

*2008
National
Cotton
Fusarium
Wilt
Report*



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THIS REPORT IS A JOINT CONTRIBUTION BETWEEN
USDA-ARS, CROP SCIENCE RESEARCH LABORATORY, MISSISSIPPI STATE UNIVERSITY, MISSISSIPPI, AND
THE ALABAMA AGRICULTURAL EXPERIMENT STATION, AUBURN UNIVERSITY, ALABAMA

2008 NATIONAL COTTON FUSARIUM WILT REPORT

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Cotton cultivars and elite breeding lines submitted by 24 cooperators were evaluated for Fusarium wilt resistance under field conditions at the E. V. Smith Research Center, Plant Breeding Unit, Tallahassee, Alabama. These entries were grown on an Wickham loamy fine sand highly infested with the Fusarium wilt fungus (*Fusarium oxysporum*) Schlecht. 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 an 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.

Entries were planted in single 20-foot rows on 36-inch centers, separated by 5-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).

The test was planted on May 19. Initial plant counts were made on June 12. Wilted plants were counted and removed on June 25, July 10, July 24, August 8, and August 22. The remaining live plants were counted and recorded on September 26. Total percent wilted plants were then determined and mean wilting for a given entry calculated.

Wilt development was quite uniform in all blocks with rep averages ranging from 11 to 26% averaged over all entries. The average % wilted plants for the susceptible check **Rowden** was 61%, with a range from 6 to 100% on an individual plot basis (Fig. 1). The resistant check **M-315** had an average of 4% wilted plants, with a range of 0 to 28%. **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 for the North Wilt Field and % wilt for control plot of Rowden (suceptible) and M-315 (resistant). Distances (ft) from the SE corner of the trial are given in the left hand column and the bottom row.



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.	P-value	Avg. no. of plants
		Rep1	Rep 2	Rep 3	Rep 4			
Gary L. Rea, Delta and Pine Land Co., 247 US HWY 380 W, Haskell, TX 79521								
101	GLR-1	0	10	5	7	5	0.007	88
102	GLR-2	4	5	6	7	4	0.012	77
103	GLR-3	10	3	4	4	5	0.009	81
104	GLR-4	5	13	3	0	4	0.010	86
105	GLR-5	12	41	6	10	16	<0.0001	86
106	GLR-6	0	3	2	5	2	0.127	83
107	GLR-7	5	35	26	1	15	<0.0001	82
108	GLR-8	2	2	10	2	4	0.025	87
	Rowden	36	95	43	51	57	<0.0001	87
	M-315	3	3	0	0	1		83
Laura Barham, Bayer Crop Science, 4205 Williamson Road, Wilson, NC 27893								
201	LB-1	7	10	1	5	5	0.254	81
202	LB-2	35	78	52	67	59	<0.0001	84
203	LB-3	23	64	40	22	36	<0.0001	88
204	LB-4	2	8	12	6	7	0.087	85
205	LB-5	31	5	7	9	12	0.001	83
206	LB-6	66	66	18	2	38	<0.0001	88
207	LB-7	32	35	9	1	18	<0.0001	80
208	LB-8	7	9	5	8	7	0.088	85
	Rowden	99	80	79	78	85	<0.0001	78
	M-315	6	1	3	8	4		81
O. Lloyd May, Delta and Pine Land Co., 381 William Gibbs Rd, Tifton, GA 31794								
301	LM-1	87	14	30	14	34	<0.0001	76
302	LM-2	75	42	26	1	33	<0.0001	74
303	LM-3	31	9	2	9	10	<0.0001	75
304	LM-4	15	4	13	3	7	0.013	70
305	LM-5	92	10	46	12	39	<0.0001	68
306	LM-6	1	6	3	3	2	0.702	73
307	LM-7	11	6	7	11	6	0.014	78
308	LM-8	3	6	10	6	5	0.095	70
	Rowden	96	85	73	61	82	<0.0001	79
	M-315	9	3	2	2	3		77

