

TIMELY INFORMATION

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2009 SCREENING TRIALS FOR COTTON VARIETY RESISTANCE TO VERTICILLIUM WILT

C.H. Burmester, Extension Agronomist, K.S. Lawrence, Associate Professor
and E. Schavey, Multi-County Agent, Auburn University

B. Meyer, Alabama Farmers Coop, N. Silvey, Madison County Coop

Verticillium wilt of cotton is a soilborn fungal pathogen caused by *Verticillium dahliae*. The wilt attacks the vascular system of the plant producing a foliar necrosis which is usually observed after cotton reaches the bloom stage. Infected plants will have necrosis of the vascular system, which appears as a distinct brown coloration inside the main stem of the cotton plant. Infected cotton typically defoliates prematurely, death of the plant follows, and yields are reduced. In cotton, resistant varieties are used as the primary method of control. In recent years verticillium wilt has increased in severity in the northern areas of Alabama, southern Tennessee and the southern high plains of Texas. In Alabama, the cotton variety ST5242 BR has shown proven resistant to verticillium wilt and has been planted on many verticillium wilt prone areas. The ST 5242 BR variety and other single gene Bt cotton varieties are currently being replaced by double stacked Bt cotton varieties. No commercially available ST 5242 seed is expected for sale in 2010.

Field trials were conducted in 2009 to identify possible new cotton varieties that have resistance to verticillium wilt for this production region. Screenings were conducted in an irrigated cotton field (Tate) and non-irrigated fields (Hunter), both with a history of verticillium wilt. To observe wilt resistance on as many new and developing varieties as possible, one row plots with 22 entries were planted across the length of both cotton fields. In early fall when verticillium wilt symptoms began appearing; ratings were conducted in four regions across the length of the each field where uniform wilt symptoms were visible. The numbers of cotton plants in ten row feet were counted and the number of plants with wilt symptoms was recorded. An overall rating of the severity of the wilt symptoms was made with 0 indicating no symptoms and 5 indicating plant deaths.

Yield evaluations were also conducted on eight cotton varieties in each field. These varieties were planted in eight row plots with three replications. Seed cotton yields were collected using a weigh buggy. Seed cotton samples were collected from each plot for lint turnout and fiber quality analysis.

Overall the occurrence of wilt symptoms was high in 2009; reflective of the extensive rainfall afforded the area from July through November. In the one row trials several cotton varieties indicated possible wilt tolerance comparable to the commercial standard ST5242 BR. At the Hunter site, ST5242 BR had the lowest verticillium incidence and severity ratings (Table 1). The varieties, PHY5922WF, ST4498B2RF, ST5288B2RF, ST4288B2RF, DP912B2RF, FM1740B2 and BC1010B2RF had similar disease incidence or severity ratings as ST5242 BR. At the Tate site, the incidence of wilt was lower than found at the Hunter site (Table2). The PHY5922WF had slightly lower wilt incidence and severity ratings than ST 5242BR at the Tate site. Many of the varieties tested at the Tate site had similar verticillium wilt ratings as ST5242BR (Table 2).

The yield tests indicated FM 1740 B2RF, ST 4288B2F, DP 0912 B2F and DP 0920 B2F as the highest yielding varieties at the Hunter location (Table 3). In the Tate field, ST 4288 B2F and FM 1740B2F were the highest producing varieties (Table 4.) These preliminary results at both sites would indicate that ST4288 B2F and FM 1749 B2F as top varieties to replace ST 5242BR on verticillum wilt infested fields in northern Alabama. More yield data on these varieties and other new varieties however is needed and will continue in these on-farm trials. These screening trials are only the first step in identifying possible replacement cotton varieties for this area of Alabama and Tennessee. On-farm cotton yield results will ultimately determine which cotton varieties have the yield and wilt resistance cotton farmers need in this area.

Table 1. Verticillium wilt incidence and severity on selected cotton cultivars and lines on the Hunter field in north Alabama, 2009.

Entry	Stand 10 ft row	Disease Incidence % Verticillium	Disease Incidence ranking	Disease Severity index	Disease Severity Ranking
ST5242BR	26.7 cd	28.9 f	1	1.9 g	1
PHY5922WF	28.8 bcd	49.7 cde	11	2.5 fg	2
ST4498B2RF	30.0 a-d	43.3 def	6	2.6 ef	3
ST5288B2RF	33.5 ab	50.4 cde	12	2.6 def	4
ST4288B2RF	29.5 a-d	35.3 ef	3	2.9 def	5
DP912B2RF	30.0 a-d	42.5 def	5	2.9 def	6
FM1740B2RF	30.0 a-d	37.0 ef	4	3.1 c-e	7
BC1010B2RF	27.0 cd	31.2 ef	2	3.3 b-e	8
DP9R643BF	31.3 a-d	49.7 cde	10	3.3 b-e	9
DP9R348BF	32.0 abc	47.1 def	7	3.4 a-d	10
BC1020B2RF	10.8 e	69.1 abc	17	3.4 a-d	11
DP920B2RF	26.3 d	48.1 def	8	3.5 a-d	12
BC1030B2RF	13.3 e	71.9 ab	20	3.5 a-d	13
BC1040B2RF	10.0 e	86.2 a	22	3.5 a-d	14
DP924B2RF	26.5 cd	49.6 cde	9	3.8 abc	15
DP9R627BF	30.3 a-d	68.0 abc	16	3.8 abc	16
DP9R303BF	28.5 bcd	58.8 bcd	14	3.9 ab	17
DP9R615BF	34.8 a	61.2 bcd	15	3.9 ab	18
PHY375WRF	33.3 ab	50.5 cde	13	4.0 a	19
DP9R796BF	33.3 ab	69.1 abc	18	4.0 a	20
DP9R623BF	34.0 ab	69.3 abc	19	4.0 a	21
DP9R619BF	32.0 abc	74.2 ab	21	4.0 a	22
LSD (0.05)	6.5	19.9		0.75	

Stand represents the number of live plants per 10 foot of row.

