

LATE-SPRING SOIL NITRATE TEST (LSNT) USE IN 2019

John Sawyer, Professor, Department of Agronomy, Iowa State University

Antonio Mallarino, Department of Agronomy, Iowa State University

Nitrogen (N) fertilization for this year's Iowa corn crop has been complicated by frequent and sometimes excessive rainfall from late last fall through this spring. Many farmers who normally apply N in the fall couldn't, and spring preplant N application and corn planting has been challenging in many areas with the wet and extended cold soil conditions. Therefore, many farmers are uncertain about the N availability for corn, early post-emergence assessment of soil N supply, and the potential for supplemental sidedress N application.

The Late-Spring Soil Nitrate Test (LSNT) can be a useful tool for estimating crop N-availability in soils. In 2017, a new Extension and Outreach publication, [Use of the Late-Spring Soil Nitrate Test in Iowa Corn Production](#) (CROP 3140), replaced the previous publication (PM 1714). The new publication provides an overview of the LSNT, research on correlation and calibration, specific procedures for using the test, and interpretation of test results. The basics and interpretation of the test are generally the same as the past. Guidelines are now specific for interpretation in manured fields and corn following alfalfa, and an additional soil test category was added for those interpretations. Additional information was added providing more detail explaining various aspects of the test and both its reliability and precautions for use.

Considerations for use in the spring of 2019

The calibrated LSNT sampling time is when corn is six to twelve inches tall (measured from the ground to the center of the whorl). That timing is usually late May to early June. This year, with the wet and cold conditions, many fields will likely not have corn at that height during the late May through early June period; or even later because in some fields corn may be planted in late May or early June. So, when should samples be collected this year? We suggest collecting LSNT soil samples in early June (first two weeks) even if the corn is not to the suggested height. This sample timing caveat is also described in the time and depth of sampling section of the new publication [CROP 3140](#).

The LSNT measures nitrate-N concentration in the top foot of soil, and the test result is used as a guide for sidedress N application. That concentration is a combination of nitrate residual from the prior year, mineralized N from soil organic matter, and any fall or early spring applied N that has converted to nitrate. Due to these various sources of nitrate, and potential for nitrate leaching below the top foot of soil when rainfall is greater than normal, the test reliability may vary. This will be especially an issue this spring with the quite different spring weather and timing of N application across Iowa. In general, research has shown that the LSNT is most reliable at predicting a lack of corn response to additional N at values above the 25 ppm critical level. Reliability is lower for specific rate of N to apply when the test result indicates a potential deficiency (test results below 25 ppm). Also, the transformation of soil organic N to nitrate may be delayed given prevailing colder and wetter soils than usual, and ammonium nitrogen applied close to sampling time (like recent anhydrous ammonia) that may not have all converted to nitrate. The LSNT does not measure ammonium-N, and ammonium-N is not included because

1

previous research has shown that in most conditions ammonium measurement is not useful to assess and predict N supply for corn. Therefore, the reliability of the LSNT test is lower in these special conditions and should be used with caution because an underestimation of future N supply for corn is likely.

Some areas of the state had greater than normal rainfall, and generally soils have been colder than normal in Iowa this spring. Therefore, consider using an adjusted soil test critical value of 20-22 ppm instead of 25 ppm, especially if you've had greater than 20 percent above normal precipitation between April 1 and time of sampling (for manured soils greater than 5 inches in May). The reason for this adjustment is described in the test result interpretation section of CROP 3140.

Resources for nitrogen rate decisions

[Corn Nitrogen Rate Calculator](#)

[Nitrogen use in Iowa Corn Production \(CROP 3073\)](#)

[ISU Extension and Outreach Soil Fertility Web Site](#)