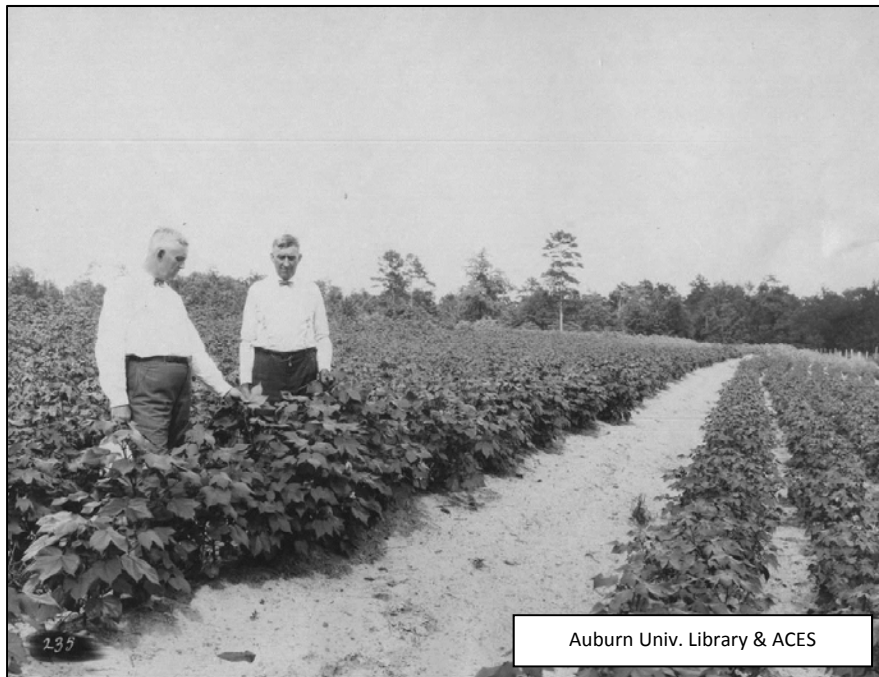


2014 National Cotton Fusarium Wilt Report



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2014 National Cotton Fusarium Wilt Report

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Cotton cultivars and elite breeding lines submitted by six 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*) Schlecht. *F. vasinfectum* [Atk.] (Snyd. & Hans.) and southern root-knot nematodes (*Meloidogyne incognita*).

In 2014, a soil analysis for nematodes revealed that southern root-knot was the predominant nematode species in the test plots. The south Fusarium wilt area contains a population of *M. incognita* that ranges from 28 to 1694 eggs and J2's per gram of root with a mean of 409. Other nematode genera present are stubby root (*Trichodorus sp.*) stunt (*Tylenchorhynchus sp.*), and spiral (*Helicotylenchus sp.*). Root-knot nematodes, however, appear to be causing the crop 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.

Methods.

For the National Fusarium Wilt Trial, 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 experimental design. Each test cultivar group submitted by the breeder was evaluated as a separate trial. Both susceptible ('Rowden') and resistant ('M-315') cultivars were included as check plots and were randomized independently with each group.

Initial plant stand was recorded on June 5, 2014. The number of wilted plants were recorded and subsequently removed on June 20, July 1, July 16, July 30, and August 20. Final plant-stand was recorded on August 27. Percent remaining plants was then determined by comparing the final stand to that recorded on June 5.

Results.

Tables 1 through 9 reflect the effect that Fusarium wilt had on the varieties included in the trial. Cotton breeders that had entries in the trials included: Bourland (Table 1); Cook (Tables 1, 2, and 3), Fraser (Table 4); Johnson (Table 5); McPherson (Table 6); and Styles (Tables 7 and 8).

