2011 National Cotton Fusarium Wilt Report

Table of Contents

2011 NATIONAL COTTON FUSARIUM WILT REPORT

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Cotton cultivars and elite breeding lines submitted by 20 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 both pathogens the root-knot nematode (*Meloidogyne incognita* race 3) and *Fusarium oxysporium* f. sp *vasinfectum* . The field has a long history of 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 plants per plot were removed on July 27. The fresh root weights were recorded and nematodes were extracted from the root system by shaking in 0.6% NaOCl counted under the inverted microscope. Fusarium was aseptically isolated on acidified potato dextrose media from systematic plants removed July. 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 harvest in September were 80.7, 84.9, 95.8, 92.9, 95.6, and 85.2°F with average minimum temperatures of 52.5, 57.4, 69.3, 72.4, 70.2, and 62.7°F, respectively. Rainfall accumulation for each month was 1.91, 2.22, 2.24, 8.02, 0.64, and 4.9 in with a total of 19.93 in over the entire season.

The 2011 season, environmentally, experienced prolonged periods of drought which reduced the incidence and severity of the root-knot nematode and Fusarium wilt pathogens. The numbers of root-knot nematodes increase in all the cotton samples submitted at 45 days after planting (DAP) and at harvest. The standard susceptible cotton, Rowden, averaged 241 root-knot juveniles and eggs per gram of root while the M-315 resistant cotton supported 66 root-knot juveniles and eggs per gram of root at 45 DAP.   Nematode juveniles and eggs extracted from the root systems for all the submission ranged from a high of 1315 in FM 1740 B2F to a low of 18 in PHY 367 WRF.   The reproductive potential of the nematode varied widely from highly susceptible (FM 1740 B2F, STV 5458 B2RF, and PHY 375 WRF) to low susceptibilities (PHY 367 WRF, STV 5288 B2F, and CG 3787 B2RF) depending on the cotton submission.   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. Over all the cotton submissions planted in 2011, 68.42% were colonized by *Fusarium oxysporum* f. sp. *vasinfectum*.

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 17 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 14 of this report.

Initial plant counts were made on June 21. Wilted plants were counted and removed on July 7, July 28, and August 18. The remaining live plants were counted and recorded on August 30. 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 11%, with a range from 0 to 83% on an individual plot basis (Fig. 1). Wilt development was low but quite uniform in all blocks with rep averages ranging from 3.5 to 3.8%. The resistant check **M-315** had an average of 2% wilted plants, with a range of 0 to 9%. **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.

NS	Col 1	Col 2	Col 3	Col 4	Col 5	
338	83 / 1 — Rowden M-315	1 / 1 — Rowden M-315	4 / 17 — M-315 Rowden	3 / 3 — M-315 Rowden	8 / 2 — Rowden M-315	
312	19 / 1 — Rowden M-315	5 / 1 — Rowden M-315	2 / 8 — M-315 Rowden	2 / 3 — M-315 Rowden	1 / 1 — M-315 Rowden	
286	58 / 2 — Rowden M-315	2 / 1 — Rowden M-315	1 / 1 — Rowden M-315	4 / 2 — M-315 Rowden	7 / 2 — Rowden M-315	
260	2 / 9 — M-315 Rowden	5 / 14 — M-315 Rowden	1 / 5 — M-315 Rowden	6 / 3 — Rowden M-315	2 / 1 — Rowden M-315	
234	8 / 1 — Rowden M-315	0 / 10 — Rowden M-315	1 / 3 — M-315 Rowden	2 / 21 — M-315 Rowden	14 / 1 — Rowden M-315	
208	1 / 4 — M-315 Rowden	3 / 1 — Rowden M-315	2 / 6 — Rowden M-315	3 / 8 — Rowden M-315	21 / 1 — Rowden M-315	
182	26 / 3 — Rowden M-315	13 / 2 — Rowden M-315	2 / 28 — M-315 Rowden	3 / 7 — Rowden M-315	1 / 2 — Rowden M-315	8 rows
156	1 / 2 — M-315 Rowden	1 / 14 — M-315 Rowden	1 / 2 — Rowden M-315	1 / 1 — M-315 Rowden	1 / 4 — M-315 Rowden	
130	29 / 1 — Rowden M-315	7 / 1 — Rowden M-315	3 / 9 — Rowden M-315	1 / 5 — M-315 Rowden	21 / 8 — Rowden M-315	
104	14 / 1 — Rowden M-315	4 / 1 — Rowden M-315	1 / 3 — M-315 Rowden	7 / 2 — Rowden M-315	1 / 10 — M-315 Rowden	
78	1 / 16 — M-315 Rowden	10 / 2 — Rowden M-315	2 / 1 — Rowden M-315	7 / 1 — Rowden M-315	1 / 9 — M-315 Rowden	
52	36 / 1 — Rowden M-315	1 / 11 — M-315 Rowden	1 / 23 — M-315 Rowden	1 / 15 — M-315 Rowden	3 / 16 — M-315 Rowden	
26	16 / 1 — Rowden M-315	1 / 8 — M-315 Rowden	1 / 3 — M-315 Rowden	1 / 5 — M-315 Rowden	1 / 12 — M-315 Rowden	
0	7 / 16 — M-315 Rowden	1 / 16 — M-315 Rowden	16 / 6 — Rowden M-315	1 / 3 — M-315 Rowden	1 / 29 — M-315 Rowden	
EW	24	54	84	114	144	