† 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
		Rep 1	Rep 2	Rep 3	Rep 4	Avg.		
Darren Jones, Monsanto Company, 4600 Old Leland Rd, Leland, MS 38756								
401	DJ-1	12	16	15	0	8	0.048	69
402	DJ-2	17	15	15	1	9	0.016	84
403	DJ-3	9	22	39	0	13	<0.0001	73
404	DJ-4	0	21	4	5	6	0.323	76
405	DJ-5	11	51	11	4	15	<0.0001	71
406	DJ-6	12	9	16	1	7	0.102	77
407	DJ-7	24	15	4	5	10	0.010	77
Kathryn M Glass, Auburn University, 201 Funchess Hall, Auburn, AL 36849								
408	ST 4498 B2RF	3	11	10	3	5	0.594	73
	Rowden	34	96	82	11	55	<0.0001	83
	M-315	6	8	8	5	5		80
Laval Verhalen, Oklahoma State University, 368 Agricultural Hall, Stillwater, OK								
501	OKLA-1	21	9	3	0	5	0.108	80
502	OKLA-2	20	18	13	5	9	0.001	77
503	OKLA-3	11	11	3	2	4	0.286	74
504	OKLA-4	51	23	8	11	16	<0.0001	76
505	OKLA-5	67	75	10	6	34	<0.0001	77
506	OKLA-6	13	13	1	2	4	0.236	67
507	OKLA-7	64	26	6	0	16	<0.0001	69
508	OKLA-8	11	13	0	2	4	0.327	80
	Rowden	94	95	26	12	59	<0.0001	78
	M-315	3	8	10	0	3		79
Charlie Cook, All-Tex Seeds, Inc., 356 Hosek Road, Victoria, TX 77905-5636								
601	CC-1	3	7	5	4	3	0.254	79
602	CC-2	20	1	2	9	7	0.008	58
603	CC-3	3	5	27	7	9	0.001	56
604	CC-4	3	17	0	14	7	0.006	68
605	CC-5	2	5	29	3	7	0.005	63
606	CC-6	0	30	23	2	11	<0.0001	63
607	CC-7	2	8	3	1	3	0.509	67
608	CC-8	11	93	73	6	43	<0.0001	57
	Rowden	44	99	71	62	71	<0.0001	87
	M-315	1	13	0	0	3		77

Table 1. *continued*

Entry	Cultivar/Line	Percent wilted plants					P-value	Avg. no. of plants
		Rep 1	Rep 2	Rep 3	Rep 4	Avg.		
Richard Sheetz, Delta and Pine Land Co., RR 2, Box 60, Hale Center, TX 79041								
701	RHS-1	2	0	3	3	2	0.932	79
702	RHS-2	4	12	1	5	5	0.355	86
703	RHS-3	27	38	1	4	16	<0.0001	78
704	RHS-4	4	18	12	1	8	0.034	83
705	RHS-5	5	4	3	3	3	0.739	91
706	RHS-6	1	17	3	3	5	0.257	84
707	RHS-7	13	11	4	6	7	0.058	77
708	RHS-8	17	41	30	44	33	<0.0001	73
	Rowden	62	88	27	71	63	<0.0001	81
	M-315	3	9	0	7	4		73
Curtis Williams, Delta and Pine Land Co., 381 William Gibbs Rd, Tifton, GA 31794								
801	CW-1	36	41	1	0	15	<0.0001	71
802	CW-2	4	10	4	0	3	0.790	76
803	CW-3	100	27	34	53	52	<0.0001	74
804	CW-4	76	75	7	19	42	<0.0001	58
805	CW-5	7	55	8	6	15	<0.0001	73
806	CW-6	35	41	5	14	20	<0.0001	74
807	CW-7	9	14	1	5	5	0.309	80
808	CW-8	36	10	2	13	11	0.001	76
	Rowden	98	97	49	68	83	<0.0001	80
	M-315	4	14	3	2	4		77
Steve Calhoun, Bayer Crop Science, 4205 Williamson Road, Wilson, NC 27893								
901	SC-1	12	30	13	22	17	<0.0001	87
902	SC-2	25	24	7	52	24	<0.0001	88
903	SC-3	10	100	19	16	33	<0.0001	84
904	SC-4	2	8	5	8	5	0.035	80
905	SC-5	42	94	22	19	43	<0.0001	85
906	SC-6	11	23	0	5	8	0.001	86
907	SC-7	11	13	2	26	10	<0.0001	83
908	SC-8	1	14	3	2	4	0.092	88
	Rowden	43	96	23	23	46	<0.0001	82
	M-315	4	4	1	2	2		72

