

# Oxford Innovative Nitrogen Management Strategy

## Thornton Well Field, Woodstock, Ontario

### Final Report - April 2011

#### What has been Done?

The County of Oxford led a project to investigate the effectiveness and efficiency of innovative nitrogen management practices for crop producers and the impact on drinking water sources. This was the first research of this type in Ontario.

The two year project included a research demonstration site to:

- Assess the impact / effectiveness of innovative nitrogen management practices, such as slow release nitrogen, on reducing nitrate levels in drinking water sources;
- Conduct an economic analysis to determine the costs and benefits of slow release nitrogen use for crop producers;
- Share the results of the project on the County of Oxford and Upper Thames River Conservation Authority websites.

#### Project Steps

- Carrying out environmental monitoring of nitrogen movement of the different treatments over the growing season.
- Conducting economic monitoring of treatments to measure corn yield and nitrogen use efficiency, and to determine cost effectiveness.
- Analyzing treatment data and sample data and comparing with 2009 preliminary results.
- Releasing 2010 results comparing new and enhanced nitrogen management options with standard practices.
- Identifying positive practices that will improve Woodstock's main drinking water source.

#### The following observations and conclusions are based on 2009 and 2010 corn plot research:

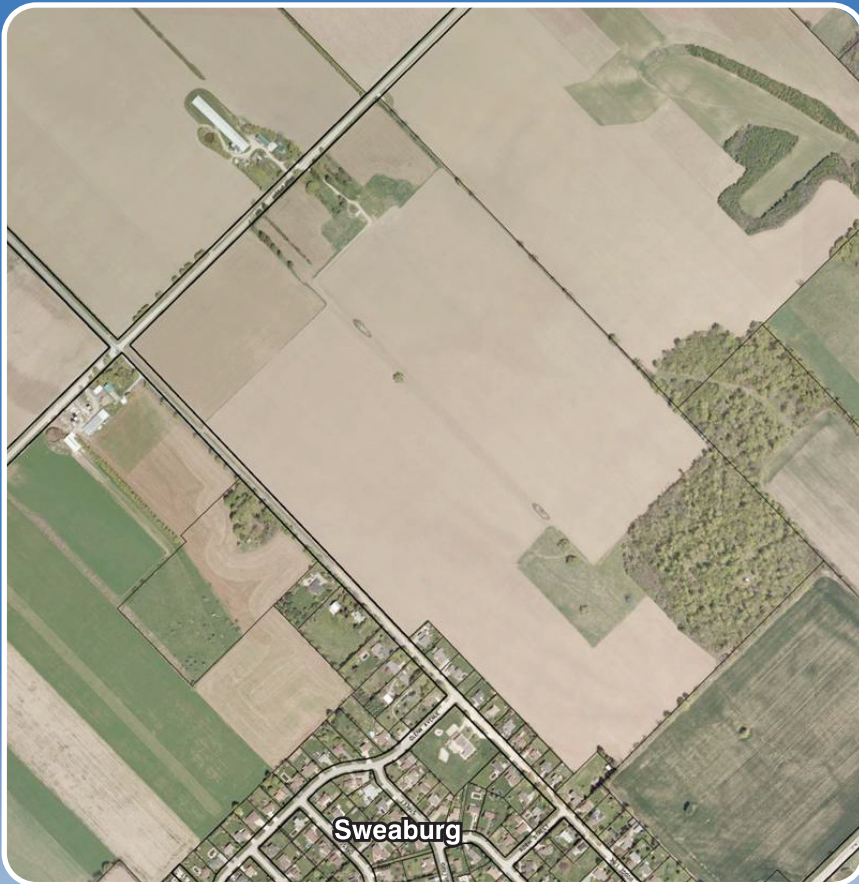
- Soil nitrate samples showed there was a delay in the release of nitrogen from the new generation controlled release nitrogen product of up to about 3 weeks. This product has the environmental benefit of delaying the release of nitrogen and reducing the risk of leaching losses during the early, wetter period of spring and releasing it closer to when plants can take it up.
- Crop yield results for the spring applied controlled release urea nitrogen and conventional urea were similar resulting in a lower return with the use of the more expensive coated nitrogen.
- The delayed application of nitrogen at side-dress time of about a month and using a lower rate as recommended from the revised Ontario Corn Nitrogen Calculator further reduced soil nitrate levels. Results showed that these plots had comparable yields to spring applied nitrogen (controlled release and conventional urea nitrogen).
- Plots with a red clover cover crop that received 45% lower nitrogen application rates using the Ontario Corn Nitrogen Calculator had similar yields to plots without a cover crop. These plots did not demonstrate additional residual soil nitrogen at harvest time after the cool, wet 2009 season but were statistically higher during and after the warmer, wetter 2010 season. Soil organic nitrogen release in 2010 was higher in all plots and contributed to very high yields even in plots without added nitrogen; however, soil nitrogen at the end of the year was still relatively low for the plots using recommended nitrogen rates.
- Nitrogen applications that do not take into account residual soil nitrogen, as considered by the Ontario Corn Nitrogen Calculator and the Pre-Sidedress Nitrogen Test (PSNT), present a risk for the well field's drinking water supply with excessive soil nitrate nitrogen remaining after the crop year. This higher application rate tested based on historical recommendations also resulted in a lower economic return.
- The use of the Ontario Corn Nitrogen Calculator at the research site appeared to be cost-effective for spring and side-dress application and red clover nitrogen credit - [www.gocorn.net](http://www.gocorn.net)
- Greater economic returns were observed from using side-dress application and from those plots with the red clover cover crop. A new transgenic corn hybrid compared to a conventional hybrid showed no yield advantage at 3 different rates of nitrogen over the 2 years.
- Further investigation into the issue of nitrogen variability in a field from season to season is needed to help determine appropriate nitrogen application rates and reduce the risk of nitrogen losses to groundwater.



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## Location

The research was conducted within the Thornton Well Field, which is located on the west side of Oxford Road #12, between Highway #401 and the Village of Sweaburg. This site was selected because it is owned by the County of Oxford and contains over 130 groundwater monitoring wells.

## Funding

Funding for this project was provided by the Ontario Drinking Water Stewardship Program of the Ministry of the Environment.

## Partners

- County of Oxford (project lead)
- University of Waterloo
- University of Guelph
- Ontario Ministry of Agriculture, Food and Rural Affairs
- Upper Thames River Conservation Authority
- local farm operators
- Soil Resource Group

## For more information

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