k-state extension AGRONOMY e-Updates

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1. Spring oats for forage production

Over the last several years, cattle producers have found spring oats to provide excellent spring pasture and hay. Oat seed is inexpensive and with reasonable fertilizer inputs, it can provide an excellent bridge for producers short on available pasture in April and May until perennial pasture or summer annual forage production becomes available.

Oat pasture should be treated the same as winter wheat pasture in terms of stocking rates and time to initiate grazing. Since grain production is not practical or recommended under grazing, producers should treat oat pasture as a graze-out program or remove it when ready for the next crop. Oats are easily controlled by a variety of herbicides, such as glyphosate and atrazine. The length of effective grazing is a function of stocking rate and weather. Rotational grazing may extend the window for effective pasture production. Oat pasture is also being used successfully in sheep production.

Properly stored, oat hay also provides a high-quality feed source. Studies at the South Central Experiment Field near Hutchinson indicate hay yields on a dry weight basis of three to five tons per acre are typical under average weather conditions. The average yield across 20 varieties at the Experiment Field is four tons per acre. Hay yield was determined at late milk/early dough stage, with an average moisture content of 60%.

These hay yields were obtained with 75 lbs/acre of nitrogen (N) applied preplant and an additional 50 lbs/acre N broadcast approximately six weeks after emergence. Lower total N rates will result in adequate forage production, especially hay. However, to maximize grazing opportunities, it is important to supply adequate N.

For hay, late boot to early heading is the optimal timing to balance quantity with quality considerations. Harvested at the dough stage, hay should have an approximate TDN of 56% with 10% protein, both on a dry basis. A nitrate test is recommended. Prussic acid levels should not be a concern.

Silage is another option for spring oats. Oats should be harvested for silage from late milk through early dough stages. Expect silage with a TDN of approximately 60% and 9% protein on a dry weight basis.

Finally, oats in Kansas may be planted for grain with expected yields of 50 or more bushels per acre most years. However, typical growing conditions during grain fill normally result in low test weights, making the grain unsuitable for food use. Grain from oats is acceptable as livestock feed; however, a market should be identified prior to planting since few markets exist locally.

Oat seed

Producers interested in planting spring oats should secure seed as soon as possible since oat seed stocks are typically not large, especially of Kansas-produced seed. Often area seed dealers will ship in oat seed stocks from out of state.

There are many potential spring oat varieties for planting. However, availability often determines what variety is planted. Ogle, though an older variety, is still readily available and is well suited for low pH soils. Bates, Dan , Don, Richard and Mustang also perform well in the area as forage oats. Most oat varieties available in Kansas perform adequately.

The most recent K-State publication on spring oat varieties can be found at:
http://www.oznet.ksu.edu/library/crpsl2/srp806.pdf

Cultural practices

Before planting oats, check the herbicide history of the desired field. Oats are especially sensitive to triazine herbicides. Also, if producers are planting oats for pasture and are considering applying a herbicide for weed control, carefully check the pesticide label for grazing restrictions.

The optimal planting date depends on location. In southeast Kansas, the optimal date ranges from February 20 to March 15. In northwest Kansas, the optimal date is from the first week of March through the end of March. For most of the state, planting is recommended from late February through the mid-March. After the optimal planting range, grain production will be limited most years. However, adequate pasture is practical after the optimum planting date. To maximize pasture production potential, it is necessary to plant as early as possible.

A seeding rate of two bushels per acre is recommended. Under good soil moisture or irrigation, three bushels per acre may be preferable for grazing. When grown for hay or silage, fertility recommendations are similar to those for grain production: 75 to 125 lbs N per acre. When

planted for grazing, an additional 30 lbs N per acre is recommended. As always, a soil test is recommended.

