Performing a Corn Stalk Nitrate Test

Q. What is the corn stalk nitrate test?

The corn stalk nitrate test (CSNT) is conducted late in the season and can be a reliable end-of-season indicator of crop nitrogen (N) status. The test reflects N availability during the growing season and provides a tool to help growers determine if their N management practices were adequate. The CSNT provides an assessment of whether the crop had the right amount of N, too much N, or was N limited.

Q. When should you collect samples for the CSNT?

Sampling can be done anytime between ¼ milk line up to about 3 weeks after black layer formation, before grain harvest.

Q. How should CSNT samples be taken?

- Starting at least 6 inches up to 14 inches above the soil line, cut an 8-inch-long section of corn stalks, removing any leaf sheaths. Pruning shears can work well for taking samples.
- A sample should include 10-15 stalk sections from randomly selected representative plants throughout the field. Selected plants should be healthy, and stalks severely damaged by insects or disease should not be used.
- A sample, 10 to 15 stalk sections, should not represent more than 20 acres.
- If soil characteristics or past management practices vary across the field, separate samples should be collected for each area.

Q. How do you prepare and what should you do with the samples?

- Cut stalk sections into 1- to 2-inch-long segments to facilitate drying.
- Samples should be placed in paper bags (not plastic) and sent to a laboratory for analysis.
- Samples should be refrigerated (not frozen) if they are to be stored for more than one day before shipping.
- Most soil testing laboratories will conduct the CSNT. Contact your laboratory to confirm that they will run the test along with any procedures or paperwork required.

Q. What will the lab results tell you?

The CSNT is based on the concentration of nitrate-N in the lower corn stalk at the time when the plant is near or reaches maturity. Lab results will indicate the following:

Table 1. Interpreting a corn stalk nitrate test result.

Nitrate Concentration	Nitrate Level Interpretation
<700 ppm	Low
700-2000 ppm	Optimal
>2000 ppm	Excessive

- A low nitrate level reading indicates that not enough N was available to the plant to reach full yield potential.
- An optimal nitrate level reading indicates that the N was adequate for optimum economic yields in the field or sample area.
- An excessive nitrate level reading indicates that excess N was applied that could reduce profitability and result in N losses to the environment.

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Q. What are the limitations of a CSNT?

The CSNT can be greatly influenced by weather, soil productivity, and management practices. These factors can complicate interpretation of the test results:

- The test identifies optimal and excessive nitrate levels more accurately on medium yield potential soils compared to high yield potential soils.
- The test can incorrectly indicate excessive nitrate levels on fields with manure applications within the past two years and/or alfalfa in the rotation, particularly on high yield potential soils. The test should not be used for first-year corn following sod.
- Test levels can be high in extremely dry years and low in extremely wet years. Drought conditions can result in elevated nitrate levels in the lower stalk.

The test does not provide an indication of the amount of N that was over or under supplied. Test result readings of high concentrations (>2000 ppm nitrate) are more definitive and provide greater confidence that there is excess N available to the plant. Less confidence can be placed on low nitrate level interpretations or in specific N rate adjustments.

Q. What can you learn and how can you use information from the CSNT?

The CSNT can be used to evaluate your N management and help to guide future N applications toward economically optimum rates. The test will tell how you did, not what you need to do. The test will not tell you what management practices to change but provides information about how your N management is performing. Decisions can be made to adjust the fertility program for subsequent years based on the results of the CSNT.

CSNT results are most useful when evaluated over a period of several years on the same field. Basing future N rate decisions solely on one year's CSNT values could result in poor management decisions. CSNT data collected over several years coupled with fertilizer and manure application history, growing season weather conditions, soil type and productivity, and general crop management history can be used to determine if N fertilizer rates should be reduced to improve profitability.

The test is best suited to understand when N applications are greater than the crop need. If the CSNT shows high nitrate levels for several seasons, then it becomes evident that the N applications are too high and there should be an adjustment to more moderate rates. Continued monitoring of CSNT results will show if stalk nitrate levels decrease into the optimal range after adjustment in N application rates. Using the CSNT can result in greater N use efficiency and profitability and helps to reduce the potential for negative environmental impacts from N that is not being utilized by the crop.

Sources (Web sources verified 07/05/19):

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