

Shoppers Guide Article June 8, 2021

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## Wet Soils and Nitrogen Loss

With the excessive and continual wet weather during most of May, many parts of eastern and central Kansas are faced with the potential for leaching and/or denitrification losses of valuable nitrogen (N) from fields already planted or intended for corn and sorghum. The potential for N loss is much greater when the weather is warm than when it is cool.

The leaching and denitrification processes are quite different, and normally occur on different types of soils and under different situations. However, it is important to keep in mind that both processes involve the nitrate form ( $\text{NO}_3^-$ ) of nitrogen. The Nitrate-N present in fertilizers such as urea ammonium nitrate (UAN) solution (25% nitrate), is immediately susceptible to leaching or denitrification loss. Other forms of N have to be converted in the soil to Nitrate-N before leaching or denitrification would become a problem. This microbial conversion process is called nitrification and requires oxygen in the soil (an oxidation process). Before estimating how much N may have been lost in wet soils, producers should first try to get some idea of how much of the applied N may have undergone nitrification into Nitrate-N at this point in the season.



Several factors influence how quickly Ammonium-N converts to Nitrate-N in soil. These factors include: Soil oxygen content; Soil temperature; Soil pH; N fertilizer application method; Certain characteristics of the N fertilizer.

Thus far this year, the saturated soil conditions have been accompanied by low soil temperatures (Figure 1), therefore we can expect that a good amount of the N applied in late fall or early spring to still be in the ammonium form. This would suggest a lower risk for N loss at this point in the season. However, producers that applied all their N very early in the fall should be in position to apply an additional 30 to 50 lbs of additional N if needed. Keep in mind that from the N uptake standpoint, we have a big window for any “supplemental” N application. Recent work at K-State has shown that N applied close to tasseling can be used effectively by corn. That will require dribbling the N on between the rows with high-clearance application equipment. If your corn “runs out of gas” later in the season, it gives you an option to correct the problem.

All corn that appears yellow at this time will not be seriously N deficient. In fields where N application was delayed until late April or early May, especially where ammonia was applied, the majority of the N is likely still present in the soil and the corn is probably yellow due to “wet feet” and will green up when things dry out and oxygen gets back into the soil. Thus, no additional N will be needed.

Trying to sort out exactly how much N loss has occurred in a specific field is difficult, if not impossible. Producers can establish some reference strips in the field to serve as a base for comparison. Apply the equivalent of an additional 50 to 75 pounds of N per acre to 3 to 5 areas in a field. These areas can serve as a point of reference for evaluating your crop.