Oats may be successfully planted no-till, however, growth and vigor are typically greater when pre-plant tillage is used. No-till is more successful in fields that have been under no-till for a period of years, and riskier in "opportunistic" no-till situations. In either case, a fine, firm seedbed is necessary for optimal production. Under adequate soil moisture conditions, a seeding depth of ½ to 1 inch is preferable. Oats may be planted at depths greater than one inch under dry conditions; however, oat seedlings are less vigorous than wheat and can experience difficulties emerging at deeper planting depths, especially after crusting rains.

To facilitate planting and maximize forage production, winter annual weeds should be controlled either mechanically or with a burndown herbicide prior to planting. Weed control is best achieved through a good stand with rapid growth. Before using any herbicides consult the label.

For more information, see K-State publication MF-1072 "Small Grain Cereals for Forage" at: http://www.oznet.ksu.edu/library/crpsl2/MF1072.pdf

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2. Sources of free data for Geographic Information Systems (GIS)

Winter is the time when producers and agricultural professionals review yield results from previous years and make plans for future growing seasons. More people than ever are using Geographic Information Systems (GIS) and georeferenced data sets to help in doing this kind of analysis and planning.

"Georeferencing" is a term that is used to describe the process of collecting data for a given location, usually described using latitude and longitude coordinates. So for example, data collected by a yield monitor is a georeferenced data set -- each data point will contain information about yield and location within the field. Soil samples can also be georeferenced, whether they are taken from pre-determined grids, or have been sampled from management zones.

In order to better explain yield and/or soil test results, it may be beneficial to add some additional information to your GIS. Fortunately, there are many free online sources that users may access to enhance their geographic data sets. The following describes three very useful and comprehensive sites, and a brief description of the type of information that they contain.

Note: Geospatial data sets are often at least a few megabytes (MB) in size, so downloading on a high speed connection often takes a few minutes. It may not be feasible to download some of these data sets using a dial-up connection.

Soil Data Mart: http://soildatamart.nrcs.usda.gov/ Remember the paper copies of the county soil surveys? All of that information is now available electronically. At Soil Data Mart, you select the state and county you are interested in, submit your request, and a link will be emailed to you. The requests are processed in the order that they are received, but this often only takes minutes. The zipped Soil Mart data sets range from about 5 to 20 MB for each Kansas county, and will occupy several more MB when unzipped. Another site maintained by the United States Department of Agriculture is the Web Soil Survey, and this is also a great site for learning about soils for a location of interest. However, this site is only for viewing, and cannot be used for downloading data. http://websoilsurvey.nrcs.usda.gov

