1. Liming prior to fall seedings of alfalfa

Correcting acid soil conditions through the application of lime can have a significant impact on crop yields, especially alfalfa. Since seeding alfalfa is expensive, and we hope a stand will last for several years, getting lime applied and acidity corrected before seeding is critical. Liming is one of the most essential, but commonly overlooked, management decisions a producer can make.

Unfortunately lime is expensive, and not always available close to where it may be needed. In many cases trucking and spreading costs may be more than the cost of the lime itself. Lime quality can also vary widely and no one wants to apply more than is necessary. So to make the best decisions on how much and what kind of lime to apply, it is useful to know how lime recommendations are made.

A routine soil test will reveal the pH level of the soil, and this will determine whether lime is needed on the field. Generally, east of the Flint Hills, lime is recommended for alfalfa if the pH drops below 6.5, with a Target pH for liming of 6.8. In the Flint Hills and west, lime is recommended for alfalfa and all other crops when the pH drops below 5.8, with a Target pH of 6.0. Target pH is simply the pH goal one hopes to achieve once the lime reacts with the soil. Why are the target pH's different? They differ because of the pH of the subsoil. East of the Flint Hills, especially south of the Kansas River, the subsoil tends to be acid, and a higher target pH is used to assure adequate amounts of calcium and magnesium. From the Flint Hills west, most soils have high pH, basic, subsoils that can provide additional calcium and magnesium to meet crop needs.
The pH test tells us if lime is needed, but it does not tell us how much lime is needed. To develop a lime recommendation, an additional soil test, Buffer pH, is used. At K-State we use the SMP Buffer test to determine the quantity of effective calcium carbonate, ECC, needed to raise the pH to the target pH.

What is the difference between water pH determination and buffer pH? The basic soil pH is done by mixing known quantities of soil and deionized water to form a slurry, and then measuring the activity of acidity in the soil water. This only measures a tiny fraction of the total acidity in the soil. A salt solution with a pH of 7.5 and designed to resist change in pH is used when measuring buffer pH. This salt solution, or buffer, reacts with the reserve acidity associated with the cation exchange capacity, found on the clay and organic matter in the soil. The more reserve, or exchangeable acidity present, the lower the pH of the soil:buffer mixture drops. This change in pH of the buffer has been calibrated to relate to lime requirement. The lower the buffer pH, after reacting with the soil, the more lime required.

Soils with more clay and organic matter will have more reserve acidity at a given pH, and 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.

The lime recommendation calibrations were developed when moldboard plowing was common and assume uniform incorporation into two million pounds per acre of soil. This equates to roughly a 6-inch plowing depth, with the lime incorporated uniformly throughout the "plow layer". But, most people don't plow anymore, so the standard buffer recommendation needs to be adjusted for lime incorporation depth. With no-till or limited-till systems, lower rates of lime have been shown to be cost-effective in many cases. This is because lime is relatively immobile and will only react with the top 2 or 3 inches of soil. Current K-State lime recommendations suggest that "traditional" rates should be reduced by 50 to 60% when surface applied in no-till systems, or when applied to existing grass or alfalfa stands (See K-State publication MF-2586 for complete details).

Lime rates are given in lbs of effective calcium carbonate, ECC, per acre, but how does that relate to ag. lime and how much lime to apply? Lime materials can vary widely in their neutralizing power. All lime materials sold in Kansas must guarantee their ECC content and dealers are subject to inspection by the Kansas Department of Agriculture. The two factors that influence neutralizing value and are used in determination of the ECC content are the chemical neutralizing value of the lime material relative to pure calcium carbonate, and the fineness of crushing, or particle size, of the product. The surface area of the particles is critical for neutralizing to occur. Expressing recommendations as pounds of ECC allows fine-tuning of rates for variation in lime sources, and avoids under or over applying lime products.

Research has clearly shown that a pound of ECC from ag. lime, pelleted 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.

What about the calcium and magnesium contents? Most ag. limes found in Kansas contain both calcium and magnesium, though the relative concentrations of the two essential plant nutrients
varies widely. While the advantages and disadvantages of using a dolomitic, magnesium containing, lime versus a calcitic lime (low magnesium, high calcium lime) have been cussed and discussed for years, the differences are very, very slight unless your soil is deficient in magnesium. In Kansas, both dolomitic lime and calcitic lime is suitable for use on cropland.

