Taking a Corn Stalk Nitrate Test Sample After Corn Silage Harvest

In some ways, corn can be considered a luxury consumer of N, much in the same way alfalfa is a luxury consumer of potassium: if the nutrient is available in the soil, the crop will take it up beyond actual requirement and to levels that do not produce a yield response. In corn, the extra N accumulates in the lower portion of the stalks and we can use this understanding to help guide management. The end-of-season corn stalk nitrate test (CSNT) measures nitrate concentrations in the lower portion of corn stalks at silage or grain harvest time, and can help identify where "luxury consumption" of N has occurred. This test is a useful tool as it helps fine-tune nitrogen (N) management over time and on a field by field basis. Since it was first developed, the CSNT has gained use in several parts of the US and over the past three years we have tested its performance under New York growing conditions. In factsheet 31 we summarized our research findings and gave interpretations for New York soils and growing conditions. This factsheet was developed in response to requests from field agronomists to test ways to expand the timeframe for taking a CSNT.

Basic Sampling Protocols

The original sampling protocol for the CSNT is to collect an 8-inch portion of each stalk, between 6 and 14 inches above the ground. Leaf sheaths should be removed and pieces need to be handled to avoid contact with the soil, especially the stalk ends. Also, avoid sampling stalks from corn showing significant damage from disease or insects, such as corn borers.

Alternative Field Sampling Protocols

As it is recognized that walking through a standing corn field is not very practical, we completed a study to evaluate the impact of sample length and height on final CSNT values. For 10 fields, stalks were analyzed in 1-inch segments. The results illustrate a gradation of nitrate accumulation in the stalks, especially in the first inches off the ground in optimal or excessive CSNT conditions (Figure 1). These

