k-state extension AGRONOMY e-Updates

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1. Formula for estimating corn yield potential

With the ongoing heat and drought conditions in much of Kansas, many corn growers are trying to decide if their corn crop is worth keeping for grain harvest or if it should be harvested for silage or left in place for residue benefits (see e-Updates 304 and 305 from July 1 and July 8, 2011).

Now that tassel, silking, and pollination are complete, or nearly complete, producers can begin to get some idea of what the potential yield might be. To get a reasonable yield estimate, corn should be in the milk, dough, or dent stage. Before the milk stage, it is difficult to tell which kernels will develop and which ones have been aborted.

Producers can get some estimate of the success of pollination by examining ear silks. With successful pollination, the exposed silks should be turning brown and should easily separate from the ear when the husks are removed. Silks that have not been successfully pollinated will stay green, possibly growing to several inches in length. Unpollinated silks also

will be connected securely to the ovaries (the undeveloped kernels) when the husks are removed (see photo).

Yield estimates can be made using the yield component method. This method uses a combination of known and projected yield components of corn to calculate an estimate of the yield potential yield. It is "potential" yield because one of the most critical yield components, kernel size, will not be known until physiological maturity. Before then, one can only use an estimate of predicted yield based on what you think the grain filling period might be like (e.g. favorable, average, or poor).
Estimating potential corn yield using yield components is accomplished using the following elements:

Ears per acre: This is determined by counting the number of ears in a known area. With 30-inch rows, 17.4 feet of row = 1,000 of an acre. This is probably the minimum area that should be used. The number of ears in 17.4 feet of row x 1,000 = the number of ears per acre. Counting a longer length of row is fine, just be sure to convert it to the correct portion of an acre when determining the number of ears per acre. Make ear counts in 10 to 15 representative parts of the field to get a good average estimate. The more ear counts you make (assuming they accurately represent the field of interest), the more confidence you have in your yield estimate.

Kernels per ear: This is determined by counting the number of ear rows and number of kernels in each row. Multiply those two items to arrive at kernels per ear (number of rows x kernels per row). Do not count aborted kernels or the kernels on the butt of the ear; count only kernels that are in complete rings around the ear. Do this for every 5^{th} or 6^{th} plant in each of your ear count areas. Avoid odd, non-representative ears.

Kernels per acre = Ears per acre x kernels per ear

Kernels per bushel: This will have to be an estimate until physiological maturity. Common values range from 75,000 to 80,000 for excellent, 85,000 to 90,000 for average, and 95,000 to 105,000 for poor grain filling conditions. The best you can do at this point is estimate a range of potential yields depending on expectations for the rest of the season.

Example:

Ears per acre: (30-inch rows)
* 10 different 17.4-foot lengths of row provided counts of 25, 24, 22, 21, 24, 26, 20, 21, 22, 20
* average of these counts is (25 + 24 + 22 + 21 + 24 + 26 + 20 + 21 + 22 + 20)/10 = 225/10 = 22.5
* scaling up to an acre gives 22.5 x 1,000 = **22,500 ears per acre**

Kernels per ear:
* The 4 or 5 ears from each 17.4-foot area had an average of 12 rows and 32 kernels per row
* 12 x 32 = **384 kernels per ear**

Kernels per acre: 22,500 ears per acre x 384 kernels per ear = **8,640,000 kernels per acre**

Kernels per bushel: given that this field has been exposed to 95° F and above for the past couple of weeks and the prediction for the next 7-10 days is for triple digits every day, it may not hurt to

assume below-average fill conditions and use a fairly large number of kernels per bushel (because kernels will be small). Based on the ranges mentioned above, a reasonable value might be **95,000 kernels per bushel**.

Bushels per acre: 8,640,000 kernels per acre ÷ 95,000 kernels per bushel = about **91 bushels per acre**

If these estimates are close to correct, the field in this example is probably worth taking to grain harvest provided it is still living and likely to keep filling grain. Past experience indicates that this method of estimating yield usually provides fairly optimistic estimates.

Use a larger number for kernels per bushel if you want the process to be a bit more "pessimistic." See last week's e-Update for the range of yields that might lead to a decision to chop the crop for forage or maybe even leave it in place for the value of the residue.

Here are a few links to more detailed discussions of the process of estimating corn yields and an on-line tool that will do most of the calculations for you:
http://www.ca.uky.edu/agc/pubs/agr/agr187/agr187.pdf University of Kentucky
http://www.agry.purdue.edu/ext/corn/news/timeless/yldestmethod.html Purdue
http://www.conservfs.com/ProdServ/AgCalc/Calc1.html on-line calculator tool

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2. Wheat streak mosaic and seed quality

Where wheat streak mosaic was a severe problem on some wheat fields in 2011, will it be safe to use that wheat as seed this fall? Can wheat streak mosaic virus be carried over into the following season from the seed?

Viruses in general are mobile within the wheat plant. They have a hard time getting through the barrier formed between the developing kernel and the rachis and making it into the seed. However, Australian scientists have reported seed transmission by wheat streak mosaic virus (2005 Plant Dis. 89:1048-1050). They report seed transmission rates of 0.5-1.5% from infected genotypes. I don't recall that seed transmission has been reported in the U.S. Therefore, the potential exists to introduce the virus into new areas via seed.

Obviously, however, without the mite vector, the virus will not spread from the 0.5-1.5% infected plants that develop from the seed. If the mite is present, it most likely will already be a vector of the wheat streak mosaic virus; therefore, the impact of seed transmission within an individual field seems very small.

