COTTON PRODUCTION AND IPM IN KANSAS

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Abstract

Interest in cotton continues to grow in Kansas as producers look for options to traditional crops. Cotton acreage in Kansas has increased every year since 1995, from less than 3,000 acres to 40,000 in 2000. An estimated 30 counties now have certified cotton acres. Climatic considerations show that southern Kansas averages higher available heat units and precipitation during the growing season than Lubbock, Texas. In 2000, Kansas cotton producers were faced with challenges of heavy weeds, 2-4D drift, thrips, fleahoppers, bollworms, inadequate late-season rainfall, and poor performance of desiccants to produce a disappointing yield in most cases. Dryland yields averaged about 300 lbs. lint, ranging from 125-800 lbs. Fields irrigated by pivot or water cannon averaged about 600 lbs. lint per acre, ranging from about 250-1100 lbs.; one drip-irrigated field yielded 1440 lbs. lint per acre. Custom stripping and module hauling are the first and second most costly components of Kansas cotton production, respectively.

Introduction

An agricultural revolution is going on in Kansas. Known as The Wheat State for over a century, Kansas is in the early stages of a significant shift in crop production. Production systems that have been exclusive rotations of small grains and soybeans are beginning to include cotton for increasing numbers of Kansas producers.

Cotton? In Kansas?

Historical records show that cotton was present in southeast Kansas as early as 1895, continuing into at least the early 1930s. However, modern cotton "pioneers" only began experimenting with cotton in Kansas in the early 80's. In 1983, a small gin was built near Sterling (SW of Hutchinson) and served about a dozen producers. The gin was sold and closed in about 1996, but a few producers continued to grow cotton and truck it up to 250 miles to Yukon, Oklahoma for ginning.

In the early 1980's there were 400-800 acres of cotton statewide (Duncan, et al, 1983). Acreage grew only slightly, up to 2500 acres by the early 1990's and remained fairly static until 1995. After the Freedom to Farm Act was passed in 1995, cotton acreage in Kansas expanded each year to an estimated 40,000 acres in 2000 (S. Duncan, personal comm.). FSA offices in 30 counties now have certified cotton acres (unpublished data from Plains Cotton Co-Op Assoc.). There are two gins now operating in Kansas. The first of the two was built in Winfield (southeast Kansas) in 1996 and the second in Anthony (southcentral Kansas) in 1998. Significant increases in acreage appear likely in light of continuing poor profitability of small grains and soybeans.

The newness of cotton as an increasingly important crop in Kansas presents many challenges to production and many holes exist in the current infrastructure and knowledge base. This report describes experiences in cotton production in Kansas in 2000.

Discussion

Climate

Short-season varieties have been the dominant varieties utilized in Kansas until only recently due to the northern longitude of Kansas and its presumed short production season. However, analysis of historical weather records indicates that average seasons possess sufficient heat units to make this practice unnecessary. Heat Units (HUs) for Winfield for April through September have averaged 2485 HUs (30-yr. aver., DD60). In 2000, there were 2573 HUs accumulated during this time period, although many of these were not "useful HUs" due to drought conditions in August and September. By comparison, Lubbock, Texas historically accumulates an average of 2348 HUs (30-yr. aver.) from April through September (Figure 1).

In spite of the differences in longitude between Lubbock and Winfield, the surprising similarity in total HUs is primarily due to differences in altitude. Cotton production areas in Kansas range from 800 to 1300 feet above sea level (Winfield is 1160 ft. above sea level), as compared with 3254 ft. at Lubbock.

On average, southern Kansas (e.g., Winfield) receives significantly more rainfall from April through September than the Lubbock area, 22.4 inches versus 13.6 inches, respectively. Typical weather patterns for Southern Kansas call for a relatively wet April through mid-July, followed by a relatively hot and dry August and September. Rainfall for April through September totaled 18.3 inches in 2000, but only 2.2 inches of that total fell in August and September (Figure 2), which locals say is extremely unusual. Although unusually hot and dry months in the late season may hurt yield some years, such as in 2000, rainfall appears to be sufficient on average to support dryland yields of a bale per acre or better in most areas.

