2006 National Cotton Fusarium Wilt Report

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2006 NATIONAL COTTON FUSARIUM WILT REPORT

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Cotton cultivars and elite breeding lines submitted by 32 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 1994, a soil analysis for nematodes revealed that southern root-knot (*Meloidogyne incognita*) and lance (*Hoplolaimus galeatus*) are the predominant nematode species in the test plots. High populations of both species are found throughout the test area. 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.

Entries were planted in single 20-foot rows on 40-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).

Plots were planted May 17. Initial plant counts were made on June 9. Wilted plants were counted and removed on July 12, July 26, August 9, and August 23. 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 82%, with a range from 40 to 100% on an individual plot basis (Fig. 1). Wilt development was quite uniform in all blocks with rep averages ranging from 73 to 87%. The resistant check **M-315** had an average of 2% wilted plants, with a range of 0 to 13%. **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 (suceptible) and M-315 (resistant). Distances (ft) from the NE corner of the trial are given in the left hand column and the bottom row.

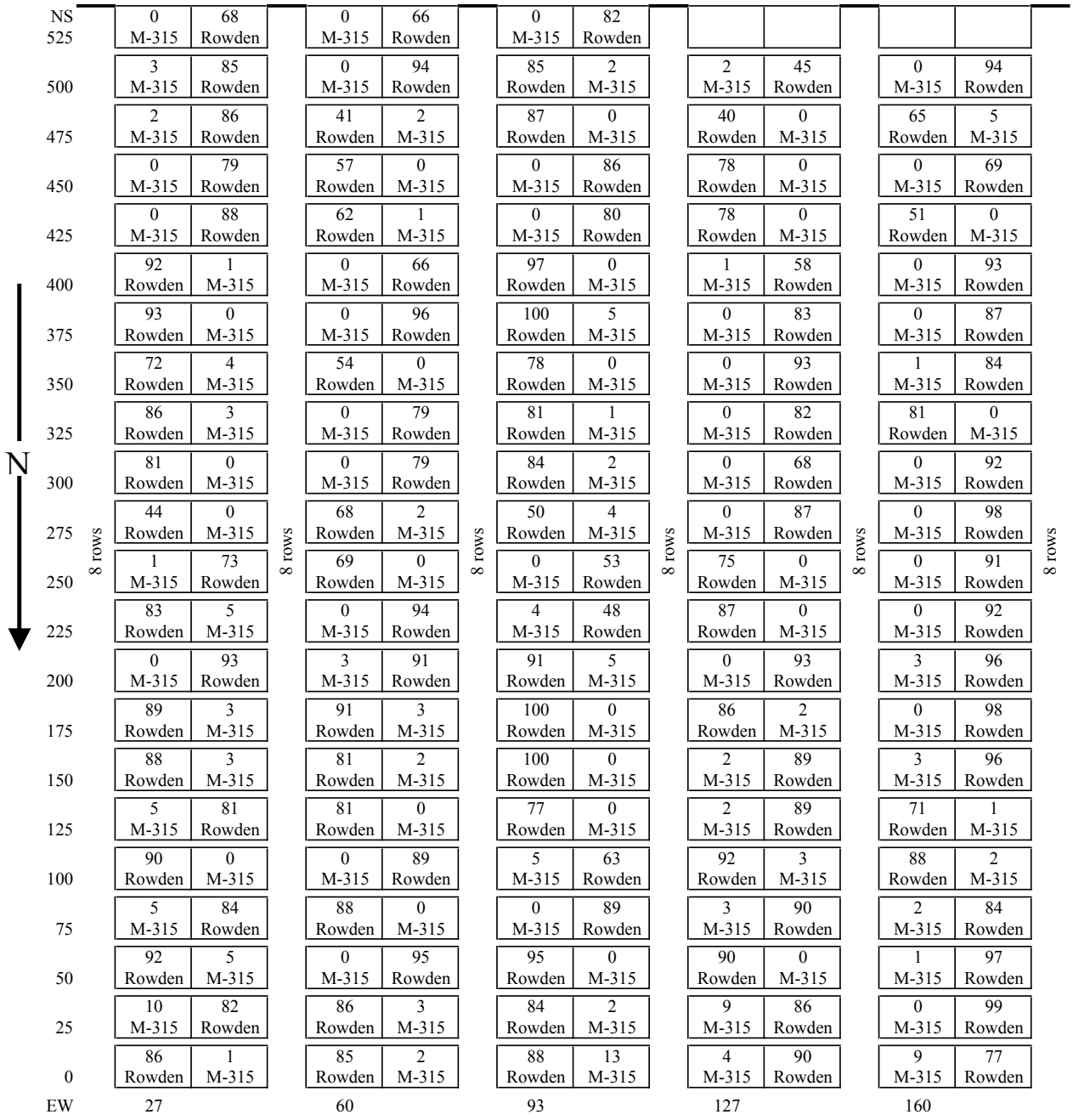

Table 1. Percent wilted plants for entries and check in each replicate, least squares estimate of the average, *P*-value based on Dunnett's versus the resistant check M-315, and initial average number of plants per plot.

