The University of Georgia
Cooperative Extension
College of Agricultural and Environmental Sciences

Georgia Cotton

September 8, 2009 www.ugacotton.com

Shifts in Cotton Technology and Varieties Planted in 2009 and Decisions Looming For 2010
(Don Shurley, Phillip Roberts, and Stanley Culpepper). Georgia cotton acreage increased in 2009. Georgia was one of only 6 out of 13 cotton-producing states that had an increase in acres planted. After declining from 1.4 million acres in 2006 to 940,000 last year, Georgia acreage increased to 980,000 acres this year. Cotton has faced more competitive prices and net returns from crops like corn and soybeans but acres actually increased this year perhaps at least partially due to sharply lower acreage planted to peanuts.

One major challenge ahead for 2010 will be the loss of single-gene Bollgard® (Bt) technology. This means the loss of DP555BR- a high yielding variety that accounts for the majority of Georgia acreage. The industry has responded, however, and developed varieties which are hopeful to also rank high in yield. With exception of any remaining Bollgard® seed supplies, beginning in 2010 producers will have to switch to non-Bt cottons-- non-transgenic, Roundup-Ready® or Roundup-Ready Flex®, or two-gene Bt cottons-- Bollgard II®, or Widestrike®.

This loss of single-gene Bt technology also comes at a time when Georgia cotton producers are facing the spreading threat of glyphosate-resistant Palmer Amaranth (pigweed). The loss of DP555BR combined with the switch to new varieties and the fight with glyphosate resistance could be a challenge and uncertainty in 2010.

Table 1 shows the percentage of Georgia cotton acres planted by variety in 2008 and 2009 DP555BR remains the predominant variety in the state with 82.5% of the acreage this year. This was down percentage-wise from 2008 but still a slight increase in acres planted (806,990 acres in 2008, 808,794 acres in 2009).

Table 1. Top Dozen Varieties Planted In Georgia, Percent of Acres Planted By Variety In 2008 and 2009

2008- 940,000 Acres		2009- 980,000 Acres	
Variety	**% Acres**	**Variety**	**% Acres**
DP555BR	85.85	DP555BR	82.53
DP515BR	1.48	PHY370WR	2.74
PHY480WR	1.37	DP0935B2RF	2.61
DP444BR	1.25	DP0949B2RF	2.14
PHY370WR	1.18	ST5458B2RF	1.07
DP434R	1.02	PHY485WRF	.68
DP454BR	.77	PHY375WRF	.59
DP432R	.55	FM1845LLB2	.47
DP147RF	.46	DP434R	.43
FM960BR	.45	PHY440W	.38
DP141B2RF	.44	DP143B2RF	.37
DP493	.42	DP167RF	.34
PHY485WRF	.40	DP0924B2RF	.30
All Others	4.36	All Others	5.35
Total	100.00	Total	100.00

Source: *Cotton Varieties Planted*, USDA-AMS.

In 2008, no other variety had even 1.5% of acreage. In 2009, however, 3 varieties had over 2%--PHY370WR and 2 of the new DeltaPine varieties. ST5458B2RF, none was planted in the state in 2008, garnered over 1% of acres in 2009. These changes could be an indicator of how producers will respond in 2010 in the absence of DP555BR.

To further illustrate this, Table 2 compares 2008 and 2009 by seed technology planted. For 2009, there was a shift away from BR varieties. As Table 1 showed, DP555BR was down 3.32% but plantings of all BR varieties were down 7.3% (down over 35,000 acres). While acreage of BR technology was down in 2009, there was a sizable increase in B2RF, Widestrike® (W, WR, and WRF), and Liberty-Link® (LLB2).

Most of the increase in B2RF acreage is accounted for by DP0935B2RF, DP0949B2RF, and ST5458B2RF. Use of Widestrike® technology increased from less than 3% last year to over 5% this year. Liberty-Link® (LLB2), while still a very small proportion of acreage, increased 6x from last year.