Agronomy

Production scenarios in Kansas range from no-till to conventional tillage, dryland to pivot, water cannon, and drip irrigation systems. Most farms are strictly dryland. Planting dates range from the last week in April to the end of May. Row spacing is thirty inches, with plant populations ranging from about 17,000 to 34,000 plants per acre in dryland, and up to 69,000 plants per acre under irrigation. Achieving a uniform stand was often a problem in no-till production systems in 2000. Conventional, Roundup Ready®, and some stacked gene stripper varieties continue to be evaluated by farmers, consultants, and the Extension service.

Early Season

Weeds. In 2000, spring rainfall lead to a very heavy germination of weeds. Venice mallow, pigweed and related species, cocklebeurs, sandburs, bindweed, velvetleaf, and others were abundant in many fields, but because most fields were planted into Roundup Ready® varieties, these were cleaned up with one application of Roundup® by the 5-leaf stage. Unfortunately, rains that occurred after the 5-leaf stage caused significant secondary weed emergence that could not be addressed with over-the-top applications of Roundup® without suffering significant yield loss (which some did). Few Kansas producers are equipped to apply directed sprays after the 5-true leaf treatment cut-off, and many Roundup Ready® fields suffered severe weed problems that were only partially controlled with cultivation. Non-Roundup Ready® fields typically had moderate to severe weed problems all season long, although properly applied pre-emergent herbicides of Treflan, Cotoran, and Diuron were quite successful in limiting weed problems. Wicking was used to kill pigweeds in some fields in the late season, but was limited in effectiveness.

Insects. Upon emergence, seedlings in most fields that did not have seed treatments or systemic insecticides suffered moderate to severe terminal damage due to thrips. The degree of damage in untreated fields was usually due to the timeliness of remedial insecticide applications of Dimethoate® or Orthene®. In-furrow treatments of Temik® or Thimet® or seed treatments with Orthene® effectively prevented thrips damage, but under extreme pressure an additional foliar application was sometimes necessary in the latter case. Crop development in some untreated fields was delayed up to 4 weeks, which significantly reduced yields in late-planted fields.

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Fleahoppers, and at times plantbugs (e.g., *Lygus lineolarus*?), required treatments in most fields. In some cases, more than one application of insecticide was necessary to maintain or increase square retention to acceptable levels. Hairy-leafed varieties, such as Paymaster 2145RR, appeared to tolerate significantly higher numbers of fleahoppers than the smooth-leafed varieties, such as Paymaster 2200RR.

Mid-to-Late Season

Insects. Bollworms were a problem region-wide and most fields were treated once with pyrethroids to control them. In most cases, a one-time flush of bollworm activity was observed. The flush of bollworm activity was apparently driven by the local environment such as the maturation of surrounding corn or sorghum fields, because its timing varied from field to field. The scope of bollworm problems was broad enough that some local shortages of pyrethroids were experienced.

Several unidentified species of stinkbugs were observed infrequently, with levels of damage ranging from none to economically significant. Very few fields were treated for stinkbugs as the primary target pest, however some fields benefited from control of sub-threshold populations of stinkbugs when they were treated for bollworms.

Weather

Weather emerged as the single most important factor affecting yields in 2000. Adequate rainfall (i.e., 16.10") fell in somewhat regular intervals from April through July and then stopped abruptly. Crops with fruit sets that should have yielded from 600 to 800 pounds of lint ended up losing half or more of their fruit on the upper half of the plants due to severe moisture stress. Additionally, retained bolls were smaller and had reduced lint quality. Minimal rainfall in August and September (i.e., .94" and 1.22", respectively, in Winfield) and a total of 25 days above 100°F in August effectively terminated all but those fields that were receiving irrigation or that were in soils with a shallow water table.

Harvest

The drought led to a very early crop overall, with the first fields being harvested the first week of September. The drought also contributed significantly to difficulties in defoliation. Single, and sometimes double, applications of either low or high rates of Gramoxone were typically ineffective in achieving satisfactory leaf drop. This, in turn, led to higher leaf and bark content at harvest for many fields.

Dryland yields ranged from about 150 to about 800 lbs. lint per acre, with an average of approximately 300 lbs. per acre. The higher dryland yields were due to shallow water tables that permitted continued growth during the hot, dry period in August and September. Yield in pivot and water cannon-irrigated fields ranged from approximately 250 to 1100 lbs. per acre. Poor timing and or inadequate amounts of irrigation and nitrogen fertilizer explained the lower yields in most cases. The best yield in Kansas that the authors are aware of was produced under drip irrigation, with 1440 lbs. lint per acre.

