k-state extension AGRONOMY e-Updates

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1. Liming recommendations from the K-State Soil Testing Lab

Correcting acid soil conditions through the application of lime can have a significant impact on crop yields. In fact, liming is often one of the most critical management decisions a producer should make.

But lime is expensive, in whatever form it is used, and no one wants to apply more than is necessary. To make the best decisions on how much and what kind of lime to apply, it is useful to know how the K-State soil testing lab makes lime recommendations. If producers plan to apply only half or a quarter of the recommended rate, they should know what this means for the fertility of their soil.

A routine soil test analysis by K-State will reveal the pH level of the soil, and this will determine whether lime is needed on the field. The initial pH analysis, however, does not tell us how much lime is needed. To develop a lime recommendation, additional soil test measurements and field information are needed.

The lime requirement test is used to determine the amount of liming material (normally calcium carbonate) that is needed to neutralize the acidity in a given soil. Results for the lime requirement test are reported as "Buffer pH." The buffer pH value is used by the K-State lab and other labs to calculate the effective calcium carbonate (ECC) rate needed to reach a target pH for a specified incorporation depth.

What is the difference between the basic water pH determination and the buffer pH determination? The basic soil pH (soil/water slurry) test only measures active acidity in the soil water, which is just a small fraction of the total acidity in the soil. The buffer pH test measures the reserve acidity associated with the clay and organic matter in the soil.

Soils with higher clay and organic matter contents will require more ECC to reach a target soil pH than will a sandy soil. This is why two soils may have the same soil pH but have quite different buffer pHs, and different lime requirements.

Lime recommendations were made for many years to raise the soil pH to 6.8, assuming incorporation into two million pounds per acre of soil. This equates to roughly a 6-inch plowing depth. With no-till or limited-till systems, crop rotations that do not include alfalfa, and limited government cost-share for lime, lower rates of lime have been shown to be more cost-effective in many cases. Current K-State lime recommendations are calculated using buffer pH, target pH, and incorporation depth (see K-State publication MF-2586 for complete details) to adapt to individual farming systems.

Should producers consider applying a lower rate of lime than what is recommended by the K-State soil test lab? If soybeans or alfalfa will be grown on the field in question, and if the pH level is less than 6.0, then the full rate of lime should be applied. If the cropping system consists of some combination of wheat, grain sorghum, corn, or sunflowers, without a legume in the rotation, then it's not as critical to use the full recommended rate of lime. With these crops, which can tolerate somewhat lower pH levels than soybeans and alfalfa, producers may realize some benefit by applying less-than-recommended rates of lime as long as they are willing to make more frequent applications.

What type of lime is best to apply? All lime materials must guarantee their ECC content and are subject to inspection by the Kansas Department of Agriculture. The purity of the lime material relative to pure calcium carbonate and fineness of crushing are the two factors used in determination of the ECC content.

Lime recommendations are made for an effective calcium carbonate rate (ECC) which allows lime sources of varying ECC to be considered.

Research has clearly shown that a pound of ECC from ag lime, pelletized lime, water treatment plant sludge, fluid lime, or other sources are equal in neutralizing soil acidity. All lime sources have a very limited solubility and must be incorporated and given time to react with the acidity in the soil to effect neutralization.

Therefore, when selecting a lime source the cost per pound of ECC should be a primary factor in source selection. Such factors as rate of reaction, uniformity of spreading, and availability should be considered, but the final pH change will hinge on the amount of ECC applied.

Finally, what method of application should be used in no-till, strip-till, or ridge-till systems? One of the first steps a producer should make before converting a field to one of these forms of limited tillage is to test the soil, apply the full recommended rate of lime, and till it in to a 6-inch depth if possible.

After the field is in no-till, strip-till, or ridge-till, the only practical means of applying lime is to broadcast it on the surface. Surface-applied lime will eventually work its way

into the soil. Pelletized lime can safely be mixed with seed, but it's simply not physically possible to apply enough in this way to have any meaningful effect on soil pH.

-- David Whitney, Soil fertility specialist
785-532-5776

2. Soil carbon sequestration programs starting to pay for Kansas producers

On January 30-31, producers attending the "No-till On The Plains" conference in Salina can learn more about soil carbon sequestration at one of the breakout sessions. Producers can also find out how they might be able to enroll in a new program that pays producers in certain counties in Kansas to sequester carbon through no-till or new grass plantings.