(Column separators between plot groups each marked "8 rows".)

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.

Entry	Cultivar/Line	Percent wilted plants						Avg. no. of plants
		Rep1	Rep2	Rep3	Rep4	Avg.	P-value	
O. Lloyd May, Delta and Pine Land Co., 381 William Gibbs Rd, Tifton, GA 31794								
101	LM-1	7	5	3	1	3	0.473	31
102	LM-2	7	2	1	2	3	0.507	39
103	LM-3	1	1	1	1	1	0.900	34
104	LM-4	2	2	3	1	2	0.770	42
105	LM-5	0	14	1	0	3	0.625	46
106	LM-6	1	3	15	9	5	0.257	37
107	LM-7	26	6	3	1	8	0.087	39
108	LM-8	0	6	1	3	2	0.703	38
	Rowden	16	9	3	3	8	0.097	45
	M-315	7	1	8	2	3		18
Dawn Fraser, Monsanto Company, 741 Coker Farm Road, Hartsville, SC 29550								
201	DF-1	0	1	0	1	0	0.700	53
202	DF-2	0	2	0	3	1	0.353	78
203	DF-3	1	0	0	0	1	0.637	69
204	DF-4	2	0	2	0	1	0.453	57
205	DF-5	0	5	1	1	1	0.350	44
206	DF-6	2	1	12	2	4	0.106	43
207	DF-7	0	2	0	0	1	0.607	63
208	DF-8	11	0	0	0	3	0.116	69
	Rowden	14	3	14	1	8	0.022	49
	M-315	1	1	1	1	1		26
Darren Jones, Monsanto Company, 3410 N. Elm Avenue, Lubbock, TX 79403								
301	DJ-1	0	5	1	1	2	0.569	48
302	DJ-2	0	2	5	5	2	0.398	40
303	DJ-3	2	0	0	1	1	0.869	60
304	DJ-4	0	12	1	0	3	0.358	53
305	DJ-5	0	9	2	2	3	0.367	56
306	DJ-6	0	3	2	1	1	0.718	59
307	DJ-7	0	3	0	1	1	0.773	61
308	DJ-8	0	1	5	5	2	0.397	52
	Rowden	1	15	2	8	6	0.066	26
	M-315	2	1	6	2	2		29

