UNIVERSITY of GUELPH

SOILS AT GUELPH

The nitrogen hangover – 'tis the season to take stock

When it comes to applying nitrogen to corn, how do you know if your corn has had enough?

For many, the holidays are a time to gather with friends and family. In some cases, we overindulge in the spirit of maximizing enjoyment. Sometimes that "maximizing" can leave you holding your head, your gut, or your wallet the next morning, wishing you'd made different choices, only to find yourself doing it again the next time.

Why is it hard to change how you've always done things (or forget that you used to do it another way)? And why are we resistant to hear the wisdom of, say, the cousin in the corner who's trying to tell you, "There might be another way…"?

When it comes to nitrogen (N) management in agriculture, Dale Cowan, Senior Agronomist and Agronomy Strategy Manager at AGRIS Cooperative Ltd in southwestern Ontario (above photo), isn't one to keep doing something the same way if he thinks there is a better way of doing it.

"If we are still having difficulty after all these years picking the 'right rate' of N for our corn" Cowan says, "maybe we don't have to have the perfect rate of N out of the gate. Maybe start by applying a nominal rate. Then use models and predictive tools to meet crop demands later in the season."

The science behind Cowan's theory and more are explored in a series of case studies by Soils At Guelph. The series looks at concepts related to soil functions in agriculture from four different perspectives – 1) Soil Carbon, 2) Soil Biology and Agriculture, 3) Using and Losing Soil Nitrogen in Agriculture, and 4) Soil Health. Each case study is

Photo – Dale Cowan

grounded in research coming out of the University of Guelph and beyond.

According to Cowan, the first step in determining the 'right rate' of N application is to take a soil test. Why? Because soil can store N from one season to the next – a sort of N-hangover, if you will. One factor influencing the N-hangover is the amount of organic matter (OM) in the soil. OM contains N as well as carbon, which both support the microbial transformations that make nutrients available to crops.

Other factors influencing the N-hangover include the soil's inherent texture, its structure (which is influenced by tillage practices and levels of OM), as well as soil water saturation levels and temperature. Finally, soil N levels are influenced by how much N was removed in the harvest, and how much was lost to the atmosphere or to surface- or groundwater (Figure 1).

Before Cowan's time, most N would have been supplied by manure or rotting plant material and would have been applied at the rate that it was available. But times have changed. Not only do we have synthetic forms of N, but we can also apply it with more precision than ever and at rates supporting yields our ancestors could only imagine.

Science facilitated these changes. Now, science tells us that N losses to the atmosphere contribute to global warming (with 298 times more punch than a molecule of carbon dioxide). Science also tells us that N losses to ground and surface water can make us, our lakes, and our rivers "sick".

Besides, synthetic N isn't cheap, so losing it to the environment can make us feel sick for other reasons!

So, before you head into the next cropping season, consider taking a moment to evaluate your nitrogen management strategy. There are tools and resources out there to help you minimize the risk of N losses while still maximizing the benefits provided by N. *

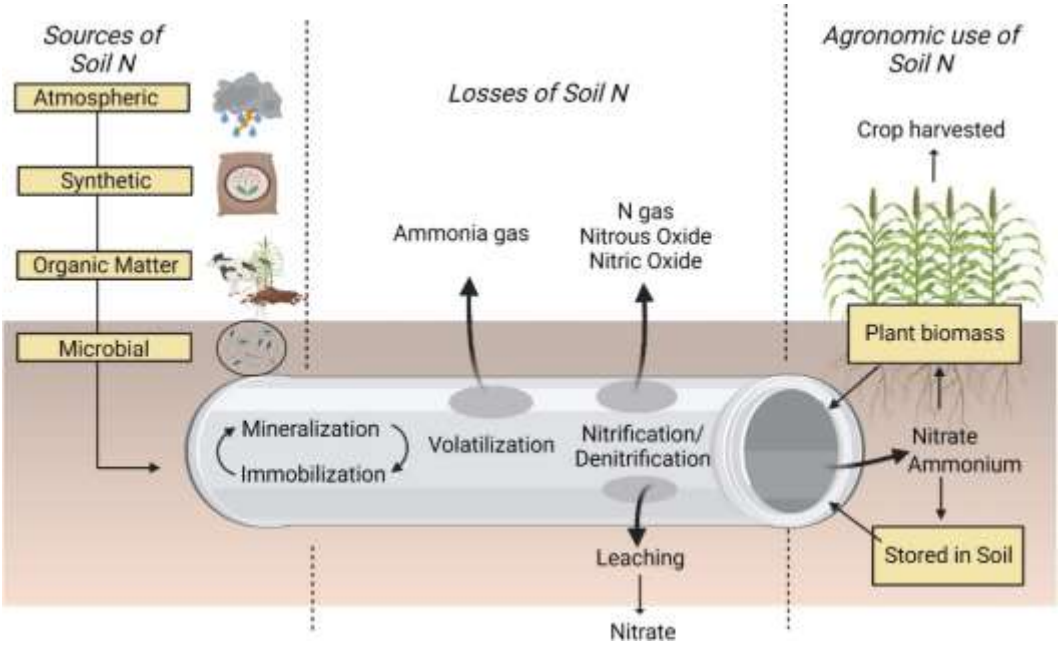

Figure 1 - This "hole in the pipe model" of the nitrogen cycle helps us to visualize the sources, transformations, and possible losses/uses of N in agricultural systems.

* Author Heather White is the Knowledge Mobilization and Communications Coordinator at Soils At Guelph
soils@uoguelph.ca

This article first appeared in the Ontario Farmer Tuesday December 19th, 2023. It was part of a four-part series by Soils At Guelph to support growers and their advisors in understanding the essential role of soil health in crop production and the provisioning of ecosystem services. To see the case study series in full, visit our website, www.soilsatguelph.ca

UNIVERSITY of GUELPH
SOILS AT GUELPH

This case study project is funded in part by the Ontario Ministry of Agriculture, Food, and Rural Affairs (OMAFRA), through the Ontario Agri-Food Innovation Alliance.

Soils At Guelph
Alexander Hall Building
50 Stone Road East
Guelph, Ontario, N1G 2W1
soils@uoguelph.ca