

Nitrogen Inhibitors – What Products Should You Consider?

Managing nitrogen fertilizer to maximize availability and decrease environmental risk is a noble endeavor, but it is not easy. There are multiple products available to achieve our desired goal of keeping nitrogen around in forms that are less susceptible to loss and increasing plant uptake. In this article, we will only tackle nitrogen inhibitors, and more specifically, urease and nitrification inhibitors.

What is your greatest loss potential?

While it may not seem that intuitive, this is the correct first question to ask. Are you concerned about volatilization potential of a urea-based nitrogen application or just denitrification/leaching of nitrate? These have two different potential solutions. If you are concerned about volatilization, then a urease inhibitor should be considered. If you are concerned about denitrification or leaching, then a nitrification inhibitor should be considered.

Urease Inhibitors

A natural question is, just how much nitrogen can you lose if your urea containing product is unprotected? It depends upon the environment and management (see the bullet list below), but nitrogen loss via volatilization (gassing-off of ammonia) can approach 40% within a 7-day period after application.

So, what conditions will cause greater loss of ammonia from applying a urea-containing product?

- Surface applications
- High levels of crop residue
- Surface pH levels above 7.2
- Low probability of rainfall events after the application occurs, but there is enough humidity to cause urea to take on water

An NBPT containing compound is the right choice for mitigating volatilization risk of urea-containing nitrogen fertilizers (common trade names – AGROTAIN®, AGROTAIN® PLUS, ANVOL®). These products bind with the urease enzyme (the compound responsible for breaking down urea) rendering it incapable of reacting with the urea you have applied.

How much of a yield benefit do urease inhibitors provide? Again, it depends upon the conditions experienced at the time of application but yield responses can be a few bushels to over 30 bushels per acre under the right conditions. The yield benefit is a function of loss potential (all the factors illustrated in the bullet points) and nitrogen application rate.

Nitrification Inhibitors

Just how much nitrogen can you lose by denitrification/leaching? It depends upon several factors (see bullet list below), but the amount of nitrate lost by leaching can be as high as 50 pounds per acre (we

are only focused on losses during the growing season), and nitrate lost by denitrification can be as high as 4-5% per day of the total applied when soil temperatures are warm.

So, what conditions will cause greater loss of nitrate?

- Leaching
 - High rainfall (when your tiles are running)
 - Coarser textured soils (sands have greater risk than clays)
- Denitrification
 - More anaerobic conditions (waterlogging)
 - Warmer soil temperatures
 - Heavier textured soils (clays have greater risk than sands)

Products that contain nitrapyrin or DCD are your options to help slow nitrification. Nitrapyrin products are N-Serve[®] (compatible only with anhydrous ammonia) and Instinct[®] (compatible with liquid nitrogen materials). DCD products are AGROTAIN PLUS (compatible with UAN and urea) and CENTURO[®] (compatible with anhydrous ammonia and liquid nitrogen materials).

How much of a yield benefit do nitrification inhibitors provide? Again, it depends upon the conditions experienced after the application (and the nitrogen source). Our goal with nitrification inhibitors is to slow nitrification so that there is not a large concentration of nitrate available in the soil at any given time to be susceptible to loss. Under extreme loss conditions, nitrification inhibitors can provide considerable yield benefits (approaching 20 bushels per acre). Under low loss conditions, nitrification inhibitors may only provide a couple of bushels or none.

You should consider the use of nitrogen inhibitors within your fertilization strategy. The right one for your operation is going to be impacted the source of nitrogen you are using, how much your applying, when it is being applied, and where it is being applied (this looks like a 4R concept). Ask your local Heritage agronomist for more information.