

# NITROGEN MANAGEMENT FOR MAXIMUM BENEFITS

## GET NITROGEN APPLICATION “JUST RIGHT”

Sorry, Goldilocks. Research and experience have shown the “just right” amount of Nitrogen (N) can be a moving target. This is because N use efficiency (NUE) is very related to weather, particularly when and how much rain falls, as well as to soil and market conditions.

Getting the most out of your N investment (because it IS a major expense, especially for corn) is about risk management – doing what you can to minimize the risk of losing N to air as ammonia or nitrous oxide, or to ground and surface water as nitrates.

“ Split application and inhibitors seem to me to make the best sense. Applying in July when the soil is less likely to be soggy means you’ll often lose less to the air as nitrous oxide. You’ll also have a good sense of how growth is progressing so you can be more realistic with your projected yields and the N requirements to get there.” | Daynard

## MAXIMUM YIELD, PROFIT AND BENEFIT

A study for the Greenbelt Foundation looked at what the research could tell us about yield response (Figure 1) and effect on net returns (Figure 2) from split application (side-dress), rate reduction, variable rate application, and enhanced efficiency fertilizers (EFFs, like inhibitors and stabilizers). Each of the treatments assumed the recommended rate of fertilizer N was being applied.

When enhanced efficiency fertilizers were used, the research showed only positive yield responses. However, some gains in yields were required to cover the increased cost of the fertilizer and move to a net positive revenue. This is a good reminder for growers to **track the effect of fertilizer on both yield response and net returns.**



Terry Daynard farms 150 acres in Wellington County and is a former Executive Vice-President of the Ontario Corn Producers’ Association and corn researcher and educator at the University of Guelph.

### Keep Learning:

Daynard has been farming for 50 years and has never stopped modifying his practices as new information and technologies become available.

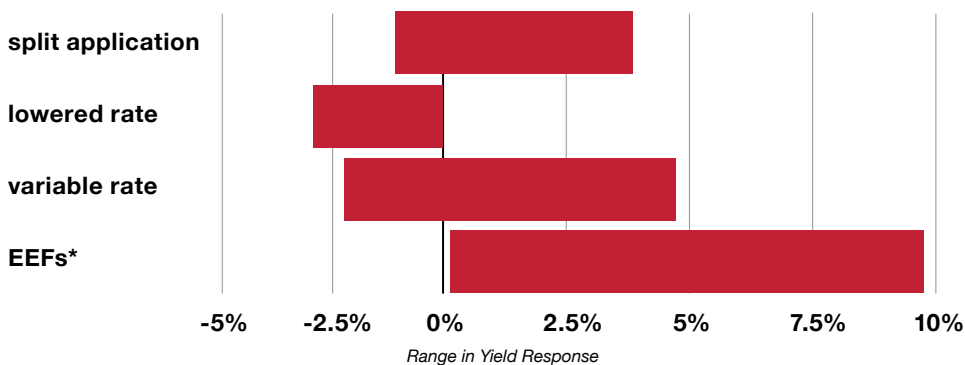
“In the early 1970s, I was farming continuous corn in a no-till system. Then for many years I had a corn - soybean rotation that also included winter wheat and white beans. Just last year I had my fields mapped. With the help of cost-share programs, I was able to recover 70% of the mapping costs. Now I have a more targeted nutrient program; some zones get no nutrients (mainly P and K), while others require more. Going forward I’ll be tracking the impact of this new program on my net returns.” | Daynard

# WHAT'S THE BOTTOM LINE?

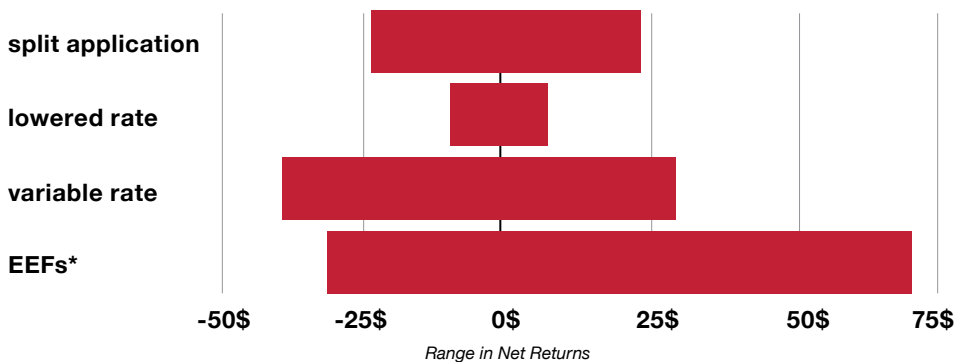
Split application and variable rate application had a range in yield response (both positive and negative), but the range in net returns nearly cancel each other out. This is representative of the type of variation you might expect over good years and bad years. Over time, the revenue stays relatively stable, yet the benefit to the environment is improved each year by having a more targeted nutrient program.

When recommended rates were reduced by 10 and 20%, yields were either unaffected or were slightly reduced. In a scenario when “extra” N is added, it is likely wasted most years. A modest reduction in N rates could be a good place to start to test the yield/net return response in your system. Consider the Pro Tips to think through how you might be able to reduce the risk of N loss on your farm while still having favourable net returns.

**Figure 1: Range in yield response (%) with different fertilizer management.**



**Figure 2: Range in net returns (\$) with different fertilizer management.**



\*Enhanced Efficiency Fertilizers

**Additional resources:**

Towards a Business Case for Soil Health: A Synthesis of Current Knowledge on the Economics of Soil Health Practices in Ontario. 2022. The Greenbelt Foundation. [www.greenbelt.ca/business\\_case\\_soil\\_health](http://www.greenbelt.ca/business_case_soil_health)

For all OMAFRA's Best Management Practices Resources, including Managing Crop Nutrients, Rotation of Agronomic Crops, Soil Health in Ontario, and Winter Cover Crops, go to: [bmpbooks.com](http://bmpbooks.com)

**Possible funding programs to support equipment modifications, purchase, new practices, etc., consult:**

- Your local Conversation Authority
- OMAFRA Programs
- Ontario Soil and Crop Improvement Association, or your local Soil and Crop Group



**Pro Tips:**

**Try a test strip:** “Don't just believe the research, try reducing fertilizer rates by 10% on a test strip on your farm the next few seasons and track the results. You might be surprised by how little that rate change impacts yield” | Colin Elgie, Soil Fertility Specialist, OMAFRA.

**Include small grains and cover crops:** These two practices are great “gateway” practices towards soil health and can condition soils for more efficient nutrient cycling in the whole system.

**Don't go alone:** Find others who are trying to fine-tune their nitrogen use. They can help problem-solve, access existing resources, and help you gain confidence in the approach.

“We need to move towards Integrated Nitrogen Management, where management strategies are “stacked” to achieve the best possible outcome for profitability and the environment.” | Deb Campbell, CCA-ON, 4R NMS

**Access funding:** Use available incentive funding to offset new costs, including soil mapping or investment in application equipment.

This factsheet is a summary of key findings from the report, Towards a Business Case for Soil Health. Soil health practices considered in the report and this Factsheet Series are: reduced tillage, cover crops, crop rotation, manure amendments, rotational grazing and various 4R nutrient practices. The report estimated that Ontario farm net returns would increase by approximately \$14.6 million dollars per year if an additional 10% of the agricultural land in Ontario were to be managed to support soil health.

The numbers come from peer-reviewed, Ontario-based research and the analysis is based on financially-representative, farm-level budgeting techniques for Southern Ontario. Estimates are conservative and do not represent profits possible with experienced management.