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University of Minnesota Extension Service

THE BASAL STALK NITRATE TEST FOR CORN

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Minnesota corn growers are becoming more interested in fine tuning rates of fertilizer N used for corn production. This increased interest is fueled by higher prices for fertilizer N and concerns for environmental quality. Therefore, many are searching for diagnostic tools that can be used to improve the management of fertilizer N. The basal stalk nitrate test is one of these tools.

This analytical test was developed and refined by faculty at Iowa State University. It is a diagnostic – not a predictive test. It was not intended to and cannot predict the amount of fertilizer N needed for the next time that corn is in the rotation. However, its use does allow for a closer evaluation of the rate of fertilizer N used in the year that the corn was grown.

What's Measured? In this analytical test a 6 inch section of the corn stalk starting at 6 to 8 inches above the soil surface is analyzed for NO_3-N. Leaves are not included. The results are compared to standards developed from field research. For best results, the sample should be collected after formation of black layer in the kernel. Waiting until after harvest to collect the sample could easily lead to inaccurate results.

What's In the Sample? The base of the corn stalk is used for this test. The base is considered to be that section of stalk that is 6 inches long and starts 6 to 8 inches above the said surface. This section of stalk should include the bottom node of the plant. Only stalk, not leaf or sheath tissue, is submitted for the sample. Any other tissue should be removed before the sample is submitted. A representative sample should include at least 15 stalks from the area of interest. Some advisors have worked with farmers to compare the impact of various rates of nitrogen fertilizer across the landscape. For these comparisons, this test, in addition to yield, would be an added feature in the evaluation of nitrogen rates. This test could also be used in the evaluation of management zones.

Handling the Sample. Once the sample is collected it should be split vertically parallel to the length of the corn stalk. Splitting each stalk into four sections would be ideal. Splitting into two sections is absolutely necessary. The splitting is necessary to assure rapid drying.

Once split, the sections should be dried as rapidly as possible. Use of an oven or placing in front of a fan blowing warm air is suggested for rapid drying. Once dried, the samples can be submitted to the laboratory. Accurate results depend on rapid drying of the samples.

Suggested Interpretation of the Results. As mentioned, this is a diagnostic, not predictive, test. Interpretation of the results is as follows:

NO_3-N ppm	Interpretation
0 to 250	low, nitrogen was probably deficient during the growing season
250 to 700	marginal, it is possible that nitrogen shortage limited yield
700 to 2,000	optimum, yield was not limited by a shortage of nitrogen
2,000+	excessive, nitrogen rate was too high or some production factor caused a yield reduction

When interpreting the basal stalk nitrate values, it's important to remember that factors other than excessive use of N fertilizer can lead to high values. Anything that can cause a severe reduction in yield such as hail damage or drought can lead to high values.

The Laboratories: The University of Minnesota Soil Testing Laboratory as well as some commercial laboratories will analyze these stalk samples. All use the same analytical procedure. Submit the samples in paper, not plastic, bags. Get the samples to the laboratory as soon after collection as possible. Speed in getting the sample to the laboratory will help to insure accuracy of analysis.

If using the University of Minnesota, send or deliver the samples to:

Soil Testing Laboratory
University of Minnesota
135 Crops Research Building
1903 Hendon Avenue
St.Paul, MN 55108-6089

Cost: $15 per sample. Please send a check made out to the University of Minnesota for payment with the sample.

If there are any questions, please contact George Rehm at (612) 625-6210 (rehmx001@umn.edu) or Roger Eliason (612) 625-7701.