2005 National Cotton Fusarium Wilt Report

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The Alabama Agricultural Experiment Station, Auburn University, Alabama

2005 NATIONAL COTTON FUSARIUM WILT REPORT

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Cotton cultivars and elite breeding lines submitted by 28 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*.).

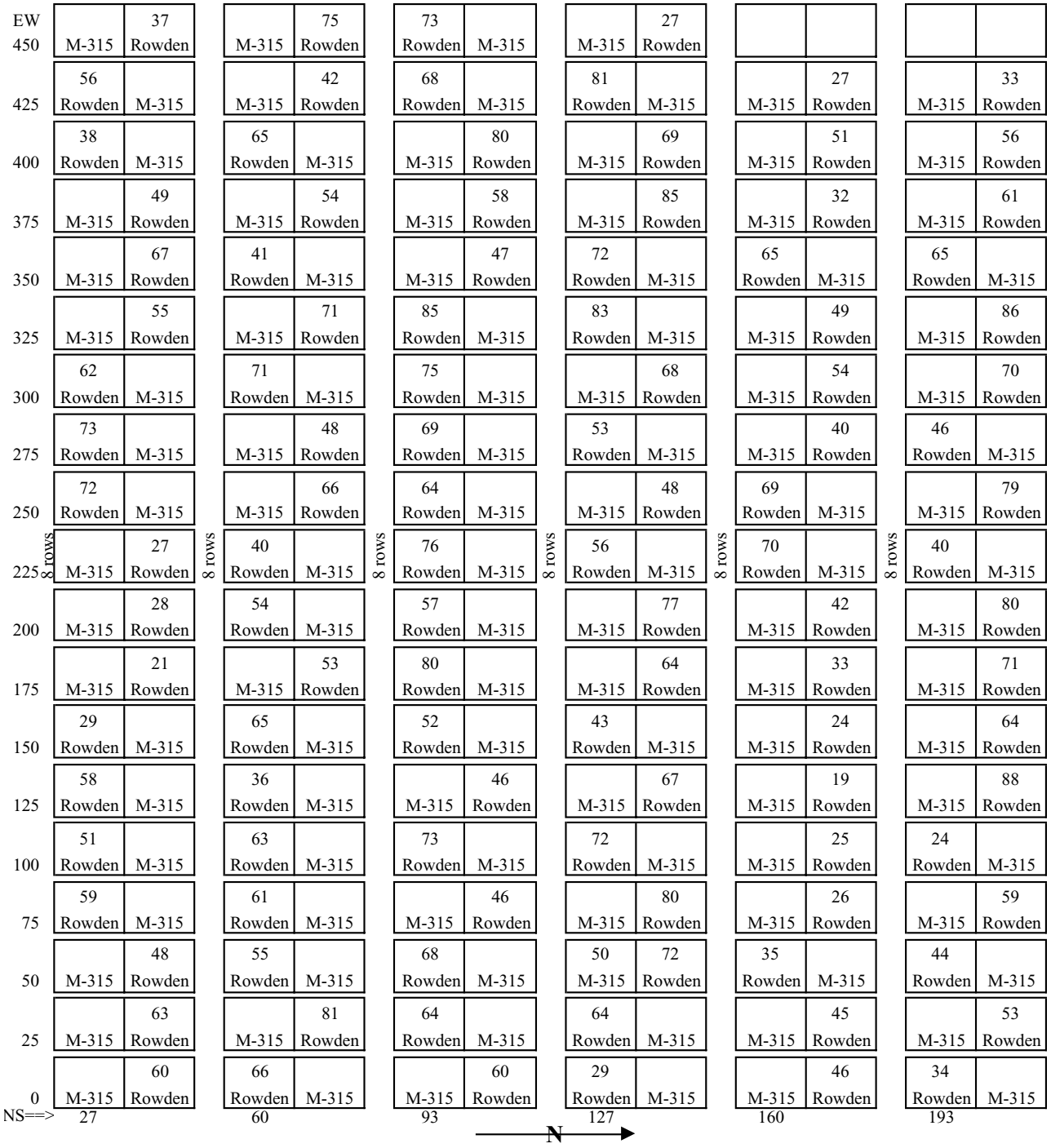
In 1994, a soil analysis for nematodes revealed that southern root-knot (*Meloidogyne incognita*) and lance (*Hoplolaimus galeatus*) are the predominant nematode species in the test plots. High populations of both species are found throughout the test area. Other nematode genera present are stubby root (*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 June 3. Extreme dry conditions delayed planting and once planted, excessive moisture was a problem. Initial plant counts were made on June 24. Wilted plants were counted and removed on July 21, August 3, and August 25. The remaining live plants were counted and recorded on September 15, delayed due to excessive rainfall. 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 56%, with a range from 19 to 88% on an individual plot basis (Fig. 1). Wilt development was quite uniform in all blocks with rep avearges ranging from 49 to 64%. The resistant check **M-315** had erratic emergence due to problems caused by chemical delinting and thus was not included in this report. **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 SE corner of the trial are given in the left hand column and the bottom row.