Entry	Cultivar/Line	Percent wilted plants					*P*-value	Avg. no. of plants
		Rep1	Rep2	Rep3	Rep4	Avg.†		
Gary L. Rea, Delta and Pine Land Co., 247 US HWY 380 W, Haskell, TX 79521								
101	GLR-1	5	4	7	4	5	0.147	80
102	GLR-2	0	4	0	12	4	0.181	59
103	GLR-3	6	3	2	12	6	0.122	76
104	GLR-4	10	13	4	1	7	0.085	83
105	GLR-5	2	3	0	2	2	0.470	82
106	GLR-6	18	0	16	11	12	0.027	78
107	GLR-7	2	0	0	0	1	0.684	73
108	GLR-8	40	48	1	1	22	0.005	85
	Rowden	90	86	81	79	84	<0.001	70
	M-315	3	2	1	0	2		71
Sally Clayshulte, Emergent Genetics, 7622 Moore Road, Memphis, TN 38120								
201	JC-1	33	13	65	17	30	0.016	77
202	JC-2	15	57	1	5	19	0.045	82
203	JC-3	4	8	1	0	3	0.457	81
204	JC-4	28	28	56	9	30	0.016	84
205	JC-5	55	28	61	18	40	0.007	82
206	JC-6	29	45	6	11	22	0.034	81
207	DP 515 BR	10	42	33	0	21	0.037	75
208	DP 445 BR	6	1	25	1	8	0.194	76
	Rowden	82	73	83	66	77	<0.001	73
	M-315	10	1	0	0	3		72
O. Lloyd May, Delta and Pine Land Co., 381 William Gibbs Rd, Tifton, GA 31794								
301	LM-1	5	26	10	7	11	0.079	61
302	LM-2	58	63	11	0	29	0.009	61
303	LM-3	26	6	13	7	12	0.072	59
304	LM-4	47	5	70	33	34	0.006	56
305	LM-5	68	59	57	21	52	0.001	69
306	LM-6	36	28	13	1	19	0.026	63
307	LM-7	39	12	7	3	14	0.050	73
308	LM-8	21	40	15	18	23	0.017	61
	Rowden	81	100	86	78	87	<0.001	75
	M-315	5	0	3	0	2		72

continued

† 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.		
Bobby Hagood, PhytoGen Cottonseed, 1832 Swynford Lane, Collierville, TN 38017								
401	PHY 470 WR	17	3	12	14	11	0.084	83
402	PHY 480 WR	19	3	5	16	11	0.087	79
403	PHY 310 R	27	64	23	22	34	0.002	77
404	PHY 370 WR	28	75	21	43	41	<0.001	86
405	PHY 425 RF	12	6	10	1	7	0.195	80
406	PHY 485 WRF	29	7	30	6	17	0.031	68
407	PHY 745 WRF	9	11	1	3	6	0.276	85
Daryl Bowman, North Carolina State University, Raleigh, NC 27607								
408	NCST0334	25	27	19	2	17	0.031	57
	Rowden	86	89	84	62	79	<0.001	68
	M-315	9	2	2	1	3		68
Laval Verhalen, Oklahoma State University, 368 Agricultural Hall, Stillwater, OK 74078								
501	OKLA-1	2	13	12	1	7	0.151	80
502	OKLA-2	7	50	2	57	28	0.025	81
503	OKLA-3	3	22	2	26	13	0.076	83
504	OKLA-4	2	5	8	0	3	0.258	78
505	OKLA-5	2	0	0	6	2	0.351	87
506	OKLA-6	3	1	2	6	3	0.277	78
507	OKLA-7	33	59	53	21	41	0.013	85
508	OKLA-8	27	40	1	7	18	0.051	62
	Rowden	88	71	54	86	75	0.002	80
	M-315	1	1	0	2	1		61
Don Keim, Delta and Pine Land Co., P.O. Box 157, Scott, MS 38772								
601	LMS-1	5	20	27	3	11	0.020	81
602	LMS-2	37	54	8	1	20	0.004	77
603	LMS-3	5	17	22	4	7	0.047	55
604	LMS-4	61	94	32	13	49	<0.001	63
605	LMS-5	1	11	1	0	2	0.289	77
606	LMS-6	0	13	2	2	3	0.217	63
607	LMS-7	8	14	2	0	4	0.147	67
608	LMS-8	16	56	0	2	13	0.014	59
	Rowden	84	88	78	41	77	<0.001	69
	M-315	2	3	0	2	1		66

