2012 National Cotton Fusarium Wilt Report

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2012 NATIONAL COTTON FUSARIUM WILT REPORT

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Cotton cultivars and elite breeding lines submitted by 16 cooperators were evaluated for Fusarium wilt resistance under field conditions at the E. V. Smith Research Center, Plant Breeding Unit, Tallassee, Alabama. These entries were grown on an Independence loamy fine sand highly infested with the Fusarium wilt fungus (*Fusarium oxysporum*) Schlect. f. *vasinfectum* [Atk.] (Snyd. & Hans.) and southern root-knot nematodes (*Meloidogyne incognita*.).

In 2008, a soil analysis for nematodes revealed that southern root-knot (*Meloidogyne incognita*) was the predominant nematode species in the test plots. The North Fusarium wilt field plot contains a population of *M. incognita* that ranges from 155 to 1546 J2 per 150 cc of soil with a mean of 711 J2. The populations in the South Fusarium wilt field are lower with a range from 77 to 1004 J2 per 150 cc of soil and a mean population of 378. Other nematode genera present are stubby root (*Trichodorus* sp.) and stunt (*Tylenchorhynchus* sp.). Root-knot nematodes, however, appear to be causing the major damage to cotton in the Fusarium Wilt Test as indicated by the high galling indices found on the roots of all cotton lines. The root-knot nematode population throughout the entire test area, i.e., even the areas with the lowest root-knot nematode populations, is more than sufficient to cause a high incidence of Fusarium wilt.

Cotton lines submitted to the Commercial Fusarium Wilt Trial were examined to determine their response to the root-knot nematode (*Meloidogyne incognita* race 3) and f. sp *vasinfectum*. The field has a long history of the Fusarium wilt disease incidence and root-knot nematode infestation. Plots consisted of 1 row, 20 ft long, with 36 in row spacing and were planted in a randomized complete block design with four replications. All plots were maintained throughout the season using standard herbicide, insecticide, and fertility production practices as recommended by the Alabama Cooperative Extension System. Three root systems per plot were removed immediately after harvest on November 9. The fresh root weights were recorded and nematodes were extracted from the root system by shaking in 0.6% NaOCl counted at 40 X with the inverted Nikon TSX microscope. Data was statistically analyzed using Generalized Linear Mixed Models procedures as implemented in SAS® PROC GLIMMIX with a negative binomial distribution function for count variables. Percentage data converted to decimal fractions were treated as a pseudo-binomial, whereas seed cotton yield data in the commercial test were analyzed using a normal distribution function. Dunnett's P-values were calculated to compare entries to check cultivars. Monthly average maximum temperatures from planting in April through October were 77.1, 83.9, 86.5, 92.5, 85.3, and 76.0 F with average minimum temperatures of 52.4, 61.2, 64.4, 70.1, 68.2, 61.2, and 50.2 F, respectively. Rainfall accumulation for each month was 0.95, 6.94, 3.02, 3.30, 5.33, 1.88, and 2.43 in with a total of 23.85 in over the entire season.

The 2012 season experienced drought in April with adequate moisture in May and August and extended dry periods in June, July, and September. The initial infection of root knot nematodes was ideal for a test but the lack of moisture reduced the severity of the root-knot nematode damage to the cotton plants throughout the remaining season. The numbers of root-knot nematodes increased in all the cotton commercial cultivars. The standard susceptible cotton, Rowden, averaged 909 root-knot second stage juveniles and eggs per gram of root while the M-315 resistant cotton supported 371root-knot second stage juveniles and eggs per gram of root at cotton harvest. Nematode juveniles and eggs extracted from the root systems for all the cotton cultivars ranged from a high of 4176 in FM1348GLB2 to a low of 227 in PHY367WRF. The reproductive potential of the nematode varied widely. In 2012, the cultivars supporting the highest nematode populations were FM1348GLB2, FM1740B2F, AM1550B2RF, DP1137B2RF, AllTexNitro44B2RF, CG3787B2RF, and FM1944GLB2. The low susceptibilities included PHY367WRF, PHYPX443314WRF, and DP1252B2RF.