Table 1. *continued*

Entry	Cultivar/Line	Percent wilted plants					P-value	Avg. no. of plants
		Rep 1	Rep 2	Rep 3	Rep 4	Avg.		
Jack E. Jones, Jajo Genetics, 246 Maxine Dr., Baton Rouge, LA 70808-6831								
1001	JJ-1	89	11	12	5	24	<0.0001	66
1002	JJ-2	15	51	2	3	12	<0.0001	58
1003	JJ-3	50	20	43	7	25	<0.0001	59
1004	JJ-4	44	33	0	7	17	<0.0001	53
1005	JJ-5	25	16	6	0	9	<0.0001	60
1006	JJ-6	16	33	28	11	19	<0.0001	54
1007	JJ-7	11	8	1	5	5	0.022	75
1008	JJ-8	4	14	3	0	4	0.063	75
	Rowden	85	92	9	60	64	<0.0001	84
	M-315	0	3	0	6	2		72
Dawn Fraser, Delta and Pine Land Co., P.O. Box 1529, Hartsville, SC 29550								
1101	DF-1	39	65	23	4	28	<0.0001	75
1102	DF-2	19	12	0	7	7	0.283	71
1103	DF-3	2	5	2	2	2	0.993	67
1104	DF-4	20	30	2	4	10	0.031	66
1105	DF-5	4	4	1	0	2	0.997	79
1106	DF-6	69	16	4	6	19	<0.0001	73
1107	DF-7	3	17	3	4	5	0.700	68
1108	DF-8	11	9	5	0	4	0.813	78
	Rowden	96	80	42	20	61	<0.0001	84
	M-315	6	14	6	6	6		73
Frank Bordelon, PhytoGen Cottonseed, P.O. Box 27, Leland, MS 38756								
1201	PHY-FB1	4	11	16	3	7	0.033	80
1202	PHY-FB2	3	4	1	9	4	0.516	92
1203	PHY-FB3	4	9	4	5	5	0.232	91
1204	PHY-FB4	6	15	3	3	6	0.113	83
1205	PHY-FB5	2	4	8	2	4	0.545	83
1206	PHY-FB6	25	41	4	37	26	<0.0001	77
1207	PHY-FB7	9	6	4	6	6	0.161	69
1208	PHY-FB8	7	2	2	0	2	0.841	59
	Rowden	57	65	6	8	34	<0.0001	78
	M-315	5	5	6	1	4		78

Table 1. *continued*

Entry	Cultivar/Line	Percent wilted plants					P-value	Avg. no. of plants
		Rep 1	Rep 2	Rep 3	Rep 4	Avg.		
Peggy Thaxton, Mississippi State University, P.O. Box 197, Stoneville, MS 38776								
1301	DREC-1	93	69	17	33	54	<0.0001	71
1302	DREC-2	38	7	3	15	12	<0.0001	72
1303	DREC-3	9	19	3	30	12	<0.0001	61
1304	DREC-4	24	17	3	3	8	0.001	71
1305	DREC-5	18	3	3	11	7	0.014	59
1306	DREC-6	0	2	4	3	1	0.918	63
1307	DREC-7	0	13	0	0	3	0.604	57
1308	DREC-8	13	10	0	1	4	0.164	61
	Rowden	99	94	44	71	81	<0.0001	79
	M-315	6	7	1	3	3		78
David Miller, Bayer Crop Science, 4205 Williamson Road, Wilson, NC 27893								
1401	DM-1	8	21	4	8	9	0.001	87
1402	DM-2	29	8	5	2	8	0.002	84
1403	DM-3	8	5	3	2	4	0.234	88
1404	DM-4	8	4	1	9	5	0.093	82
1405	DM-5	4	6	3	9	5	0.131	81
1406	DM-6	5	2	2	1	2	0.776	86
1407	DM-7	9	23	4	2	8	0.005	87
1408	DM-8	8	1	1	4	3	0.501	90
	Rowden	81	75	15	26	49	<0.0001	81
	M-315	4	4	4	4	3		80
Michael Swindle, Bayer Crop Science, 117 Kennedy Flat Rd., Leland, MS 38756								
1501	BCSI-MS-1	5	14	25	31	18	<0.0001	83
1502	BCSI-MS-2	2	4	3	5	3	0.113	85
1503	BCSI-MS-3	18	75	16	35	35	<0.0001	89
1504	BCSI-MS-4	1	8	6	1	4	0.062	88
1505	BCSI-MS-5	2	6	1	2	3	0.159	86
1506	BCSI-MS-6	2	1	0	0	1	0.750	82
1507	BCSI-MS-7	26	5	12	7	12	<0.0001	83
1508	BCSI-MS-8	5	0	4	1	2	0.209	77
	Rowden	48	84	33	54	54	<0.0001	79
	M-315	1	3	0	2	2		77

