k-state extension AGRONOMY e-Updates

Number 24
March 17, 2006

1. Chloride fertilization of wheat, grain sorghum, and corn

When producers think of fertilizing their crops, they typically think of applying nitrogen and phosphorus, and perhaps potassium, sulfur, and zinc. Until recent years, chloride (Cl) did not even come to mind. But that is changing.

Plant scientists did not establish Cl as an essential nutrient for plant growth until 1954. Little thought was given to Cl as a potential fertilizer in crop production after this discovery because of the small quantity of Cl needed by plants and the relative abundance of Cl in the environment. It was thought that plant deficiencies would be unlikely.

However, research in Kansas and the Great Plains, starting in the 1980's, has confirmed that wheat, grain sorghum, and corn can sometimes respond to Cl fertilization. Chloride is known to play a role in photosynthesis and maintaining cell hydration and turgor, which helps plants tolerate moisture stress. Overcoming a Cl nutrient deficiency can increase yields by improving those physiological functions. Chloride can also help by suppressing the development of several diseases, and that may be the reason for the yield response.

Chloride is very mobile in the soil, similar to nitrate, and does not react to form insoluble compounds. This makes Cl readily leachable. Thus, soils in the eastern and central parts of the state would be the areas most likely to be deficient. However, producers in southeast Kansas have traditionally been applying KCl fertilizer as a potassium source, so deficiencies are uncommon in that area.

Where yield responses to Cl fertilization have been found, visual difference between plants with and without Cl fertilization have not always been observed. Some wheat

varieties show a characteristic leaf spotting that may be mistaken for tan spot if not closely inspected.

Yield responses of 25 to 30 percent have been obtained on sensitive wheat varieties that are deficient in Cl. But responses among wheat, grain sorghum, and corn are more typically in the range of 0 to 10 percent.

The only way to predict whether a crop will respond to Cl is to have a soil test. The K-State Soil Testing Lab offers a profile Cl test, using a two-foot sampling depth. This is the first step in deciding whether Cl should be applied. If the soil tests low in Cl, there's a better chance that wheat, grain sorghum, or corn would show a yield response to applied Cl.

There are several sources of Cl available to use as a fertilizer. The least expensive source is potassium chloride (0-0-60). Potassium chloride is roughly 47 percent Cl. A complete N-P-K fertilizer using KCl as the K source is another good option. Other possible sources include calcium chloride, magnesium chloride, sodium chloride (table salt), and ammonium chloride. These are all equally effective Cl sources.

Research trials comparing fall vs. spring topdressing of wheat, starter vs. broadcast on wheat, corn, and grain sorghum have shown no difference in effectiveness due to placement or time of application. If Cl is added to starter fertilizer, only small amounts should be placed in direct seed contact because of potential salt injury.

For additional information, see K-State Research and Extension publication MF-2570.

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

2. Dryland row crop selection and depth of moist soil at planting time

The continuing drought in much of Kansas raises questions about what row crops to plant under non-irrigated conditions this year. In particular, producers in Kansas often must decide whether to plant dryland corn or grain sorghum. Part of the decision-making process involves the depth of soil moisture at planting time. In-season precipitation and temperatures ultimately have the biggest impact on yield of these crops, but depth of soil moisture at planting is also important. When soils are very dry at planting time, it's a bigger risk to plant corn than grain sorghum under non-irrigated conditions.

Research in Kansas has shown that it takes a certain amount of water for a given crop to produce its first unit of grain, and that amount is different for different crops.

Approximate Amount of Water Required to Produce the First Unit of Grain	
Crop	Inches of Water
Corn	10.9

Grain Sorghum	6.9
Soybeans	7.8
Sunflowers	5.4
Wheat	10.0

Corn takes about 11 inches of water to start producing grain, while grain sorghum takes only 7 inches of water. An average silt loam soil holds about 2 inches of available water per foot of soil. Therefore, 4 feet of moist silt loam soil would contain about 8 inches of available water for crops.

Simply based on minimum moisture requirements, dryland corn has the best chance for success where a silt loam soil has 4 feet or more of moist soil at planting time. If the same soil has less than 4 feet of moist soil, grain sorghum probably has a better chance of producing grain that year.

These are just general guidelines, and exceptions are common. It's certainly possible to plant dryland corn when there is less than 4 feet of moist soil, and still get excellent yields if in-season precipitation is above average and temperatures are cool at silking time. But if producers want to play it safe, and go with the odds, they would plant dryland corn where soils have at least 8 inches of available water at planting time and grain sorghum where soils have less than 8 inches of available water.

-- Scott Staggenborg, Cropping systems agronomist
sstaggen@ksu.edu

Loyd Stone, Soil physics
stoner@ksu.edu

3. Spring planting of alfalfa

Although most alfalfa is planted in the fall in Kansas, spring is also a good time for planting. Fall-seeded alfalfa will usually produce more first-year tonnage than spring-seeded alfalfa, but planting in April usually results in more reliable moisture conditions and less risk of poor stand establishment.