The incidence and severity of Fusarium wilt was excellent in 2012 permitting a worthy test for determining cotton cultivars disease resistance to this cotton disease complex. The standard susceptible cotton, Rowden with an average of 73% symptomatic Fusarium wilt plants per plot while the M-315 resistant cotton's disease incidence was only 2%. All commercial cotton varieties exhibited fewer Fusarium wilt symptomatic plants than Rowden. The least amount of Fusarium wilt incidence indicating the most resistant cultivars were DP0912B2RF, PHYPX4433-14WRF, PHY367WRF, DG-2570B2RF, FM1346 GLB2 and FM1348GLB2. Re-isolation of the Fusarium wilt fungus *Fusarium oxysporum* f. sp. *vasinfectum* was conducted to confirm the presence of the disease pathogen. The fungal pathogen was not found in the resistant M -315 cotton but was readily isolated from Rowden.

For the National Fusarium Wilt Trial, entries were planted in single 20-foot rows on 36-inch centers, separated by 6-foot alleys. Four replications of the test entries and checks were evaluated in a randomized complete block design with a split plot restriction on randomization. The set of eight test cultivars submitted by a cooperator was always evaluated as a group together with two control plots within each replicate. Both susceptible (Rowden) and resistant (M-315) cultivars were included as check subplots in the two center rows of each main plot (Fig. 1).

An industry-sponsored cotton test was planted adjacent to the National Fusarium Wilt Trial (NFWT) to compare 20 commercially available cotton cultivars to Rowden and M-315 for wilt response, root-knot nematode reaction, and yield. Trial maintenance was similiar to the NFWT. Results are presented in Tables 2-5, starting on page 13 of this report.

Initial plant counts were made on June 22. Wilted plants were counted and removed on July 11, July 25, August 9, and August 23. The remaining live plants were counted and recorded on September 11. Total percent wilted plants were then determined and mean wilting for a given entry calculated.

The average % wilted plants for the susceptible check **Rowden** was 81%, with a range from 43 to 100 % on an individual plot basis (Fig. 1). Wilt development was high but quite uniform in all blocks with rep averages ranging from 77 to 87 %. The resistant check **M-315** had an average of 3% wilted plants, with a range of 0 to 22%. **Critical evaluations of breeding lines should be made relative to the Rowden check listed at the bottom of each group**.

Fig. 1. Field plot layout and % wilt for control plot of Rowden (susceptible) and M-315 (resistant). Distances (ft) from the NE corner of the trial are given in the left hand column and the bottom row.

EW													
390		22 M-315	89 Rowden		68 Rowden	1 M-315		6 M-315	75 Rowden		83 Rowden	4 M-315	
364		9 M-315	83 Rowden		93 Rowden	3 M-315		4 M-315	89 Rowden		0 M-315	67 Rowden	
338		94 Rowden	3 M-315		0 M-315	74 Rowden		91 Rowden	1 M-315		68 Rowden	2 M-315	
312		95 Rowden	0 M-315		75 Rowden	0 M-315		91 Rowden	0 M-315		43 Rowden	1 M-315	
286		2 M-315	88 Rowden		1 M-315	73 Rowden		3 M-315	85 Rowden		46 Rowden	2 M-315	
260		90 Rowden	3 M-315		0 M-315	90 Rowden		71 Rowden	3 M-315		0 M-315	59 Rowden	
234		2 M-315	73 Rowden		1 M-315	97 Rowden		51 Rowden	1 M-315		58 Rowden	0 M-315	
208		91 Rowden	5 M-315		1 M-315	92 Rowden		7 M-315	93 Rowden		72 Rowden	1 M-315	
182	8 rows	84 Rowden	3 M-315	8 rows	82 Rowden	4 M-315	8 rows	0 M-315	97 Rowden	8 rows	84 Rowden	5 M-315	8 rows
156		0 M-315	84 Rowden		6 M-315	90 Rowden		2 M-315	100 Rowden		91 Rowden	1 M-315	
130		3 M-315	92 Rowden		76 Rowden	1 M-315		4 M-315	93 Rowden		91 Rowden	0 M-315	
104		1 M-315	97 Rowden		75 Rowden	0 M-315		5 M-315	71 Rowden		85 Rowden	1 M-315	
78		91 Rowden	1 M-315		57 Rowden	6 M-315		93 Rowden	9 M-315		0 M-315	89 Rowden	
52		20 M-315	88 Rowden		58 Rowden	1 M-315		7 M-315	76 Rowden		1 M-315	73 Rowden	
26		0 M-315	80 Rowden		5 M-315	79 Rowden		78 Rowden	1 M-315		86 Rowden	0 M-315	
0		88 Rowden	3 M-315		82 Rowden	7 M-315		92 Rowden	12 M-315		96 Rowden	1 M-315	
SN		24			54			84			114		