The resistant check M-315 had erratic emergence due to problems related to chemical delinting. Results for this entry are thus omitted from the report.

2005 Fusarium Wilt Test, Plant Breeding Unit, EVSRC, Tallassee, AL

Entry	Cultivar/Line	Percent wilted plants Rep1	Rep2	Rep3	Rep4	Avg.	P-value
Gary L. Rea, Delta and Pine Land Co., 247 US HWY 380 W, Haskell, TX 79521							
101	GLR-1	9	3	6	4	5	0.295
102	GLR-2	1	1	1	1	1	0.816
103	GLR-3	30	3	7	0	10	0.064
104	GLR-4	1	6	11	5	6	0.267
105	GLR-5	8	41	8	3	15	0.007
106	GLR-6	11	7	3	10	8	0.136
107	GLR-7	0	0	1	0	0	0.958
108	GLR-8	2	14	6	2	6	0.235
109	Rowden	46	25	75	67	53	<0.001
110	M-315	Not included because of emergence problems					
Johnie Jenkins, USDA-ARS, Mississippi State, MS 39762							
201	JNJ-1	3	3	1	1	2	0.617
202	JNJ-2	7	4	6	5	5	0.197
203	JNJ-3	7	4	3	2	4	0.327
204	JNJ-4	12	10	11	1	9	0.042
205	JNJ-5	6	6	3	4	5	0.257
206	JNJ-6	0	0	3	0	1	0.878
207	JNJ-7	4	19	7	4	8	0.051
208	JNJ-8	7	15	23	1	12	0.009
209	Rowden	73	21	40	58	48	<0.001
210	M-315	Not included because of emergence problems					
Jack McCarty, USDA, Mississippi State, MS 39762							
301	JCM-1	0	4	9	1	4	0.144
302	JCM-2	1	2	6	1	3	0.246
303	JCM-3	8	8	3	0	5	0.064
304	JCM-4	0	18	3	5	6	0.010
305	JCM-5	1	6	1	3	3	0.244
306	JCM-6	9	2	3	0	3	0.164
307	JCM-7	14	3	9	0	7	0.009
308	JCM-8	10	13	3	6	8	0.002
309	Rowden	60	67	69	56	63	<0.001
310	M-315	Not included because of emergence problems					

continued

THE P-VALUE INDICATES THE PROBABILITY THAT THE AVERAGE WILT PERCENTAGE DIFFERS FROM ZERO.

