Applying knowledge to improve water quality
Great Lakes
Regional Water Program
A Partnership of USDA CSREES
& Land Grant Colleges and Universities

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Evaluation of a Cover Crop Root System for Retaining Bacterial Contaminants in the Root Zone

GREAT LAKES REGION

National Theme:
Animal Waste Management
Pollution Assessment and Prevention

Project Description

In order to improve profitability, many dairy and livestock farms are consolidating to form larger production units. This increase in large-scale animal production units coupled with a growing awareness of potential adverse effects on water quality from farming systems has led to adversarial relationships among some Michigan and Ohio dairy and livestock farmers and their non-farm neighbors. Many of the conflicts stem from contamination of surface waters with manure from runoff or subsurface drains.

Combining aeration tillage with low manure application rates helps protect water quality where subsurface drains and livestock-based cropping systems coexist. Photo by Tim Harrigan.

Nutrients that are not used by crops can escape from the application site to surface waters, contributing to eutrophication of surface waters and carrying with them the health threat of waterborne pathogens. Land-applied manure has been shown to quickly enter subsurface drains. Indeed, the number one research priority identified at the 2004 conference, *Liquid Animal Manure Application on Drained Cropland: Preferential Flow Issues and Concerns* in Columbus, Ohio was the need to better understand the transport and fate of pathogens in land-applied manure. In addition, the need for pathogen-based best management practices (BMPs) in animal waste management was identified in 2005 by the Great Lakes Water Program as one of the top research priorities.

Practices such as the planting of cover crops can influence the persistence of pathogens in the root zone. Where manure and sub-surface drainage coexist, a vegetative cover and active root system may help prevent manure contaminant loss to tile lines. Development of this and other pathogen-based BMPs can help prevent manure pollution of waterways.

The work provides a foundation for a balanced management approach to help protect water quality, an approach that expands the use of conservation tillage and cover crops, and provides new knowledge for developing pathogen-based BMPs for manure land application.

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Project Goals

There is a need to better understand the effects of vegetative covers and subsurface root systems in retaining bacterial contaminants in the soil profile for water quality protection. Specific objectives of this project are to:

- increase the use of cover crops on farm ground for water quality protection; and
- evaluate the bacteriological water quality of tile line effluent following manure application over tile lines with vegetative and non-vegetative surface covers.

Outcomes

The project has demonstrated that with low-disturbance pre-tillage and controlled (low) liquid manure application rates (e.g. 6000 gpa), there is little risk of rapid movement of manure contaminants to subsurface drains on the Blount loam soils in no-till cropping systems. These soils and cropping systems are characteristic of southeast Michigan and northwest Ohio. These recommendations have become the basis for discussions with livestock producers regarding the adoption of new manure management practices that protect surface and ground-water from manure contamination.

Dairy and livestock producers are keenly interested in manure and land management alternatives that protect water quality. Photo by Tim Harrigan.

The project has also increased the aware-ness and understanding of potential water quality impacts from manure application, and improved the under-standing of factors contributing to bacterial contamination.

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