Table 1. *continued*

Entry	Cultivar/Line	Percent wilted plants					P-value	Avg. no. of plants
		Rep 1	Rep 2	Rep 3	Rep 4	Avg.		
Joe Johnson, Bayer Crop Science, 117 Kennedy Flat Rd., Leland, MS 38756								
1601	BCSI-JJ-1	83	58	16	15	40	<0.0001	81
1602	BCSI-JJ-2	68	80	27	18	48	<0.0001	78
1603	BCSI-JJ-3	17	6	4	5	5	0.001	74
1604	BCSI-JJ-4	5	16	4	5	5	0.001	80
1605	BCSI-JJ-5	7	20	7	5	6	<0.0001	55
1606	BCSI-JJ-6	20	6	1	2	5	0.001	85
1607	BCSI-JJ-7	1	7	1	1	2	0.098	84
1608	BCSI-JJ-8	1	12	5	0	3	0.018	83
	Rowden	99	69	11	23	49	<0.0001	79
	M-315	0	4	0	1	1		83
Mustafa McPherson, PhytoGen Cottonseed, P.O. Box 27, Leland, MS 38756								
1701	PHY- MM1	14	5	4	2	5	0.007	78
1702	PHY- MM2	5	6	0	7	4	0.035	76
1703	PHY- MM3	6	1	3	3	2	0.182	72
1704	PHY- MM4	8	4	2	3	3	0.070	67
1705	PHY- MM5	21	8	0	6	7	0.001	85
1706	PHY- MM6	12	41	7	8	14	<0.0001	82
1707	PHY- MM7	7	2	0	1	2	0.269	84
1708	PHY- MM8	47	77	9	3	28	<0.0001	54
	Rowden	94	65	49	39	64	<0.0001	79
	M-315	2	2	2	1	2		85
Mike								
1801	MR-1	24	5	3	4	7	0.001	90
1802	MR-2	34	5	12	7	11	<0.0001	88
1803	MR-3	50	9	6	2	13	<0.0001	85
1804	MR-4	19	4	1	8	6	0.005	78
1805	MR-5	11	6	7	1	5	0.022	85
1806	MR-6	89	55	17	35	49	<0.0001	86
1808	MR-8	5	3	5	2	3	0.265	88
1808	MR-8	5	3	5	2	3	0.265	88
	Rowden	67	74	14	70	57	<0.0001	83
	M-315	0	7	4	0	2		79