2005 Fusarium Wilt Test, Plant Breeding Unit, EVSRC, Tallassee, AL

Entry	Cultivar/Line	Percent wilted plants Rep1	Rep2	Rep3	Rep4	Avg.	P-value
Russ Hayes, USDA, Mississippi State, MS 39762							
401	RH-1	14	11	9	0	8	0.044
402	RH-2	4	4	1	6	4	0.371
403	RH-3	2	3	3	2	2	0.544
404	RH-4	25	26	23	24	24	<0.001
405	RH-5	4	19	4	18	11	0.009
406	RH-6	21	11	3	1	9	0.030
407	RH-7	6	10	12	15	11	0.013
408	RH-8	4	12	2	10	7	0.094
409	Rowden	45	43	76	80	61	<0.001
410	M-315	Not included because of emergence problems					
Laval Verhalen, Oklahoma State University, 368 Agricultural Hall, Stillwater, OK 74078							
501	OKLA-1	18	11	4	1	9	0.280
502	OKLA-2	5	2	6	26	10	0.230
503	OKLA-3	3	11	2	4	5	0.546
504	OKLA-4	15	6	16	17	14	0.093
505	OKLA-5	12	10	2	11	9	0.281
506	OKLA-6	20	22	24	27	23	0.006
507	OKLA-7	2	28	75	6	28	0.001
508	OKLA-8	25	2	26	9	16	0.055
509	Rowden	60	19	79	75	58	<0.001
510	M-315	Not included because of emergence problems					
Don Keim, Delta and Pine Land Co., P.O. Box 157, Scott, MS 38772							
601	DLK-1	3	4	0	0	2	0.831
602	DLK-2	44	14	8	9	19	0.024
603	DLK-3	6	0	0	0	2	0.838
604	DLK-4	25	17	13	6	15	0.061
605	DLK-5	28	6	1	29	16	0.049
606	DLK-6	6	2	15	2	6	0.429
607	DLK-7	62	17	6	1	21	0.011
608	DLK-8	30	74	12	5	30	0.001
609	Rowden	80	54	71	61	66	<0.001
610	M-315	Not included because of emergence problems					

continued

2005 Fusarium Wilt Test, Plant Breeding Unit, EVSRC, Tallassee, AL

Entry	Cultivar/Line	Percent wilted plants Rep1	Rep2	Rep3	Rep4	Avg.	P-value
Richard Sheetz, Delta and Pine Land Co., RR 2, Box 60, Hale Center, TX 79041							
701	RHS-1	11	5	7	23	12	0.008
702	RHS-2	5	5	6	7	6	0.183
703	RHS-3	2	18	0	3	6	0.145
704	RHS-4	1	2	1	0	1	0.788
705	RHS-6	9	6	4	9	7	0.096
706	RHS-7	1	1	11	1	4	0.388
707	RHS-8	3	9	1	1	4	0.366
708	RHS-8	3	10	0	6	5	0.231
709	Rowden	81	36	64	41	56	<0.001
710	M-315	Not included because of emergence problems					
Curtis Williams, Delta and Pine Land Co., 381 William Gibbs Rd, Tifton, GA 31794							
801	CW-1	32	12	41	30	29	0.001
802	CW-2	1	29	7	1	10	0.212
803	CW-3	1	31	22	11	16	0.043
804	CW-4	27	1	4	15	12	0.129
805	CW-5	4	8	5	5	5	0.498
806	CW-6	7	3	5	24	10	0.216
807	CW-7	4	0	13	12	7	0.358
808	CW-8	5	13	27	15	15	0.060
809	Rowden	34	24	56	72	47	<0.001
810	M-315	Not included because of emergence problems					
Steve Calhoun, Emergent Genetics, 7624 Moore Road, Memphis, TN 38120							
901	SC-1	8	4	2	0	4	0.394
902	SC-2	7	8	6	2	6	0.193
903	SC-3	4	0	0	0	1	0.825
904	SC-4	8	6	8	3	6	0.164
905	SC-5	11	13	13	30	17	0.000
906	SC-6	1	7	1	1	3	0.514
Al Balducchi, Emergent Genetics, 7624 Moore Road, Memphis, TN 38120							
907	AB-1	2	0	0	0	1	0.902
908	AB-2	1	3	0	0	1	0.813
909	Rowden	63	57	53	49	56	<0.001
910	M-315	Not included because of emergence problems					