[†] 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						Avg. no. of plants
		Rep1	Rep2	Rep3	Rep4	Avg.	*P*-value	
Dave Albers, Monsanto Company, 800 N Lindbergh Blvd., St. Louis, MO 63167								
401	DA-1	1	4	0	0	1	0.887	66
402	DA-2	0	0	0	0	0	0.957	55
403	DA-3	0	0	1	1	0	0.954	51
404	DA-4	0	0	1	0	0	0.962	57
405	DA-5	0	1	0	5	2	0.833	57
406	DA-6	0	2	1	0	1	0.933	53
407	DA-7	0	2	0	0	1	0.950	63
408	DA-8	5	5	2	3	4	0.406	52
	Rowden	16	3	1	2	6	0.156	51
	M-315	6	9	1	1	3		26
Richard Sheetz, Monsanto Company, 3410 N. Elm Avenue, Lubbock, TX 79403								
501	RS-1	0	2	0	1	0	0.658	56
502	RS-2	1	0	2	0	1	0.612	59
503	RS-3	19	2	0	0	3	0.070	59
504	RS-4	2	0	3	0	1	0.451	59
505	RS-5	75	3	1	3	15	0.002	36
506	RS-6	3	2	2	3	1	0.312	52
507	RS-7	3	1	0	0	1	0.554	61
508	RS-8	7	2	1	2	2	0.213	48
	Rowden	16	7	3	2	5	0.039	40
	M-315	1	2	1	4	1		16
Daryl Bowman, North Carolina State University, 3709 Hillsborough Street, Raleigh, NC 27607								
601	NC1101	1	1	11	1	2	0.576	27
Thomas Brooks, Americot Inc., 5017 122nd Street, Lubbock, TX 79424								
602	NG-1	0	0	1	1	1	0.814	78
602	NG-1	0	0	1	1	1	0.814	78
604	NG-3	0	0	4	0	1	0.705	77
605	NG-4	0	0	0	0	0	0.910	70
606	NG-5	2	0	0	3	1	0.658	64
607	NG-6	0	0	0	0	0	0.904	68
608	NG-7	0	0	0	0	0	0.922	78
	Rowden	5	2	1	14	5	0.104	38
	M-315	1	1	2	5	2		23

Table 1. *continued.*

Entry	Cultivar/Line	Rep1	Rep2	Rep3	Rep4	Avg.	P-value	Avg. no. of plants
Percent wilted plants							

Entry	Cultivar/Line	Rep1	Rep2	Rep3	Rep4	Avg.	P-value	of plants
Mustafa McPherson, PhytoGen Seed Co., LLC, 118 Kennedy Flat Road, Leland, MS 38756								
701	PHY- MM1	0	3	0	0	1	0.898	64
702	PHY- MM2	0	11	0	2	3	0.500	60
703	PHY- MM3	‡						
704	PHY- MM4	0	1	1	1	0	0.928	47
705	PHY- MM5	1	0	1	1	1	0.936	59
706	PHY- MM6	0	2	0	1	1	0.933	57
707	PHY- MM7	‡						
708	PHY- MM8	2	1	2	1	1	0.860	49
	Rowden	5	36	13	4	14	0.006	45
	M-315	1	1	2	17	3		19
Fred Bourland, University of Arkansas, P.O. Box 48, Keiser, AR 72351								
801	FB-1	0	1	3	2	1	0.558	28
802	FB-2	0	1	2	2	1	0.551	28
803	FB-3	1	1	6	2	1	0.552	20
804	FB-4	2	1	2	14	3	0.170	32
805	FB-5	1	1	3	14	1	0.561	24
806	FB-6	5	75	100	25	30	0.001	22
807	FB-7	1	1	6	1	1	0.669	29
808	FB-8	2	1	2	2	1	0.453	32
	Rowden	11	10	2	19	12	0.014	37
	M-315	1	2	1	1	1		21
Brent Styles, Bayer Crop Science, 4205 Williamson Road, Wilson, NC 27893								
901	MR-1	0	0	1	0	0	0.739	64
902	MR-2	0	0	0	0	0	0.783	77
903	MR-3	0	0	4	1	1	0.414	55
904	MR-4	0	0	2	0	1	0.618	67
905	MR-5	2	3	3	0	2	0.209	76
906	MR-6	0	0	0	1	0	0.752	65
907	FS-1	1	2	3	1	2	0.371	19
908	FS-2	0	10	2	3	5	0.075	35
	Rowden	5	11	8	3	7	0.032	44
	M-315	1	1	1	3	1		24

‡ These entries could not be evaluated because fewer than 7 seedlings emerged.