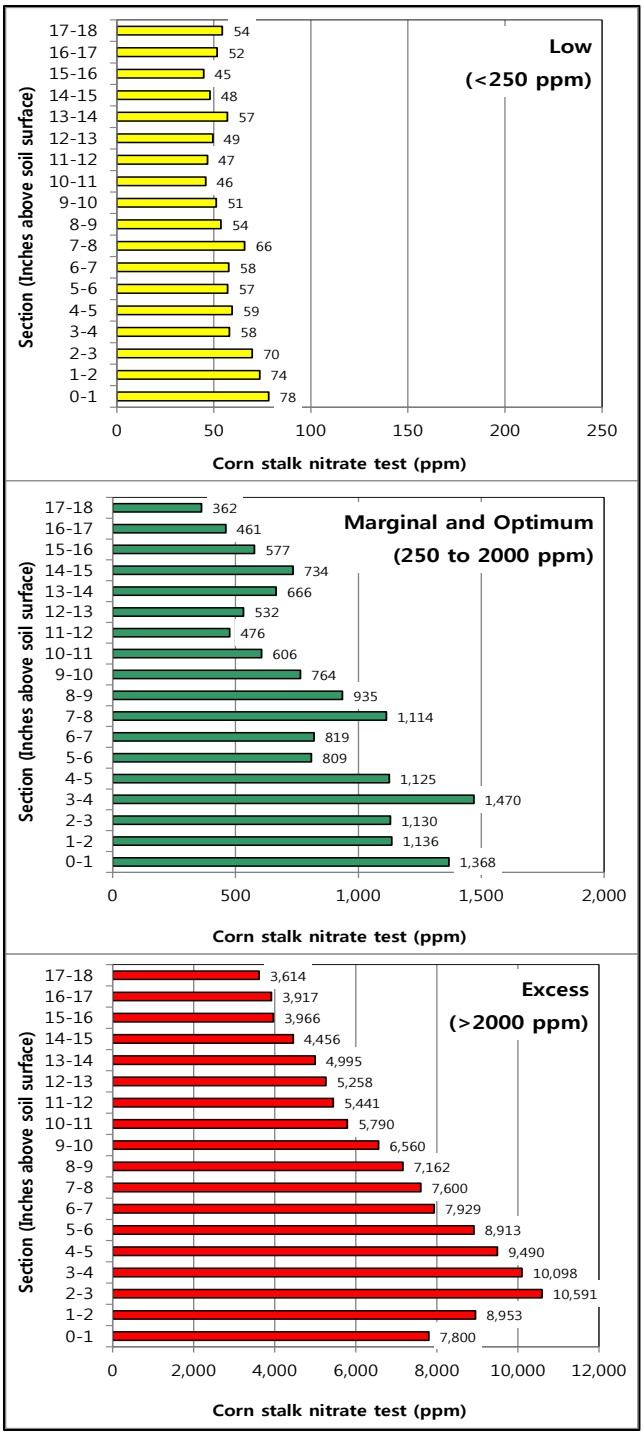

Figure 1. Average corn stalk nitrate test results as impacted by the position of the 1-inch piece in the stalk for average of 10 fields, low fields (2 locations), optimal fields (2 locations) and fields with excessive CSNT (6 fields).

results indicate that *adhering to a standardized sampling protocol in the field is very important* but also suggest an alternative stalk length is possible, an important factor if stalks are to be sampled after corn silage harvest. If the silage cutting height in the field exceeds 14 inches, we suggest collecting the standard 8-inch section of stalk from the 6-14 inch height. When stubble height is less than 14 inches but greater than 8 inches, stalk samples can be taken between 2 and 8 inches off the ground. This alternative cutting height should be reported to the laboratory when submitting CSNT samples so the laboratory staff can properly adjust the result. This is needed because stalk nitrate levels are higher in the lower portions of the stalk; with 2-8 inch samples, laboratory values need to be divided by 1.5 for the test results to be comparable to the New York interpretation scale of low (<250 ppm), marginal (250-750 ppm), optimal (750-2000 ppm) and excess (>2000 ppm).

Sampling Density

- Within field variability from stalk to stalk can be large. Sampling density should not be less than one sample per acre. Avoid sampling of diseased or damaged plants, and sampling of unrepresentative areas. Targeted within field sampling could be considered, in conjunction with within field yield mapping and precision application (within-field) or manure and/or fertilizer.

Sample Timing

- Stalk samples may be taken at silage harvest (65–70% moisture) and grain harvest (20–30% moisture) without any major effect on the CSNT results.
- Collecting samples in the field a few days after harvest will not affect CSNT results (assuming no significant rainfall in that time period). It is acceptable to wait up to 5 days after harvest to collect samples from the stubble, assuming harvest height was at least 8 inches.

Quartering of Samples

- Quarter each sample length-wise and keep only the quarter that best represents a true 25% of the stalk (tossing out the remaining three quarters). Our studies showed that individual quarters of stalks tested very similar to whole stalks across a range of stalk nitrate levels (more variability with low CSNTs than with optimal or excessive CSNTs). Quartering of the samples helps them dry faster, reduces mailing expenses, and makes grinding quicker and easier at the laboratory (and hence reduces the per sample costs).

Sample Storage

- The CSNT levels were not impacted by days of storage at room temperature during 8 days following sampling.
- Samples can be stored in the fridge for up to 8 days (recommended if direct mailing is not feasible); freezing should be avoided.

Concluding Remarks

The protocols outlined in this factsheet make CSNT sampling post-harvest easier to do. If fields test 3000 ppm or higher for multiple years in a row, there are opportunities to cut N application rates without impacting yield. Crop history, manure history, other N inputs, soil type, and growing conditions all impact CSNT results. Crop management records that include these pieces of information should be used to evaluate CSNT results and determine where changes can be made.

Additional Resources

- Nutrient Management Spear Program Agronomy Fact Sheet Series: nmsp.cals.cornell.edu/index.html.
- New York On-Farm Research Partnership: nmsp.cals.cornell.edu/NYOnFarmResearchPartnership/.
- USDA-NRCS New York State 590 Standard: ftp://ftp-fc.sc.egov.usda.gov/NY/eFOTG/Section_4/Practice_Standards/nyps590.pdf.

Disclaimer

This fact sheet reflects the current (and past) authors' best effort to interpret a complex body of scientific research, and to translate this into practical management options. Following the guidance provided in this fact sheet does not assure compliance with any applicable law, rule, regulation or standard, or the achievement of particular discharge levels from agricultural land.

For more information

Cornell University Cooperative Extension

Nutrient Management Spear Program
http://nmsp.cals.cornell.edu

Quirine Ketterings, Eun Hong, Greg Godwin, Sanjay Gami, and Karl Czymmek

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