

PROJECT REPORT- ALABAMA COTTON COMMISSION 2005

TITLE: Boll Rot and Hard Lock of Cotton-project report

INVESTIGATORS:

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OBJECTIVE:

Our objectives are 1) to determine the environmental factors that induce boll rot on early and full season cotton varieties; 2) to determine cotton variety response and potential yield losses due to boll rot; and 3) to conduct efficacy trials with fungicides to determine boll rot incidence and yield effects.

A planting date trial, four cotton variety trials and two fungicide trials were conducted at the Auburn University, Gulf Coast Research Substation, Fairhope, AL. Over all trials, plots consisted of 2 - 4 rows, 25 ft long, with 38 in. row spacing and were arranged in a randomized complete-block design with four replications. In the date of planting trial, two varieties, Sure-Grow 215 BG/RR (early season) and Deltapine DP 555 BG/RR (full season) were planted bi weekly on 14 Apr, 29 Apr, 13 May, and 3 Jun. Cotton variety trials consisted of approximately 90 varieties over the four tests and were planted 5 May. The fungicide trials were planted with Deltapine DP 555 BG/RR on 29 Apr. All fungicide applications were applied as a foliar spray using a back pack CO₂ system with a 2 row boom calibrated to deliver 10 GPA at 25 PSI. In all trials, cotton boll rot was evaluated by recording the number of healthy bolls and diseased bolls from a one meter section within each plot. Disease index (# diseased bolls / total # healthy counted) × 100 was calculated for each variety on 16 Sep. Plots planted on 14 and 29 April and 13 May were harvested 20 Sept. The remaining plots were harvested on 16 Oct. All plots were maintained throughout the season with standard herbicide, insecticide, and fertility production practices as recommended by the Alabama Cooperative Extension System. Data were statistically analyzed using PROC GLM, and means were compared with Fisher's protected least significant difference test ($P \leq 0.05$).

1. Environmental factors affecting on cotton boll rot incidence and severity.

Cotton boll rot disease incidence was relatively high in the earlier planting dates compared to the later planting dates in 2005. The initial disease index taken on 18 Aug for Sure-Grow 215 BG/RR planted 13 Apr had the highest disease index ($P \leq 0.05$) as compared to the 3 Jun planting (Table 1). By 16 Sept. the disease index ratings had increased over both varieties and all planting dates. The earliness of planting increased the disease index for both varieties. Hard lock incidence was also higher for the earlier planting dates than the later planting dates. Seed cotton yields varied by 1155 lb/A between Sure-Grow 215 BG/RR planted 13 May and Deltapine DP 555 BG/RR planted 3 Jun, respectively. Seed cotton yields from both varieties for the first three planting dates were higher ($P \leq 0.05$) than the last planting on 3 Jun.

Table 1. Cotton boll rot disease levels and yields as influenced by planting date and variety.

Variety	Planting Date	Disease Index* 8/18	Disease Index 9/16	Hard lock Index** 9/16	Yield lb/seed cotton/A
Sure-Grow 215 BG/RR	13-Apr	6.33 a	17.57 a	14.97 ab	2024.7 a
Deltapine DP 555 BG/RR	13-Apr	2.82 ab	22.67 a	20.07 a	2134.8 a
Sure-Grow 215 BG/RR	29-Apr	2.75 ab	15.42 ab	11.02 abc	2167.8 a
Deltapine DP 555 BG/RR	29-Apr	3.44 ab	15.44 ab	10.24 a-d	1925.7 a
Sure-Grow 215 BG/RR	13-May	1.90 ab	7.10 bc	5.30 bcd	2244.8 a
Deltapine DP 555 BG/RR	13-May	1.00 ab	5.92 c	2.72 cd	2200.8 a
Sure-Grow 215 BG/RR	3-Jun	0 b	2.45 c	2.45 cd	1254.5 b
Deltapine DP 555 BG/RR	3-Jun	2.97 ab	0.92 c	0.52 c	1089.4 b
LSD ($P \leq 0.05$)		5.65	9.14	9.96	363.5

*Disease index = (# diseased bolls / total # healthy bolls) × 100.

**Hard lock index = (# hard lock bolls / total # healthy bolls) × 100.

Means within columns followed by different letters are significantly different according to Fisher's LSD ($P \leq 0.05$).