Table 1. Percent wilted plants for entries and check in each replicate, least squares estimate of the average, *P*-value based on Dunnett's versus the resistant check M-315, and initial average number of plants per plot.

		Percent wilted plants						Avg. no.
Entry	Cultivar/Line	Rep1	Rep2	Rep3	Rep4	Avg.	*P-value*	of plants
Don Keim, Monsanto Company, 1 Cotton Row, Scott, MS 38772								
101	DK-1	2	2	2	0	2	0.809	78
102	DK-2	3	3	1	6	3	0.546	73
103	DK-3	13	3	4	21	10	0.107	69
104	DK-4	8	10	26	5	13	0.085	62
105	DK-5	1	6	8	0	4	0.491	76
106	DK-6	4	13	5	4	7	0.173	69
107	DK-7	5	29	27	10	20	0.060	65
108	DK-8	64	10	11	44	30	0.047	54
	Rowden	91	82	71	75	80	0.024	66
	M-315	1	4	3	6	4		68
Dawn Fraser, Monsanto Company, 741 Coker Farm Road, Hartsville, SC 29550								
201	DF-1	7	6	11	11	9	0.005	69
202	DF-2	7	4	10	3	5	0.087	59
203	DF-3	1	10	16	26	14	<0.001	50
204	DF-4	22	21	24	26	23	<0.001	45
205	DF-5	0	17	3	10	7	0.024	58
206	DF-6	8	3	9	8	7	0.019	67
207	DF-7	56	51	24	31	39	<0.001	41
208	DF-8	20	21	48	22	29	<0.001	54
	Rowden	57	93	88	91	85	<0.001	64
	M-315	6	4	2	1	3		68
John Quillin, All-Tex Seed, 356 Hosek Road, Victoria, TX 77905								
301	JQ-1	15	13	7	20	13	0.006	70
302	JQ-2	12	19	1	0	7	0.318	82
303	JQ-3	24	28	23	40	27	<0.001	65
304	JQ-4	1	2	2	6	2	0.984	63
305	JQ-5	7	0	8	4	5	0.801	65
306	JQ-6	14	22	6	0	9	0.127	51
307	JQ-7	17	12	2	2	7	0.341	56
308	JQ-8	13	8	6	8	8	0.294	51
	Rowden	88	100	59	93	86	<0.001	65
	M-315	20	2	0	3	6		66

† The number listed in the average column is the estimate of the average wilt percentage based on a generalized linear mixed model with the binomial distribution for fixed effects. This estimate will generally be close, but may or may not be identical to the arithmetic average obtained by averaging the numbers in the columns representing the 4 reps.

Table 1. *continued*.

