Corn Stalk Nitrate Test (CSNT)

Are Changes in N Management Needed?

Has your corn silage received the appropriate amount of nitrogen this year?

12-8-2016

What is the Stalk Nitrate Test?

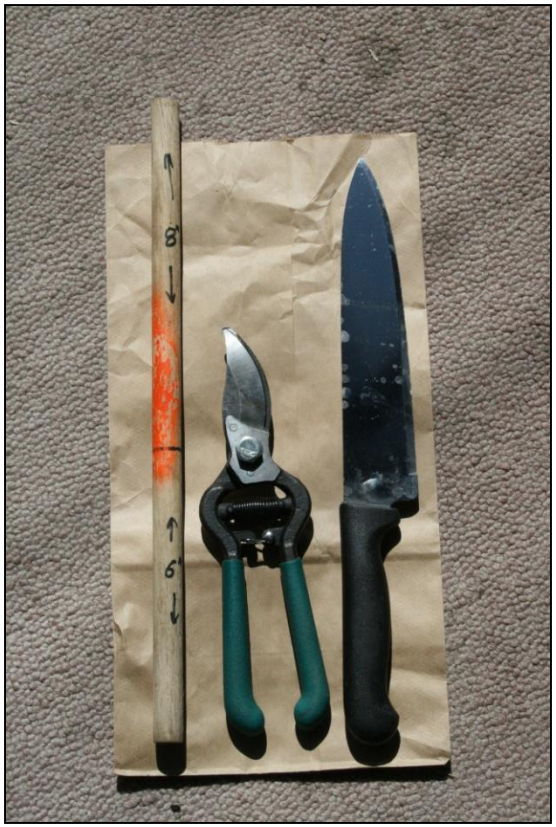
- The stalk nitrate test is a useful tool that indicates whether the nitrogen supply for that year was low, marginal, optimal, or in excess of what the corn needed this year.
- A comparison of two or more years of test results is required before any interpretations can be made.

