Fall and Spring Anhydrous Ammonia Applications

- Fall applications of anhydrous ammonia can help to reduce soil compaction and spread out the workload for more timely spring plantings.
- Spring anhydrous ammonia applications can help to limit nitrogen loss before it is needed by the crop.
- Splitting applications of anhydrous ammonia in the fall and spring helps to minimize many of the disadvantages associated with applying all of the product at once.

Anhydrous Ammonia

Anhydrous ammonia can be a good and economical source of nitrogen (N) for corn. It is in a gaseous form and quickly reacts with soil water to form ammonium, which binds to soil particles and is not subject to loss through volatilization, leaching, or denitrification. Ammonium is converted to nitrate in the soil by a microbial process called nitrification. Nitrate is the form of N that is available for plant uptake, but it can also be subject to loss. Denitrification is a microbial process that occurs under anaerobic (lack of oxygen) soil conditions converting nitrate to N gases that can be lost through volatilization. Warm soil temperatures favor nitrification, and warm temperatures along with wet soils favor denitrification. When compared to other N fertilizers, the rate of conversion to nitrate in the soil is slower with anhydrous ammonia, helping to minimize the potential for N loss.

Fall Application

Applying anhydrous ammonia in the fall can have the advantages of reduced soil compaction and spreading out the workload. Disadvantages can be the loss of N between application and crop use, and environmental concerns with nitrate runoff and leaching into streams, lakes, and groundwater.

Anhydrous ammonia is the preferred source for fall-applied N. Other sources of N have a greater potential to leach, volatilize, or to be lost in runoff. Fall anhydrous ammonia applications are common in areas that have favorable soil and weather conditions. Fall applications should not be made in areas where soils seldom or never freeze, or where there is a long period between the time when soils reach 50°F and soil freeze. Nitrifying organisms continue to function down to 32°F, but at a slower rate. Fall applications should be made when the soil temperature is below 50°F and continued cool weather is in the forecast. Long periods of time at low soil temperatures above 32°F can still result in nitrification of a large percentage of fall-applied N. Including a nitrification inhibitor in a fall N management system can potentially help slow the conversion of ammonium to nitrate.

Loss of N from anhydrous ammonia application can be higher under extended warm periods in the fall, and under prolonged wet conditions in the spring before planting. If the following spring is dry, there may be little risk of loss from a fall application.

Spring Application

Applying anhydrous ammonia in the spring reduces the amount of time between N application and crop use. Nitrogen loss by leaching and surface runoff may be less of a concern in the spring. Disadvantages of spring N application include workload issues that could delay timely planting. A wet spring can delay N applications and may increase soil compaction. Early N crop uptake may be limited with a delayed application and without good dispersal of N in the soil. Another risk of applying anhydrous ammonia in the spring is the potential for damage to the crop when it is applied too close to planting.

Splitting Fall and Spring Applications

Many of the disadvantages with fall and spring applied anhydrous ammonia can be minimized by applying a lower rate in both the fall and spring. Applying some anhydrous ammonia in the fall, and the rest in the spring has the advantage of minimizing the risk of fall-applied N loss. The N applied in the fall can provide what the crop needs to get started in the spring. The remainder applied in the spring, closer to when the plant needs the N, helps to increase use efficiency and reduces the chance of loss by leaching and denitrification. Applying lower rates can also help to increase the efficiency of a nitrification inhibitor in the fall, and minimize the risk of crop injury in the spring.


For additional agronomic information, please contact your local seed representative. Developed in partnership with Technology, Development, & Agronomy by Monsanto. Individual results may vary, and performance may vary from location to location and from year to year. This result may not be an indicator of results you may obtain as local growing, soil and weather conditions may vary. Growers should evaluate data from multiple locations and years whenever possible. ALWAYS READ AND FOLLOW PESTICIDE LABEL DIRECTIONS. All other trademarks are the property of their respective owners. ©2015 Monsanto Company.