continued

Table 1. *continued*

Entry	Cultivar/Line	Percent wilted plants					*P*-value	Avg. no. of plants
		Rep1	Rep2	Rep3	Rep4	Avg.		
Richard Sheetz, Delta and Pine Land Co., RR 2, Box 60, Hale Center, TX 79041								
701	RHS-1	43	10	7	13	17	0.020	70
702	RHS-2	3	16	6	12	9	0.083	79
703	RHS-3	12	1	18	39	17	0.022	74
704	RHS-4	14	16	0	4	7	0.128	70
705	RHS-5	15	18	14	47	23	0.009	93
706	RHS-6	12	2	2	11	6	0.176	75
707	RHS-7	7	7	3	8	6	0.162	93
708	RHS-8	27	1	0	22	11	0.055	91
	Rowden	92	81	81	80	84	<0.001	80
	M-315	5	2	0	1	2		61
Curtis Williams, Delta and Pine Land Co., 381 William Gibbs Rd, Tifton, GA 31794								
801	CW-1	32	0	3	30	16	0.049	64
802	CW-2	27	26	16	19	21	0.035	57
803	CW-3	4	15	5	5	7	0.112	75
804	CW-4	35	5	29	11	20	0.036	63
805	CW-5	15	34	19	10	18	0.043	57
806	CW-6	21	70	48	15	39	0.013	78
807	CW-7	48	22	35	11	28	0.023	59
808	CW-8	4	7	10	5	6	0.128	69
	Rowden	81	94	84	40	76	0.002	79
	M-315	0	0	1	0	1		68
Steve Calhoun, Emergent Genetics, 7624 Moore Road, Memphis, TN 38120								
901	SC-1	39	24	4	13	20	0.039	80
902	SC-2	20	18	5	13	14	0.077	83
903	SC-3	15	2	0	7	6	0.276	78
904	SC-4	23	3	4	9	9	0.170	76
905	SC-5	23	45	81	2	39	0.006	75
Will Lambert, Delta and Pine Land Co., 381 William Gibbs Rd, Tifton, GA 31794								
906	WL 1	42	75	61	57	59	0.001	76
907	WL 2	46	44	18	25	33	0.011	54
908	WL 3	21	45	13	7	23	0.027	80
	Rowden	97	91	72	87	87	<0.001	74
	M-315	1	5	4	0	3		68

continued

Table 1. *continued*

Entry	Cultivar/Line	Percent wilted plants					*P*-value	Avg. no. of plants
		Rep1	Rep2	Rep3	Rep4	Avg.		
Jack E. Jones, Jajo Genetics, 246 Maxine Dr., Baton Rouge, LA 70808-6831								
1001	JJ-1	9	15	2	7	7	0.053	62
1002	JJ-2	11	17	4	0	7	0.048	78
1003	JJ-3	13	5	0	10	5	0.074	66
1004	JJ-4	5	2	5	0	3	0.180	74
1005	JJ-5	3	0	1	0	1	0.419	71
1006	JJ-6	12	41	7	0	14	0.013	78
1007	JJ-7	13	18	0	3	7	0.045	74
1008	JJ-8	16	2	9	0	6	0.056	71
	Rowden	88	87	93	45	81	<0.001	79
	M-315	2	0	0	2	1		69
Dawn Fraser, Delta and Pine Land Co., P.O. Box 1529, Hartsville, SC 29550								
1101	DF-1	5	13	7	8	7	0.094	46
1102	DF-2	52	12	10	10	19	0.016	38
1103	DF-3	40	57	16	14	30	0.004	52
1104	DF-4	44	77	5	10	32	0.003	72
1105	DF-5	78	84	81	52	78	<0.001	62
1106	DF-6	18	59	20	18	27	0.006	50
1107	DF-7	92	89	50	19	64	<0.001	64
1108	DF-8	28	67	8	20	29	0.004	70
	Rowden	86	89	96	93	93	<0.001	82
	M-315	3	3	0	0	1		70
Frank Bordelon, PhytoGen Cottonseed, P.O. Box 27, Leland, MS 38756								
1201	PHY-FB-1	0	5	0	1	1	0.337	74
1202	PHY-FB-2	13	23	3	0	8	0.098	63
1203	PHY-FB-3	24	94	30	5	37	0.016	75
1204	PHY-FB-4	36	33	5	2	17	0.048	68
1205	PHY-FB-5	13	27	17	11	14	0.059	56
1206	PHY-FB-6	3	13	1	0	3	0.197	65
1207	PHY-FB-7	81	52	38	28	48	0.001	73
1208	PHY-FB-8	85	32	25	9	38	0.016	64
	Rowden	84	93	82	94	90	<0.001	86
	M-315	2	0	0	0	1		69

