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Checking corn nitrogen status

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Abstract
While most of Iowa has not been excessively wet this spring, a few areas have been hit with heavy rains. The potential for nitrogen (N) losses are low, but some fields or field areas are more at risk. Generally, losses should be minimized because wet soils occurred early in the spring when temperatures were cool and much of the heavy rainfall ran off fields. Of course, losses could change if we receive excessive rainfall into June, as occurred last year. If you are wondering about available N for this year's corn crop, you can consider a few methods to check the N status.

Disciplines
Agriculture | Agronomy and Crop Sciences

Crop Production

Checking corn nitrogen status

by John Sawyer, Department of Agronomy

While most of Iowa has not been excessively wet this spring, a few areas have been hit with heavy rains. The potential for nitrogen (N) losses are low, but some fields or field areas are more at risk. Generally, losses should be minimized because wet soils occurred early in the spring when temperatures were cool and much of the heavy rainfall ran off fields. Of course, losses could change if we receive excessive rainfall into June, as occurred last year. If you are wondering about available N for this year's corn crop, you can consider a few methods to check the N status.

Apply additional N in strips and watch the corn. The corn plant expresses N stress through reduced leaf greenness, which can be visually seen as you look at corn plants and measured with sensors such as a chlorophyll meter. Measurements need to be compared with adequately fertilized (non-N limiting) reference areas in order to reduce bias due to different growing conditions, soils, hybrids, or other factors affecting color other than N deficiency. If you are concerned about N loss, then apply two or three non-N limiting strips and watch the corn. These will be the reference areas that you compare with the rest of the field. When corn gets some size to it, around the V10 to V15 stage (waist to shoulder height), and you see differences in the color between the strips and the rest of the field, then additional N should be applied to the field or field areas showing differences.

A method to quantify the N stress and amount of N to apply is to monitor the crop with a chlorophyll meter. Relative chlorophyll meter values (readings from the field area of interest divided by readings from the reference area) give an indication of the severity of deficiency; that is, the lower the relative value, the greater the N deficiency and greater the N needed (Figure 1 shows relative SPAD values versus N rate sufficiency).

Chlorophyll readings can aid in confirming suspected N-loss situations and need for supplemental N. This is especially helpful when corn has recovered from wet conditions, resumed growth, and is putting pressure on the available N supply. The later into the growing season these readings are taken, the more they can indicate deficiencies and the better they relate to total crop N need. Small plants usually do not reflect potential N shortages because the amount of N taken up is small. Therefore, corn plant sensing is more reliable with larger plants. Measurement from approximately V10 to R1 should provide similar results. Table 1 gives suggested N rates to apply at relative values. Readings are taken from the uppermost leaf with the collar visible until the R1 stage (silking), and then from the ear leaf. Average 15–30 representative readings from the reference strip and field area of interest.

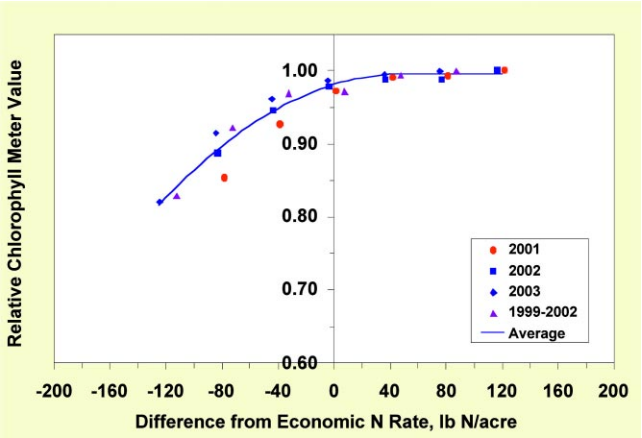

Figure 1. Relationship between Minolta® 502 SPAD chlorophyll meter relative values (reading divided by N sufficient reference strip reading) and N rate deviation from the economic optimum N at 51 sites where corn followed soybean in Iowa (1999–2003).

Table 1. Relative Minolta® SPAD chlorophyll meter value and N rate to apply.

Relative SPAD Reading*	N Rate to Apply** (lb N/acre)
< 0.88	100
0.88–0.92	80
0.92–0.95	60
0.95–0.97	30
> 0.97	0

* Readings taken from approximately the V15 to R1 corn growth stage.

** Suggested N rates limited to a maximum of 100 pounds N per acre.

Note: Minolta® SPAD 502 chlorophyll meters are available from Spectrum Technologies, Inc. (**www.specmeters.com**) and sell for $1,495.

Supplemental N will need to be applied with high-clearance equipment. With UAN solutions, injection or drop tubes between every other row or every row will work equally well. Rainfall after late N applications will be important for plant uptake. If the applied N is within the active root system, and if there is a need for the N, corn yield can be increased with N applied until shortly after silking.

Late spring soil nitrate test. Details about this test can be found in the ISU Extension publication PM 1714, *Nitrogen Fertilizer Recommendations for Corn in Iowa,* and has been discussed in previous newsletter articles. See the nitrogen topic area of the ISU Agronomy Extension Web site to find these articles at **http://extension.agron.iastate.edu/soilfertility/nutrienttopics/nutrienttopics.html**.

Calculating N loss. An amount of N to apply is calculated based on an estimate of nitrate formation and denitrification loss. This method for estimating N loss has been discussed in previous newsletter articles. See the nitrogen topic area of the ISU Agronomy Extension Web site to find these articles at **http://extension.agron.iastate.edu/soilfertility/nutrienttopics/nutrienttopics.html**.

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Insects and Mites

Stalk borer migration set to begin

by Marlin E. Rice and Rich Pope, Department of Entomology

Stalk borer eggs have hatched and many larvae are now in brome or other grasses bordering corn. Some stalk borers already may be in corn because they hatched from eggs that were laid on grass or giant ragweed out in the field last fall, or they moved directly into border row corn instead of the grass when they hatched. Most stalk borers that hatch in grass stay there until they grow to a size that is too big for the grass stem. Then they migrate in search of larger diameter plants, which often is corn. As of May 31, there were two reports of stalk borer migration in southwest Iowa. This article discusses management for stalk borers only in grass adjacent to corn, but occasionally stalk borer damage may extend through fields when there are suitable host weeds present in the field for early larval development.

The predicted dates for the early stages of stalk borer migration are shown in the map on page 105. These dates predict when about 10 percent of the larvae will move out of brome grass. Ten percent will have moved by the time 1,400 degree days (base 41°F) have accumulated, and 50 percent will have migrated by 1,700 degree days.

When 1,300–1,400 degree days have occurred in your area, scout to determine if the larvae are moving into corn. Begin by scouting corn adjacent to grassed terraces, waterways, fence lines, or where stalk borer damage occurred last year. Look for small larvae visible

Brome grass goes to the dead-heading stage, signaling migration of stalk borer larvae. ***(Marlin E. Rice)***

Migrating stalk borer larva search for larger diameter plants, often corn. ***(Marlin E. Rice)***