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Ag Megatrends Give Rise to Soil Acidity Problems Testing More Crucial Than Ever to Successful Farming

Biofuels

With the ongoing rise in ethanol production and subsequent corn market prices holding steadily above \$3, U.S. agriculture has its scope set on more corn for ethanol. The trend shows an estimated 30 percent of corn acres going to ethanol by 2015.

No-till

Because of its economic, environmental and soil-nutrient-preservation benefits, no-till farming continues to become more prevalent since the 1990s. The trend here says that by 2010, more than 75 percent of the seven major annual crops (corn, soybeans, sorghum, wheat, oats, barley and rye) will be grown in no-till applications.

Together, these two trends in agriculture point to a greater potential for increasing farm income. But maximizing these opportunities requires an awareness of the negative impact such trends can have on soil fertility and, thus, yield potential.

Soil Acidity Puts a Drag on Crop Inputs

With more acres going to corn and more corn-on-corn rotation, fertilizer nitrogen application rates are up. Whether commercial grade or manure, fertilizer lowers soil pH, making it more acidic. Naturally, the increase in the use of fertilizers in this advancing biofuel age gives rise to more frequent and more intense soil acidity issues.

The problem is, when soil pH levels drop below 6.0, they handicap crop inputs and, ultimately affect the grower's bottom line.

For example, fertilizer efficiency can drop more than 20 percent, while the nitrogen availability of some plants can be reduced as much as 50 percent. In the simplest of terms, scenarios like this mean a large amount of money spent on fertilizer is completely wasted.

Likewise, as soil pH drops below 6.0, valuable phosphorous becomes more insoluble, while iron and aluminum—two elements that, in high concentrations, are toxic to plants—become more readily available. And it doesn't end with fertilizers.

Herbicides are also handicapped in acidic soils, as most are formulated to perform best within a certain soil pH range. As a matter of fact, if pH is too low, some herbicides won't work at all. And worse still, many weed species thrive in acidic soils.

Such drawbacks are even more likely in continuous no-till, where nitrogen has been broadcast on the surface. This creates a shallow acid layer on the soil that directly impedes the activity of sprayed-on herbicides.



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Test Regularly and Add Aglime

The solution begins with regular soil pH testing and, when tests show levels below the optimum range, the application of liming materials, or “aglime.” Aglime neutralizes soil acidity and adds back in other valuable nutrients plants need, such as calcium and magnesium. Furthermore, aglime promotes the decomposition of organic materials which enhance good soil structure and tilth.

While soil acidity is hardly a new problem, today's ag megatrends are creating an environment where acid soils are more prevalent and, possibly, more severe. In the past, experts recommended farmers order soil tests roughly every three to four years. But in an era of more corn production and more intense fertilizer rates, some are putting that number into a more conservative two to three years.

The key to proper soil sampling is understanding that pH can vary widely across a field and at different depths.

In the wake of another megatrend—precision ag—laboratories are recommending samples be taken every 2.5 acres to fully optimize the benefits of such advanced capabilities. Test results they see often show notable pH variations in the same field, rendering a sample taken from anything more than 10 to 15 acres inadequate.

At the same time, pH can also vary significantly across a soil depth range as little as one to six inches deep. The general rule is to sample based on depth of tillage—approximately two inches in no-till where nitrogen is broadcast rather than incorporated, and as deep as six inches in cultivated fields.

However, when applying aglime, even in no-till, it's best to incorporate the aglime into the soil. Just broadcasting it on a no-till field allows for little, if any, movement of aglime down into the soil profile. Instead, in this type of application, it's much more effective to work the aglime into the field with a chisel plow. Or, if the timing is right, apply aglime in the normal recommended course of no-till management that says, for proper soil mixing and mineralization of nitrogen immobilized in organic matter, use a moldboard plow every four to six years.



The Aglime Council
11711 North College Avenue, Suite 180
Carmel, Indiana 46032-5601
Tel: (317) 580-9100 Fax: (317) 580-9183
E-mail: staff@indmaa.org

For more information, including locations of aglime sources, see our Aglime Producers Map at www.aglime.org or contact your local county extension office.