Table 2. Acres Planted In Georgia,
Percent of Acres Planted By Technology Type

Technology	2008- 940,000 Acres	2009- 980,000 Acres
Non-Transgenic	.62	.10
R	2.34	.63
RF	.68	.96
BR	90.33	83.03
B2R	.38	.32
B2RF	.90	7.09
W	.00	.38
WR	2.55	3.59
WRF	.40	1.27
LLB2	.12	.77
Variety Not Specified	1.68	1.86
Total	100.00	100.00

Source: *Cotton Varieties Planted*, USDA-AMS

There are at least 2 factors that will drive growers' choice of varieties in 2010. One is the loss of DP555BR and other single-gene Bollgard® varieties. The other major factor for an increasing number of growers and acres will be control of glyphosate-resistant Palmer Amaranth (pigweed).

In 2008, 4.23% of Georgia acreage was planted to two-gene technology (B2 or W). This season, 12.65% of acreage was planted to two-gene cottons. Growers were testing and already shifting acreage away from DP555BR and other single-gene varieties.

2009 has been a challenging year in some areas for insect pests such as fall armyworm and corn earworm. Improved control of these 2 pests has been observed with the 2-gene Bt cotton compared to Bollgard®. However, we have also learned that 2-gene Bt cottons are not immune from caterpillar pests.

Management and control of the worsening pigweed situation requires that growers use residual chemistries along with glyphosate (when using R or RF varieties) or use glufosinate and residual products in LL varieties or plant a non-transgenic variety. Timely application is critical to control and hand weeding is also becoming increasingly necessary.

Georgia research has proven that moderate to severe infestations of glyphosate or glyphosate/ALS resistant Palmer Amaranth can be controlled most effectively in glufosinate-(Ignite) based systems with emphasis on residual herbicides and very timely postemergence applications of Ignite. In fields with lighter infestations of glyphosate or glyphosate/ALS resistant Palmer Amaranth (especially in areas with irrigation), a Roundup Ready systems approach using residual herbicides throughout the season can also be very effective. Research using cover crops, and or deep turning the land, have also proven extremely valuable in reducing the populations of Palmer Amaranth that emerge in a given area.

Table 3 shows estimates of technology-related costs for other varieties and technologies for 2009 compared to DP555BR. Estimates were made and are shown for BR, B2RF, WRF, and LLB2 (WR and W have not been estimated at this time). These costs are for production practices based on UGA Cooperative Extension recommendations. Two-gene cottons appear to offer a $7 to $10 per acre reduction in insecticide cost but this is offset by higher technology cost. Herbicide cost appears about the same regardless of system but this excludes pulling of weeds (costs often ranging from $20/acre up to $60/acre) and any difference that would be between systems. The LLB2 system appears to be the cheapest per acre overall.

Table 3. Comparison of 2009 Estimated Seed and Technology-Related Costs Per Acre

	DP555BR	B2RF[1]	WRF	LLB2[2]
Seed[3]	$20.03	$20.76	$19.89	$37.62
Tech Fees[3]	$45.37	$58.34	$55.18	$28.96
Herbicides[4]	$54.20	$54.20	$54.20	$53.27
Insecticides[4]	$24.72	$14.52	$17.44	$14.52
Total Per Acre	**$144.32**	**$147.82**	**$146.71**	**$134.37**

Source: "Expiration of Single-Gene Bollgard® Technology: Analysis of Alternatives Available to Georgia Cotton Producers", *2008 Cotton Research-Extension Report*, University of Georgia, http://www.ugacotton.com
1/ Seed cost is average of DeltaPine(DP), Stoneville(ST), and FiberMax(FM) varieties.
2/ Seed cost includes LL fee.
3/ Based on 2-3 seed per foot of row and 36" rows
4/ Includes cost of application. Herbicide cost excludes labor for hand weeding if needed.

Monsanto has recently released details of its Bollgard® phase-out plan. Availability of single-gene Bollgard® varieties for planting in 2010 will be limited to remaining seed stocks. Growers are advised to contact their distributor concerning seed availability. Deltapine is the only brand that will have Bollgard seed to sell for 2010.

All purchases must be made September 30, 2009. Seed will be shipped by February 28, 2010. Seed must be planted prior to July 1, 2010. Seed will not be available for replant. Seed purchased but not planted must be returned.