E.V. Smith Research and Extension Center, Plant Breeding Unit, Tallassee

Greg Pate, Director

Jason Burkett, Associate Director



Table 1. Cotton variety response to Fusarium wilt in central Alabama, 2014: Bourland

Plant Breeding Unit, Tallassee AL

Variety*	Breeder	Plant stand	Plants affected					Plant stand	
		Initial	20-Jun	1-Jul	16-Jul	30-Jul	20-Aug	Final	Remaining
		5-Jun	No. plants removed/date					27-Aug	%
FB-1	Bourland	76.0	4.0	4.0	1.0	1.3	0.3	63.8	83.5
FB-2	Bourland	84.5	3.5	3.3	0.0	0.5	1.8	74.5	87.8
FB-3	Bourland	84.0	5.0	1.8	0.5	0.3	0.3	75.5	90.0
FB-4	Bourland	89.3	1.5	1.0	0.8	0.0	0.5	83.8	94.0
FB-5	Bourland	85.3	2.0	6.0	0.5	0.5	0.3	75.0	88.0
FB-6	Bourland	86.5	2.0	4.0	0.3	0.5	0.5	75.8	87.5
FB-7	Bourland	79.5	0.3	1.3	0.3	0.3	0.0	76.5	96.0
FB-8	Bourland	82.0	4.5	3.3	1.5	1.8	0.0	71.3	87.0
M-315		76.8	1.0	2.5	0.0	0.3	0.0	70.8	92.5
Rowden		83.5	7.5	13.3	5.5	27.0	12.8	15.3	18.3
Trial mean		82.7	3.1	4	1	3.2	1.6	68.2	82.5
C.V. (%)		7.2	95.2	76.5	144.7	91.1	127.3	13.6	11.1
Pr>F		0.0768	0.057	0.0003	0.0006	0.0001	0.0001	0.0001	0.0001

*Planted May 29, 2014 on an Independence loamy fine sand.

Table 2. Cotton variety response to Fusarium wilt in central Alabama, 2014: Cook

Plant Breeding Unit, Tallassee AL

Variety*	Breeder	Plant stand	Plants affected					Plant stand	
		Initial	20-Jun	1-Jul	16-Jul	30-Jul	20-Aug	Final	Remaining
		5-Jun	No. plants removed/date					27-Aug	%
CC-01	Cook	77.0	4.3	7.5	3.8	5.3	5.0	49.3	64.5
CC-02	Cook	83.0	6.3	7.3	2.5	1.3	0.3	63.8	76.0
CC-03	Cook	78.8	7.8	5.3	1.8	0.0	2.5	57.5	73.0
CC-04	Cook	80.0	5.5	6.0	2.0	1.0	2.5	60.8	75.3
CC-05	Cook	81.3	10.5	3.3	1.3	0.8	0.0	65.0	78.5
CC-06	Cook	90.5	6.0	2.8	0.3	1.0	0.3	75.8	83.8
CC-07	Cook	89.5	5.0	1.8	0.3	1.5	2.5	75.0	84.0
CC-08	Cook	92.5	5.8	2.8	0.5	2.5	0.5	77.5	84.0
M-315		74.3	1.8	0.5	0.5	0.8	0.0	68.0	91.8
Rowden		79.5	7.8	10.3	4.5	14.5	16.0	24.3	30.3
Trial mean		82.6	6.1	4.7	1.7	2.9	3.0	74.0	82.6
C.V. (%)		5.9	150.0	52.8	11.5	116.9	110.8	14.0	5.9
Pr>F		0.0001	0.6297	0.0001	0.0373	0.0001	0.0001	0.0001	0.0001

*Planted May 29, 2014 on an Independence loamy fine sand.

Table 3. Cotton variety response to Fusarium wilt in central Alabama, 2014: Cook

Plant Breeding Unit, Tallassee AL

Variety*	Breeder	Plant stand	Plants affected					Plant stand	
		Initial	20-Jun	1-Jul	16-Jul	30-Jul	20-Aug	Final	Remaining
		5-Jun	No. plants removed/date					27-Aug	%
CP-01	Cook	81.3	9.3	7.3	1.5	1.3	0.5	57.5	71.0
CP-02	Cook	88.0	2.3	3.5	0.3	0.3	0.5	77.5	88.0
CP-03	Cook	90.0	2.3	4.8	1.5	1.3	0.3	78.0	86.8
CP-04	Cook	87.8	6.5	8.8	2.3	6.0	2.8	56.3	64.0
CP-05	Cook	86.8	8.0	4.5	1.3	2.0	1.8	65.0	74.5
CP-06	Cook	74.0	3.3	5.5	0.8	0.8	0.3	59.5	80.0
CP-07	Cook	85.5	9.8	9.8	1.0	0.3	0.3	60.8	71.0
CP-08	Cook	80.8	15.3	7.0	1.8	1.0	0.3	54.5	68.0
M-315		71.0	0.8	1.5	0.3	0.3	0.0	64.5	91.3
Rowden		82.8	5.0	5.3	6.3	23.3	16.3	22.5	28.3
Trial mean		82.8	6.2	5.8	1.7	3.6	2.3	59.6	72.3
C.V. (%)		7.4	115.1	52.3	85.5	126.3	100.1	19.2	18.5
Pr>F		0.0018	0.1839	0.0235	0.0002	0.0001	0.0001	0.0001	0.0001

