1. Kansas cotton crop: Drought reduced dryland yields in 2006

The Kansas cotton crop is estimated to yield about 120,000 bales this year, from harvested acreage of 110,000. Yields are projected to average 525 lbs per acre, which is down about 110 lbs per acre from last year. This yield estimate includes both dryland and irrigated acreage.

Dryland cotton suffered more yield loss than irrigated cotton this year in Kansas, which is to be expected. The most severe combination of drought and extreme heat occurred in late July and early August, during fruiting and boll filling. This caused the dryland cotton to shed some of the top harvestable bolls. Once harvestable bolls are shed, new ones do not form in the same location so yield potential normally is reduced.

Yields of irrigated cotton will probably not be down much this year, as long as sufficient water was available in mid-season. Extreme heat does not reduce cotton yields much as long as sufficient water is available.

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2. Progress in breeding new wheat varieties with Hessian fly resistance

Hessian fly has become an increasingly serious problem in Kansas in recent years. This is especially true in continuous wheat grown under no-till or reduced-till. This has focused attention on the lack of Hessian fly resistance in almost all of the hard red and hard white winter wheat varieties grown in Kansas.
Until recently, Hessian fly had not been a serious problem consistently in Kansas for many years. With the emergence of stripe rust and the consistent threat of leaf rust, less focus was placed on resistance to Hessian fly in breeding programs. As a result, Hessian fly resistance was a low priority in most wheat breeding programs in the High Plains area. The foundation of Hessian fly resistance germplasm is relatively weak, and we’re working to diversify and strengthen this foundation. In contrast, the genetic foundation for leaf rust and stripe rust resistance is strong because that has been a high priority for several years.

Currently, Hessian fly resistance is one of the top priorities in K-State’s Manhattan breeding program – right up there with leaf rust and stripe rust resistance. Within the next six to seven years, our goal is that half the varieties released from the Manhattan program will have Hessian fly resistance.

For the immediate future, it will be at least three to four years or more before any new varieties with Hessian fly resistance are released by K-State. The line that is closest to being ready is in the Kansas Intrastate Nursery tests now. It has good yield potential and “H3” Hessian fly resistance, but it has questionable milling and baking quality, and questionable drought tolerance. If this line continues to advance and meet minimum milling and baking quality standards, it could be ready for release in 2009.

We are working with several newer sources of Hessian fly resistance from alien germplasm in the Wheat Genetics Resource Center program, backcrossing this germplasm into advanced experimental lines with other desirable qualities. Getting Hessian fly resistance into these lines may set back the potential variety release date by a year. New varieties from this breeding effort could be ready by 2011 at the earliest.

One of our goals in the Manhattan program is to start releasing varieties in about five or six years that have a combination of leaf rust, stripe rust, Hessian fly, and barley yellow dwarf resistance.

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3. Wheat streak mosaic resistance in wheat

Earlier this year, K-State released RonL, the first variety with true wheat streak mosaic resistance. In addition, there are more experimental lines being tested that have wheat streak mosaic resistance. How diverse is the resistance, and how effective is it?

* Diversity of genetics. There are two genetic sources of wheat streak resistance currently being used in the wheat breeding programs at K-State. One source comes from a wheat background, and that is the type of resistance found in RonL. The other source of resistance uses the wsm1 gene, which comes from an *Agropyron* background (intermediate wheatgrass). The *Agropyron* source has some advantages over the source
from wheat (it’s a little less temperature sensitive). But this source has yet to be incorporated into desirable varieties. Both sources of resistance are found in our advanced lines.

* Effectiveness of the resistance. The type of resistance found in RonL is very effective against the wheat streak mosaic virus at cool temperatures. The resistance is effective against the virus itself, not its vector, the wheat curl mite. If RonL is planted during cool weather and the weather remains cool through early spring, producers should see no wheat streak mosaic on RonL (or other future varieties with this source of resistance) regardless of the population level of wheat curl mites. At warmer temperatures, the resistance becomes less effective. If RonL is planted when the daily high temperature averaged with the daily low temperature is over 70 degrees for several days in a row, it may become infected with wheat streak mosaic if wheat curl mites are present. It is also possible for RonL to become infected with wheat streak mosaic in the early spring if temperatures are unusually warm. Varieties with the other source of resistance (from *Agropyron*) hold their resistance better at warmer temperatures but will break down if temperatures get high enough.

A complicating factor is the presence of high plains virus and the newly identified virus, called Triticum mosaic virus. It appears that neither source of wheat streak mosaic resistance is effective against high plains virus, although more testing is needed.

The source of resistance found in RonL is also ineffective against Triticum mosaic virus. The *Agropyron* source of resistance has a different reaction. In seedling tests carried out at a temperature of 66 degrees, the *Agropyron* source of resistance remained symptomless when inoculated with Triticum mosaic virus. It was susceptible in the same test conducted at 77 degrees, however.

The wheat curl mite is known to be the vector of wheat streak mosaic virus and the high plains virus. Studies are currently underway to determine if the wheat curl mites are also the vector of Triticum mosaic virus.

Antiserum to Triticum mosaic virus is currently being made. This should allow us to determine, in the near future, the relative frequency of transmission of Triticum mosaic virus to that of wheat streak mosaic virus.

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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
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