2. Cotton variety response.

Weather conditions were favorable for high incidence of boll rot as this area endured rains from two tropical storms, Arleen and Cindy, as well as three hurricanes, Dennis, Katrina, and Rita. Early season variety disease index ratings for boll rot ranged from a high of 37.6% for Deltapine DP 445BG/RR to a low rating of 22.4% for PhytoGen PHY 370WR (Table 2). Seed cotton yields varied 361 lb/A between all early season cotton varieties. Much less boll rot was present in the full season varieties as compared to the early season varieties in 2005. In the full season cotton variety trial, the boll rot disease index ranged from a high of 18.7% for Fiber Max FM 989 BR to a low rating of 6.1% for PhytoGen PHY 510RR (Table 3). Seed cotton yields varied 419 lb/A between all varieties. The amount of boll rot was similar between the early season flex cotton varieties and the standard early season varieties. The flex early season cotton boll rot disease index ranged from a high of 27.2% for DynaGro 2520 B2 RF to a low rating of 5.4% for PHY 485 WRF (Table 4). Fifteen cultivars had less cotton boll rot ($P \leq 0.10$) as compared to DynaGro 2520 B2 RF and DP 108 RF which displayed the greatest disease indexes. Seed cotton yields varied between the high and lowest yielding varieties by 322 lb/A. The full season flex varieties had lower boll rot disease indexes similar to the full season varieties. The disease index for boll rot ranged from a high of 16.83% for STX 6611B2RF to a low rating of 5.34% for Deltapine DP 555 BG/RR (Table 5). Deltapine DP 555 BG/RR and DP 147 RF had less cotton boll rot ($P \leq 0.10$) as compared to STX 6611B2RF, Stoneville ST 5599BR, and Deltapine DP 164 B2RF. Seed cotton yields varied only 84 lb/A between all varieties.

Table 2. Early season cotton variety disease index ratings and seed cotton yields, 2005.

Variety	Disease index ^z		Seed cotton	
	16 Sep		lb/A	Lint %
PhytoGen PHY 310R	33.0	a-d	1105	0.42
Stoneville ST5242BR	34.8	a-d	1016	0.38
Fiber Max FM 960RR	34.1	a-d	1012	0.37
Stoneville STX0416B2R	30.1	a-e	1010	0.37
Fiber Max FM 966LL	36.8	abc	1001	0.37
PhytoGen PHY 370WR	22.4	e	997	0.39
PhytoGen PHY 440W	26.2	de	985	0.38
Deltapine DPLX03X179R	27.3	b-e	955	0.41
PhytoGen PHY 410RR	32.6	a-e	939	0.37
Deltapine DP 555 BG/RR	31.1	a-e	937	0.40
Deltapine DP 393	28.6	a-e	925	0.39
PhytoGen PHY 470WR	26.7	cde	919	0.37
Stoneville ST 4575BR	27.3	b-e	910	0.39
Deltapine DP 432 RR	29.3	a-e	907	0.37
Deltapine DP 434 RR	27.6	a-e	888	0.39
Fiber Max FM 958LL	30.6	a-e	885	0.37
Deltapine DP 445BG/RR	37.6	a	878	0.39
PhytoGen PHY 480WR	25.6	de	822	0.36
Deltapine DP 454BG/RR	28.4	a-e	813	0.41
Deltapine DPLX04Y170BR	34.4	a-d	801	0.41
Fiber Max FM 960B2R	32.9	a-d	795	0.38
Fiber Max FM 960BR	35.1	a-d	778	0.37
Stoneville ST 4686R	37.4	ab	775	0.39
Deltapine DP 424 BGII/RR	33.4	a-d	774	0.37
Deltapine DP 444BG/RR	26.7	cde	766	0.39
Deltapine DP 455BG/RR	33.5	a-d	744	0.40
LSD (.10)	10.2		175	

^zDisease index = (# diseased bolls / total # healthy bolls) × 100.

Means within columns followed by different letters are significantly different according to Fisher's LSD ($P \leq 0.10$).

Table 3. Full season cotton variety disease index ratings and seed cotton yields, 2005.