Entry	Cultivar/Line	Percent wilted plants					*P-value*	Avg. no. of plants
		Rep1	Rep2	Rep3	Rep4	Avg.		
Dave Albers, Monsanto Company, 800 N Lindbergh Blvd., St. Louis, MO 63167								
401	DA-1	6	6	1	7	5	0.471	74
402	DA-2	7	35	10	42	23	<0.001	40
403	DA-3	2	3	3	3	3	0.907	73
404	DA-4	26	47	27	25	26	<0.001	43
405	DA-5	17	4	31	2	11	0.009	45
406	DA-6	16	4	5	0	6	0.256	74
407	DA-7	42	45	44	71	50	<0.001	70
Kathryn M Glass, Auburn University, 201 Funchess Hall, Auburn, AL 36849-5415								
408	DG 2530 B2RF	25	23	31	39	31	<0.001	50
	Rowden	93	76	93	94	90	<0.001	69
	M-315	9	1	7	3	5		66
Bryan Shook, All-Tex Seed, 356 Hosek Road, Victoria, TX 77905								
501	BS-01	0	13	2	9	5	0.026	79
502	BS-02	3	13	7	28	13	<0.001	63
503	BS-03	1	19	1	5	6	0.011	73
504	BS-04	22	1	7	8	9	0.001	71
505	BS-05	1	4	1	4	2	0.402	79
506	BS-06	7	6	0	19	7	0.004	63
507	BS-07	7	9	6	17	9	0.001	62
508	BS-08	6	0	5	32	10	<0.001	67
	Rowden	88	91	91	91	91	<0.001	63
	M-315	3	0	5	0	2		72
Nilesh Dighe, Monsanto Company, 3410 N. Elm Avenue, Lubbock, TX 79403								
601	ND-1	35	2	3	0	8	0.024	79
602	ND-2	1	4	2	0	1	0.988	67
602	ND-2	1	4	2	0	1	0.988	67
604	ND-4	38	33	9	8	22	<0.001	60
605	ND-5	8	7	7	5	6	0.248	85
606	ND-6	3	3	6	1	3	0.893	75
607	ND-7	4	16	1	3	5	0.457	69
608	ND-8	21	10	12	9	11	0.003	62
	Rowden	92	90	90	43	81	<0.001	71
	M-315	12	6	3	1	5		74

Table 1. *continued.*

Entry	Cultivar/Line	Percent wilted plants					*P-value*	Avg. no. of plants
		Rep1	Rep2	Rep3	Rep4	Avg.		
Mustafa McPherson, PhytoGen Seed Co., LLC, 118 Kennedy Flat Road, Leland, MS 38756								
701	PHY- MM1	32	15	0	12	13	<0.001	61
702	PHY- MM2	9	7	2	2	5	0.009	64
703	PHY- MM3	9	12	5	2	6	0.002	73
704	PHY- MM4	0	5	1	1	2	0.233	69
705	PHY- MM5	3	8	4	5	5	0.008	69
706	PHY- MM6	12	13	1	2	7	0.001	79
707	PHY- MM7	12	6	4	4	6	0.002	69
708	PHY- MM8	3	23	4	6	7	0.001	65
	Rowden	78	75	58	68	72	<0.001	63
	M-315	1	0	0	2	1		77
Fred Bourland, University of Arkansas, P.O. Box 48, Keiser, AR 72351								
801	FB-1	8	1	9	2	5	0.007	69
802	FB-2	16	4	5	15	10	<0.001	59
803	FB-3	5	14	3	1	6	0.003	75
804	FB-4	18	20	7	55	26	<0.001	68
805	FB-5	40	7	3	0	9	<0.001	58
806	FB-6	10	2	10	3	6	0.003	39
807	FB-7	31	22	44	37	34	<0.001	72
808	FB-8	27	7	2	30	16	<0.001	52
	Rowden	58	91	97	74	82	<0.001	59
	M-315	1	1	1	0	1		78
Brent Styles, Bayer Crop Science, 4205 Williamson Road, Wilson, NC 27893								
901	MA-1	8	9	22	5	11	<0.001	82
902	MA-2	3	11	8	23	11	<0.001	68
903	MA-3	17	17	47	61	37	<0.001	65
904	MA-4	16	15	51	29	27	<0.001	83
905	MA-5	1	4	9	10	6	0.013	76
906	MA-6	41	19	30	13	25	<0.001	86
907	MA-7	46	9	20	11	21	<0.001	69
908	MA-8	6	19	5	9	9	0.001	81
	Rowden	86	84	92	89	88	<0.001	67
	M-315	0	1	1	4	1		57

Table 1. *continued*.