*Planted May 29, 2014 on an Independence loamy fine sand.

Table 4. Cotton variety response to Fusarium wilt in central Alabama, 2014: Cook

Plant Breeding Unit, Tallassee AL

Variety*	Breeder	Plant stand	Plants affected					Plant stand	
		Initial	20-Jun	1-Jul	16-Jul	30-Jul	20-Aug	Final	Remaining
		5-Jun	No. plants removed/date					27-Aug	%
JQ-01	Cook	78.3	3.5	4.3	1.3	2.8	5.5	56.8	72.0
JQ-02	Cook	84.0	3.5	3.0	0.8	0.0	1.8	72.5	86.0
JQ-03	Cook	92.0	2.8	0.5	0.3	0.0	0.0	86.0	93.8
JQ-04	Cook	48.3	2.5	2.0	1.0	0.0	0.0	42.3	87.0
JQ-05	Cook	82.0	1.3	1.0	1.0	0.3	0.0	76.8	93.5
JQ-06	Cook	84.8	3.8	5.5	0.5	3.3	1.8	64.8	76.5
JQ-07	Cook	89.8	1.5	2.3	0.0	0.0	0.0	85.0	94.8
JQ-08	Cook	72.5	4.8	5.3	0.8	0.5	1.0	59.0	80.3
M-315		74.8	1.0	1.8	0.0	0.3	0.0	68.8	91.5
Rowden		85.8	2.3	10.0	5.3	26.5	17.8	18.5	21.8
Trial mean		79.2	2.7	3.6	1.1	3.4	2.8	63.0	79.7
C.V. (%)		6.8	96.2	71.5	142.9	82.9	142.7	17.0	13.8
Pr>F		0.0001	0.5472	0.0005	0.0026	0.0001	0.0001	0.0001	0.0001

*Planted May 29, 2014 on an Independence loamy fine sand.

Table 5. Cotton variety response to Fusarium wilt in central Alabama, 2014: Fraser

Plant Breeding Unit, Tallassee AL

Variety*	Breeder	Plant stand	Plants affected					Plant stand	
		Initial	20-Jun	1-Jul	16-Jul	30-Jul	20-Aug	Final	Remaining
		5-Jun	No. plants removed/date					27-Aug	%
DA-1	Fraser	88	1.8	4.0	1.3	1.8	3.3	74	83
DA-2	Fraser	89	2.8	4.8	6.3	3.5	11.0	57	64
DA-3	Fraser	70	7.5	5.3	2.0	0.8	0.0	53	75
DA-4	Fraser	81	5.0	13.5	2.3	3.5	2.8	54	67
DA-5	Fraser	82	9.0	5.8	0.5	1.5	0.3	63	78
DA-6	Fraser	94	5.5	2.3	1.0	0.8	0.0	83	89
DA-7	Fraser	88	1.5	1.8	1.3	0.3	0.0	83	95
DA-8	Fraser	82	3.5	8.5	3.5	3.3	2.5	57	70
M-315		76	2.5	1.3	0.0	0.0	0.3	69	91
Rowden		84	11.5	10.5	2.5	22.0	14.5	22	27
Trial mean		83	5.0	5.8	2.1	3.7	3.5	61	74
C.V. (%)		6.7	150	87.5	119.5	84.2	122.4	23.7	23.5
Pr>F		0.0001	0.6297	0.028	0.0592	0.0001	0.0001	0.0001	0.0005

*Planted May 29, 2014 on an Independence loamy fine sand.

