Corn Stalk Nitrate Test (CSNT)

Are Changes in N Management Needed?

Has your corn silage received the appropriate amount of nitrogen this year?
What is the Stalk Nitrate Test?

- The stalk nitrate test is a useful tool that indicates whether the nitrogen supply for that year was low, marginal, optimal, or in excess of what the corn needed this year.
- A comparison of two or more years of test results is required before any interpretations can be made.
Timing of Sampling

- Take stalk nitrate samples at the optimum harvest time for silage. If you sample after silage harvest, take the stalk samples within 5 days after harvest (prior to significant rainfall or any tillage or manure application).
Tools Needed for Sampling

- A ruler, tape, a 14 inch dowel marked at 6 inches (see picture; regular protocol) or an 8 inch dowel marked at 2 inches
- Hand pruners
- Large kitchen knife or machete
- Brown paper bags
How Many Stalks Are Needed?

- For fields of 15 acres or less:
  - 15 stalks
- For fields larger than 15 acres:
  - 1 stalk per acre
Cutting the Stalk – Regular Protocol

First, measure up 14 inches
Cut so 14 inch stubble remains
Cutting the Stalk

Measure 6 inches from the soil

This leaves an 8 inch stalk
Corn stalk segment 8 inches in length for testing

Bottom cut 6 inches above ground

Top cut 14 inches above ground

Regular CSNT Field Sampling Procedure
Cutting the Stalk – After Harvest

If you want to sample after harvest and stalks in the field are less than 14 inches tall but at least 8 inches tall, use this “After Harvest” protocol:

- Measure up 8 inches. Cut so 8 inch stubble remains.
- Measure 2 inches from the soil, and cut to obtain a 6-inch undamaged piece of stalk. This is the sample to submit to the laboratory.
Preparing Stalks for Submission

- During sampling, don’t touch the soil with the stalk; soil contamination will adversely affect test results.
- Once the stalks are taken, quarter them lengthwise, take one of the quarters per stalk (toss the rest) and place in a brown paper bag; this speeds the drying process, reduces the possibility of mold growth, and reduces mailing and sample processing cost.
Carefully quarter the stalk using a machete or kitchen knife.
Quartering is a quick and easy way to ensure that a quality sample arrives at the laboratory. You only need one of the four quarters per stalk so toss three out and keep the 4th (most representative stalk) to reduce mailing and sample processing costs.
Submission

- When submitting samples, make sure you identified if these are 2-8 inch stalks (“after harvest protocol) or 6-14 inch stalks (regular protocol).

- A comparison of results between DairyOne and the NMSP shows excellent comparison of results. Either laboratory can process samples.

http://nmsp.cals.cornell.edu/NMSPLabSubmissionForm2013.pdf
Interpreting the Results

Research conducted on New York farms in supports the following interpretations:

- **Low** = less than 250 ppm N
- **Marginal** = 250-750 ppm N
- **Optimal** = 750 to 2000 ppm N
- **Excess** = greater than 2000 ppm N
Visual Indicators

<table>
<thead>
<tr>
<th>Level</th>
<th>ppm Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>&lt;250 ppm</td>
</tr>
<tr>
<td>Marginal</td>
<td>250-750 ppm</td>
</tr>
<tr>
<td>Optimal</td>
<td>750-2000 ppm</td>
</tr>
<tr>
<td>Excess</td>
<td>&gt;2000 ppm</td>
</tr>
</tbody>
</table>
Low (<250 ppm N)

- These fields would likely have benefited from some additional N.
- At harvest time, leaves are dead to or above the ear leaf and/or the entire plant has a light to very light green color.
- Drought symptoms are almost the same as N deficiency symptoms so drought will make N deficiency appear to be worse.
Marginal (250-750 ppm N)

- In some years, yields could have been increased with some additional N. In those years, plants look like described under low CSNT. In other years, the N supply was sufficient.
- Since it is difficult to predict what kind of growing conditions a season will bring, farmers are advised to target CSNTs in the optimal range.
Optimal (750-2000 ppm N)

- Nitrogen availability in these fields was within the range needed for optimum economic corn production.
- In this range, three of the five lower leaves will likely be dead by silage harvest time while the top leaves remain medium to dark green.
Excess (>2000 ppm N)

- The corn had access to more N than it needed for optimum yield.
- Most likely, fewer than three leaves from the bottom will have died and the top leaves remain medium to dark green.
- If manure and/or N fertilizer were applied, the application(s) supplied more N than the crop needed that growing season.
Multiple Year Assessment

- Field history, manure and fertilizer application, other N inputs, soil type, and growing conditions all impact stalk nitrate test results, which is why stalk nitrate test results should be monitored for 2-3 years before management changes are made.

- The greatest confidence is gained when multiple fields are sampled per farm (~15 fields or more) each year.
Adaptive N Management

How to use the CSNT in adaptive management?

- **Nitrogen for Corn; Management Options**
  - [http://nmsp.cals.cornell.edu/publications/factsheets/factsheet77.pdf](http://nmsp.cals.cornell.edu/publications/factsheets/factsheet77.pdf)

- **Adaptive Management of Nitrogen for Corn**
  - [http://nmsp.cals.cornell.edu/publications/factsheets/factsheet78.pdf](http://nmsp.cals.cornell.edu/publications/factsheets/factsheet78.pdf)
Summary

- CSNT results reflect N availability during the growing season. The test allows for evaluation + refining of N management for a specific field; multiple years of data are needed.

- CSNT results >2000 ppm indicate excessive levels of available N during the growing season. If high CSNTs occur multiple years in a row, consider lowering fertilizer and/or manure application rates.
More Information

- Nutrient Management Spear Program (NMSP) Agronomy Fact Sheet series:
  
  http://nmsp.cals.cornell.edu/guidelines/factsheets.asp

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