



Stabilizing fall-applied nitrogen helps boost potential crop growth

Improving understanding of how and when applied nitrogen migrates following application supports nutrient maintenance and retention.

Fall-applied nitrogen can migrate if the wrong conditions occur, leading to increased nitrification – the process that contributes to nitrogen loss – allowing the fertilizer to leach from the soil where it's needed by the upcoming crop.

However, fall-applied nitrogen can be a great way to prepare fields for upcoming crops and reduce the spring workload. Having a more comprehensive understanding of the challenges that fall-applied nitrogen faces during the winter and into the spring, coupled with information on how a product like N-Serve® nitrogen stabilizer functions, can leave you better prepared to provide nitrogen management recommendations for customers.

Temperature, moisture and nitrogen loss

First, there are a few key takeaways to understand about the hibernation process fall-applied nitrogen experiences.

Temperature matters to fall-applied nitrogen and 50°F is an important benchmark because *Nitrosomonas* – the bacteria that spark the nitrification process – are more active when it's warmer. *Nitrosomonas* activity shows a significant decline at 50°F and almost completely stops when temperatures fall below 40°F. While application of nitrogen can occur at, above or below 50°F, ideal application occurs when temperatures fall below this 50°F high-activity threshold for *Nitrosomonas*.

Moisture levels also can negatively affect nitrogen presence. High moisture levels following rain or snowmelt combined with warmer temperatures and higher *Nitrosomonas* activity increase the risk of nitrogen leaching. The negative influence that the combination of weather and temperature changes can have on nitrogen remaining in place is heightened for fall-applied nitrogen, as the fertilizer experiences two periods of transitional or unstable weather with fluctuating rainfall and temperatures.

Despite the documented vulnerabilities that nitrogen faces, it remains an important tool for farmers. One way to take advantage of the flexibility of applying nitrogen in the fall and ensure that the nutrient stays in place for spring planting



is to protect it with a proven product like N-Serve® nitrogen stabilizer. The stabilizer defends nitrogen from both leaching and the denitrification process, helping to guard it during warm and wet transitional periods.

Developing, testing nitrogen stabilizers

N-Serve nitrogen stabilizer has helped farmers protect applications of anhydrous ammonia for decades. Work on developing a nitrification-inhibiting ingredient took off in the late 1950s with the discovery of nitrapyrin, which was registered by the U.S. Environmental Protection Agency in 1974 as the active ingredient in what would become a nitrogen stabilizer. In 1976, the N-Serve product was brought to market in the U.S. for use with anhydrous ammonia.

There was some initial skepticism about the product because it was hard to tell if or how it worked in the field. However, since it was introduced, N-Serve has been tested in more than 1,000 trials and university studies. These examinations have provided years of data demonstrating the stabilizer's capabilities.

The nitrogen stabilizer works below ground where up to 70% of nitrogen loss occurs, acts to slow down *Nitrosomonas* bacteria and prevents nitrogen from becoming nitrate. Nitrates can be lost

more easily into groundwater or, through denitrification, into the atmosphere.

A meta-analysis of more than 180 studies found that N-Serve – powered by Opinyte® technology – can:¹

- Improve yields by 5.2% when used with spring anhydrous ammonia applications and by 7% when added to fall applications.
- Extend nitrogen availability up to eight weeks.
- Reduce leaching by 16%.
- Improve nitrogen retention in soil by 28%.
- Lower greenhouse gas emissions by 51%.

By helping maintain nitrogen in its ammonium form longer, the nutrient is more likely to stay in the root zone and be available to corn during key growth stages.

Building off its legacy, N-Serve continues to be a product that protects anhydrous ammonia and keeps nitrogen where it is needed. Use of the nitrogen stabilizer provides several economic and environmental benefits to farmers. It also supports increased grain production, more natural dry-down, improved standability and reduces stalk rot. The use of N-Serve also can extend nitrogen's availability in the soil, helping to ensure its presence in the spring so crops can access it during critical growth periods.

Despite the documented vulnerabilities that nitrogen faces, it remains an important tool for farmers. One way to take advantage of the flexibility of applying nitrogen in the fall and ensure that the nutrient stays in place for spring planting is to protect it with a proven product like N-Serve® nitrogen stabilizer.

¹ Wolt, Jeffrey. "A meta-evaluation of nitrapyrin agronomic and environmental effectiveness with emphasis on corn production in the Midwestern USA." *Nutrient Cycling in Agroecosystems*. 69(May 2004): 23–41.

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