

2011 Statewide Nutrient Management Benchmarking Project:

Zinc Status

Problem addressed

Similar to other micronutrients (Fe, Mn, Cu), plants require Zn to support many enzyme systems. Zinc is relatively immobile (it cannot be transferred easily from the old to the young leaves), therefore, symptoms of Zn deficiency often occur on the younger leaves.

In Iowa in the past, Zn deficiencies have been observed on corn and very rare on soybean. The likely areas for corn Zn deficiencies are calcareous soils and soils with low SOM or coarse texture.

Summary of soil testing

For corn, about 1200 soil samples were analyzed for Zn. The median (which splits the distribution into two equal parts) test value was 1.9 ppm with 75% of the values ranging from 1.2 to 3.3 ppm (Fig. 1).

Based on ISU sufficiency categories, about 90% of the samples would be considered adequate in Zn for corn. Based on Midwest Lab interpretations (TDPA extraction), about 30% of the soil samples would be considered Deficient in Zn (data not shown).

There were not significant effects of sampling area ("good" or "bad"), soil pH, crop stage or manure history on average Zn soil test values for corn.

Summary of tissue testing

For all corn fields, the median ear leaf Zn test value was 13 ppm with 75% of the data ranging from 11 to 17 ppm (Fig. 2). In contrast to the soil test results (Fig 1), only about 35% of the corn samples had Sufficient and High Zn tissue status based on University Minnesota sufficiency categories. About 30% of the samples were considered Deficient in Zn. The percentage of Deficient samples could be overestimated because the recommended sampling time was at silking. However, based on Midwest Labs sufficiency categories, about 80% of the samples would be considered as Low and Very Low (data not shown).

There were no significant effects of sampling area ("good" or "bad"), soil pH, crop stage or manure history on Zn soil test values.

Also, tissue Zn values were not related to soil Zn values, but the Zn tissue concentrations tended to increase with higher tissue N concentrations (data not shown).

Observations on soybeans

About 90% of the soybean samples (fully developed trifoliates) were in the Sufficient and High categories base on Midwest Labs interpretations (data not shown).

Summary

The majority of the soybean tissue samples had adequate Zn supply.

Based on soil test results, Iowa soils have Adequate Zn supply for corn. But, the ear leaf tissue test suggested that from 30 to 80% % of samples could be deficient. These observations should be verified by corn yield response to Zn fertilizer.

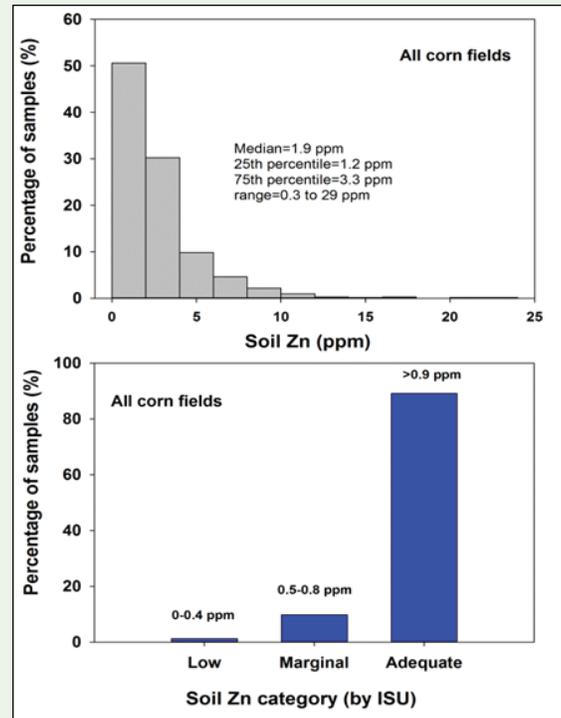


Fig. 1. Distributions of soil Zn test values and soil Zn test sufficiency categories (based on Iowa State University, PM 1688).

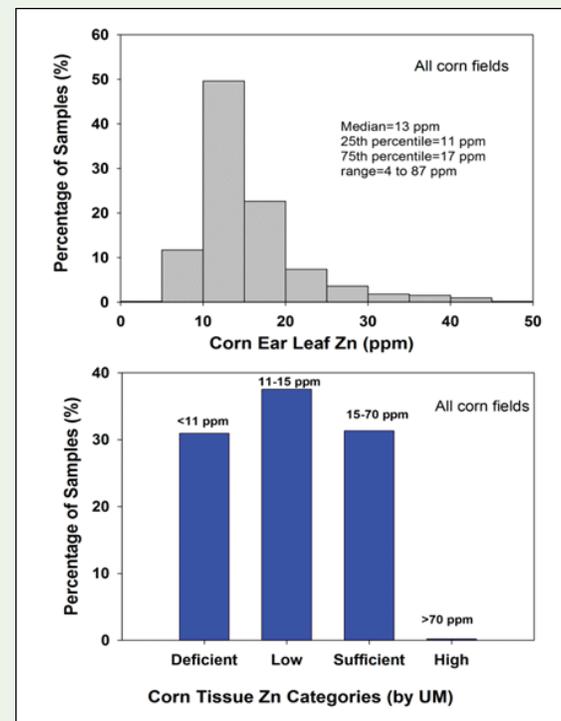


Fig. 2. Distributions of corn ear leaf Zn test values and tissue Zn test sufficiency categories (based on University of Minnesota, 2002).