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TIPS FOR STRETCHING YOUR NITROGEN FERTILIZATION INVESTMENTS THIS YEAR

World demand for N fertilizers and increased energy expenses have caused N fertilizer costs to increase to ranges not seen before. Prices of grain, oilseed, and fiber crops have increased as a consequence of lower stocks of these crops, associated with increased global demand. These market forces and prices require farmers and their crop advisers to use every resource available to optimize the benefits of each unit of N fertilizer applied. Many farmers are seeking alternative sources of N, such as animal manures and biosolids. Whatever the chosen source, there are key principles that need to be considered in management decisions this year, to ensure good crop N use efficiency and optimized profits.

There are four major loss pathways to consider when applying N fertilizers and all other N sources to soils to meet crop requirements. They are: l) escape to the atmosphere as ammonia gas (termed volatilization); 2) surface runoff; 3) leaching through the soil; and 4) gaseous loss to the atmosphere as nitrous oxide (N_2O, a potent greenhouse gas) or stable di-nitrogen gas (N_2, which makes up 78% of the atmosphere)…this loss is termed denitrification.

Here are some tips to consider to minimize the risk of N loss via these four major pathways, and to improve N use efficiency on your farm this year.

Ammonia emission or volatilization losses — Ensure that anhydrous ammonia, urea-containing, and ammonium-based N sources are properly placed beneath crop residues and are incorporated below the soil surface; with urea-containing sources, urease inhibitors can be used that help delay or reduce the risks of loss as ammonia gas.

Leaching and runoff losses — These losses can occur with any N source applied to the soil, since all sources, including ammonium and urea-containing sources, will normally convert to the nitrate (NO_3^-) form in warm, moist soils in the course of several weeks. With NO_3^--based sources, and essentially all N sources, time the application to synchronize as closely as practical with crop uptake demand; avoid timing that may be subject to high intensity rainfall events within a few days to a few weeks after application that could rapidly accelerate movement off or through the soil; apply rates consistent with crop requirements and yield potential; consider split applications to minimize NO_3^- accumulations before crop uptake; and/or use nitrification inhibitors with ammonium-based N sources.

Denitrification losses — Once the applied N exists in the soil as NO_3^-, under warm, wet (near saturation) conditions, bacteria can convert it to N_2O and N_2 gases that can escape to the air. Take measures to prevent build-up of NO_3^- by using appropriate N rates and timing. Place N beneath the soil surface, but no deeper than necessary to prevent any potential ammonia losses from ammonium-based sources or those that convert to ammonium (often no deeper than 6 to 8 in., depending on soil texture); consider using nitrification inhibitors or slow- or controlled-release N sources which help time N availability with crop demand.

Consult your fertilizer dealer, crop adviser, agricultural consultant, or Extension agent to learn more about ways to enhance your crop's N use efficiency this year. You may need to adjust your plans from past management practices. Use the tips mentioned above to return better profits and to minimize environmental losses. Good fertilizer N decisions include the fundamental principle of selecting the appropriate N source, applying the right N rate, choosing the right time of application, and placing the N source properly in the soil.

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Abbreviations: N = nitrogen;

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