Sidedress considerations

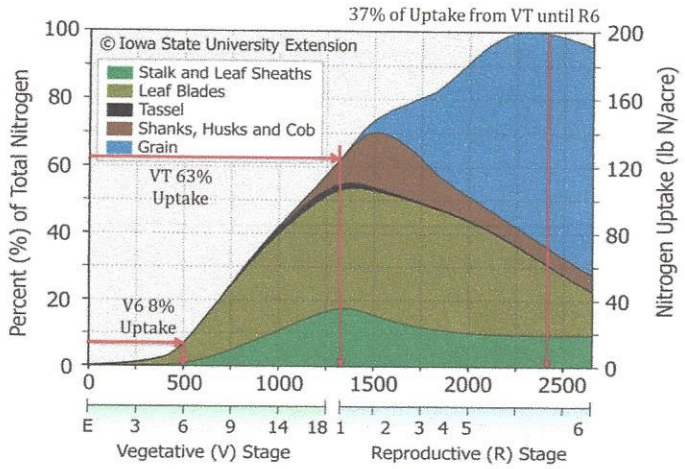
Written by: Mick Goedeken
Technical Marketing Agronomist, United Suppliers, Inc.

Splitting nitrogen applications can improve efficiency of nitrogen. Sidedress applications are an important part of Balance N management. Numerous studies from across the Corn Belt have proven that split N applications increase corn yields. Furthermore, sidedress applications also play an important role in following the 4R's of nutrient stewardship. This communication will help answer questions associated with sidedress applications.

Timing

When planning a sidedress application it is important to think about when the corn plant will utilize the nitrogen. At V6 the corn plant has only taken up 8% of its nitrogen need for the entire growing season. By the time the corn plant reaches VT it has only taken up 63% of the N need which results in 37% of the N need being taken up between VT and R6 (Figure 1.). This is why it is more efficient to apply N using split applications.

Ideally sidedress N would be supplied at or just shortly before V10 however, logistics, Mother Nature, and rapid growth are limiting factors to applying all sidedress during this time. Many growers choose to begin sidedress applications earlier to insure they are able to apply sidedress nitrogen. An early sidedress application would be applied between emergence and V4 while a late sidedress application would be after V4. Late sidedress applications are often limited by application equipment and the ability to drive over the growing crop without damaging it. Over the past decade equipment manufacturers have developed application equipment with higher clearance allowing applications to taller crops without damaging them. Furthermore, utilization of a nitrogen stabilizer will allow for earlier application while protecting the product from nitrogen loss.



Nitrogen Products

When considering a sidedress nitrogen application the grower can choose from many N sources that will fit both their supplier's abilities and the fields that they are sidedressing. Urea Ammonium-nitrate (UAN28-32% N) is a liquid fertilizer that can be dribble banded or coulter banded as a sidedress application. Anhydrous ammonia (NH_3 82% N) is knife injected into the soil. Urea (46% N) is spread over the top of the corn crop using a dry spinner or airflow applicator. Finally, a foliar nitrogen application can be sprayed directly onto the plant as a nitrogen source without injuring the plant and is a very efficient method of supplying N to the growing corn plant.

Nitrogen Stabilizers and Sidedress Urea

Nitrogen stabilizers prevent nitrogen losses due to volatilization, denitrification, or leaching or all three. When N is applied as a sidedress application the first concern would be loss due to volatilization when urease causes the urea portion of surface applied N to be lost as ammonia gas. After application ammonium is converted to nitrate and can leach out of the root profile or saturated soils can lead to denitrification losses therefore it is important to use a stabilizer that protects against all loss pathways. Generally nitrogen stabilizers will provide two to four weeks of protection from volatilization. Most nitrification inhibitors will prevent nitrification for a few weeks to thirty days depending on soil conditions. If a volatilization inhibitor is applied and a dry period of two weeks occurs will the N still be protected? It is a general agreement that the protection from volatilization will be reduced by around 50% when rain does not occur for two weeks after application because of environmental breakdown of the products. Furthermore, N moves into the plant by mass flow so soil moisture is necessary to get the N into the plant regardless of the N source. Therefore, N availability is not the largest issue during dry conditions. The table below will help demonstrate the protection provided by many different nitrogen stabilizers.

Table 1. Protection from loss pathways offered by Nitrogen Stabilizers.

Product	Volatilization	Leaching	Denitrification
Agrotain Advanced, Ultra, Dri-Maxx	X		
Agrotain Plus	X	X	X
ESN	X		
N-Serve		X	X
Instinct II		X	X
Limus	X		
NutriSphere-N Liquid, Granular, HV, QDO, NH3	X	X	X
SuperU	X	X	X

From the table above it can be seen that some products only offer protection from volatilization and not leaching or denitrification. All nitrogen stabilizer products help prevent N loss when utilized and will increase yields when environmental conditions for N loss are present. However, it is difficult to know ahead of time what loss pathways will be present for each growing year therefore, using a nitrogen stabilizer is like buying insurance.

Nitrogen loss from fields across the Corn Belt can be quite substantial. Data indicates that fields across the Corn Belt can lose between 21 and 224 pounds of nitrogen per year. Up to 45 pounds of the total N loss can be attributed to volatilization, up to 36 pounds of N loss from leaching and up to 40 pounds of the loss can be from denitrification. Recent case studies from Adapt N found that N loss in 3 Iowa fields ranged from 50 to 150 pounds of N loss per acre over the past three growing seasons. Utilizing a nitrogen stabilizer will help prevent some of the N loss.

Wrap up

There are several good sources for sidedress N applications. With any sidedress application the risk of N loss is a concern. The N loss can be limited by a stabilizer or a foliar N application. It is important to use a stabilizer when applying early sidedress applications to make sure the N is still available when the plant needs it.