continued

2005 Fusarium Wilt Test, Plant Breeding Unit, EVSRC, Tallassee, AL

Entry	Cultivar/Line	Percent wilted plants Rep1	Rep2	Rep3	Rep4	Avg.	P-value
Jack E. Jones, Jajo Genetics, 246 Maxine Dr., Baton Rouge, LA 70808-6831							
1001	Jajo-1	18	19	6	7	13	0.229
1002	Jajo-2	5	1	8	10	6	0.556
1003	Jajo-3	38	8	20	34	25	0.023
1004	Jajo-4	40	10	1	2	13	0.205
1005	Jajo-5	6	27	16	3	13	0.223
1006	Jajo-6	6	0	8	100	29	0.010
1007	Jajo-7	21	8	9	7	11	0.283
1008	Jajo-8	26	9	20	11	16	0.124
1009	Rowden	72	33	83	85	68	<0.001
1010	M-315	Not included because of emergence problems					
Dawn Fraser, Delta and Pine Land Co., P.O. Box 1529, Hartsville, SC 29550							
1101	DF-1	7	4	23	1	9	0.140
1102	DF-2	11	8	4	11	9	0.136
1103	DF-3	4	10	3	0	4	0.484
1104	DF-4	10	10	10	4	9	0.140
1105	DF-5	26	11	28	3	17	0.006
1106	DF-6	20	5	11	9	11	0.058
1107	DF-7	1	5	9	9	6	0.285
Al Balducchi, Emergent Genetics, 7624 Moore Road, Memphis, TN 38120							
1108	AB-6	1	4	3	4	3	0.557
1109	Rowden	48	42	69	81	60	<0.001
1110	M-315	Not included because of emergence problems					
Larry Burdett, Delta and Pine Land Co., 38768 W. Farrell Rd, Maricopa, AZ 85239							
1201	LB-1	2	6	0	6	4	0.500
1202	LB-2	34	3	4	3	11	0.048
1203	LB-3	1	2	3	0	2	0.779
1204	LB-4	1	6	7	5	5	0.364
1205	LB-5	5	4	2	7	4	0.416
1206	LB-6	9	21	6	0	9	0.104
1207	LB-7	10	17	5	9	10	0.061
1208	LB-8	17	8	4	11	10	0.075
1209	Rowden	26	46	85	27	46	<0.001
1210	M-315	Not included because of emergence problems					

continued

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Entry	Cultivar/Line	Percent wilted plants Rep1	Rep2	Rep3	Rep4	Avg.	P-value
Chris Tinius, Emergent Genetics, 7622 Moore Road, Memphis, TN 38120							
1301	CT-1	4	16	2	0	6	0.249
1302	CT-2	16	32	21	5	19	0.001
1303	CT-3	1	3	3	0	2	0.697
1304	CT-4	7	5	6	3	5	0.266
1305	CT-5	11	15	11	5	11	0.033
1306	CT-6	1	4	0	0	1	0.808
1307	AB-3	6	14	4	0	6	0.209
1308	AB-4	0	2	4	0	1	0.783
1309	Rowden	53	27	40	56	44	<0.001
1310	M-315	Not included because of emergence problems					
Mark Barfield, Emergent Genetics, 7622 Moore Road, Memphis, TN 38120							
1401	MB1	9	9	18	5	10	0.057
1402	MB2	37	19	47	11	28	<0.001
1403	MB3	12	9	7	10	10	0.073
1404	MB4	29	3	13	3	12	0.033
1405	MB5	3	3	2	0	2	0.703
1406	MB6	2	16	0	6	6	0.252
Robert Cossar, Emergent Genetics, 7622 Moore Road, Memphis, TN 38120							
1407	RC-1	3	5	3	1	3	0.555
1408	RC-2	21	37	22	7	22	0.000
1409	Rowden	29	71	70	47	54	<0.001
1410	M-315	Not included because of emergence problems					
Jody Butler, Emergent Genetics, 7622 Moore Road, Memphis, TN 38120							
1501	JB-1	19	22	1	4	11	0.053
1502	JB-2	4	7	0	3	4	0.535
1503	JB-3	20	4	27	1	13	0.033
1504	JB-4	8	7	13	13	10	0.091
1505	JB-5	11	14	10	5	10	0.098
1506	JB-6	0	12	4	5	5	0.370
Robert Cossar, Emergent Genetics, 7622 Moore Road, Memphis, TN 38120							
1507	RC-3	1	4	0	12	4	0.452
1508	RC-4	6	0	16	12	8	0.153
1509	Rowden	51	40	71	32	48	<0.001
1510	M-315	Not included because of emergence problems					