continued

Table 1. *continued*

Entry	Cultivar/Line	Percent wilted plants					*P*-value	Avg. no. of plants
		Rep1	Rep2	Rep3	Rep4	Avg.		
Jim Mitchell, Emergent Genetics, 7622 Moore Road, Memphis, TN 38120								
1301	JM-1	17	41	3	2	14	0.064	79
1302	JM-2	28	83	17	26	37	0.001	80
1303	JM-3	15	15	0	1	7	0.167	80
1304	JM-4	28	13	8	43	22	0.032	55
1305	JM-5	80	52	45	20	50	0.004	83
1306	JM-6	51	44	44	16	38	0.009	71
Kathryn Glass, Agronomy & Soils Dept., 201 Funchess Hall, Auburn University, AL 36849								
1307	DP 393	85	56	10	35	47	0.005	76
1308	DP 555 BR	21	17	11	7	12	0.075	76
	Rowden	89	96	68	58	80	<0.001	74
	M-315	1	3	2	1	2		57
Mark Barfield, Emergent Genetics, 7622 Moore Road, Memphis, TN 38120								
1401	MB1	16	8	0	19	10	0.086	80
1402	MB2	11	17	14	0	10	0.085	53
1403	MB3	14	31	13	40	24	0.038	70
1404	MB4	17	6	8	6	11	0.076	64
1405	MB5	13	40	8	4	14	0.065	66
1406	MB6	25	68	46	7	36	0.023	78
1407	FM 988 LLB2	49	45	29	9	34	0.025	71
1408	FM 965 LLB2	19	72	14	16	28	0.032	44
	Rowden	90	98	87	78	89	0.002	78
	M-315	0	0	0	0	0		70
Al Balducchi, Emergent Genetics, 7622 Moore Road, Memphis, TN 38120								
1501	AB-1	68	77	36	19	50	0.006	69
1502	AB-2	72	93	39	30	59	0.004	80
1503	AB-3	45	53	28	4	30	0.017	71
1504	AB-4	19	47	49	1	27	0.020	69
1505	AB-5	50	12	31	8	21	0.029	62
1506	AB-6	37	92	20	4	37	0.012	78
Kathryn Glass, Agronomy & Soils Dept., 201 Funchess Hall, Auburn University, AL 36849								
1507	ST 5242 BR	1	2	1	1	1	0.435	55
1508	ST 4575 BR	3	0	0	0	1	0.430	68
	Rowden	95	89	68	69	83	<0.001	76
	M-315	0	2	0	0	1		64

