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Nitrogen Management on Sandy Soils

By Murray Van Zeggelaar, *CCA*

Nitrogen management on any soil type is important for agronomic, economic and environmental reasons, but sandy soils are especially sensitive to nitrogen management issues. Sandy soils are generally defined as those soils with a cation exchange capacity (CEC) of less than 5. This article will attempt to explain some of the issues surrounding nitrogen management on sandy soils and offer some tips on maximizing the benefits of nitrogen fertilization on sandy soils.

Because of the mobile nature of nitrogen in the nitrate form, one of the biggest agronomic issues of growing crops on sandy soils is having nitrogen available to the crop as it is required throughout the season. This is especially important for crops such as potatoes, some cole crops and corn, which have a high requirement for nitrogen. The second issue with nitrogen fertilization on sandy soils is its potential for leaching into groundwater. This is also an economic issue, as this means extra costs can be incurred if nitrogen is lost to leaching. The issue of leaching losses becomes greater in wet years or in those crops where irrigation is routinely used.

So, what can be done to maximize the benefits, both agronomic and economic, while minimizing the impact on the environment?

Following is a list of ten management tips that can be used. These tips are not in any order and not all can be used by every grower with every crop.

1. **Select the proper nitrogen fertilizer.** Avoid using nitrate forms of nitrogen fertilizer where possible. Ammonium-containing fertilizers such as anhydrous ammonia and 28% UAN contain ammonium nitrogen, which is not subject to leaching. Urea is also a more stable form of nitrogen on sandy soils than nitrate forms.
2. **Apply the recommended rate.** Select the correct rate of nitrogen for your soil and crop based on soil test recommendations. Too little nitrogen cuts into profits through yield reductions and quality problems; too much nitrogen increases costs through unnecessary fertilizer use and increases the potential for leaching.
3. **Use split applications of nitrogen.** The practice of split applications of nitrogen should help to supply fertilizer when the crop needs it. The use of the pre-sidedress nitrogen test will also help pinpoint exact nitrogen requirements. Crop nitrogen needs can also be monitored with plant tissue sampling.
4. **Use variable rate technology.** With variable rate technology and yield monitors, it is now possible to match the nitrogen rate to the yield potential in specific areas of the field. This will enable optimum nitrogen rates by applying higher rates of nitrogen where yield potential is higher and lower nitrogen rates where yield potential is lower.
5. **Use nitrification inhibitors.** Use nitrification inhibitors, especially in surface-applied nitrogen applications. These products slow down the conversion of ammonium nitrogen into nitrate nitrogen. The most common nitrification inhibitors used today are ammonium thiosulphate and nitrapyrin.
6. **Use cover crops.** The use of cover crops helps to soak up and use any left over nitrogen in the ground and prevent it from leaching. The most common "mop-crops" include cereal grains such as fall rye and oats. Other work has been done on novel cover crops such as oilseed radish.
7. **Use credits from organic sources of nitrogen.** Legume plowdown and manure or compost applications can contribute significant amounts of nitrogen to your crop. Take these credits into account when determining nitrogen requirements.
8. **Incorporate materials as soon as possible after application.** Always incorporate manure and fertilizer such as urea as soon as possible after application. Where immediate incorporation is not practical or possible, use a urease inhibitor such as N-(n-butyl) thiophosphoric triamide (NBPT) to prevent nitrogen loss due to volatilization.
9. **Irrigate wisely**. Irrigation is both necessary and economically viable for many crops grown on sandy soils. Use an irrigation-scheduling program that provides the required water while at the same time avoiding over-application.
10. **Use buffer zones.** This practice applies to nitrogen application on any soil type, but especially on sandy soils. Do not apply nitrogen near wells and other environmentally sensitive areas.

Most of the above management tools can be incorporated into almost all cropping systems. These tools are becoming even more important than ever in an era of increasing energy costs, which translate into higher nitrogen costs. They are also important tools in helping growers protect our groundwater resources from contamination, enabling agriculture to be sustainable in the future.

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