With regards to using the grain from the field with wheat streak mosaic virus for seed, the major problem will probably be that it will be shriveled. All else being equal, small seed often produces less vigorous plants than large seed. A producer who uses small seed and plants according to bushels per acre will plant more seeds per acre than someone who uses large seed. If the germination rate of the small seed is still high, that tends to compensate for the less vigorous plants that come from small seed compared to large seed, according to my data. But, if the producer is planting by seed

number per acre, then it is best to use large, dense seed. The key is whether the seed has high germination and good seedling vigor.

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3. Interpreting wheat plot yield data

Producers are always interested to see how wheat varieties perform in yield plot comparisons from their county and nearby counties. However, county demonstration plots often include a wide range of varieties, some of which are included for comparison purposes only and are not really adapted to the area. At times, these non-adapted varieties may actually top the plots.

In the absence of any other information, there are two main factors to consider when deciding whether any particular variety is adapted to your local area: soilborne mosaic virus resistance and maturity.

* Soilborne mosaic virus. In eastern and central Kansas, it is imperative to use a variety with resistance to soilborne mosaic. Some county wheat demonstration plots in those areas will include varieties that are susceptible to soilborne mosaic. If the plot is not on a field with soilborne mosaic, these varieties may do very well, but producers should disregard that. Varieties susceptible to soilborne mosaic include Bill Brown, Hatcher, TAM 111, and TAM 112. For a complete list, check K-State's *Wheat Variety Disease and Insect Ratings 2011* at your local county Extension office, or at: www.ksre.ksu.edu/library/plant2/mf991.pdf

* Maturity. This is usually a north-south issue. Occasionally a variety from Oklahoma, for example, will do well in a northern Kansas plot. Or a variety from Nebraska will do well in a southern Kansas plot. These kind of anomalies are bound to happen from time to time due to unusual spring weather, and are a matter of interest. But producers should not select a variety that is either too early or too late for their local area.

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4. Herbicide carryover from failed corn could affect fall planting decisions

Where corn has failed this year, producers may be thinking about planting wheat this fall. Unless producers had been planning for this rotation all along, they may find that the herbicides they applied to the corn crop will not allow them to plant wheat.

Most corn herbicides, other than atrazine, have a 4.5 month or less rotational restriction when planting back to winter wheat. However, **atrazine or any premix herbicide containing atrazine**, will be the main herbicides of concern. Words directly from the atrazine label are as follows: Rotational Crops – All Atrazine uses: (1) Do not rotate back to any crop except corn or sorghum until the following year, or injury may occur (2) If atrazine is applied after June 10, do not rotate with crops other than corn or sorghum the next year, or crop injury may result.

The above statement suggests that if atrazine is used, regardless of rate or whether it is applied preemergence or postemergence, wheat could be injured if planted in the fall following the application.

Atrazine breakdown is clearly affected by soil pH and precipitation. Dry conditions will slow the degradation of atrazine, making it difficult to predict the risk of potential crop injury.

Research under normal conditions suggests that half-life of atrazine in the soil is:

- 39 days at pH 6.8
- 119 days at pH 7.3
- 261 days at pH 8.0

Crop injury to wheat following atrazine application is most likely under high-pH or dry conditions.

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5. Planning ahead before installing an onsite wastewater treatment system saves money

When a new home is constructed, or when an onsite wastewater treatment system (OWTS) is replaced for an existing home, some planning ahead can potentially save the homeowner thousands of dollars in installation costs.

In Kansas, the state requires a minimum of 4 feet of vertical separation distance between the bottom of the trenches used in the absorption field and the water table. The size of the absorption field is determined by the soil texture and soil structure present at the site. Some soils have so much clay in them that water moves too slowly through the soil profile. Such soils are not suitable for OWTS that have an absorption area, and instead might require a lagoon.

If some of the soils on the property are more suited for the OWTS absorption field than other soils, extra care should be taken to save the areas with suitable soils for the OWTS absorption field. Also, it is important to place the absorption field in an area that is well drained and that does not receive additional water running onto the site.

Therefore, with some planning, the homeowner and construction contractor could work together with a local environmental health professional in determining the best site for the onsite wastewater treatment system. There are minimum separation distances for OWTS:
a minimum distance of 50 feet from a private drinking water well, 10 feet from the property line, and so forth. Local sanitary codes may be more restrictive than minimum state standards, so please check with your local environmental health professional. A listing for local environmental health professionals is available at: http://www.kdheks.gov/nps/lepp/lepp.html

Minimum state standards for OWTS are found in KDHE Bulletin 4-2 available at:
http://www.kdheks.gov/nps/resources/mf2214.pdf

Once the OWTS site is determined, the site should be protected from damage or compaction during the construction of the house and other structures. The soil should not be driven upon by heavy construction equipment, nor should building materials be stockpiled in this area. Topsoil should not be removed or scraped from this area. The homeowner should also think about any future additions to the house, or other features that might be added someday, such as a swimming pool, and plan accordingly.

A little extra planning regarding the site and soil for a home's OWTS can go a long way toward eliminating unnecessary expenses and costly delays in the construction process.

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6. Note on this week's Comparative Vegetation Condition Report

Due to technical difficulties, this week's Vegetation Condition Report maps will be sent out Monday as a supplemental issue of the Agronomy e-Update.

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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