Table 1. *continued.*

Entry	Cultivar/Line	Rep1	Rep2	Rep3	Rep4	Avg.	P-value	Avg. no. of plants
			Percent wilted plants					
Brent Styles, Bayer Crop Science, 4205 Williamson Road, Wilson, NC 27893								
1001	BS-1	1	1	0	0	0	0.971	50
1002	BS-2	0	0	0	1	0	0.980	64
1003	BS-3	0	0	0	0	0	0.988	84
1004	BS-4	0	0	0	0	0	0.984	71
1005	BS-5	0	0	0	0	0	0.988	80
1006	BS-6	0	1	10	32	6	0.288	33
1007	FS-3	10	1	0	1	4	0.591	46
1008	FS-4	1	1	5	1	1	0.917	45
	Rowden	6	5	0	9	5	0.424	52
	M-315	4	1	10	2	4		20
Brent Styles, Bayer Crop Science, 4205 Williamson Road, Wilson, NC 27893								
1101	LB-1	0	0	1	0	0	0.836	56
1102	LB-2	1	1	2	1	1	0.717	33
1103	LB-3	9	15	3	3	9	0.020	32
1104	LB-4	1	0	1	1	1	0.775	38
1105	LB-5	0	6	1	1	3	0.281	43
1106	LB-6	0	1	2	1	1	0.750	39
1107	FS-5	0	2	1	1	1	0.687	45
1108	AM-1	0	0	1	1	1	0.774	40
	Rowden	8	16	14	8	11	0.008	37
	M-315	1	3	1	2	2		27
Brent Styles, Bayer Crop Science, 4205 Williamson Road, Wilson, NC 27893								
1201	MS-1	0	2	8	6	1	0.620	21
1202	MS-2	1	1	0	3	1	0.642	33
1203	MS-3	2	1	2	2	2	0.461	28
1204	MS-4	0	0	6	1	1	0.570	45
1205	MS-5	1	1	2	3	1	0.523	33
1206	MS-6	2	3	8	6	3	0.300	32
David Weaver, Auburn University, 201 Funchess Hall, Auburn, AL 36849-5415								
1207	AU 3095	6	1	2	3	4	0.290	19
1208	AU 3202	20	1	5	2	5	0.244	14
	Rowden	16	23	26	7	19	0.126	32
	M-315	1	1	3	2	1		16

Table 1. *continued.*

Entry	Cultivar/Line	Percent wilted plants				Avg.	*P*-value	Avg. no. of plants
		Rep1	Rep2	Rep3	Rep4			
Charlie Cook, All-Tex Seed, 356 Hosek Road, Victoria, TX 77905								
1301	CC-01	0	1	4	6	2	0.100	52
1302	CC-02	3	1	50	10	3	0.060	19
1303	CC-03	0	1	10	1	2	0.113	43
1304	CC-04	1	10	1	1	2	0.104	29
1305	CC-05	1	0	0	2	1	0.387	64
1306	CC-06	2	2	5	2	2	0.083	54
1307	CC-07	0	0	0	0	0	0.651	59
1308	CC-08	2	1	2	3	2	0.142	40
	Rowden	18	4	4	83	24	0.000	48
	M-315	1	1	1	1	0		32
Cody Poage, All-Tex Seed, P.O. Box 1057, Levelland, TX 79336								
1401	CP-01	0	12	2	3	4	0.230	45
1402	CP-02	0	2	2	4	2	0.320	47
1403	CP-03	2	10	0	1	3	0.291	52
1404	CP-04	8	0	3	1	3	0.265	44
1405	CP-05	0	2	0	1	1	0.571	58
1406	CP-06	0	8	1	3	3	0.292	53
1407	CP-07	0	0	2	5	1	0.432	46
1408	CP-08	2	1	1	1	1	0.417	29
	Rowden	29	16	28	6	23	0.107	46
	M-315	1	1	2	3	1		21
Tim Dabbert, Monsanto Company, 749 W. Ash Avenue, Casa Grande, AZ 85193								
1501	TD-1	2	0	7	2	2	0.252	49
1502	TD-2	1	1	3	2	2	0.356	52
1503	TD-3	1	0	0	2	1	0.530	63
1504	TD-4	3	3	1	2	2	0.226	44
1505	TD-5	3	3	7	0	3	0.188	48
1506	TD-6	2	3	1	2	2	0.231	46
1507	TD-7	2	3	3	1	2	0.340	47
1508	TD-8	0	6	6	0	2	0.247	40
	Rowden	29	7	21	5	15	0.004	44
	M-315	1	1	2	1	1		25