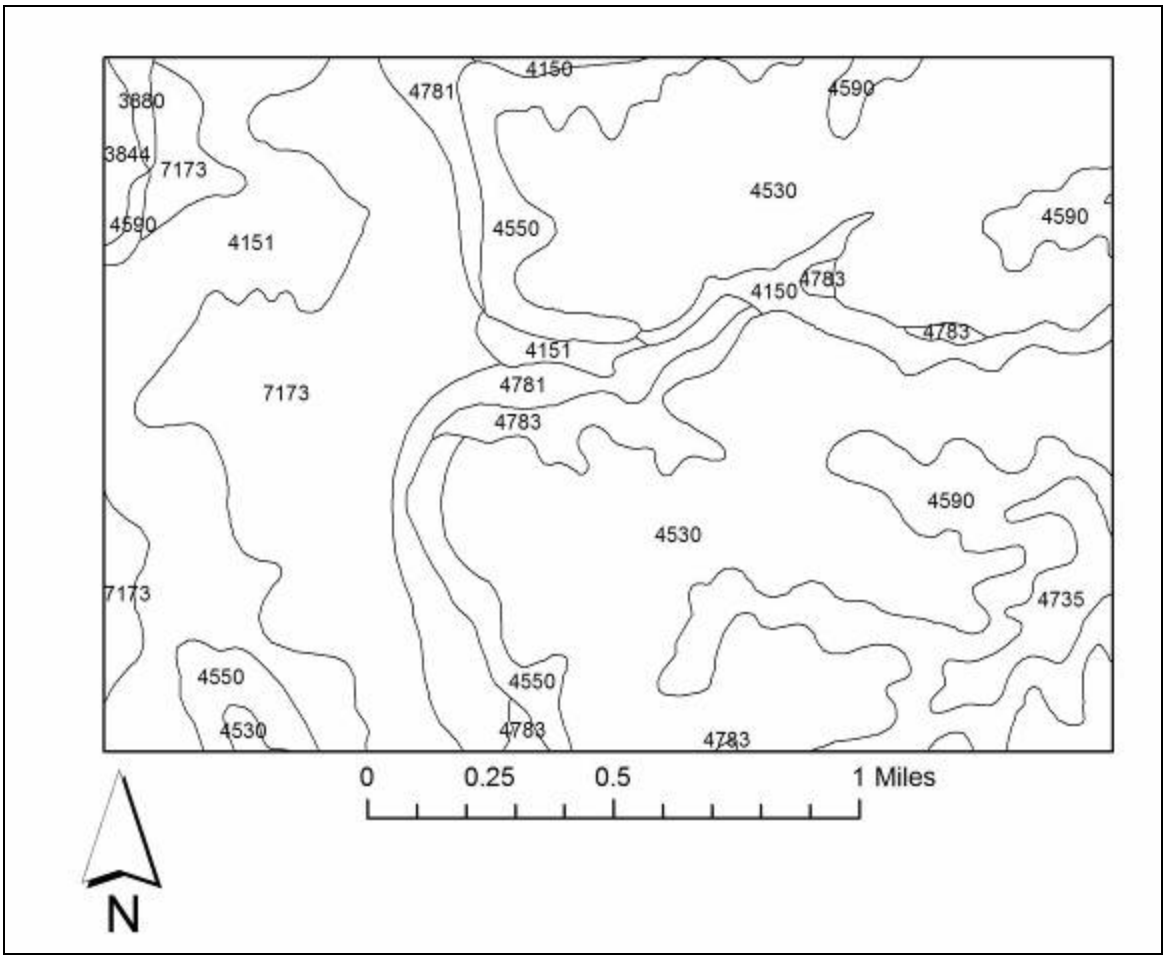

Figure 1. Example of Soil Data Mart information for section 36, T11S, R6E in Geary County, Kansas. Each 4-digit number represents a different soil type.

Kansas Geospatial Community Commons: http://www.kansasgis.org/ This site is a very comprehensive source of data (for Kansas) that has been generated and/or compiled for a variety of purposes. One of the newest data sets available here is the 2008 National Agriculture Imagery Program (NAIP) produced by the Farm Service Administration. The 2008 NAIP is color aerial photography with 1 meter resolution.

