

2011 Statewide Nutrient Management Benchmarking Project:

Corn Sulfur Status

Problem addressed

Although corn and soybean require 15-20 lbs/acre of sulfur (S) to produce optimal yields, yield responses to S were uncommon in the past in Iowa. However, with smaller atmospheric S deposition and less S applied as impurities in commercial fertilizers, some yield responses to S have been observed recently. Therefore, a survey of corn and soybean fields for S status could identify where responses to S are likely across the state.

Soil S testing

The median soil S concentration measured to a 6-in depth was 9 ppm across Iowa. Three-quarters of the values were between 7 and 10 ppm (Fig. 1A).

The critical values for the soil S test is often considered as 10-13 ppm. Based on Midwest Labs sufficiency categories, about 80% of soil samples were in the Low soil test category (Fig. 1B).

Soil S test value did not correlate with SOM or other variables.

Tissue S testing

Because, similar to N, many factors impact soil S availability, tissue S test is considered more reliable than the soil test. The median corn ear leaf S value was 0.24%, with 75% of data ranging from 0.15 to 0.32% (Fig 1 C). Based on literature, the critical S concentration is in a range of 0.10 to 0.20% measured at silking. Based on the Midwest Labs interpretations and adjustments to the crop stage, about half of the samples had below Sufficient S status (Fig 1. D).

Soil S values tended to positively correlate with tissue S values, but soil S values could explain only 6% of the total variability (data not shown). Target "Bad Sampling Areas" had a slightly larger percentage of tissue S Deficient samples than target "Good Sampling Areas" (Fig. 3).

Tissue N/S ratio testing

Tissue S values positively correlated with tissue N values (Fig. 2 A). because plants need more S with higher tissue N content to build amino acids. The N/S ratio is often used as a better indicator of corn S status since it is less affected by crop stage and S deficient plants tend to have higher or above-optimal tissue N. The critical N/S ratio for corn is considered about 16, with higher values indicating potential S deficiency. The median N/S ratio across the state was 13, with 75% of values between 12 and 15 (Fig. 2B). About 25% of the samples would be considered S deficient.

Unlike N deficiency, S deficiency symptoms are more pronounced early in the season and in younger leaves because S is relatively immobile. Reliability of soil and tissue S testing can be verified by measuring corn yield responses to applied S in replicated strip trials across the state.

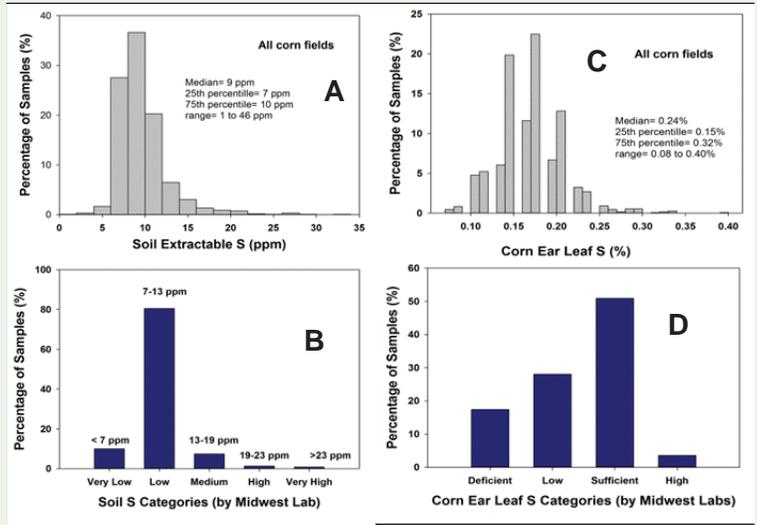


Fig. 1. Distribution and sufficiency categories of soil S test values and corn ear leaf S test values for 505 corn fields sampled across Iowa in 2011.

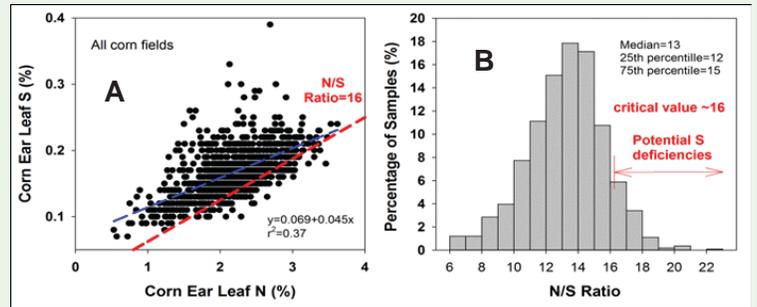


Fig. 2. Relationship between corn ear leaf N and S content. Distributions of N/S ratio values, which is believed to be better diagnostic than soil S test or tissue S test.

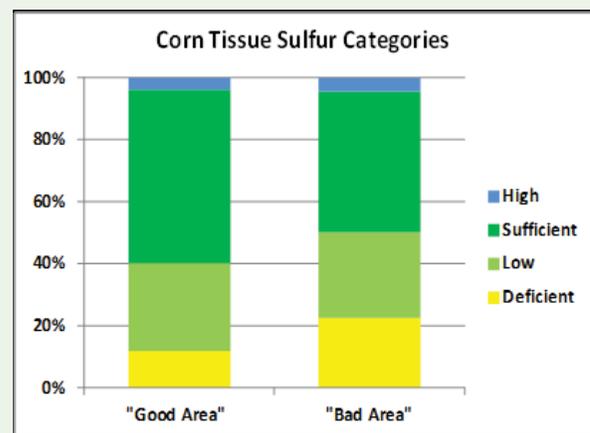


Fig. 3. Effect of sampling area on corn tissue S categories.