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

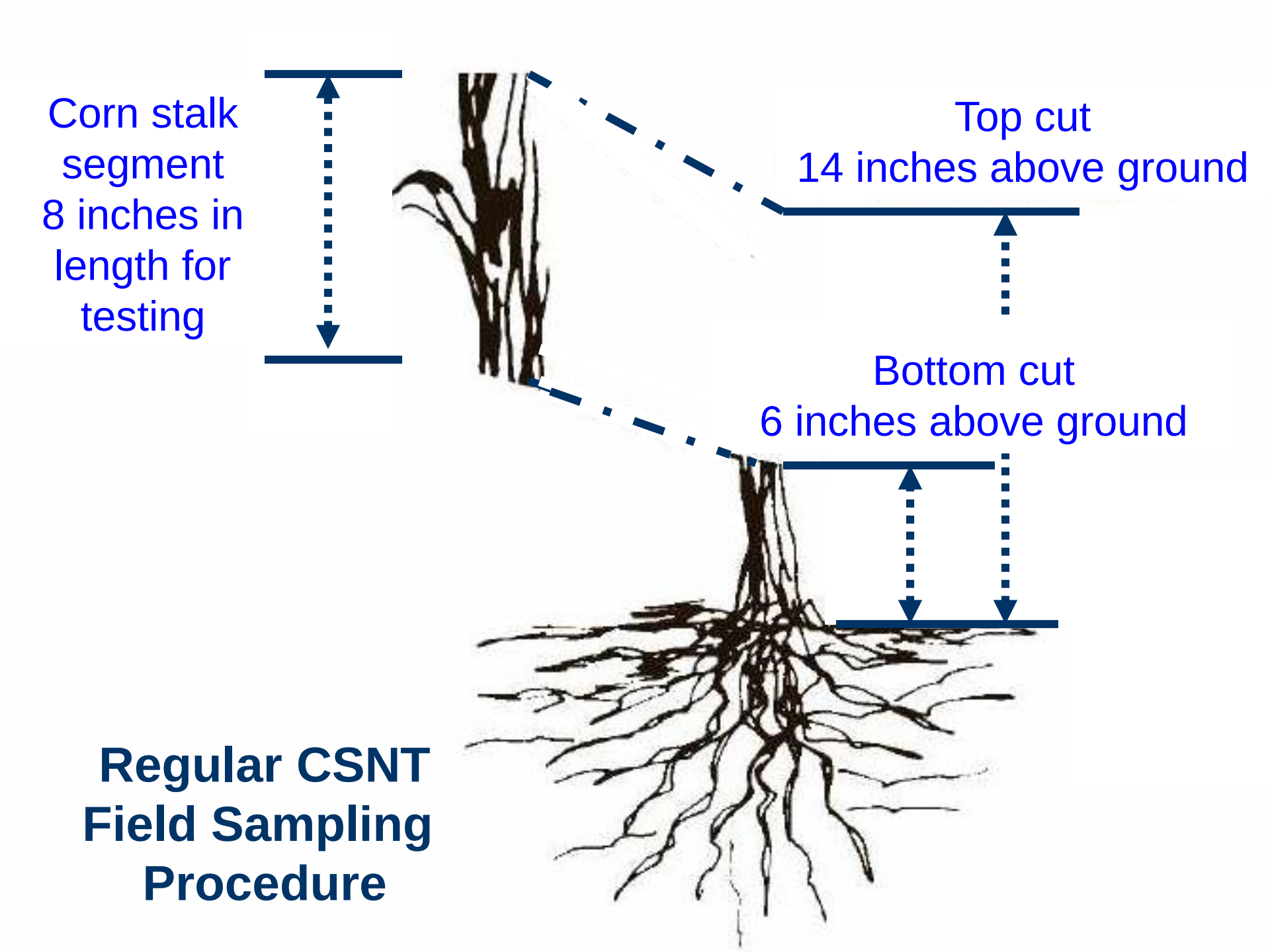
First, measure up 14 inches

Cut so 14 inch stubble remains

Cutting the Stalk

Measure 6 inches from the soil

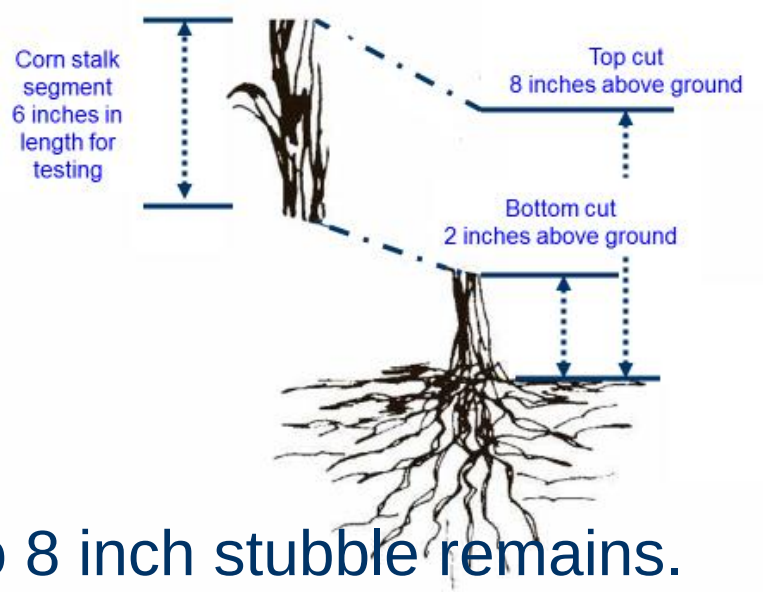
This leaves an 8 inch stalk



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.

Quartering

Carefully quarter the stalk using a machete or kitchen knife.

Quartering

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

http://dairyone.com/analytical-services/agronomy-services/corn-stalk-nitrate-test/

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

Low	Marginal	Optimal	Excess
<250 ppm	250-750 ppm	750-2000 ppm	>2000 ppm

Low (<250 ppm N)

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.

Marginal
250-750 ppm N

Optimal (750-2000 ppm N)

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)

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
- Adaptive Management of Nitrogen for Corn
  - 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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