Remaining Challenges

A number of challenges remain that, when dealt with, will improve yields and accelerate the continued adoption of cotton as a viable option to Kansas producers: 1) A complete shift in producers' mindsets from grain production to cotton production. Most Kansas growers are not accustomed to the management intensity of and expenses associated with cotton production. This new style of crop production is contrasted with management of "plant and forget" crops like wheat and sorghum that they are used to. 2) An appreciation of cotton's extreme sensitivity to 2-4D herbicide by neighbors and county and state agencies. This is a very sensitive area for many non-cotton farmers or ranchers who already resent cotton's presence in Kansas. Most, if not all consulted cotton fields had 2-4D drift damage ranging from individual abnormal plants to complete crop loss. Continued education and cooperation of farmers, ranchers, and county and state agencies will be necessary to avoid future conflicts and lawsuits regarding 2-4D damage. 3) Farmers obtaining the proper equipment for cotton production and harvest. Most growers who are interested in growing some cotton would be more so if they would not need to invest significantly in new, specialized equipment, e.g., planters, sprayers and strippers. Custom harvesting is the single most expensive production cost for most Kansas cotton producers. 4) Improved location of gins to reduce hauling distances. Fees associated with hauling modules from distant fields to the gin are the *second* highest costs of production for many Kansas producers, with many fields located from 40 to up to 160 miles to the nearest gin. 5) Improved production infrastructure. Equipment, parts, service, chemicals, applicators, and other components of cotton production are currently in short supply in Kansas and delays in obtaining them are frequent. This situation will certainly improve as acreage and demand for services continue to increase.

Summary

The future of cotton production in Kansas looks very promising. Cotton acreage will continue to increase as Kansas farmers become more familiar and comfortable with the requirements of cotton production and as the infrastructure evolves to meet their needs. Heat Units and precipitation appear to be adequate on average to produce 1 bale per acre yields in most locations, although timely rainfall will continue to play a key role in achieving yield potential for most producers. Yield potential could be significantly increased for producers with irrigation capabilities. Control of weeds and insect pests of thrips, fleahoppers, plant bugs, bollworms and stinkbugs will likely be common components of production in Southern Kansas. Custom harvesting and module hauling are the first and second most significant expenses for Kansas producers.

References

Duncan, S. R., D. L. Fjell, D.E. Peterson, and G.W Warmann. 1993. Cotton Production in Kansas. Exten. Publ. #MF-1088. 6 pp.

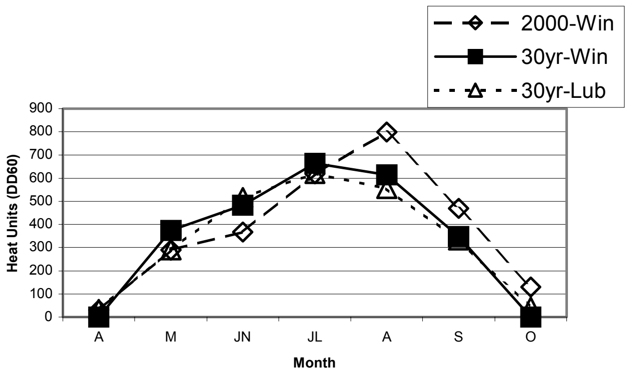

Figure 1. Average Monthly Heat Units Winfield, KS; Lubbock, TX.

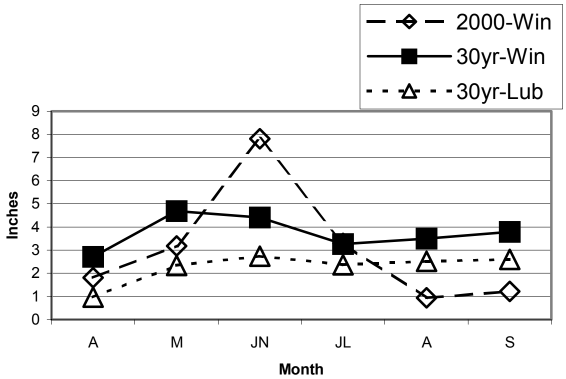

Figure 2. Average Monthly Precipitation Winfield, KS; Lubbock, TX.