

# INTEGRATED CROP MANAGEMENT

## Soil nitrate concentrations are low this year

The late-spring test is revealing some very low soil nitrate concentrations this year. Here are some suggestions to help you interpret the results.

**Low concentrations of nitrate should be expected after above-average amounts of spring rainfall.** The basis for this expectation is summarized in the article [Early season losses of nitrogen](#) [1], which appeared in the February 2001 issue of this newsletter. Low concentrations of soil nitrate in the spring tend to be followed by low concentrations of nitrate in cornstalks in the fall. Yields also tend to be reduced, but yield reduction is more difficult to detect.

Do not be surprised if you find low soil nitrate concentrations in fields that received manure or anhydrous ammonia last fall. Research during the past decade indicates that delaying fall applications of anhydrous ammonia until soils have cooled to 50°F does not offer much protection against nitrogen (N) losses during wet springs. Some of these studies have been summarized in this newsletter: [Is fall nitrogen profitable](#) [2] (August 7, 2000); [Soil pH and losses of fall-applied ammonia](#) [3] (August 21, 2000); [Rescue fertilization following losses of nitrogen](#) [4] (May 5, 1999 special edition Precision Ag); and [Status of fall-applied N this spring](#) [5] (May 18, 1998).



Much of the N in liquid swine manure is as ammonium, and this N is converted to nitrate about as fast as N applied as anhydrous ammonia. Nitrogen from manure is more susceptible to loss than is N from commercial fertilizers, however, because manure contains organic carbon, which promotes denitrification in wet soils.

Recommended rates of N fertilization for these low-testing soils are given in Table 3 of ISU Extension publication PM 1714 (May 1997), [Nitrogen Fertilizer Recommendations for Corn in Iowa](#) [6]. Note that fertilization is not recommended until soil nitrate concentrations are less than 10 ppm under rainfall and economic conditions prevailing this year. This table should be used for soils that received fall-applied anhydrous. Additional information is provided in the article [Hold nitrogen on manured cornfields this spring](#) [7], which appeared in the February 2000 issue of this newsletter.

**Do not be surprised if you find low concentrations of nitrate in fields treated with urea-ammonium nitrate solutions this spring.** Much of this N could have been lost due to rainfall in May and early June. Do not be concerned about N supplies if nitrate concentrations are greater than 20 ppm. About 8 lb N/acre should be applied for each ppm of nitrate below

20 ppm, but do not apply more than 100 lb N/acre additional N.

**Testing fields after spring-applied anhydrous ammonia is tricky.** Do not even try if you applied N at a rate greater than 150 lb/acre. You must collect 24-32 cores to get a reasonable sample. Use Table 3 of PM 1714 to select an N rate for low-testing soils.

Fields of corn after soybean that have received less than 50 lb of N should be expected to test less than 15 ppm. Assume that higher test values are an error. Such fields should receive at least an additional 50 lb N/acre, but more than 100 lb of N usually is not needed. Note that 100 lb N/acre applied after plants are 6 inches seems to be near optimal on most years (see Optimal rates of side-dressed nitrogen [8] in the May 5, 1999, special edition Precision Ag ICM newsletter).

**Nitrogen applied late is much better than no N at all.** Research in Iowa during the past few years has shown that N-deficient corn responds to fertilization after tassels have emerged. The fertilizer applied was UAN dribbled on the soil surface. Mounting evidence suggests that delaying applications of N is an effective strategy for managing N in years like this year. Fertilizer N applied during June of this year is much more likely to be available to crops than is the N that was applied last fall.

**Remember that the late-spring test is only a tool.** The late-spring test is a tool that reduces uncertainty, but it is not perfect. Do not follow recommendations that seem unreasonable. Whenever you use the test to guide fertilization, check the results by treating some strips with a reasonable rate that you did select for the rest of the field.

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**Source URL:**

<http://www.ipm.iastate.edu/ipm/icm//ipm/icm/2001/6-18-2001/soilnitrate.html>

**Links:**

- [1] <http://www.ipm.iastate.edu/ipm/icm/2001/2-26-2001/earlyn.html>
- [2] <http://www.ipm.iastate.edu/ipm/icm/2000/8-7-2000/falln.html>
- [3] <http://www.ipm.iastate.edu/ipm/icm/2000/8-21-2000/fallloss.html>
- [4] <http://www.ipm.iastate.edu/ipm/icm/1999/5-5-1999/rescue.html>
- [5] <http://www.ipm.iastate.edu/ipm/icm/1998/5-18-1998/nspring98.html>
- [6] <http://www.extension.iastate.edu/Publications/PM1714.pdf>
- [7] <http://www.ipm.iastate.edu/ipm/icm/2000/2-28-2000/holdnit.html>
- [8] <http://www.ipm.iastate.edu/ipm/icm/1999/5-5-1999/opt-sidedrn.html>

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