Therefore under most circumstances, the cost per pound of ECC applied to your field 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, and subsequent alfalfa growth, will hinge on the amount of ECC applied.

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2. Abnormal corn ears

Most of the corn in Kansas has pollinated and is well into the grain fill stage. We have been getting a few reports concerning abnormal ears. There are a number of possible causes for ear abnormalities: conditions early in the season as the ear was forming, late herbicide or early fungicide applications, weather conditions at pollination, insect feeding, or diseases. Peter Thomison (thomison.1@osu.edu) and Allen Geyer, from The Ohio State University Department of Horticulture and Crop Science have assembled an informative poster with illustrations of a number of ear malformations and their likely causes.

Go to http://agcrops.osu.edu/corn/EARABNORMALITIES.php to order a 26 x 33 inch poster ($10.00), to download an 11 x 17 inch, pdf version of the poster, or to read on line about:

ABNORMAL EAR DEVELOPMENT:
Ear Pinching, Blunt Ears, Multiple Ears per Node, Ear Deformities Associated with Low Temperatures, Bear Claw, Drought Damage and Nubbin Ears, Tassel Ears, Stink Bug Injury

REDUCED KERNEL DEVELOPMENT AND NUMBERS:
Incomplete Kernel Set - Whole Ear, Poor Kernel Set at Ear Tip, Tip Dieback, Zipper Ears, Chaffy Ears

EAR MOLDS AND DISEASE:
Diplodia Ear Rot, Giberrealla Ear Rot, Fusarium Ear and Kernel Rot, Blue Eye Mold Aspergillus Ear and Kernel Rot, Corn Smut, Crazy Top

FEEDING INJURY:
Western Bean Cutworm, Corn Earworm, European Corn Borer, Fall Army Worm Bird Damage, Kernel Red Streak
3. Canola production and breeding update for Kansas

The 2007-2008 winter canola growing season was challenging. Table 1 describes the fates of variety trials grown in Kansas. Dry soils reduced emergence at Hesston, Hutchinson, and Manhattan. With timely emergence, winter survival was good considering temperatures were colder than recent winters. Kansas is an ideal state for breeding varieties with improved winter survival because differential winterkill is likely to occur among genotypes each year. Where fall and spring stands were thin, plants compensated with additional branching. Before harvest, severe thunderstorms caused significant shattering and reduced yield at Garden City and Parsons.

<table>
<thead>
<tr>
<th>Location</th>
<th>Yield Average</th>
<th>Yield Range</th>
<th>Survival Average</th>
<th>Survival Range</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Garden City (irrigated)</td>
<td>1036</td>
<td>187-1951</td>
<td>92</td>
<td>60-100</td>
<td>Severe shattering from hail, high winds, and heavy rain.</td>
</tr>
<tr>
<td>Hesston</td>
<td>813</td>
<td>73-1788</td>
<td>100</td>
<td>99-100</td>
<td>Crop development slowed because of cooler spring temperatures, reducing yield potential.</td>
</tr>
<tr>
<td>Hutchinson</td>
<td>N/A</td>
<td>N/A</td>
<td>0</td>
<td>0</td>
<td>Emergence delayed one month because of dry soil at planting. Small plants did not survive the winter.</td>
</tr>
<tr>
<td>Manhattan</td>
<td>N/A</td>
<td>N/A</td>
<td>38</td>
<td>0-100</td>
<td>Plots abandoned because of temperatures below 30°F on May 4.</td>
</tr>
<tr>
<td>Parsons</td>
<td>N/A</td>
<td>N/A</td>
<td>68</td>
<td>0-85</td>
<td>Heavy rains and hail caused excessive shattering loss.</td>
</tr>
</tbody>
</table>

Even though the 2007-2008 production year was not outstanding, it is important to remember that each year is different and presents unique challenges. In 2007, the average yield for the National Winter Canola Variety Trial (NWCVT) at Garden City was 2,811 lbs/a, with a top-end yield of 3,651 lbs/a. At Hutchinson following the hard spring freeze; the NWCVT averaged 1,441 lbs/a with a top-end yield of 2,432 lbs/a.

