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FALL ANHYDROUS APPLICATIONS - WHY WAITING IS IMPORTANT?

As harvest wraps up, farmers look at other fall field work. For those planning to apply anhydrous ammonia for next year's corn crop, soil temperature is the guiding force behind the start of the application window. The reason why is somewhat complicated. There is a short simple reason explanation. We don't want to lose the nitrogen to leaching or denitrification before the corn has a chance to take it up.

Nitrogen in the form of nitrate is the N form that can potentially be lost from soils due to these wet conditions via leaching and denitrification (conversion to nitrogen gas). Anhydrous ammonia is instantly bound to the soil as ammonium. This is not subject to leaching until soil bacteria transform it to nitrate. Temperature is the largest influence on the rate of soil nitrification. Research indicates that the optimum temperature for nitrification is around ninety degrees F. Below fifty degrees F, the rate slows rapidly, even though it continues at a very slow rate until the ground is frozen. We need to make sure the soil temperature is trending downward. Since we cannot control soil temperatures, we have to manage to avoid the effects they have on N loss. We would like to see a full week with soil temperatures below fifty to ensure the temperatures will stay low. The average of the high and low air temperature for the day is a good estimate of soil temperature. Daytime highs in the 70's and lows in the 40's will keep the soil temperature above 50 degrees F.

Nitrification inhibitors can slow the conversion of ammonium to nitrate. In our silty clay loam soils, the effect they have does us little good until spring warm up. Even then the length of time between nitrogen application and crop use make it somewhat impractical to use them except in sandy soil areas where leaching is more severe.

The longer we wait the more likely we are that snow cover and frozen ground will stop fall applications. While this can complicate spring workloads, it can also help keep costs in line as application rates can be reduced by 5 percent to achieve the same yield goals. We can further reduce nitrogen needs by using prescription management options. We would use yield maps and soil organic matter maps to set spring application rates. These would be from 5-10 percent less than normal spring rates. Then we use tissue testing to determine if added nitrogen is needed in the growing crop. This added nitrogen can be applied with ground, air or irrigation systems. Research and experience with area farmers using this system indicates added nitrogen is only needed one or two years out of ten.

Application of urea or UAN liquid nitrogen forms is not recommended for fall application as losses to leaching or denitrification are likely to exceed 80 percent of the application rate. Another consideration in selection of a nitrogen fertilizer system is the energy cost of nitrogen. It is by far our highest energy user in crop production. While the cost of nitrogen fertilizer slows our use, carbon dioxide use factors are also becoming part of corn purchase contracts.

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