogen, and phosphorus entering the wetland and also concentrations in the wetland effluent. This has not been conducted at the Pirtle constructed wetlands.

This proposed project requests funding to determine flow into the wetlands and pesticide, nitrogen, and phosphorous influent and effluent concentration. From these measurements constructed wetland removal

efficiencies can be computed. Design of the constructed wetland can be optimized to achieve desired removal efficiencies for the agricultural chemicals in water runoff.

The objective of this project is to determine pesticide, nitrogen, and phosphorus removals at the constructed wetland at Pirtle container nursery. A real advantage of this research is that the data is from a constructed wetland at a grower site. This will reduce observed differences that often occur in bench scale research projects when compared to actual working systems.

Proposed methods include pesticide (prodiamine, oryzalin, and isoxaben) analysis by gas chromatography (EPA 505), nitrogen by the persulfate method (SM 4500-N C), and phosphorus by the ascorbic acid manual method (EPA 365.1). These analyses have been developed and conducted by the Water Center Laboratory.