The U.S. is meeting 70% of its domestic demand for canola oil through imports from Canada. Global demand is at an all-time high for all oilseeds. Kansas is a state where canola can be grown profitably. Good news exists for producers who are considering whether or not to plant winter canola in fall 2008. The information below provides an update on the hot-button topics related to canola production on the southern Great Plains.
**Profitability.** In an informal report prepared by the Oklahoma Agricultural Experiment Station and presented at the 4th Annual Winter Canola Production Conference in Enid, OK, switching from a continuous grain-only wheat system to a canola-wheat-wheat rotation increases expected net returns by $74 per acre per year. Present markets are proving an incentive for producers to insert canola into their traditional continuous-wheat system. Producers should be encouraged to switch some, but not all production to winter canola.

**Varieties.** As global seed companies gain interest in the U.S. canola market, more winter canola varieties will become available to producers. Ten new varieties and/or hybrids are available for planting in 2008. There is a variety from the K-State/OSU canola-breeding program being considered for release, although it will not be available for fall planting. The name 'Kiowa' has been selected and cleared for the experimental line KS9135. This cultivar has shown improved winter survival since 2004 when it was entered in the National Winter Canola Variety Trial for the first time. Across the Great Plains, KS9135 averaged 3.2% greater winter survival than the average of the check cultivars. Wichita, a very consistent variety in terms of winter survival, averaged 2.9% greater survival than the mean of the check cultivars. Enough breeder seed exists to produce a limited amount of Foundation and Certified seed for 2009 production.

**Breeding.** Yield potential, oil quality, winter survival, and herbicide tolerance are the major breeding goals of the program. Pod shatter resistance also would benefit producers who grow canola. Shatter resistance is a very challenging trait to conventionally breed into adapted germplasm requiring multiple years of selection and screening before varieties are available. Producers can reduce some effects of shattering by swathing prior to harvest. However, Kansas producers have successfully harvested canola both by swathing prior to combining and by direct harvesting.

As one canola production season ends, another season rapidly approaches. Canola planting in the northern counties of Kansas should begin by September 1. Here are some tips for proper stand establishment this fall and the latest research with regard to planting canola in a no-till production system.

**Stand establishment.** Canola seed should be planted 0.5 to 1 inches deep when soil moisture is adequate. Seeding deeper than 1 inch, delays emergence, reduces seedling vigor, and delays fall crop development. Canola has a hard time emerging through a crusted soil or from depths greater than 1 inch. A firm seedbed is essential for good seeding depth control.

Row spacing can be anywhere from 6 to 16 inches. Although yields do not drop off at wider row spacing, narrower rows often provide quicker canopy closure and less weed competition. Narrower rows may reduce pod shattering because the plants will "lace" together with neighboring plants, providing some protection from high winds. In a one-year study at the Southwest Research and Extension Center in Garden City, using narrower rows (8 inch) rather than wider rows (12 and 16 inch) increased stand establishment, winter survival, and final stand density. This study will be continued in the 2008-2009 growing season.

**Conventional and no-till seeding.** The small seed size of canola presents a challenge for seedbed preparation. It is very important to have good seed-to-soil contact. If the seedbed is too cloddy, or has too much residue, proper seed-to-soil contact can be a problem. Compacted soils
can also create emergence problems. A seedbed that is worked too often, losing its granular structure, will result in a dry seedbed that crusts easily and reduces emergence.

Some producers have encountered problems planting winter canola no-till. Maintaining a good stand through the winter has been a problem when seed has been placed into the residue from the previous crop rather than placed in the soil. Also, when wheat residue is heavy, the canola crown may develop on top of the residue rather than at the soil surface, which can lead to stand loss during the winter. Producers who choose to plant canola no-till should use a no-till drill, and consider removing residue from the seed row. This will aid stand establishment in no-till.

Research at Garden City has shown that using a coulter in combination with a double disk opener or hoe opener will increase stand establishment, winter survival, spring vigor, stand density, and yield compared to a double disk opener alone in no till. Preliminary results from a second establishment study planted at one location in KS and two locations in OK show that removing residue from the seed-row either with tillage, burning, coulters, or mowing will improve winter survival. These results also show removing residue in whatever manner will result in stands, winter survival, and yields comparable to conventional till. All of these residue management methods still provide the biggest benefit of no-till, retaining soil moisture.

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These e-Updates are a regular weekly item from K-State Extension Agronomy and Steve Watson, Agronomy e-Update Editor. 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 Steve Watson, 785-532-7105 swatson@ksu.edu, or Jim Shroyer, Research and Extension Crop Production Specialist and State Extension Agronomy Leader 785-532-0397 jshroyer@ksu.edu