Entry	Cultivar/Line	Percent wilted plants					*P-value*	Avg. no. of plants
		Rep1	Rep2	Rep3	Rep4	Avg.		
Brent Styles, Bayer Crop Science, 4205 Williamson Road, Wilson, NC 27893								
1001	FS-1	5	7	5	14	7	0.471	80
1002	FS-2	15	5	9	3	8	0.385	74
1003	FS-3	20	52	18	34	29	0.051	78
1004	FS-4	2	7	1	0	3	0.872	80
1005	FS-5	12	0	44	10	15	0.113	74
1006	FS-6	4	9	4	5	5	0.752	72
1007	FS-7	29	15	18	0	15	0.108	71
1008	FS-8	6	5	4	4	5	0.795	66
	Rowden	76	92	73	89	82	0.022	70
	M-315	7	3	1	22	7		65
Brent Styles, Bayer Crop Science, 4205 Williamson Road, Wilson, NC 27893								
1101	FS-9	3	4	4	5	4	0.028	77
1102	MS-9	5	10	4	4	6	0.006	71
1103	MS-10	20	26	51	20	28	<0.001	82
1104	MS-11	11	11	5	4	8	0.001	77
1105	MA-9	4	12	2	10	7	0.003	70
1106	MA-10	4	7	5	0	4	0.030	75
1107	MA-11	0	10	0	3	3	0.050	80
Kathryn M Glass, Auburn University, 201 Funchess Hall, Auburn, AL 36849-5415								
1108	DG 2610 B2RF	7	16	10	25	15	<0.001	66
	Rowden	73	97	51	75	77	<0.001	63
	M-315	1	1	1	0	1		70
Brent Styles, Bayer Crop Science, 4205 Williamson Road, Wilson, NC 27893								
1201	MS-1	22	11	5	17	13	<0.001	84
1202	MS-2	31	1	2	5	10	<0.001	75
1203	MS-3	27	3	9	3	10	<0.001	80
1204	MS-4	74	14	18	10	28	<0.001	77
1205	MS-5	23	5	5	6	9	0.001	72
1206	MS-6	15	16	8	7	10	<0.001	68
1207	MS-7	25	40	36	21	29	<0.001	75
1208	MS-8	21	33	44	42	34	<0.001	76
	Rowden	96	84	72	68	81	<0.001	61
	M-315	1	5	1	1	2		77

Table 1. *continued*.

Entry	Cultivar/Line	Percent wilted plants					*P-value*	Avg. no. of plants
		Rep1	Rep2	Rep3	Rep4	Avg.		
Charlie Cook, All-Tex Seed, 356 Hosek Road, Victoria, TX 77905								
1301	CC-01	39	5	6	5	15	<0.001	57
1302	CC-02	10	14	4	12	10	0.002	64
1303	CC-03	26	14	0	15	13	<0.001	55
1304	CC-04	14	1	5	2	7	0.035	55
1305	CC-05	7	3	13	12	9	0.004	52
1306	CC-06	24	43	2	8	19	<0.001	55
1307	CC-07	28	28	7	12	18	<0.001	70
1308	CC-08	4	21	19	8	14	<0.001	63
	Rowden	79	71	73	95	81	<0.001	50
	M-315	5	5	2	0	3		66
Cody Poage, All-Tex Seed, P.O. Box 1057, Levelland, TX 79336								
1401	CP-01	14	7	5	8	8	0.002	79
1402	CP-02	0	1	0	1	1	0.906	72
1403	CP-03	8	0	3	3	3	0.235	83
1404	CP-04	4	5	4	3	4	0.130	75
1405	CP-05	10	10	6	5	7	0.006	57
1406	CP-06	21	37	36	18	28	<0.001	76
1407	CP-07	10	31	1	9	12	<0.001	67
1408	CP-08	15	11	3	1	7	0.006	78
	Rowden	89	85	46	83	77	<0.001	70
	M-315	0	1	2	4	2		71
Joe Johnson, PhytoGen Seed Co., LLC, 118 Kennedy Flat Road, Leland, MS 38756								
1501	PHY-JJ1	19	10	42	17	21	<0.001	70
1502	PHY-JJ2	18	9	18	8	13	<0.001	75
1503	PHY-JJ3	13	19	4	2	9	0.003	74
1504	PHY-JJ4	29	8	8	12	13	<0.001	63
1505	PHY-JJ5	13	21	18	17	17	<0.001	68
1506	PHY-JJ6	7	14	31	11	16	<0.001	72
1507	PHY-JJ7	5	7	29	6	12	0.001	64
1508	PHY-JJ8	22	10	10	14	13	<0.001	75
	Rowden	80	84	85	83	83	<0.001	59
	M-315	0	3	3	9	3		65

Table 1. *continued*.