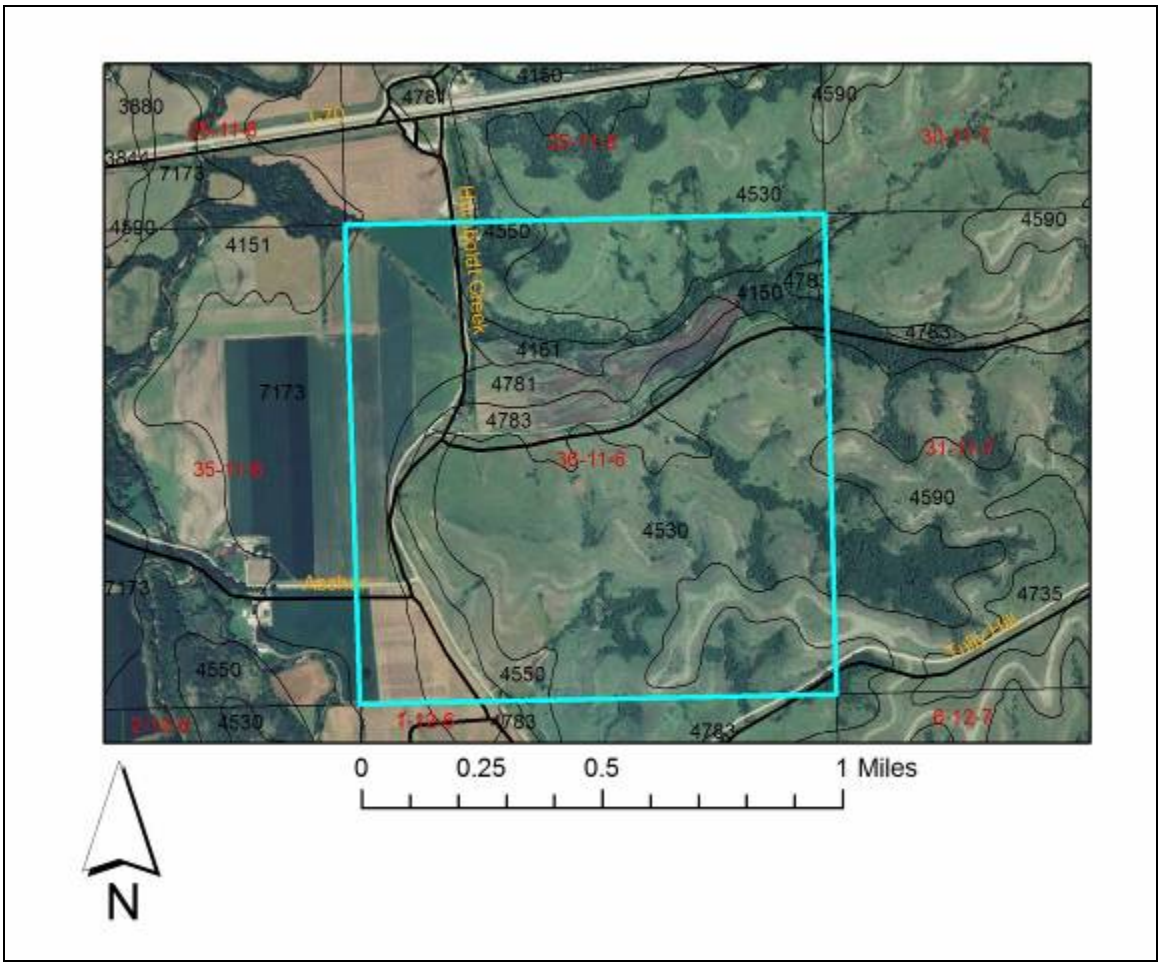

Figure 2. Three data sets from the Kansas Geospatial Community Commons site have been added to the area shown in figure 1. They include the 2008 NAIP color imagery, roads, and sections. Now it is easy to recognize that this site is located just off I-70 (south) on Humboldt Creek Road.

National Map Seamless Server: http://seamless.usgs.gov/ This site is a little different than the previous two sites as the data is continuous or seamless. To obtain data from this site the user must use the tools to select the area that they are interested in. For example, if you managed land along the Kansas River Valley in three counties it might be important to you to have elevation data for the entire area. The user may select the resolution, but a good starting point would be the 1" National Elevation Dataset, which has 30 meter by 30 meter resolution. In other words, one cell would be about 0.2 acres in size.

Note: For the Seamless site, it is important to change internet settings to allow pop-ups.