continued

2005 Fusarium Wilt Test, Plant Breeding Unit, EVSRC, Tallassee, AL

Entry	Cultivar/Line	Percent wilted plants Rep1	Rep2	Rep3	Rep4	Avg.	P-value
Randy Wood, Emergent Genetics, 7622 Moore Road, Memphis, TN 38120							
1601	RW-1	7	8	21	21	14	0.005
1602	RW-2	11	17	21	15	16	0.002
1603	RW-3	18	19	4	18	15	0.003
1604	RW-4	1	7	4	9	5	0.264
1605	RW-5	0	14	4	1	5	0.289
1606	RW-6	3	0	7	1	3	0.561
Robert Cossar, Emergent Genetics, 7622 Moore Road, Memphis, TN 38120							
1607	RC-5	3	1	5	0	2	0.614
1608	RC-6	5	4	6	3	5	0.324
1609	Rowden	46	29	86	69	57	<0.001
1610	M-315	Not included because of emergence problems					
Peggy Thaxton, Texas A&M University , College Station, TX 77843-2474							
1701	CIL-1	15	10	9	25	15	0.103
1702	CIL-2	21	29	69	14	33	0.001
1703	CIL-3	38	36	22	29	32	0.001
1704	CIL-4	16	16	3	8	10	0.247
1705	CIL-5	67	31	71	62	58	<0.001
1706	CIL-6	51	21	16	65	38	0.000
1707	CIL-7	41	3	22	12	19	0.036
1708	CIL-8	17	33	60	1	28	0.004
1709	Rowden	59	28	72	68	57	<0.001
1710	M-315	Not included because of emergence problems					
Mike Robinson, Emergent Genetics, 7622 Moore Road, Memphis, TN 38120							
1801	MR-1	18	43	4	4	17	0.001
1802	MR-2	6	10	3	4	6	0.252
1803	MR-3	12	10	14	3	10	0.049
1804	MR-4	11	0	3	0	3	0.466
1805	MR-5	8	4	6	12	8	0.115
1806	MR-6	4	0	1	0	1	0.798
Randell Lee, Emergent Genetics, 7622 Moore Road, Memphis, TN 38120							
1807	RL-1	2	5	1	0	2	0.667
1808	RL-2	9	22	7	1	10	0.044
1809	Rowden	44	77	68	37	57	<0.001
1810	M-315	Not included because of emergence problems					