Table 1. *continued.*

| Entry | Cultivar/Line | Percent wilted plants | | | | | | Avg. no. of plants |
		Rep1	Rep2	Rep3	Rep4	Avg.	*P*-value	
Joe Johnson, PhytoGen Seed Co., LLC, 118 Kennedy Flat Road, Leland, MS 38756								
1601	PHY-JJ1	5	1	0	1	2	0.293	46
1602	PHY-JJ2	0	0	1	0	1	0.622	62
1603	PHY-JJ3	3	1	0	1	1	0.431	52
1604	PHY-JJ4	2	1	3	1	1	0.418	46
1605	PHY-JJ5	0	0	1	0	0	0.730	57
1606	PHY-JJ6	0	0	5	2	2	0.296	58
1607	PHY-JJ7	0	0	1	0	1	0.663	71
1608	PHY-JJ8	0	0	0	1	1	0.639	66
	Rowden	16	7	4	2	7	0.033	52
	M-315	1	1	1	1	1		24
Bryan Shook, All-Tex Seed, 356 Hosek Road, Victoria, TX 77905								
1701	BS-01	3	1	1	1	2	0.591	39
1702	BS-02	0	1	0	0	1	0.879	67
1703	BS-03	1	5	1	0	1	0.687	44
1704	BS-04	3	5	7	14	6	0.105	41
1705	BS-05	6	1	3	10	5	0.183	22
1706	BS-06	3	1	1	1	1	0.649	29
1707	BS-07	6	5	5	1	3	0.351	30
1708	BS-08	3	1	1	1	2	0.592	25
	Rowden	29	29	3	58	30	0.000	45
	M-315	1	1	7	2	2		20
Nilesh Dighe, Monsanto Company, 3410 N. Elm Avenue, Lubbock, TX 79403								
1801	ND-1	4	3	3	4	2	0.236	31
1802	ND-2	2	2	1	33	1	0.484	23
1803	ND-3	2	2	2	6	1	0.413	28
1804	ND-4	13	6	1	2	4	0.087	25
1805	ND-5	5	8	2	100	3	0.165	16
1806	ND-6	13	5	1	2	5	0.078	24
1807	ND-7	3	8	1	3	2	0.217	24
1808	ND-8	15	4	2	1	5	0.068	26
	Rowden	12	10	1	1	5	0.068	29
	M-315	1	1	2	1	1		20

Table 1. *continued.*

Entry	Cultivar/Line	Rep1	Rep2	Rep3	Rep4	Avg.	*P*-value	Avg. no. of plants
Thomas Brooks, Americot Inc., 5017 122nd Street, Lubbock, TX 79424								
1901	NG-8	1	0	2	0	1	0.768	62
1902	NG-9	0	0	1	0	1	0.873	69
1903	NG-10	0	1	0	0	1	0.869	68
1904	NG-11	0	0	0	0	0	0.917	69
1905	NG-12	0	1	0	1	0	0.912	66
1906	NG-13	0	0	0	0	0	0.911	68
1907	NG-14	0	1	0	0	0	0.908	68
1908	NG-15	0	3	0	0	1	0.782	67
	Rowden	3	21	21	5	12	0.013	32
	M-315	1	8	1	1	2		23
Thomas Brooks, Americot Inc., 5017 122nd Street, Lubbock, TX 79424								
2001	NG-16	0	1	0	1	1	0.615	62
2002	NG-17	0	0	0	0	0	0.785	72
2003	NG-18	1	0	0	1	1	0.619	60
2004	NG-19	0	0	0	0	0	0.785	73
2005	NG-20	1	0	6	0	2	0.298	59
David Weaver, Auburn University, 201 Funchess Hall, Auburn, AL 36849-5415								
2006	AU 3223	1	3	2	6	2	0.387	12
2007	AU 3111	2	27	1	1	11	0.015	21
Kathryn M Glass, Auburn University, 201 Funchess Hall, Auburn, AL 36849-5415								
2008	PHY 499WRF	3	0	1	2	2	0.364	56
	Rowden	3	14	3	1	4	0.112	43
	M-315	1	1	1	1	1		25

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

| Cultivar | Avg | 95% Confidence Limit | | Dunnett's *P* vs. | |
		Lower	Upper	Rowden	M315
AM 1550 B2RF	0	0	5	0.988	0.957
CG 3787 B2RF	1	0	5	1.000	0.995
DG 2570 B2RF	1	0	3	0.993	0.960
DP 0912 B2RF	1	0	3	0.995	0.969
DP 0949 B2RF	1	0	8	1.000	0.998
DP 1028 B2RF	3	1	11	1.000	1.000
DP 1050 B2RF	1	0	5	1.000	0.997
DP 10R052B2R2	3	1	8	1.000	1.000
DP 1137 B2RF	2	0	11	1.000	1.000
FM 1740 B2F	1	0	3	0.998	0.981
PHY 367 WRF	1	0	5	1.000	0.999
PHY 375 WRF	1	0	4	0.984	0.943
PHY 485 WRF	0	0	7	0.992	0.972
PHY 565 WRF	2	1	8	1.000	1.000
STV 4288 B2F	1	0	4	0.997	0.977
STV 5288 B2F	0	0	4	0.975	0.927
STV 5458 B2RF	0	0	4	0.932	0.852
M-315	2	1	8	1.000	
Rowden	2	1	6		1.000