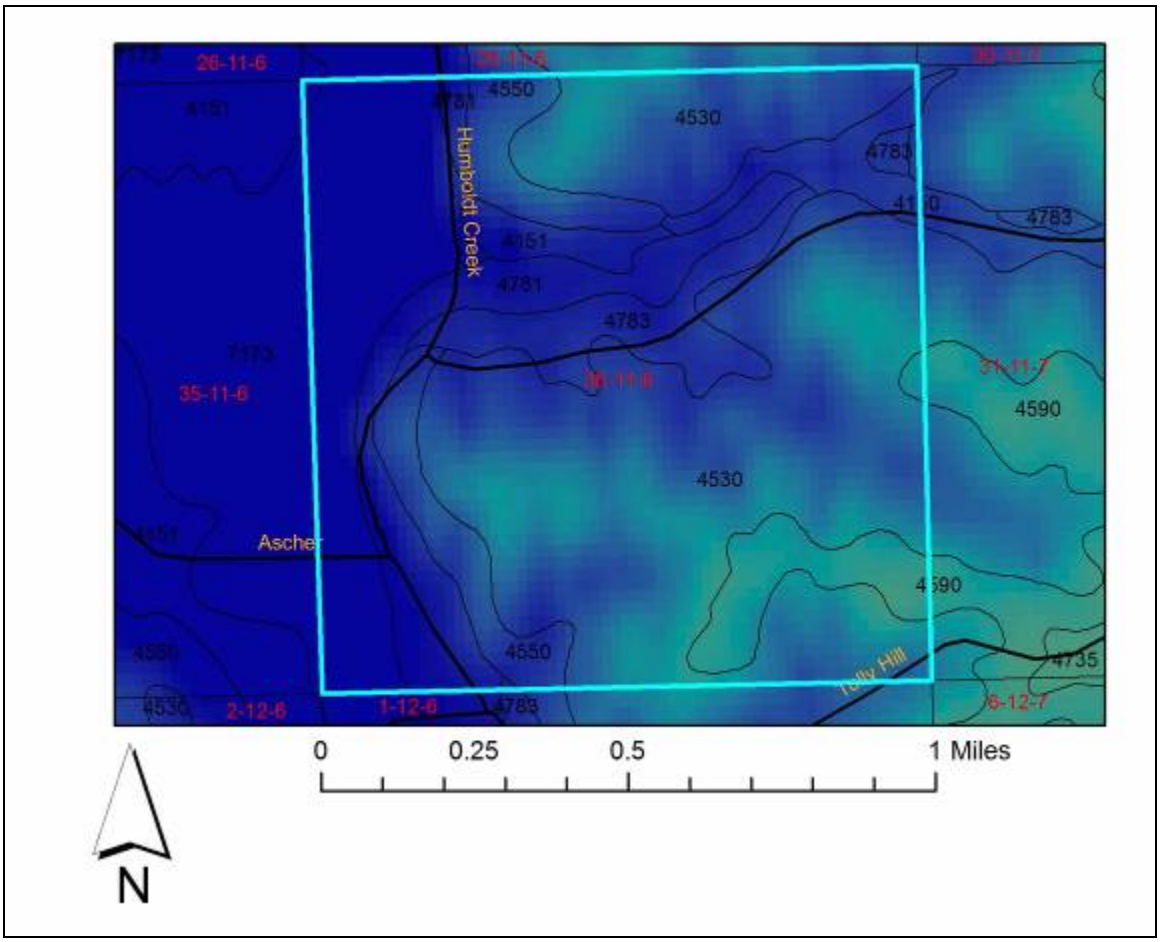

Figure 3. The elevation of section 36, T11S, R6E in Geary County ranges from 1110 feet in the northwest part of the section, to over 1280 feet in the southern part of the section. (Don't look too hard for those elevation numbers in the graphic above; you won't find them. The elevations are in a separate legend on screen that did not reproduce well for this purpose.)

In summary, users can build and enhance their GIS using free data sets from online sources. Some data sets, such as the USDA soils or elevation data sets, may be used to further examine the causes of variability in geo-referenced yield and soil data. Other data sets, such as those with roads, section lines, etc., may add value to the presentation-quality of maps for clients.

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3. Sorghum populations and row spacing

Sorghum yield is determined by a number of factors: population, tillering, head size, and seed weight. Sorghum responds to environmental conditions and available resources by adjusting tillering, head size, and seed weight. Seed weight has less room for adjustment than the other yield components, so the number of seeds harvested per acre is the critical factor determining yield. Assuming fertility needs are met, seeding rate and plant population can have a huge impact

on the number of seeds harvested per acre. Usually, it is desirable to have populations that result in one head per plant to allow for uniform grain filling and maturation.

