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MANAGEMENT TOOLS OPTIMIZE CORN RESPONSE TO SPRING-APPLIED NITROGEN

Genetic improvements have helped raise the yield potential of corn across the U.S. It is the proper management of all agronomic inputs, however, that enables farmers to capture higher yields, which are necessary for profitable production. Tools are available to determine the appropriate N rate for individual fields and sub-field management zones. Among the most reliable resources which farmers depend on are results from local, replicated university N rate research trials. In the absence of local university research data, on-farm replicated tests can be quite helpful as a guide in choosing N rates for specific soils, environmental conditions, and adapted corn hybrids.

The most successful corn growers and crop advisers always consider N credits for recent past and current manure applications, and they also factor-in N credits for any rotational legume crops (or cover crops) in their N rate decisions. With increased energy costs—-which directly impact N costs—proper N credits from these sources can really help improve the bottom-line.

Other tools that can be used to estimate either the residual or current soil nitrate-N supply, to help adjust the total N rate applied, include: 1) spring preplant soil nitrate-N test (often helpful where manure has been applied); 2) late spring soil nitrate-N test (after the crop has been planted); and 3) pre-sidedress soil nitrate N test (before the second N application). These have proven helpful, especially in less humid and lower rainfall production regions. They may also be reliable in other regions where research has calibrated the measured nitrate-N and meaningful interpretations have been developed. Demands for labor and time have sometimes prevented the wide-spread adoption of these tools.

Agronomic scientists have made valiant efforts to develop soil tests which estimate the potentially-available N provided by release of inorganic N from soil organic matter (mineralization). Some of these tests have met with moderate success, primarily in geographic areas where they were developed. Use beyond the locally-calibrated geography has frequently proven less successful. For example, one of the more recent soil N mineralization tests – the “Illinois N test” (also referred to as the amino-sugar N test) — has not worked well in a number of other states where it has been tested, according to a paper presented at the 2006 North Central Extension-Industry Soil Fertility Conference in Des Moines, Iowa.

Skilled agronomists often use in-season plant tissue testing, in combination with soil testing, to refine and verify adequate plant N nutrition. Newer technologies that are also being utilized and improved through local calibration include: 1) remote sensing of color and biomass (by satellite or airplane, calibrated to N nutrition); 2) on-the-go sensing (as equipment moves over the field during vegetative growth); and 3) hand-held chlorophyll meter (for leaf greenness estimation, related to N nutrition). In some countries, where there is considerable knowledge about adapted varieties or hybrids, simple calibrated color charts are used to determine if crop N levels are sufficient (e.g. rice in southeast Asia).

Additives like urease or nitrification inhibitors can help control or maintain the specific form of N in the source used, and may enhance crop N recovery. Slow- or controlled-release N sources may also have a place on some farms and fields, depending on the N loss mechanisms involved.

Although every tool can not be used on every field, we have the capability of using many different tools to refine spring-applied N management for corn in 2007 — for economic benefit and improved environmental stewardship. What will you add to your plan to improve N management in corn fields this year?

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Abbreviations in this article: N = nitrogen.

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