Leaf Spot Problems Continue to Plague Cotton Fields Across Georgia *(Kemerait)*. For the past four or five years, county agents and crop consultants in extreme southwestern Georgia have expressed deep concern over the presence of foliar diseases on cotton. The consultants and agents have described foliar disease symptoms that appear not only on the leaves, but also seem to spread to the bracts and even the bolls. Over the past two years, leaf spot diseases of cotton have been common in nearly every cotton field in the Coastal Plain of Georgia.

I have visited a number of cotton fields in the past several weeks and Jason Brock and I have received numerous samples from county agents over the past months. Here is a summary of what we are finding.

1. There appears to be at least four different foliar diseases of cotton present in Georgia at the this time. These include Stemphylium leaf spot, Cercospora leaf spot, Ascochyta "wet weather" blight, and what I believe to be Corynespora leaf spot, caused by the fungal pathogen *Corynespora cassiicola*.
2. Stemphylium leaf spot and Cercospora leaf spot are tied to a nutrient deficiency, especially potassium, which affects the ability to the cotton leaf to protect itself from infection. Stemphylium leaf spot is almost always tied to a deficiency in potassium and likely occurs in the sandiest areas of a field.
3. Corynespora leaf spot is newly observed in Georgia and does not seem to be tied to a nutritional problem. The disease was first reported as a leaf spot pathogen of cotton in 1961 by Dr. J.P. Jones (Jones, J.P. 1961. Phytopathology 51:305-308) and was reported to cause boll rots in India in 1989 (P. Lakshmanan et al., 1990, Phytoparasitica 18(2):171-174.
4. During the first half of the 2009 cotton season, nearly all of the samples observed for leaf spot diseases were diagnosed with Stemphylium leaf spot and/or Cercospora leaf spot.
5. Since August, our primary diagnosis on the cotton has been Corynespora leaf spot with some additional Stemphylium leaf spot and Cercospora leaf spot. The Corynespora pathogen has been detected on the bracts and may also be associated with spots on the bolls.
6. It is my experience that microscopic evaluation is needed to confirm the diagnosis of leaf spots on cotton; typically one leaf spot on cotton looks like another leaf spot. However, based upon our observations, there do appear to be some recognizable differences. Tan leaf spots, both smaller and medium size, encircled by a dark halo, are often the result of the Stemphylium pathogen. This is especially true if the center of the lesion becomes papery and detaches with age ("shot-hole" appearance). On the other hand, lesions caused by *Corynespora cassiicola* are typically larger with a "target" appearance of concentric rings. The leaf spots are brown in color and are often fairly nondescript, almost appearing a brown, circular "smears" on the leaf when they first form.
7. Stemphylium leaf spot and Corynespora leaf spot seem to progress differently in the field. With Stemphylium leaf spot, the disease can progress very quickly; the leaves take on a red color and are often dry at the margins. With Stemphylium leaf spot, defoliation occurs quickly all over the plant. The disease progression in Corynespora leaf spot appears to be different. Well formed, circular spots may develop throughout the canopy; however defoliation occurs primarily in the lower and mid canopies. Typically, the uppermost foliage remains intact while yellow, spotted leaves from the lower canopy are completely shed.

Do we need to manage these diseases and if so, how do we do it?

There is no doubt that Stemphylium leaf spot can lead to significant yield losses in severe cases. Management of Stemphylium leaf spot requires management of potassium; it is not clear (yet) how helpful a fungicide, such as Headline or Quadris, will be in the improving control of a disease with an origin in nutrient deficiency.

I believe, based upon my observations and reports in the literature, that Cornyespora leaf spot likely also causes yield losses in a field. These losses could result from a combination of premature defoliation (though defoliation late in the season could actually help to reduce boll rots) and the potential for boll rots caused by *Corynespora cassiicola*. There are currently a number of fungicide studies being conducted in Georgia to assess the efficacy of fungicides for the control of cotton leaf spot diseases. I am hopeful that after this season we may have a better ability to make effective recommendations (especially with regards to timing of application) for use of fungicides to manage a disease like Corynespora leaf spot.

Finally, I would like to thank crop consultants and county agents in southwestern Georgia for their diligence in reporting concerns about leaf spots on cotton. Until this year, Jason Brock and I have not diagnosed Corynespora leaf spot on cotton; however some of what consultants have reported in the past may have been this same disease.

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Your local County Extension Agent is a source of more information on these subjects.

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