Soil carbon sequestration is basically the process of storing carbon in the soil, usually through increased levels of soil organic matter. There are several recognized management practices producers can use to sequester carbon, including no-till, grass plantings, increased cropping intensity, tree plantings, erosion control, and others. As land remains under one of these management practices, it may be accumulating "carbon credits," which could have some monetary value, at least in theory. Now, the carbon credits are being recognized in the marketplace and some producers are able to receive a payment for them.

Last year, producers in most of Kansas were able to enroll in a carbon credit pilot project offered by the Chicago Climate Exchange (CCX) and administered by the Iowa Farm Bureau. About a dozen meetings were held last February, in which K-State agronomists discussed the principles of carbon sequestration and a representative of the Kansas Coalition for Carbon Management (KCCM) explained the carbon credit pilot project and how producers could enroll.

A new phase (called Pool 3) of this program is now in place, and eligible producers can enroll in this phase of the program from now until the end of June 2006.

Eligibility requirements for the program are established by the CCX. In the eastern half of Kansas, land in continuous no-till (or strip-till or ridge-till) and new grass plantings is eligible. In western Kansas (except for a few counties in the most southern areas), only land in new grass plantings is eligible at this time, although this may change as the eligibility requirements are reviewed by the CCX.

Last year, about 72 producers in Kansas enrolled more than 75,000 acres in the first phase of the program -- primarily no-till producers in the eastern half of Kansas.

The carbon credit program basically consists of four main players:

* The producers/landowners, who have the carbon credits;

* The Iowa Farm Bureau, which aggregates the credits from individual producers into a large pool of credits and sells the credits on a commodity exchange;
* The Chicago Climate Exchange, which offers the commodity exchange on which buyers and sellers can agree on a price; and
* The buyers, who offer a bid price for carbon credits, in terms of dollars per ton of carbon. So far, buyers have consisted of some of the companies and municipalities that are members of the CCX. Examples of CCX members include The Ford Motor Company, DuPont, International Paper, and the City of Chicago.

When the aggregator (Iowa Farm Bureau) who has the credits under contract believes the bid price in high enough, the credits are sold. The buyers pay the aggregator, and the money is then dispersed to the producers who enrolled in the project by signing a contract. The aggregator keeps 10 percent of the proceeds for administrative costs.

In December 2005, the Iowa Farm Bureau sold approximately 15 percent of the carbon credits under contract in "Pool 2" for about $2 per ton. This translates to about $1 per acre for land in no-till, and $1.50 per acre for land in new grass plantings. The remainder of the credits in Pool 2 remains with the aggregator, but should be sold sometime this year if prices improve.

Producers interested in the new Pool 3 phase of this carbon credit pilot project can either attend the carbon sequestration session at No-till On The Plains conference and visit the Iowa Farm Bureau's booth, or go directly to the description of the program and a copy of the 2006 XSO (Exchange Soil Offset) sales contract at:
www.iowafarmbureau.com/special/carbon/default.aspx

For more information about carbon sequestration, see: http://soilcarboncenter.k-state.edu

-- Chuck Rice, Soil microbiology
cwrice@ksu.edu

3. Evaluation of AMS replacement products in glyphosate solutions

Ammonium sulfate (AMS) is commonly added to glyphosate solutions before application in order to condition hard water and increase absorption by the target weeds. In its dry form, AMS works well and is relatively inexpensive, but it can be bulky to handle. AMS is added at the rate of 17 pounds per 100 gallons of solution. Liquid AMS products are also available and the equivalent use rate is 5 gallons liquid AMS per 100 gallons of solution. Dry and liquid AMS have performed equally well.

In recent years, many AMS replacement products have entered the market. The main selling point of these products is they have lower use rates than liquid AMS and are easier to handle than dry AMS. At K-State, we have compared the performance of AMS to several of these AMS replacement products, using their recommended rates, with glyphosate.

In these tests, AMS dramatically improved weed control with glyphosate compared to glyphosate alone. Of the AMS replacement products, only those products that actually contained AMS and were applied at comparable rates provided similar control to AMS. None of the commercially available low-rate AMS replacement products worked as well as AMS. In fact, weed control from glyphosate with the low-rate AMS replacement products (recommended at rates of 1 to 2 quarts per 100 gallons of spray solution) was often no better than weed control with glyphosate alone.

-- Dallas Peterson, Weed management specialist
dpeterso@ksu.edu

These e-Updates are a regular weekly item from K-State Extension Agronomy. All of the Research and Extension faculty in Agronomy will be involved as sources from time to time. If you have any questions or suggestions for topics you'd like to have us address in this weekly update, contact Jim Shroyer, Research and Extension Crop Production Specialist and State Extension Agronomy Leader
785-532-0397 jshroyer@ksu.edu