

We know that crops yield their best at near neutral soil pHs. Have you ever wondered what the effect of decreasing soil pH has on grain yields of various crops?

At the Southeast Agricultural Research Station, a study was conducted to answer this question. The study area had plots with five different soil pH levels (5.3, 6.2, 6.4, 6.8, and 7.3 pH) at the 0-4 inch soil depth. The soil pH levels were created by adding varying amounts of lime to an acidic soil. The rotation was a 3-year wheat/double crop soybeans-sorghum-full season soybean rotation. Crop yields at the two higher pH treatments, 6.8 and 7.3, were the greatest and they were not significantly different. Yields of grain sorghum ranged from 95.6 bu/a to 78.4 bu/a, full-season soybeans ranged from 32.6 bu/a to 25.2 bu/a, double-crop soybeans ranged from 22.3 bu/a to 17.5 bu/a, and wheat ranged from 41.2 bu/a to 34.1 bu/a as soil pH decreased (or soil acidity increased) from 6.8 to 5.3, respectively.

Statistically, there were no differences in yields among the 6.4, 6.8, and 7.3 pH treatments, except for full-season soybeans where the 6.4 pH soil produced 7.6 % lower yields (31.6 bu/a) than the 6.8 pH soil (34.2 bu/a). However, there was a small percentage drop in yield as pH decreased from 6.8 to 6.4 pH. For grain sorghum and full-season soybeans there was a 3.9 % yield decrease, for double-crop soybeans there was a 5 % decline, and for wheat there was a 6.5 % yield decrease (remember, these were not statistically lower).

From 6.4 to 6.2 pH there was a 7.9 % decrease in yield for sorghum, a 17 % yield decrease for full-season soybeans, and a 7.1 % yield decrease for double-crop soybeans. There was no yield decrease for wheat as pH decreased from 6.4 to 6.2. As soil pH decreased from 6.2 to 5.3, sorghum yields decreased by 7.2 %, there was a 3.8 % decrease for full-season soybeans, a 10.7 % decrease for double-crop soybeans, and a 10.9 % decrease for wheat, respectively.

Overall, as soil pH dropped from 6.8 to 5.3 there was an 18.9 % yield decrease for grain sorghum, a 22.6 % decrease for full-season soybeans, a 21.5 % decrease for double-crop soybeans, and a 17 % yield decline for wheat.

What's the bottom line? We often think that soybeans are more sensitive to lower soil pHs than grain sorghum and wheat. Based on the percentage yield loss of this study that statement is true. But, the point is that grain sorghum and wheat are sensitive, too, and crop yields are gradually lost as the soil pH declines. Most farmers believe they are okay if their soil pH is in the 6.0 range, but they are actually being robbed of crop yields without even knowing it.

For more details about this study see:

2001 Agricultural Research, Southeast Agricultural Research Center. p. 57. KAES Report of Progress 875.

To learn more about soil pH and liming see: Liming Acid Soils. MF-1065. K-State Research and Extension.

Jim Shroyer  
Extension Specialist  
Crop Production