Table 1. *continued*

Entry	Cultivar/Line	Percent wilted plants					P-value	Avg. no. of plants
		Rep 1	Rep 2	Rep 3	Rep 4	Avg.		
Albert Santos, Delta and Pine Land Co., P.O. Box 157, Scott, MS 38772								
1901	SM-1	3	8	0	5	4	0.325	79
1902	SM-2	21	29	14	3	15	<0.0001	68
1903	SM-3	3	15	11	40	18	<0.0001	65
1904	SM-4	3	21	8	4	8	0.005	69
1905	SM-5	26	16	4	11	14	<0.0001	69
1906	SM-6	1	6	5	7	4	0.161	66
1907	SM-7	11	23	14	11	14	<0.0001	76
1908	SM-8	3	17	0	5	5	0.070	65
	Rowden	71	91	30	44	59	<0.0001	86
	M-315	5	3	5	0	3		81
Rex Green, Delta and Pine Land Co., P.O. Box 157, Scott, MS 38772								
2001	LMS-1	11	11	3	3	6	0.578	70
2002	LMS-2	23	24	6	15	15	0.001	70
2003	LMS-3	13	16	8	7	10	0.060	75
2004	LMS-4	6	4	4	6	4	0.873	77
2005	LMS-5	1	0	4	11	4	0.918	70
2006	LMS-6	2	3	4	7	3	0.960	76
2007								
2008								
	Rowden	58	98	22	36	53	<0.0001	84
	M-315	6	15	2	6	6		78
Fred Bourland, University of Arkansas, P.O. Box 48, Keiser, AR 72351								
2101	FB-1	20	6	15	2	9	<0.0001	66
2102	FB-2	5	25	6	3	7	0.001	69
2103	FB-3	21	33	14	5	16	<0.0001	62
2104	FB-4	10	16	3	5	6	0.004	68
2105	FB-5	6	42	5	0	9	<0.0001	58
2106	FB-6	13	1	0	6	4	0.051	74
2107	FB-7	9	22	8	4	9	0.001	60
2108	FB-8	15	12	3	0	6	0.010	69
	Rowden	88	99	24	59	69	<0.0001	75
	M-315	1	6	2	1	2		79

Table 1. *continued*

Entry	Cultivar/Line	Percent wilted plants					P-value	Avg. no. of plants
		Rep 1	Rep 2	Rep 3	Rep 4	Avg.		
Shirley Howard, Delta and Pine Land Co., P.O. Box 157, Scott, MS 38772								
2201	SH-1	4	25	17	3	9	0.201	62
2202	SH-2	21	80	3	7	21	<0.0001	71
2203	SH-3	26	68	18	13	27	<0.0001	47
2204	SH-4	13	75	86	33	50	<0.0001	61
2205	SH-5	26	7	8	4	8	0.388	73
2206	SH-6	4	28	7	2	7	0.531	60
2207	SH-7	17	55	82	9	38	<0.0001	68
2208	SH-8	4	6	63	10	18	<0.0001	68
	Rowden	61	100	87	54	79	<0.0001	77
	M-315	1	6	28	1	8		71
Ammeta Mobley, Bayer Crop Science, 4205 Williamson Road, Wilson, NC 27893								
2301	AM-1	4	4	5	3	4	0.228	83
2302	AM-2	1	3	4	13	5	0.086	82
2303	AM-3	8	1	1	1	2	0.561	85
2304	AM-4	2	2	0	5	2	0.632	86
Cody Poage, All-Tex Seeds, Inc., P.O. Box 1057, Levelland, TX 79336								
2305	CP-1	10	5	1	19	8	0.003	64
2306	CP-2	2	6	3	4	4	0.278	59
2307	CP-3	6	0	12	6	6	0.037	61
2308	CP-4	15	4	6	8	8	0.004	55
	Rowden	38	52	41	76	51	<0.0001	79
	M-315	4	4	2	1	3		80
Jeff Klingenberg, Bayer Crop Science, 1602 Paradise Dr., Sellers, SC 25992								
2401	BCSI-JK-1	38	34	29	2	24	<0.0001	81
2402	BCSI-JK-2	12	10	10	7	8	0.005	88
2403	BCSI-JK-3	26	61	4	7	21	<0.0001	80
2404	BCSI-JK-4	3	10	6	4	4	0.267	81
2405	BCSI-JK-5	1	47	11	9	13	<0.0001	77
2406	BCSI-JK-6	35	33	6	1	15	<0.0001	74
2407	BCSI-JK-7	10	33	5	4	10	0.001	79
2408	BCSI-JK-8	46	40	12	2	22	<0.0001	70
	Rowden	75	95	65	63	77	<0.0001	75
	M-315	0	9	4	4	3		72