Entry	Cultivar/Line	Percent wilted plants					*P-value*	Avg. no. of plants
		Rep1	Rep2	Rep3	Rep4	Avg.		
David Weaver, Auburn University, 201 Funchess Hall, Auburn, AL 36849-5415								
1601	AU 91215	13	8	7	7	8	0.003	46
1602	AU 90915	16	34	21	4	18	<0.001	55
1603	AU 91411	19	5	19	9	12	<0.001	49
1604	AU 91111	30	10	2	2	11	<0.001	62
1605	AU 90810	24	11	23	5	14	<0.001	49
Kathryn M Glass, Auburn University, 201 Funchess Hall, Auburn, AL 36849-5415								
1606	FM 1944 GLB2	4	4	0	9	5	0.041	69
1607	PHY 375 WRF	38	19	54	5	28	<0.001	51
1608	DP 1048 B2RF	8	29	9	14	15	<0.001	55
	Rowden	82	97	90	67	85	<0.001	69
	M-315	7	1	0	0	2		63

Commercial Cotton Wilt Trial

Table 2. Least squares estimates of the average percent wilted plants for entries and checks, confidence intervals, and *P*-values based on Dunnett's versus the susceptible check Rowden and the resistant check M-315.

		95% Confidence Limit		Dunnett's *P* vs.	
Cultivar	Avg	Lower	Upper	Rowden	M315
AM 1511 B2RF	16	12	21	<0.001	<0.001
AM 1550 B2RF	15	11	20	<0.001	<0.001
All-Tex Nitro 44B2RF	13	10	18	<0.001	<0.001
CG 3787 B2RF	13	10	19	<0.001	<0.001
DG 2530 B2RF	21	16	26	<0.001	<0.001
DG 2570 B2RF	5	3	9	<0.001	0.056
DP 0912 B2RF	2	1	4	<0.001	1.000
DP 1028 B2RF	13	9	18	<0.001	<0.001
DP 1050 B2RF	12	9	17	<0.001	<0.001
DP 1137 B2RF	24	19	30	<0.001	<0.001
DP 1252 B2RF	23	18	30	<0.001	<0.001
DPLX 12R242B2R2	21	17	26	<0.001	<0.001
FM 1346 GLB2	6	4	10	<0.001	0.006
FM 1348 GLB2	6	4	9	<0.001	0.013
FM 1740 B2F	24	19	30	<0.001	<0.001
FM 1944 GLB2	17	12	22	<0.001	<0.001
PHY 367 WRF	5	3	8	<0.001	0.106
PHY 375 WRF	34	28	40	<0.001	<0.001
PHY 565 WRF	11	8	16	<0.001	<0.001
PHY PX4433-14 WRF	3	1	6	<0.001	0.949
M-315	2	1	3	<0.001	
Rowden	73	70	76		<0.001

Table 3. Least squares estimate of root knot egg number (counts per 150 cc) for entries and checks, confidence intervals, and *P*-values based on Dunnett's versus the susceptible check Rowden and the resistant check M-315. Samples were collected at harvest.

		95% Confidence Limit		Dunnett's *P* vs.	
Cultivar	Avg	Lower	Upper	Rowden	M315
AM1511B2RF	181	57	573	1.000	0.994
AM1550B2RF	418	132	1322	0.888	0.074
AllTexNitro44B2RF	303	94	971	1.000	0.387
CG3787B2RF	282	90	891	1.000	0.479
DG2530B2RF	57	18	180	0.084	0.925
DG2570B2RF	152	48	478	1.000	1.000
DP091 B2RF	187	58	599	1.000	0.990
DP1028B2RF	104	33	330	0.884	1.000
DP1050B2RF	161	51	510	1.000	1.000
DP1137B2RF	396	125	1253	0.939	0.101
DP1252B2RF	107	34	338	0.898	1.000
DPLX12R242B2R2	120	38	382	0.981	1.000
FM1346GLB2	99	31	318	0.850	1.000
FM1348GLB2	336	106	1065	0.997	0.233
FM1740B2F	933	295	2954	0.026	0.000
FM1944GLB2	593	187	1878	0.325	0.007
PHY367WRF	38	11	130	0.030	0.537
PHY375WRF	72	23	229	0.309	0.999
PHY565WRF	348	110	1097	0.993	0.198
PHYPX443314WRF	83	26	263	0.509	1.000
M-315	110	35	343	0.547	
Rowden	210	66	664		0.539