continued

2005 Fusarium Wilt Test, Plant Breeding Unit, EVSRC, Tallassee, AL

Entry	Cultivar/Line	Percent wilted plants Rep1	Rep2	Rep3	Rep4	Avg.	P-value
Charlie Cook, Syngenta Seeds, Inc., 356 Hosek Rd., Victoria, TX 77905-5636							
1901	CC1	2	1	4	6	3	0.371
1902	CC2	3	11	5	4	6	0.132
1903	CC3	6	9	6	5	6	0.091
1904	CC4	11	35	5	13	16	<0.001
1905	CC5	6	9	2	6	6	0.136
1906	CC6	20	8	8	22	15	0.000
1907	CC7	16	16	7	5	11	0.006
1908	CC8	8	21	10	3	11	0.007
1909	Rowden	35	58	48	65	51	<0.001
1910	M-315	Not included because of emergence problems					
Bon Prince, Syngenta Seeds, Inc., 356 Hosek Rd., Victoria, TX 77905-5636							
2001	BP1	12	19	15	13	15	0.047
2002	BP2	62	7	4	8	20	0.008
2003	BP3	41	30	13	18	25	0.001
2004	BP4	18	35	9	5	17	0.026
2005	BP5	30	9	6	7	13	0.074
2006	BP6	8	4	2	10	6	0.405
2007	BP7	37	12	13	23	21	0.005
2008	BP8	28	25	3	2	15	0.045
2009	Rowden	72	65	48	38	56	<0.001
2010	M-315	Not included because of emergence problems					
Fred Bourland, University of Arkansas, P.O. Box 48, Keiser, AR 72351							
2101	FB-1	5	10	7	13	9	0.098
2102	FB-2	13	6	8	9	9	0.101
2103	FB-3	6	5	4	10	6	0.243
2104	FB-4	1	2	58	2	16	0.005
2105	FB-5	2	12	1	3	5	0.387
2106	FB-6	0	1	6	0	2	0.719
2107	FB-7	4	2	2	4	3	0.556
2108	FB-8	3	22	14	4	11	0.041
2109	Rowden	66	53	55	54	57	<0.001
2110	M-315	Not included because of emergence problems					

continued

2005 Fusarium Wilt Test, Plant Breeding Unit, EVSRC, Tallassee, AL

Entry	Cultivar/Line	Percent wilted plants Rep1	Rep2	Rep3	Rep4	Avg.	P-value
O. Lloyd May, Delta and Pine Land Co., 381 William Gibbs Rd, Tifton, GA 31794							
2201	WL-1	39	11	22	30	26	0.007
2202	WL-2	9	56	5	12	20	0.027
2203	WL-3	52	16	73	40	45	<0.001
2204	WL-4	42	1	6	1	13	0.160
2205	WL-5	1	3	2	3	2	0.788
2206	WL-6	25	12	4	15	14	0.123
2207	WL-7	58	12	10	5	21	0.022
2208	WL-8	39	52	30	14	34	0.001
2209	Rowden	64	88	62	65	70	<0.001
2210	M-315	Not included because of emergence problems					
Joe Ware, Emergent Genetics, 7622 Moore Road, Memphis, TN 38120							
2301	JW-1	42	33	49	28	38	<0.001
2302	JW-2	3	3	2	1	2	0.660
2303	JW-3	13	8	3	9	8	0.108
2304	JW-4	22	34	39	30	31	<0.001
2305	JW-5	8	6	9	6	7	0.189
2306	JW-6	8	12	8	5	8	0.122
Randell Lee, Emergent Genetics, 7622 Moore Road, Memphis, TN 38120							
2307	RL-3	5	16	14	6	10	0.056
Kathryn Glass, Agronomy & Soils Dept., 201 Funchess Hall, Auburn University, AL 36849							
2308	PHY 470 WR	2	11	8	9	7	0.157
2309	Rowden	61	52	54	27	49	<0.001
2310	M-315	Not included because of emergence problems					
Jeff Klingenberg, Bayer Crop Science, 1602 Paradise Dr., Sellers, SC 25992							
2401	BCSI-JK-1	7	20	3	8	10	0.007
2402	BCSI-JK-2	20	6	5	15	12	0.002
2403	BCSI-JK-3	30	18	4	26	19	<0.001
2404	BCSI-JK-4	1	16	7	17	10	0.005
2405	BCSI-JK-5	22	4	4	11	10	0.005
2406	BCSI-JK-6	13	5	4	1	6	0.103
2407	BCSI-JK-7	11	5	1	3	5	0.143
2408	BCSI-JK-8	5	5	4	4	4	0.191
2409	Rowden	63	64	66	73	67	<0.001
2410	M-315	Not included because of emergence problems					