Sorghum population recommendations range from a desired stand of 24,000 to 100,000 plants per acre depending on annual rainfall:

Average Annual Rainfall (inches)	Recommended Plant Population (plants/acre)	Within-row Seed Spacing		
		10-inch rows	20-inch rows	30-inch rows
Less than 20	24,000	16.5	8.5	5.5
20 to 26	35,000	12.0	6.0	4.0
26 to 32	45,000	9.0	4.5	3.0
More than 32	70,000	6.0	3.0	2.0
Irrigated	100,000	4.5	2.0	1.5

Because of sorghum's ability to respond to the environment, final stands can vary at least 25% from the values listed above depending on expected growing conditions without significantly affecting yields.

Recent research has confirmed these long-term recommendations. Studies at Hutchinson and Manhattan in 2008, and in Missouri in 2005, indicate that sorghum yields were maximized at 40,000, 50,000, and 60,000 plants per acre respectively. Average annual precipitation at these locations is 27, 32, and > 32 inches respectively.

Planting date has some effect on seeding rates. Sorghum tillers more readily in cool temperatures, so later plantings should probably be on the high side of the recommended range of seeding rates for each environment.

The other factor that can influence yield is row spacing. The last three columns in the table above show that plant spacing within the row becomes greater as row spacing decreases. This greater intra-row plant spacing reduces plant-plant competition early in the growing season when many of the yield components are being determined (head number, head size).

Another potential benefit of narrower row spacing is faster canopy closure. Research at the North Central Experiment Field near Belleville has documented that the sorghum canopy closed 19 days sooner when planted in 10-inch rows compared to 30-inch rows, and sorghum planted in 7-inch rows closed another 5 days sooner than that. Quicker canopy closure has the potential to improve suppression of late-emerging weeds, a major concern for many sorghum producers.

The influence of row spacing on sorghum yield has not been entirely consistent. In seven experiments that compared 10-, 20-, and 30-inch row spacings, three demonstrated a yield advantage for narrower row spacing, three had no yield response to row spacing, and one had a negative yield response to narrow rows. The one negative response was the experiment with the lowest yields (68 to 88 bushels/acre). Where there was no difference due to row spacing, yields ranged from 111 to 137 bushels per acre. Where narrow rows had an advantage, the yield range was 101 to 147 bushels per acre. The potential for a positive yield response to narrow rows is greatest in high-yielding environments, but the response is not always evident.

Should populations be adjusted with narrow rows? Results indicate that the population producing the greatest yield doesn't change with different row spacings, but the magnitude of response to population can be greater with narrower row spacings in high-yielding environments.

Planting date seems to have an interaction with row spacing. Three years of work at the North Central Experiment Field indicate that narrow rows are better than wide rows at later plantings (late June vs. late May). Over three years, there was a 10-bushel yield advantage for 15-inch rows for late June plantings, but essentially no difference in yield between 15 and 30-inch rows for late May plantings.

Summary:

1. Determine your desired population based on average rainfall and expected growing conditions – no need to go overboard.
2. Make sure you plant enough seed for your desired population (65% field germination is a good general rule).
3. Think about using narrower row spacings to close the canopy sooner and potentially capture greater yields in yield environments of 100 bushels per acre or more.

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4. Winter/spring options for winter annual broadleaf control in wheat

There are several herbicide options for controlling winter annual broadleaf weeds in wheat. Generally, fall applications will provide the best control of winter annual weeds with any herbicide, as long as the weeds have emerged. The majority of winter annual weeds usually will emerge in the fall, although you can still have some emergence in the spring, especially if precipitation after planting is limited in the fall. However, winter annual weeds that emerge in the spring often are not very competitive with the crop, assuming that you have a decent crop.

