

Is N stabilizer your answer?

By MICK LANE

NITROGEN management continues to be an important issue for growers. "As if economics weren't enough of a reason to improve nitrogen management, factors like the Chesapeake Bay, greenhouse gases and cap-and-trade legislation have only elevated the importance," says Tracy Blackmer, director of research at the Iowa Soybean Association.

There's been a huge increase in the availability and marketing of N-stabilizing products. Several of these products having some potential to conserve N have also added to the confusion, Blackmer says, but products that affect N loss fall into three main categories:

■ **Process inhibitors** are products that slow the transformations of N into forms that are likely to be lost.

■ **Controlled-release products** affect timing of fertilizer release to the soil and environment, which delays the other processes that can lead to N loss.

■ **Binding agents** are a broad category usually used in the context of a microbial product that "ties up" N so it won't be "available" for loss.

The table below shows products intended to help retain nitrogen in the soil, how they work and which nitrogen forms they work with. It's important to note that the information was provided by the manufacturers. Not all of it is backed by research, and even less by Iowa research.

While many of these nitrogen loss-prevention products can show a difference in the laboratory, there can be big differences under field conditions where they're expected to perform all season long. "Leaching rains during May-June changes the picture," Blackmer says.

Assuming that a nitrogen stabilizer will protect all the N applied from loss when using risky practices could lead to a worse situation," he adds.

No yield response expected

Here are conditions in which you would not expect an economic yield response:

■ **Overapplication of N.** When more N is applied than the crop will need, N losses might be quite high, and there could still be more than enough N for the crop. In this case, even though the nitrification inhibitor works, it's unlikely it would make a difference in yield.

■ **Lack of leaching rain or denitrification conditions.** If environmental conditions do not cause a loss of nitrate from the system, delaying the transformation will have no benefit.

Key Points

- Farmers want to improve their nitrogen management for a number of reasons.
- The availability and marketing of nitrogen stabilizer products has increased.
- Understand what these products can and can't do, and how to use them.

■ **Use of inhibitor too early, so activity ends too early.** When warm winters and warm springs combine, the N-Serve in an early-fall anhydrous application may not last long enough to stop nitrification until plant uptake in late spring or early summer.

Conditions for a yield response

Conditions in which you might expect an economic yield response:

■ **N fertilizer is applied at rates close to, or below, optimal.** When the N rate is not excessive, a nitrification inhibitor will be more noticeable in the final yield.

■ **Conditions that create a high risk for leaching/denitrification loss.** The more loss of N from a soil (both fertilizer- and soil-based), the greater the likelihood of an economic response.

■ **Conditions with rapid nitrification and N loss potentials.** Warm soils, high soil pH, light-textured soils and adequate moisture can combine to increase the rate of nitrification and the likelihood of seeing a response from N-Serve.

UAN (liquid, or 28%-32%) is a nitrogen fertilizer containing three forms of N and has several application-dependent issues.

The first issue is, 25% of the N in UAN is nitrate, which is easily lost from the soil. None of these stabilizers can do anything

to protect this.

The second is, 25% of N in UAN is in the ammonium form. In addition, urea (remember, half of the N in UAN starts out as urea) will eventually convert to the ammonium form (if not lost to volatilization). This means that 75% of the N in UAN can end up as ammonium in days or weeks. Nitrification inhibitors can slow this down.

Dow AgroSciences recently formulated nitrapyrin into a water-soluble product called Instinct to use with UAN and liquid manure. Keep in mind that Instinct won't protect against UAN volatilization losses.

DCD (dicyandiamide) is another nitrification inhibitor that has been well-documented in laboratory studies. It is the "plus" in the product Agrotain Plus. There are disagreements about whether DCD is as effective as nitrapyrin.

Nutrisphere is sold as a product to inhibit nitrification. It's a newer product on the market, and Blackmer hasn't found any lab studies to confirm this mode of action, or been able to document the effects in Iowa field trials in the first year of testing.

The third issue is that 50% of the N is in the form of urea — highly prone to volatilization if left on the soil surface. This is frequently an issue when UAN is applied on no-till fields.

Agrotain can help protect against volatilization losses for a period of weeks, until rain can move urea into the soil profile. But incorporation by injection or tillage eliminates the risk of volatilization.

Lane is research communications manager for the On-Farm Network.

■ For more on these products, go online to www.isafarmnet.com.

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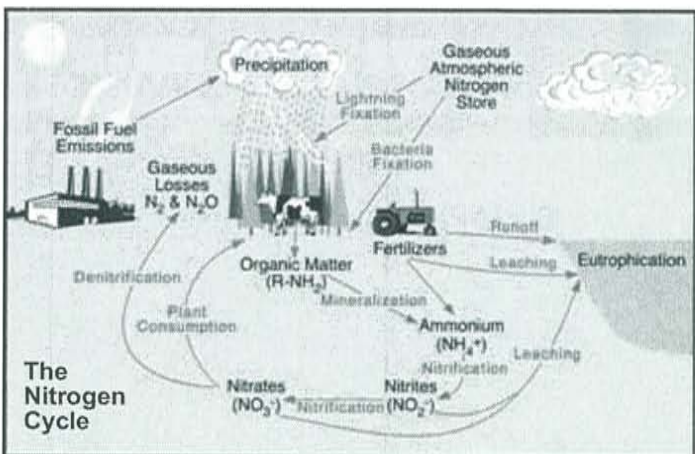
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Nitrogen stabilizer products and how they work

Product	Category	Specific	Fertilizer applied
Nutrisphere	Conversion process	Nitrification/urease	UAN/urea/manure
Agrotain	Conversion process	Urease	Urea/manure (not incorporated)
Agrotain Plus	Conversion process	Urease/nitrification	UAN/urea
N-Serve (nitrapyrin)	Conversion process	Nitrification	NH ₃
Instinct (encapsulated nitrapyrin)	Conversion process	Nitrification	UAN/manure
Accomplish	Binding agent	Not specified	All sources?
Poly-coated	Urea controlled release	Delayed availability	Urea