continued

2005 Fusarium Wilt Test, Plant Breeding Unit, EVSRC, Tallassee, AL

Entry	Cultivar/Line	Percent wilted plants Rep1	Rep2	Rep3	Rep4	Avg.	P-value
Steve Hague, Bayer Crop Science, 117 Kennedy Flat Rd., Leland, MS 38756							
2501	BCSI-SH-1	3	1	9	1	4	0.212
2502	BCSI-SH-2	23	14	18	3	14	<0.001
2503	BCSI-SH-3	14	5	19	16	14	<0.001
2504	BCSI-SH-4	7	21	10	18	14	<0.001
2505	BCSI-SH-5	14	4	6	3	7	0.025
2506	BCSI-SH-6	11	21	15	18	17	<0.001
2507	BCSI-SH-7	12	10	14	13	12	0.000
2508	BCSI-SH-8	0	11	4	2	4	0.132
2509	Rowden	55	64	70	65	64	<0.001
2510	M-315	Not included because of emergence problems					
Michael Swindle, Bayer Crop Science, 117 Kennedy Flat Rd., Leland, MS 38756							
2601	BCSI-MS-1	28	22	26	14	23	0.001
2602	BCSI-MS-2	13	15	7	4	10	0.116
2603	BCSI-MS-3	26	29	20	9	21	0.002
2604	BCSI-MS-4	4	2	9	2	4	0.481
2605	BCSI-MS-5	13	20	26	1	15	0.018
2606	BCSI-MS-6	3	18	5	6	8	0.188
2607	BCSI-MS-7	9	8	11	5	8	0.185
2608	BCSI-MS-8	52	4	11	2	17	0.008
2609	Rowden	68	80	46	33	57	<0.001
2610	M-315	Not included because of emergence problems					
Bruce Kirksey, Emergent Genetics, 7622 Moore Road, Memphis, TN 38120							
2701	BK-1	3	13	12	4	8	0.053
2702	BK-2	4	1	0	0	1	0.750
2703	BK-3	10	3	4	8	6	0.120
2704	BK-4	6	11	16	1	8	0.041
2705	BK-5	11	4	26	8	12	0.004
2706	BK-6	24	3	8	1	9	0.030
Kathryn Glass, Agronomy & Soils Dept., 201 Funchess Hall, Auburn University, AL 36849							
2707	ST 5599BR	18	0	2	6	7	0.102
2708	FM 960BR	1	4	9	1	4	0.343
2709	Rowden	59	24	49	51	46	<0.001
2710	M-315	Not included because of emergence problems					

continued

2005 Fusarium Wilt Test, Plant Breeding Unit, EVSRC, Tallassee, AL

Entry	Cultivar/Line	Percent wilted plants Rep1	Rep2	Rep3	Rep4	Avg.	P-value
Brent Styles, Emergent Genetics, 7622 Moore Road, Memphis, TN 38120							
2801	BS-1	33	27	2	4	16	0.020
2802	BS-2	50	18	3	6	19	0.007
2803	BS-3	8	2	21	5	9	0.178
2804	BS-4	42	13	34	8	24	0.001
2805	BS-5	0	0	1	1	1	0.928
2806	BS-6	4	22	8	3	9	0.177
Kathryn Glass, Agronomy & Soils Dept., 201 Funchess Hall, Auburn University, AL 36849							
2807	DP 424BGII/RR	2	1	4	8	4	0.582
2808	DP 555BG/RR	45	7	8	12	18	0.012
2809	Rowden	64	80	73	42	65	<0.001
2810	M-315	Not included because of emergence problems					