Some herbicides can work well even when applied during the dormant part of the season, while others perform best if the crop and weeds are actively growing. The key difference relates to the degree of soil activity provided by the herbicide. Herbicides that have good residual activity, such as Glean, Finesse, Amber, and Rave can generally be applied in January and February when plants aren't actively growing and still provide good weed control, assuming you have proper conditions for the application. Most other herbicides, which depend more on foliar uptake, will not work nearly as well during the mid-winter months, when the wheat and weeds aren't actively growing, as compared to a fall or early spring application.

Spring herbicide applications can be effective for winter annual broadleaf weed control as well, but timing and weather conditions are critical to achieve good control. Spring applications

generally are most effective soon after green-up when weeds are still in the rosette stage of growth, and during periods of mild weather. Once weeds begin to bolt and wheat starts to develop more canopy, herbicide performance often decreases dramatically.

Another important consideration with herbicide application timing is crop tolerance at different application timings. For example, 2,4-D should not be applied in the fall or until wheat is fully tillered in the spring. On the other hand, any herbicide containing dicamba can be applied after wheat has 2 leaves, but should not be applied once the wheat gets close to jointing in the spring, Herbicides containing dicamba include Banvel, Clarity, Rave, and Agility SG.

There has been some discussion about wheat tolerance to herbicides, especially when applied with fertilizer carrier. The best advice regarding crop safety with herbicide-fertilizer combinations and application timing is to follow the label guidelines. We generally see very minimal crop injury and no yield loss from topdress fertilizer/residual herbicide applications during the winter months. However, these combinations can often cause considerable burn to the wheat if applied when the crop is actively growing and with warmer weather. The foliar burn is generally temporary in nature and the wheat usually will recover if good growing conditions persist.

Research at Hays several years ago found as much as 47% injury to the wheat 4 days after treatment following a late March treatment of Amber plus 2,4-D, but wheat recovered and yields were not reduced. However, research in Nebraska did show some yield loss from Ally plus 2,4-D applications with fertilizer applied in late April to more advanced wheat and with moisture stress conditions. Crop injury with herbicide-fertilizer combinations will depend on the total amount of fertilizer applied, dilution with water, and the addition of surfactant. Again the herbicide label provides the best guidelines regarding if, when, and how herbicides can be applied with fertilizer.

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5. Clarification: Herbicides for new ALS- and ACCase-resistant sorghum lines

The article on weed control in grain sorghum in last week's Agronomy e-Update (No. 174, Jan. 24, 2009) mentioned the new herbicide-resistant lines of grain sorghum that K-State has released. A couple points need to be clarified.

ALS-resistant sorghum. The article mentioned several examples of ALS herbicides, just to present some products in that class of herbicides that most producers recognize. DuPont is currently developing new ALS chemistry that is designed to be labeled specifically for ALS-resistant grain sorghum.

ACCase-resistant sorghum. This topic needs a little more in-depth discussion. There are two main groups of ACCase herbicides on the market, says Curtis Thompson, Weed Management Specialist:

* The aryloxyfenoxyproprionic acids (herbicides ending in “fop”), such as quizalofop (Assure II)
* The cyclohexanediones (herbicides ending in “dim”) such as clethodim (Select) or sethoxydim (Poast)

K-State could have released a sorghum line that was resistant to both groups of grass herbicides, but that could have created a problem with controlling volunteer sorghum for producers in a grain sorghum/sunflower rotation. There would have been no postemergence herbicides available that could control the volunteer sorghum in the sunflower crop.

So K-State decided to release a line of ACCase-resistant sorghum that is resistant to the “fop” herbicides, i.e. Assure II, but susceptible to chlethodim and sethoxydim, Thompson says. That will allow producers the ability to control volunteer sorghum in sunflowers with a product such as Select or Poast.

Due to an editing oversight, the article in last week’s e-Update said that ACCase-resistant sorghum is resistant to Select (clethodim), which was incorrect.

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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