Variety	Disease index ^z		Seed cotton	Lint %
	16 Sep		lb/A	
Deltapine DP 454BG/RR	11.5		1141	0.42
Deltapine DP 455BG/RR	11.7		1024	0.41
Deltapine DP 543BGII/RR	7.5		989	0.38
Deltapine DPLX04Y170BR	7.3		969	0.40
Fiber Max FM 989 BR	18.7		949	0.38
Fiber Max FM 989 RR	9.0		929	0.38
Deltapine DP 449 BG/RR	10.3		928	0.39
PhytoGen PHY 510RR	6.1		912	0.39
Stoneville ST 6636BR	11.8		912	0.37
Deltapine DPLX03X179R	6.8		910	0.41
Deltapine DP 555 BG/RR	11.4		909	0.40
Deltapine DPLX05X648DR	13.4		883	0.41
Deltapine DP 445BG/RR	12.5		876	0.41
Stoneville ST 5303R	11.9		872	0.38
Fiber Max FM 960BR	8.5		868	0.38
Fiber Max FM 991BR	7.8		866	0.38
Deltapine DP 493	10.9		855	0.43
Deltapine DP 491	10.3		840	0.39
Deltapine DP 488 BG/RR	15.9		839	0.38
Fiber Max FM 989B2R	15.6		835	0.36
Fiber Max FM 991B2R	10.9		821	0.37
Stoneville ST 5599BR	9.4		804	0.39
Stoneville ST 6848R	18.0		801	0.37
Deltapine DP 494 RR	8.1		748	0.39
Fiber Max 991R	14.4		722	0.38
LSD (.10)	7.5		132.3	

^zDisease index = (# diseased bolls / total # healthy bolls) × 100.

Means within columns followed by different letters are significantly different according to Fisher's LSD ($P \leq 0.10$).

Table 4. Early season flex cotton variety disease index ratings and seed cotton yields, 2005.

Variety	Disease index ^z		Seed cotton	Lint %
	16 Sep		lb/A	
STX 4554B2RF	21.3	ab	1167	0.41
CG 4020 B2RF	20.8	abc	1163	0.40
xBCG - 4630 - BBII/Flex	12.9	b-g	1137	0.40
CG 3020 B2RF	11.7	b-g	1113	0.41
Vigoro CX 621	6.7	fg	1049	0.40
xBCG - 1004 - BBII/Flex	18.6	a-d	1032	0.39
DP 117 B2RF	9.4	efg	1013	0.41
xBCG - 9124 - BBII/Flex	15.9	b-f	1005	0.40
DynaGro 2520 B2 RF	27.2	a	994	0.39
CG 3520 B2RF	18.8	a-d	988	0.38
PHY 415 RF	10.5	d-g	975	0.40
PHY 485 WRF	5.4	g	975	0.40
Fiber Max FM 960BR	13.0	b-g	973	0.39
Vigoro CX 601	16.0	b-f	968	0.38
PHY 425 RF	10.0	efg	969	0.41

PHY 475 WRF	14.1	b-g	964	0.41
STX 4664RF	11.2	c-g	959	0.41
xBCG - 4153 - BBII/Flex	9.5	efg	944	0.39
xBCG - 3255 - BBII/Flex	8.6	fg	941	0.38
xBCG - 4575 - BBII/Flex	7.1	fg	928	0.38
Deltapine DP 444BG/RR	11.0	c-g	922	0.41
DP 110 RF	10.7	d-g	896	0.39
DP 108 RF	26.9	a	895	0.40
DP 113 B2RF	20.8	abc	894	0.40
xBCG - 8391 - BBII/Flex	16.5	b-f	865	0.37
DynaGro 2100 B2 RF	20.0	a-d	845	0.37
LSD (.10)	9.9		83.8	

^zDisease index = (# diseased bolls / total # healthy bolls) × 100.

Means within columns followed by different letters are significantly different according to Fisher's LSD ($P \leq 0.10$).

Table 5. Full season flex cotton variety disease index ratings and seed cotton yields, 2005.