continued

Table 1. *continued*

Entry	Cultivar/Line	Percent wilted plants					*P*-value	Avg. no. of plants
		Rep1	Rep2	Rep3	Rep4	Avg.		
Randy Wood, Emergent Genetics, 7622 Moore Road, Memphis, TN 38120								
1601	RW-1	5	2	8	1	3	0.288	55
1602	RW-3	45	100	31	2	24	0.039	64
1603	RW-4	10	9	6	5	7	0.167	78
1604	RW-5	55	20	4	5	19	0.052	81
1605	RW-6	56	1	1	0	11	0.101	76
Laura Barham, Emergent Genetics, 7622 Moore Road, Memphis, TN 38120								
1606	LB-1	33	13	15	2	15	0.072	74
1607	LB-2	28	55	55	21	39	0.017	82
1608	LB-3	61	44	77	9	50	0.001	75
	Rowden	95	48	44	51	60	0.006	74
	M-315	0	4	0	0	1		55
Mustafa McPherson, PhytoGen Cottonseed, P.O. Box 27, Leland, MS 38756								
1701	PHY- MM-1	46	7	6	14	17	0.040	63
1702	PHY- MM-2	4	1	11	10	7	0.219	74
1703	PHY- MM-3	7	30	49	17	25	0.016	62
1704	PHY- MM-4	62	12	22	4	26	0.014	67
1705	PHY- MM-5	0	0	5	1	2	0.631	72
1706	PHY- MM-6	6	3	4	22	9	0.169	50
1707	PHY- MM-7	2	9	4	17	8	0.191	73
1708	PHY- MM-8	2	2	1	0	2	0.643	82
	Rowden	63	91	81	85	82	<0.001	84
	M-315	5	3	0	3	3		65
Mike Robinson, Emergent Genetics, 7622 Moore Road, Memphis, TN 38120								
1801	MR-1	15	5	7	43	17	0.070	82
1802	MR-2	15	56	64	90	56	0.014	79
1803	MR-3	5	4	9	6	6	0.171	73
1804	MR-4	24	26	11	1	16	0.075	75
1805	MR-5	22	58	28	64	43	0.023	81
1806	MR-6	36	66	15	18	33	0.034	75
Ted Wallace, Mississippi State University, P.O. Box 9555, Starkville, MS 39762								
1807	TW-1	9	39	43	39	32	0.036	71
1808	TW-2	8	25	8	40	21	0.059	70
	Rowden	85	100	87	88	90	0.002	81
	M-315	2	0	0	0	1		69

continued

Table 1. *continued*

Entry	Cultivar/Line	Percent wilted plants					*P*-value	Avg. no. of plants
		Rep1	Rep2	Rep3	Rep4	Avg.		
Charlie Cook, Syngenta Seeds, Inc., 356 Hosek Rd., Victoria, TX 77905-5636								
1901	CGC 1	15	11	3	11	9	0.057	72
1902	CGC 2	3	13	9	3	6	0.085	77
1903	CGC 3	97	66	38	78	73	0.002	66
1904	CGC 4	71	39	31	25	41	0.008	83
1905	CGC 5	55	63	34	28	45	0.007	64
1906	CGC 6	69	27	29	28	38	0.009	76
1907	CGC 7	56	38	29	7	31	0.013	84
1908	CGC 8	32	19	5	3	14	0.038	66
	Rowden	90	75	91	82	86	<0.001	74
	M-315	0	0	0	0	0		66
Bon Prince, Syngenta Seeds, Inc., 356 Hosek Rd., Victoria, TX 77905-5636								
2001	WBP 1	47	30	57	85	55	0.003	78
2002	WBP 2	54	34	28	36	39	0.012	70
2003	WBP 3	39	36	32	11	29	0.028	84
2004	WBP 4	31	9	14	47	25	0.044	67
2005	WBP 5	18	5	17	30	18	0.093	80
2006	WBP 6	25	0	1	14	11	0.199	81
2007	WBP 7	13	8	8	19	12	0.184	88
2008	WBP 8	27	87	76	77	67	<0.001	88
	Rowden	88	53	98	85	82	<0.001	66
	M-315	13	1	0	2	5		57
Fred Bourland, University of Arkansas, P.O. Box 48, Keiser, AR 72351								
2101	FB-1	4	0	41	0	9	0.036	68
2102	FB-2	1	11	38	6	12	0.022	34
2103	FB-3	17	2	33	5	10	0.103	10
2104	FB-4	4	21	23	3	10	0.027	59
2105	FB-5	4	6	12	16	7	0.118	33
2106	FB-6	18	14	66	2	23	<0.001	51
2107	FB-7	31	32	67	24	38	<0.001	68
2108	FB-8	0	2	23	1	5	0.169	60
	Rowden	77	91	92	68	84	<0.001	75
	M-315	9	3	1	0	3		76