Incidence is the number of symptomatic plants per 10 ft or row.

Severity was based on a 0-5 scale with 0 being no disease symptoms present and 5 representing plant death.

Table 2. Verticillium wilt incidence and severity on selected cotton cultivars and lines on the Tate field in north Alabama, 2009.

PHY5922WF	30.5	ab	12.20	e	1	1.38	e	1
ST5242BR	25.0	bc	15.40	de	3	1.73	de	2
FM1740B2	30.5	ab	18.68	de	5	2.38	cde	3
ST4498B2F	30.0	ab	30.18	cde	14	2.38	cde	4
DP9R627BF	35.0	a	14.48	de	2	2.50	cde	5
DP9R643BF	32.0	ab	25.50	cde	8	2.50	cde	6
BC1030B2F	13.0	de	37.98	a-d	19	2.50	cde	7
ST4288B2F	30.0	ab	28.25	cde	13	2.63	b-e	8
DP9R623BF	32.0	ab	30.48	cde	15	2.63	b-e	9
DP920B2RF	31.5	ab	21.73	de	6	2.88	a-d	10
DP9R348BF	31.8	ab	27.35	cde	11	2.88	a-d	11
ST5288B2F	31.8	ab	28.00	cde	12	2.88	a-d	12
DP9R615BF	34.5	a	26.80	cde	10	3.00	abc	13
DP9R303BF	31.8	ab	24.38	cde	7	3.25	abc	14
DP924B2RF	30.8	ab	25.83	cde	9	3.25	abc	15
BC1010B2F	20.0	cd	58.03	ab	21	3.25	abc	16
DP9R796BF	31.8	ab	18.43	de	4	3.38	abc	17
DP912B2RF	29.8	ab	34.33	b-e	16	3.38	abc	18
PHY375WRF	33.8	a	46.23	abc	20	3.50	abc	19
DP9R619BF	32.3	ab	34.40	b-e	17	3.88	ab	20
BC1040B2F	17.8	cd	36.35	a-e	18	4.13	a	21
BC1020B2F	7.0	e	59.28	a	22	3.00	abc	22
LSD (0.05)	7.62		24.2			1.25		

Stand represents the number of live plants per 10 foot of row.

Incidence is the number of symptomatic plants per 10 ft or row.

Severity was based on a 0-5 scale with 0 being no disease symptoms present and 5 representing plant death.

Table 3. Verticillium wilt incidence and severity with seed cotton and lint yields from the Hunter field in north Alabama in 2009.

Entry	Verticillium % incidence	Severity Index	Seed Cotton lb/A	Turnout	Lint lbs/A
DP 0912 B2RF	42.5	2.9 cd	2368 ab	40.4%	957 ab
DP 0920 B2RF	48.1	3.5 abc	2164 bc	40.5%	876 abc
DP 0924 B2RF	49.6	3.8 ab	2194 bc	38.1%	836 bcd
FM 1740 B2RF	37.0	3.2 bcd	2283 b	39.5%	902 abc
PHY 375 WRF	50.5	4.0 a	1881 c	38.9%	732 d
ST 4288 B2RF	35.3	2.9 cd	2705 a	35.9%	971 a
ST 4498 B2RF	43.3	2.7 d	2149 bc	37.9%	814 cd
ST 5288 B2RF	50.4	2.7 d	2345 b	38.7%	907 abc
LSD (0.05)	16.8	0.82	337.7		130.8

Cotton yield plots were 280 ft long by 4 rows and replicated 3 times in a strip test. Yields were collected by a mechanical harvester and weighed in a boll buggy.

Table 4. Verticillium wilt incidence and severity with seed cotton and lint yields from the Tate field in north Alabama in 2009.

Entry	Verticillium % incidence	Severtiy Index	Seed Cotton Lb/A	Turnout	Lint Lb/A
DP 0912 B2RF	34.3 ab	3.8 ab	2255 cd	36.3%	818.6 cd
DP 0920 B2RF	21.8 c	2.9 ab	2260 cd	38.2%	863.5 cd
DP 0924 B2RF	25.8 bc	3.3 ab	2025 d	39.1%	791.9 d
FM 1740 B2RF	18.7 c	2.4 b	2569 a	39.1%	1004.7 a
PHY 375 WRF	46.2 ab	3.5 a	2056 d	38.8%	797.6 d
ST 4288 B2RF	28.3 bc	2.7 ab	2699 ab	37.0%	998.7 ab
ST 4498 B2RF	30.2 bc	2.4 b	2205 cd	39.5%	870.8 cd
ST 5288 B2RF	28.0 bc	2.9 ab	2360 bc	38.2%	901.6 bc
LSD (0.05)	12.1	1.06	255		99.4

Cotton yield plots were 280 ft long by 4 rows and replicated 3 times in a strip test. Yields were collected by a mechanical harvester and weighed in a boll buggy.