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QUALITY ANALYSES FOR INFORMED DECISIONS



Cornstalk Information (CSI) for N Management

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The development of a sound nitrogen management program for corn that maximizes yields while minimizing fertilizer costs and adverse environmental effects is challenging. Unlike other nutrients, inorganic forms of nitrogen are generally not retained in the soil for more than one growing season, so the “ideal” nitrogen management program provides enough nitrogen to meet the needs of the growing crop without supplying excess nitrogen that will be lost from the soil. While nitrogen deficiencies are readily seen, there are no visible symptoms that indicate when excess nitrogen has been applied.

The corn stalk nitrate test is one method that can be used to evaluate a nitrogen fertility program. The corn stalk nitrate test is a plant tissue test that measures the nitrate content of the stalk at the point of physiologic maturity of the corn plant. Nitrogen within the plant contributes to yield until abscission of the corn kernel, as indicated by the formation of the black layer. At this point, the corn kernel is physically detached from the vascular system of the plant and can no longer obtain additional inputs from other parts of the plant. Once this occurs, an adequately fertilized corn plant will retain some nitrate within the leaves and stalk, but high or low levels of nitrate remaining in the plant indicate when too much or too little nitrogen was provided. A relationship between the nitrate content of the lower stalk and yield has been developed and threshold values established that indicate whether the plant received less than adequate, adequate, or excessive quantities of nitrogen for maximum plant growth and yield (Table 1).

NITRATE CONCENTRATION CATEGORIES

Low:	<u>Less than 450 ppm nitrate-N (Purdue), less than 250 ppm (ISU)</u> Indicates high probability that greater availability of N would have resulted in higher yields. Visual signs of N deficiency are usually observed in this range.
Marginal:	<u>250 - 700 ppm nitrate-N (ISU)</u> Producers should not be concerned when samples test in this range. N availability was close to the minimum amount needed for maximum yields but should not be the target for good nitrogen management.
Optimal:	<u>450-2000 ppm nitrate-N (Purdue), 700-2000 ppm nitrate-N (ISU)</u> Indicates that N supplies were sufficient for maximum yields. <i>Note: The high end of this category is appropriate when N costs are low and corn prices are high. The low end of this category is appropriate when N costs are high and corn prices are low.</i>
Excess:	<u>Greater than 2000 ppm nitrate-N</u> Indicates that N supplies were above levels needed to maximize profits.

Sampling for this test should be done soon after the point of physiological maturity of the plant, 1 to 3 weeks after black layer formation on 80% of the kernels of most ears. Collect the 8 inch segment of the stalks between 6 and 14 inches above the soil surface from 15 plants throughout the field. As with soil and all other sampling procedures, the samples that are collected should be representative of the area, so avoid unusual looking plants or those exhibiting high levels of stress from other factors, such as disease or insect infestations. These samples should be placed in paper bags and shipped immediately to the lab or refrigerated to reduce the deterioration of the samples.

This test can be especially useful where manure is regularly applied. In these soils, the mineralization of organic matter can contribute significant amounts of nitrogen to the growing crop and reduce the amount of additional nitrogen required. The stalk nitrate test can help to identify areas where nitrogen fertility recommendations can be modified to account for these indirect nitrogen sources.

While the corn stalk nitrate test cannot be used to make corrections to the N fertility for a growing crop, data from successive crops can be used to determine trends and identify where changes can be made to the nitrogen fertility program over time, allowing growers to reduce input costs without sacrificing yields.

More information on the corn stalk nitrate test is available on our website (http://www.algreatlakes.com/pdf/factsheets/ALGLFS19_End_of_Season_Cornstalk_Test.PDF).