Table 4. Least squares estimate of root knot egg number (counts per g of root fresh weight) for entries and checks, confidence intervals, and *P*-values based on Dunnett's versus the susceptible check Rowden and the resistant check M-315. Samples collected at the 6-8 leaves stage.

		95% Confidence Limit		Dunnett's *P* vs.	
Cultivar	Avg	Lower	Upper	Rowden	M315
AM1511B2RF	1452	472	4472	0.999	0.156
AM1550B2RF	2401	780	7394	0.626	0.010
AllTexNitro44B2RF	2332	741	7335	0.689	0.014
CG3787B2RF	2216	725	6775	0.752	0.017
DG2530B2RF	516	169	1578	0.994	1.000
DG2570B2RF	1201	393	3670	1.000	0.342
DP091 B2RF	1203	383	3786	1.000	0.358
DP1028B2RF	1020	331	3142	1.000	0.597
DP1050B2RF	862	280	2653	1.000	0.821
DP1137B2RF	2375	771	7313	0.644	0.011
DP1252B2RF	378	123	1164	0.769	1.000
DPLX12R242B2R2	523	170	1611	0.995	1.000
FM1346GLB2	764	243	2404	1.000	0.957
FM1348GLB2	4176	1356	12857	0.066	<0.001
FM1740B2F	3164	1028	9744	0.246	0.002
FM1944GLB2	2111	686	6500	0.816	0.022
PHY367WRF	227	66	780	0.312	1.000
PHY375WRF	449	146	1382	0.955	1.000
PHY565WRF	1607	526	4912	0.994	0.097
PHYPX443314WRF	256	84	782	0.229	1.000
M-315	371	123	1120	0.255	
Rowden	909	294	2811		0.251

Table 5. Least squares estimate of seed cotton yield (lbs per acre) for entries and checks, confidence intervals, and *P*-values based on Dunnett's versus the susceptible check Rowden and the resistant check M-315.

		95% Confidence Limit		Dunnett's *P* vs.	
Cultivar	Avg	Lower	Upper	Rowden	M315
AM1511B2RF	1674	576	2771	0.774	0.341
AM1550B2RF	1510	413	2608	0.931	0.189
AllTexNitro44B2RF	2244	1109	3379	0.154	0.973
CG3787B2RF	2084	999	3168	0.264	0.864
DG2530B2RF	2762	1678	3847	0.011	1.000
DG2570B2RF	3369	2284	4453	<0.001	1.000
DP091 B2RF	2327	1192	3462	0.109	0.992
DP1028B2RF	2566	1469	3663	0.039	1.000
DP1050B2RF	2009	912	3107	0.336	0.779
DP1137B2RF	1340	242	2437	0.992	0.093
DP1252B2RF	1224	126	2321	0.999	0.054
DPLX12R242B2R2	864	0	1961	1.000	0.008
FM1346GLB2	3640	2505	4776	<0.001	0.997
FM1348GLB2	3343	2246	4441	<0.001	1.000
FM1740B2F	1147	50	2245	1.000	0.037
FM1944GLB2	1115	17	2212	1.000	0.032
PHY367WRF	2254	1157	3351	0.156	0.978
PHY375WRF	1989	892	3086	0.396	0.784
PHY565WRF	2726	1642	3811	0.014	1.000
PHYPX443314WRF	2113	1028	3197	0.238	0.891
M-315	3001	2184	3817	<0.001	
Rowden	678	-139	1494		<0.001