Before planting alfalfa, producers should be sure to have the soil tested for pH, phosphorus (P), and potassium (K). There is still time to get this done before a spring planting, and the results will pay off for the life of the stand – usually five to seven years.

Alfalfa does best when the soil pH ranges from 6.5 to 7.5. If the soil pH is less than 6.5, production will be reduced. At very low pH levels, the stand may be thin and weedy. Applying lime, if needed, before planting alfalfa will pay big dividends.

Alfalfa is a big user of P. For every ton of alfalfa removed from a field, 10 pounds of P are removed. Past research in Kansas has shown that applying and incorporating P

fertilizer, if recommended by a soil test analysis, results in large increases in productivity. In a no-till situation, P fertilizer can be surface-applied and still have a long-term beneficial effect on yields.

It's best to plant alfalfa no-till or reduced-till, if possible. Minimizing tillage can decrease planting costs and help maintain soil moisture levels. Alfalfa can be successfully no-tilled into wheat straw or row crop stubble. No-till will help create a firm, moist soil at planting time; save time; and cut costs.

Whether no-tilled or tilled, make sure there are no weeds growing when alfalfa is planted. Also, be sure there is not herbicide carryover from a previous crop that could injure the seedling alfalfa. Glean, Finesse, Amber, Ally, Ally Extra, Maverick, Olympus, Rave, and Peak may cause carryover concerns. Spirit, Equip, Steadfast, and atrazine-containing herbicides used on row crops the previous year also can carry over and damage newly-planted alfalfa.

Producers should consider applying a herbicide to control weeds during alfalfa establishment. Treflan can be used as a preplant incorporated treatment in conventional tillage for control of annual grasses and pigweeds. However, Treflan will not control large-seeded weeds, such as velvetleaf and cocklebur. It also can sometimes reduce alfalfa emergence if the alfalfa was seeded a little too deep, and if cool, wet weather occurs following planting.

Postemergence herbicides for alfalfa include Roundup (Roundup Ready varieties only), Buctril, Butyrac 200, Poast Plus, Select, Raptor, and Pursuit. Buctril and Butyrac 200 will control certain broadleaf weeds, while Poast Plus and Select are labeled for grass control. Raptor and Pursuit can control both broadleaf and grass weeds in alfalfa.

Be sure to read and follow all label directions when using any pesticide.

When seeding alfalfa, plant seed ¼ to ½ inch deep. Never plant less than ¾ inch deep in sandy soils, unless the field is irrigated. For dryland production, use a seeding rate of 8 to 12 pounds per acre in the west, and 12 to 16 pounds per acre in central and eastern Kansas. For irrigation production, use 15 to 20 pounds of seed per acre in all soils

When selecting seed, producers should be sure to use certified, treated seed. Varieties with a fall dormancy rating of 3 to 4 are best for the northern part of the state. For southern areas of the state, select a variety with a fall dormancy rating of 4 to 5. It is also important to select a variety with resistance to one or more of the following: phytophthora root rot, bacterial wilt, fusarium wilt, verticillium wilt, anthracnose, pea aphid, spotted alfalfa aphid, and other diseases and insects. This will help increase the longevity of the stand.

Producers should be sure to inoculate the seed to help ensure the nitrogen fixation necessary for optimum production.

-- Jim Shroyer, Crop production specialist
jshroyer@ksu.edu

Dallas Peterson, Weed management specialist
dpeterso@ksu.edu

4. Roundup Ready alfalfa

Roundup Ready alfalfa varieties are commercially available on a wide scale for the first time this season. K-State has evaluated Roundup Ready alfalfa for weed control and yield response to weed control, but has not compared yields of RR alfalfa varieties to conventional varieties.

This first year, the only glyphosate products labeled for use on Roundup Ready alfalfa are Roundup WeatherMax and Roundup OriginalMax.

Roundup should be applied to seedling alfalfa after crop and weed emergence. Because of the nature of alfalfa pollination and breeding, up to about 10 percent of the plants of Roundup Ready alfalfa will be susceptible to Roundup. Therefore, producers will want to take out these susceptible plants early, before they become established. That way, plants can compensate quickly to fill in the stand. If producers wait too long to make the first Roundup application, plants will be larger and killing the susceptible plants could thin the stand excessively.

The technology fee on Roundup Ready alfalfa is $2.50 per pound of seed. That can increase the cost of seeding by up to $50 per acre. However, herbicide costs should be considerably less than in conventional alfalfa, and weed control should be excellent. Up to 44 oz/acre of Roundup Original Max or Weather Max can be used in a single application. A maximum of 132 oz/acre per year can be used as in-crop treatments. Ammonium sulfate should be added at 8.5 to 17 lbs/100 gallons of spray solution.

Roundup can be applied at all growth stages. Domestic livestock should be removed before applying Roundup. Wait a minimum of 5 days after the last application of Roundup before grazing, cutting or feeding forage or hay.

-- 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