continued

Table 1. *continued*

Entry	Cultivar/Line	Percent wilted plants					*P*-value	Avg. no. of plants
		Rep1	Rep2	Rep3	Rep4	Avg.		
David Fang, Delta and Pine Land Co., 737 Blaylock Rd, Winterville, MS 38782								
2201	DDF-1	8	0	3	3	3	0.118	50
2202	DDF-2	15	10	10	0	8	0.029	39
2203	DDF-3	50	20	17	11	21	0.007	7
2204	DDF-4	14	2	9	1	6	0.033	74
2205	DDF-5	4	0	0	0	1	0.387	74
2206	DDF-6	29	16	1	2	11	0.011	80
2207	DDF-7	4	11	1	0	4	0.069	78
2208	DDF-8	0	1	0	2	1	0.318	70
	Rowden	86	69	79	94	82	<0.001	65
	M-315	1	0	0	0	1		69
Robert Cossar, Emergent Genetics, 7622 Moore Road, Memphis, TN 38120								
2301	RC-1	57	56	43	93	65	<0.001	57
2302	RC-2	4	2	1	4	2	0.566	56
2303	RC-3	3	2	0	0	1	0.764	100
2304	RC-4	10	2	1	4	4	0.352	97
2305	RC-5	47	31	19	24	29	0.001	58
2306	RC-6	47	40	2	96	48	<0.001	52
Kathryn Glass, Agronomy & Soils Dept., 201 Funchess Hall, Auburn University, AL 36849								
2307	CT Linwood	34	21	18	50	30	0.001	61
2308	CT 210	48	77	43	74	62	<0.001	60
	Rowden	84	96	50	97	87	<0.001	61
	M-315	5	3	4	0	3		64
Jeff Klingenberg, Bayer Crop Science, 1602 Paradise Dr., Sellers, SC 25992								
2401	BCSI-JK-1	4	71	78	51	55	0.059	72
2402	BCSI-JK-2	29	11	69	54	41	0.078	76
2403	BCSI-JK-3	13	56	67	39	43	0.076	70
2404	BCSI-JK-4	62	67	21	62	51	0.064	76
2405	BCSI-JK-5	44	7	20	11	19	0.130	67
2406	BCSI-JK-6	7	4	3	37	13	0.159	76
2407	BCSI-JK-7	9	54	15	22	26	0.109	78
2408	BCSI-JK-8	5	27	16	13	16	0.145	82
	Rowden	89	93	93	86	91	0.020	79
	M-315	0	0	0	0	0		69

continued

Table 1. *continued*

Entry	Cultivar/Line	Percent wilted plants					*P*-value	Avg. no. of plants
		Rep1	Rep2	Rep3	Rep4	Avg.		
Steve Hague, Bayer Crop Science, 117 Kennedy Flat Rd., Leland, MS 38756								
2501	BCSI-SH-1	59	85	3	7	33	0.012	75
2502	BCSI-SH-2	6	44	4	1	8	0.138	67
2503	BCSI-SH-3	81	86	18	2	43	0.006	78
2504	BCSI-SH-4	81	77	13	6	42	0.007	67
2505	BCSI-SH-5	81	84	75	4	66	0.001	72
2506	BCSI-SH-6	54	93	89	0	65	0.001	73
2507	BCSI-SH-7	97	66	17	13	44	0.005	77
2508	BCSI-SH-8	6	34	10	2	8	0.130	82
	Rowden	92	83	79	65	86	<0.001	81
	M-315	3	5	0	5	2		70
Michael Swindle, Bayer Crop Science, 117 Kennedy Flat Rd., Leland, MS 38756								
2601	BCSI-MS-1	4	26	7	2	9	0.124	81
2602	BCSI-MS-2	12	40	9	7	16	0.046	83
2603	BCSI-MS-3	54	8	51	33	36	0.006	83
2604	BCSI-MS-4	26	81	55	33	49	0.002	74
2605	BCSI-MS-5	47	48	63	39	50	0.002	47
2606	BCSI-MS-6	6	11	9	14	10	0.121	72
2607	BCSI-MS-7	19	73	42	12	36	0.006	77
2608	BCSI-MS-8	18	50	15	16	23	0.024	46
	Rowden	90	77	100	66	84	<0.001	68
	M-315	4	0	5	0	2		67
Bruce Kirksey, Emergent Genetics, 7622 Moore Road, Memphis, TN 38120								
2701	BK-1	0	38	32	14	19	0.025	80
2702	BK-3	8	6	12	9	8	0.064	78
2703	BK-4	10	9	2	3	5	0.098	58
2704	BK-5	12	19	2	1	8	0.068	58
2705	BK-6	4	12	6	0	5	0.103	71
Laura Barham, Emergent Genetics, 7622 Moore Road, Memphis, TN 38120								
2706	LB-4	22	13	16	4	14	0.036	71
2707	LB-5	45	38	8	11	25	0.017	70
2708	LB-6	13	11	4	10	9	0.060	79
	Rowden	99	92	92	57	86	<0.001	81
	M-315	0	0	0	0	0		70