Table 3. Least squares estimate of root knot 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.

| Cultivar | Avg | 95% Confidence Limit | | Dunnett's *P* vs. | |
		Lower	Upper	Rowden	M315
AM 1550 B2RF	194	18	2047	1.000	0.537
CG 3787 B2RF	528	50	5583	1.000	0.158
DG 2570 B2RF	205	26	1648	1.000	0.397
DP 0912 B2RF	316	39	2536	1.000	0.222
DP 0949 B2RF	281	27	2969	1.000	0.362
DP 1028 B2RF	544	32	9278	1.000	0.282
DP 1050 B2RF	36	3	379	0.843	1.000
DP 10R052B2R2	19	2	205	0.539	1.000
DP 1137 B2RF	185	11	3161	1.000	0.728
FM 1740 B2F	297	37	2383	1.000	0.244
PHY 367 WRF	147	14	1553	1.000	0.681
PHY 375 WRF	431	54	3466	1.000	0.137
PHY 485 WRF	227	13	3869	1.000	0.637
PHY 565 WRF	427	40	4517	1.000	0.213
STV 4288 B2F	26	2	278	0.696	1.000
STV 5288 B2F	24	2	259	0.659	1.000
STV 5458 B2RF	344	33	3642	1.000	0.283
M-315	14	2	111	0.278.	
Rowden	270	34	2168 .		0.278

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.

Cultivar	Avg	95% Confidence Limit		Dunnett's *P* vs.	
		Lower	Upper	Rowden	M315
AM 1550 B2RF	75	8	726	0.999	1.000
CG 3787 B2RF	57	6	548	0.989	1.000
DG 2570 B2RF	161	23	1135	1.000	1.000
DP 0912 B2RF	295	42	2072	1.000	0.969
DP 0949 B2RF	273	28	2636	1.000	0.990
DP 1028 B2RF	125	8	2051	1.000	1.000
DP 1050 B2RF	89	9	860	1.000	1.000
DP 10R052B2R2	85	9	818	1.000	1.000
DP 1137 B2RF	119	7	1951	1.000	1.000
FM 1740 B2F	1315	187	9249	0.922	0.300
PHY 367 WRF	18	2	178	0.609	0.997
PHY 375 WRF	1019	145	7166	0.977	0.412
PHY 485 WRF	81	5	1323	1.000	1.000
PHY 565 WRF	383	40	3703	1.000	0.944
STV 4288 B2F	161	17	1553	1.000	1.000
STV 5288 B2F	37	4	354	0.912	1.000
STV 5458 B2RF	54	6	524	0.985	1.000
M-315	66	9	463	0.991	
Rowden	241	34	1693		0.991

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.

Cultivar	Yield [lbs/acre]	SE	Dunnett's *P* vs.	
			Rowden	M315
AM 1550 B2RF	3714	377	0.146	0.004
CG 3787 B2RF	4225	377	0.012	0.000
DG 2570 B2RF	3249	324	0.585	0.025
DP 0912 B2RF	3586	324	0.165	0.003
DP 0949 B2RF	2964	377	0.978	0.180
DP 1028 B2RF	4100	465	0.065	0.002
DP 1050 B2RF	3240	377	0.705	0.051
DP 10R052B2R2	3058	377	0.925	0.120
DP 1137 B2RF	3563	465	0.435	0.032
FM 1740 B2F	3242	324	0.597	0.026
PHY 367 WRF	2915	377	0.991	0.219
PHY 375 WRF	3579	324	0.170	0.003
PHY 485 WRF	4050	465	0.080	0.003
PHY 565 WRF	2954	377	0.982	0.187
STV 4288 B2F	4672	377	0.001	0.000
STV 5288 B2F	3765	377	0.117	0.003
STV 5458 B2RF	4203	377	0.013	0.000
M-315	1742	324	0.756	
Rowden	2443	324		0.756