

2011 Statewide Nutrient Management Benchmarking Project:

Phosphorous Status

Problem addressed

Identifying corn and soybean P status has both agronomic and environmental implications. Information about distribution of soil and tissue P test values across the state have never been compiled and analyzed

Soil and tissue testing: Corn

Across Iowa, the median soil Bray 1 P value was 27 ppm, with 75% of soil test values ranging from 15 to 47 ppm (Fig 1. A). This median value was 4 ppm higher than that reported in the 2010 International Plant Nutrition Institute survey for Iowa.

About 70% of samples were in Very High category based on ISU interpretations (Fig. 1B). The percentage of Very Low and Low samples was <10%, indicating relatively high soil P levels in Iowa soils. Percentage of Very High samples was slightly larger for fields with history of manure applications (Fig. 3).

The distribution of corn tissue P categories (Fig. 1D) partially matched the soil P test distribution (Fig. 1B). Based on Midwest Labs interpretations, about 70% of samples were in the High and Sufficient categories. However, about 20% of tissue samples were Deficient.

Soil and tissue testing: Soybean

The distribution of soil P test categories for soybean (Fig. 2B) did not match that of soybean tissue P categories (Fig. 2D). Despite relatively large high soil P values, about half of soybean samples were considered Deficient and Low based on Midwest Labs interpretations. Surprisingly only a fraction of samples were in High and Excessive categories. Iowa State University research does not support the use of tissue P test for predicting yield responses to P fertilizer.

Interaction with K

Soil P test values tended to increase with soil K test values ($r^2=0.42$, data not shown).

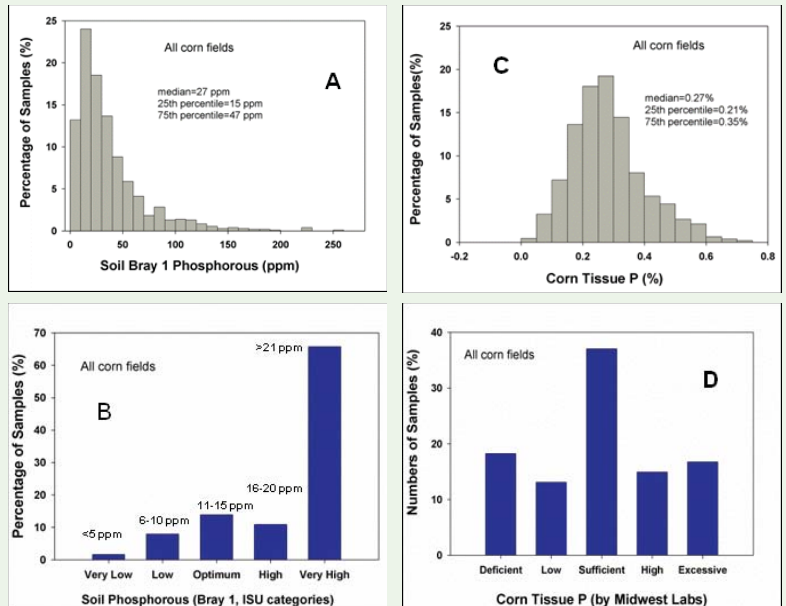


Fig. 1. Distribution and sufficiency categories of soil Bray 1 P test values and ear leaf P concentrations for 505 corn fields sampled across Iowa in 2011. Data for 92 soil samples with pH >7.3 (bicarbonate P soil test) are not shown.

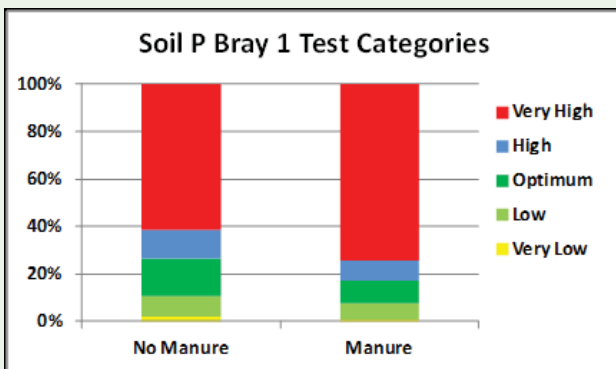


Fig. 3. Effect of manure history on soil P Bray 1 test categories for 505 corn fields across Iowa.

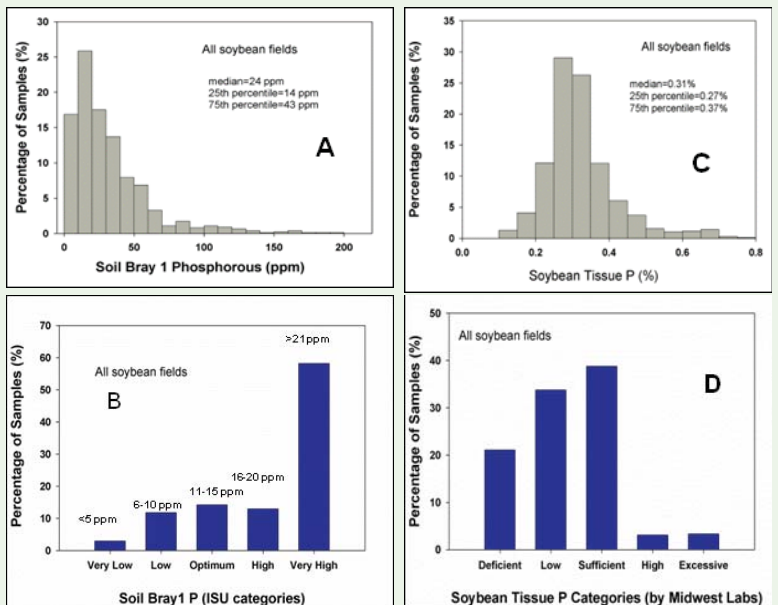


Fig. 2. Distribution and sufficiency categories of soil Bray 1 P test values and P concentrations of fully developed trifoliates for 376 soybean fields sampled across Iowa in 2011. Data for 58 soil samples with pH >7.3 (bicarbonate P soil test) are not shown.