Variety	Seed cotton		Disease index ^z
	lb/A	Lint %	16 Sep
Stoneville ST 4357B2RF	1039	0.40	8.43
Deltapine DP 555 BG/RR	1018	0.43	5.34
Deltapine DP 164 B2RF	987	0.40	15.19
Deltapine DP 167 RF	832	0.40	14.46
Deltapine DP 143 B2RF	883	0.39	10.89
Deltapine DP 156 B2RF	973	0.41	11.57
Deltapine DP 147 RF	921	0.39	5.65
Deltapine DP 152 RF	813	0.38	10.19
Stoneville ST 5599BR	983	0.41	16.02
Stoneville STX 0414B2RF	987	0.38	12.48
Stoneville ST 5007B2RF	928	0.39	7.65
Stoneville STX 5885B2RF	908	0.37	11.71
Stoneville STX 6611B2RF	920	0.39	16.83
Stoneville ST 6622B2RF	955	0.41	5.72
LSD(0.10)	67.5		9.66

^zDisease index = (# diseased bolls / total # healthy bolls) × 100.

Means within columns followed by different letters are significantly different according to Fisher's LSD ($P \leq 0.10$).

3. Efficacy trials.

The disease index taken on 16 Sep found all Quadris 2.08SC treatments reduced ($P \leq 0.05$) cotton boll rot as compared to the Pix treatment alone (Table 6). Hard lock incidence was also higher ($P \leq 0.05$) for the Pix treatment alone as compared to the Quadris 2.08SC treatments. Seed cotton yields varied by 451 lb/A between Quadris 2.08SC applied at 6.2 or 9.2 fl oz/A and the Pix treatment. The combination of Pix with Quadris 2.08SC did not increase yield as compared to the Quadris 2.08SC treatments alone. In the Topsin M test, the cotton boll rot index found Topsin M applied 2 and 4 times reduced ($P \leq 0.10$) cotton boll rot compared to the control treatment (Table 7). Hard lock incidence was also numerically higher for the control treatment as compared to the Topsin M treatments. Seed cotton yields varied by 616 lb/A between Topsin M applied 4 times as compared to the control treatment. The Topsin M treatments applied 2, 3, and 4 times bi weekly increased yield ($P \leq 0.05$) as compared to the control.

Table 6. Evaluation of Quadris 2.08 SC for management of cotton boll rot, hard lock, and cotton yield in south Alabama, 2005.

	Disease index [*]	Hard lock index ^{**}	Seed cotton lb/A
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Fungicide	Rate	timing	16 Sep		16 Sep		20 Sep	
Quadris 2.08SC	6.2 floz/A	First bloom + 14 days	9.7	b	7.92	b	2707	a
Quadris 2.08SC+ Pix	6.2 + 10 floz/A	First bloom + 14 days	7.7	b	6.31	b	2453.9	ab
Pix	10 floz/A	First bloom + 14 days	25.1	a	19.48	a	2255.8	b
Quadris 2.08SC	9.2 floz/A	First bloom + 14 days	11.5	b	9.13	b	2707	a
Quadris 2.08SC+ Pix	9.2 + 10 floz/A	First bloom + 14 days	10.5	b	8.34	b	2552.9	ab
LSD P=0.05			11.5		9.7		389	

*Disease index = (# diseased bolls / total # healthy bolls) × 100.

**Hard lock index = (# hard lock bolls / total # healthy bolls) × 100.

Means within columns followed by different letters are significantly different according to Fisher's LSD ($P \leq 0.05$).

Table 7. Evaluation of Topsin M for management of cotton boll rot, hard lock, and cotton yield in south Alabama, 2005.

Fungicide	Rate	timing	Disease index*		Hard lock index**		Seed cotton
			16-Sep		16-Sep		lb/a
Control			18.046	a	11.646		2212 b
Topsin M	16 floz/a	50% bloom + 14 days	10.634	b	6.234		2784 a
Topsin M	16 floz/a	50% bloom + 14 days + 14 days	11.693	ab	7.693		2696 a
Topsin M	16 floz/a	50% bloom + 14 days + 14 days + 14 days	10.251	b	6.851		2828 a
LSD P=0.10			6.5		5.5		397

*Disease index = (# diseased bolls / total # healthy bolls) × 100.

**Hard lock index = (# hard lock bolls / total # healthy bolls) × 100.

Means within columns followed by different letters are significantly different according to Fisher's LSD ($P \leq 0.05$).

