



Instrumentation used to monitor tile water flow and sampling collections on one of the farm field sites.

PHOTO: RICHARD BRUNKE, OMAFRA



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An Interim Report

Cropland sub-surface drainage has long been a matter of interest to those responsible for water quality, particularly in waterways and lakes.

Algae growth has been associated with phosphorus loss from cropland and has appeared in all of the Great Lakes, Lake of the Woods, Lake Manitoba and the Ottawa River system. It also has been associated with Chesapeake Bay in the U.S. and in many other water bodies.

The Lake Erie drainage basin has been the poster child of the Great Lakes blue-green algae problem and this implicates southwestern Ontario. In 2008-2009, both cropland subsurface drainage and no-till crop production were identified as contributors to the algae problem. In response, five farmers from across southern Ontario offered their land for use as research sites for a detailed year-round assessment of the role that subsurface drains and tillage practices play in the P problem. All of the farmers are excellent soil managers and had practiced some level of no-till for several years. They engaged in this project because they wanted to know if they were contributing to the problem and if so, what management changes would bring improvement. Working around this kind of research is not easy. The agricultural community owes much to this group.

The project moved forward with

participation by staff and researchers from the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA), the University of Guelph, Wilfrid Laurier University, and the University of Waterloo, with Dr. Merrin Macrae (U of Waterloo) taking the lead role.

On three sites (one farm has two sites), P content in subsurface drain pipe water was measured under varying levels of tillage that ranged from aggressive mulch tillage to no-till. On the remaining three sites, the P content of surface runoff water has been compared to drain pipe water.

Water samples have been collected automatically every two to six hours whenever there is water flowing. This has continued year-round for the past three years and this is the most comprehensive work done on upland soils in the Lake Erie Basin.

What is reported from this work is that in 2012, '13 and '14:

- Water leaving those fields did not carry increased levels of soluble P as the amount of tillage varied from aggressive mulch tillage to no-till.
- Through this study period most of the water leaving the fields left through subsurface drains with a small amount as surface runoff.
- Most of the soluble P that left the fields

was in the surface runoff with very little P lost through subsurface drains.

- The concentration of soluble P was much lower in subsurface drain water than in surface runoff water.

General observations and questions:

- Subsurface drains can play an important role in reducing soluble P losses by reducing overland flow.
- On well-managed upland soils, much of the soluble P appears to be taken up by the soil as water percolates down to the sub-surface drains. How much would this change if these same soils were compacted?
- What percent of water will leave fields as runoff on dense clay soils, particularly if they are compacted?
- What are the consequences of using surface inlets to direct water down into subsurface drain pipes?

This research has answered some important questions. Now, it needs to be extended over more time to capture the effect of a wider range of weather impacts, and we need to understand the impact of more aggressive land management, particularly on clay soils. Increased knowledge about soil and water management brings a high potential to improve water quality in waterways and lakes.



The Land Improvement Contractors of Ontario (LICO) is an association of professional drainage contractors and suppliers of drainage pipe and equipment. The focus of their business is soil moisture management to enhance crop production in Ontario.

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