

Post Rock Extension District Column

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Is winter a good time to apply anhydrous ammonia fertilizer to my crop fields?

Most producers have completed their fall harvest and may not be thinking about their fertility program for their 2022 spring row crops, but now may be the time!

For one thing, fall fertilizer application spreads out the workload so there's more time to focus on planting in the spring. Secondly, wet conditions in the spring sometimes prevents producers from applying lower-cost anhydrous ammonia ahead of possibly corn planting and forces them to apply more expensive sources after planting. Equally important for many producers have been issues with anhydrous ammonia availability at times in the spring according to Dr. Dorivar Ruiz Diaz, K-State Research and Extension, Fertility Management Specialist.

Ruiz Diaz stresses that despite those advantages, producers should be aware that there is potential for higher nitrogen (N) loss in the spring following a fall application, as a result of nitrification of the ammonium during late winter and very early spring and subsequent leaching, or denitrification. By delaying application until cold weather, most of the applied N can enter the winter as ammonium, and over-winter losses of the applied N will be minimal.

Traditionally, producers should wait until soil temperatures are less than 50 degrees F. at a depth of 4 inches before applying ammonia in the fall or early winter. Nitrification does not cease below 50 degrees F, but rather soils will likely become cold enough to limit the nitrification process. In many areas of Kansas, soils may stay warmer than 50 degrees well into late-fall and only freeze for short periods during the winter.

A great resource to obtain soil temperatures is the **KSU Mesonet Climate Library** which is an "online" website at <http://mesonet.k-state.edu/weather/soil/>. Once you get to the Mesonet website you will go to the "weather" tab and select "weekly soil temperatures". **Our Post Rock Extension District has 3 weather stations located in Jewell, Osborne and Mitchell counties that provides both 2-inch and 4-inch depth readings for soil temperatures.** During the week of November 21, 2022, our weather stations had an average temperature range, at the 4-inch soil depth, of 39-40 degrees F.

The use of a nitrification inhibitor can help reduce N losses from fall N applications under specific conditions, particularly during periods when soil temperatures warm back up for a period after application.

Producers should also think about soil physical properties when considering fall fertilizer application. Fall applications of N for example, corn, should not be made on sandy soils prone to leaching, particularly those over shallow, unprotected aquifers. Ruiz Diaz points out that fall N applications should focus on deep, medium- to heavy-textured soils where water movement through the profile is slower.

So, when is nitrogen lost? When considering fall application of N, keep in mind that loss of N during the fall and winter is not normally a problem in Kansas. The conversion of "protected" ammonium to "loss prone" nitrate during the fall and winter can be minimized by waiting to make applications until soils have cooled, and by using

products such as nitrification inhibitors. The fact that essentially all the N may remain in the soil as ammonium all winter, coupled with our dry winters, means minimal N is likely to be lost over winter. However, soils often warm up early in the spring and allow nitrification to get started well before corn planting. **Generally, if the wheat is greening up, nitrification has begun!** So, one of the potential downsides of fall application is that nitrification can begin in late February and March, and essentially be complete before the corn crop takes up much N in late May and June.

So, in summary, Ruiz Diaz emphasizes that if anhydrous ammonia is to be applied in the fall, there are a number of factors that must be considered, including soil texture, temperature, and soil moisture. Producers should consider the following guidelines:

- Do not apply anhydrous ammonia in the fall on sandy soils.
- On silt loam or heavier-textured soils, wait to apply anhydrous ammonia until soil temperatures at the 4-inch depth are below 50 degrees F (records indicate in some years this will be in November/December).
- Use a nitrification inhibitor with anhydrous ammonia to help reduce fall nitrification rates.

If you have further questions on fertility management, contact me at any Post Rock Extension District Office in Beloit, Lincoln, Mankato, Osborne or Smith Center.

Post Rock Extension District of K-State Research and Extension serves Jewell, Lincoln, Mitchell, Osborne, and Smith counties. Sandra may be contacted at swick@ksu.edu or by calling Smith Center, 282-6823, Beloit 738-3597, Lincoln 524-4432, Mankato 378-3174, or Osborne 346-2521. Join us on Facebook at "Post Rock Extension" along with our week "Ag News Roundup." Also remember our website is www.postrock.ksu.edu and my twitter account is @PRDcrops.