Table 6. Cotton variety response to Fusarium wilt in central Alabama, 2014: Johnson

Plant Breeding Unit, Tallassee AL

Variety*	Breeder	Plant stand	Plants affected					Plant stand	
		Initial	20-Jun	1-Jul	16-Jul	30-Jul	20-Aug	Final	Remaining
		5-Jun	No. plants removed/date					27-Aug	%
PHY-JJ1	Johnson	85.0	2.3	3.5	0.5	1.0	0.0	75.3	88.5
PHY-JJ2	Johnson	85.3	2.3	2.5	1.0	1.0	0.0	76.3	89.5
PHY-JJ3	Johnson	82.5	3.8	0.8	0.3	0.5	0.0	77.3	93.5
PHY-JJ4	Johnson	88.3	6.3	4.5	1.3	0.8	0.0	74.8	84.8
PHY-JJ5	Johnson	89.0	5.5	5.0	0.5	0.0	0.3	78.8	88.3
PHY-JJ6	Johnson	86.5	8.8	14.3	3.0	9.8	11.5	40.0	46.3
PHY-JJ7	Johnson	77.8	5.5	4.0	3.8	8.5	2.3	51.5	65.0
PHY-JJ8	Johnson	84.8	8.8	7.8	1.3	2.3	3.5	59.8	70.5
M-315		72.3	2.5	4.5	0.0	0.3	0.0	65.5	90.8
Rowden		80.3	6.8	9.3	4.3	27.0	15.0	15.5	19.3
Trial mean		83.1	5.2	5.6	1.6	5.1	3.3	61.5	73.6
C.V. (%)		7.4	89.3	111.3	90	96.7	78.4	24.8	22.7
Pr>F		0.0189	0.373	0.1806	0.0009	0.0001	0.0001	0.0001	0.0001

*Planted May 29, 2014 on an Independence loamy fine sand.

Table 7. Cotton variety response to Fusarium wilt in central Alabama, 2014: McPherson

Plant Breeding Unit, Tallassee AL

Variety*	Breeder	Plant stand	Plants affected					Plant stand	
		Initial	20-Jun	1-Jul	16-Jul	30-Jul	20-Aug	Final	Remaining
		5-Jun	No. plants removed/date					27-Aug	%
PHY- MM1	McPherson	84.0	3.3	5.0	0.5	0.8	1.0	72.8	86.5
PHY- MM2	McPherson	83.5	4.8	8.5	2.5	4.5	5.5	56.8	67.5
PHY- MM3	McPherson	91.0	4.8	10.3	1.8	2.5	2.0	65.5	71.5
PHY- MM4	McPherson	95.0	2.8	2.0	0.3	0.0	0.3	88.0	92.8
PHY- MM5	McPherson	91.0	3.3	4.0	1.5	0.3	0.8	76.0	83.8
PHY- MM6	McPherson	86.3	1.5	5.5	1.8	1.0	1.5	74.0	86.0
PHY- MM7	McPherson	87.5	3.8	2.3	1.0	0.3	0.5	80.0	91.5
PHY- MM8	McPherson	88.8	5.0	7.5	1.5	6.5	6.5	59.3	66.3
M-315		78.0	1.3	2.5	0.0	0.0	0.0	72.8	93.3
Rowden		84.0	7.0	10.3	3.3	27.3	13.8	20.0	23.8
Trial mean		86.9	3.7	5.8	1.4	4.3	3.2	66.5	76.3
C.V. (%)		5.9	70.8	83.6	118.7	135.1	147.8	21.9	20.6
Pr>F		0.0049	0.133	0.1263	0.2085	0.0001	0.0064	0.001	0.001

*Planted May 29, 2014 on an Independence loamy fine sand.

Table 8. Cotton variety response to Fusarium wilt in central Alabama, 2014: Styles

Plant Breeding Unit, Tallassee AL

Variety*	Breeder	Plant stand	Plants affected					Plant stand	
		Initial	20-Jun	1-Jul	16-Jul	30-Jul	20-Aug	Final	Remaining
		5-Jun	No. plants removed/date					27-Aug	%
MR-1	Styles	93.8	2.5	3.5	1.3	0.8	1.3	85.3	90.8
MR-2	Styles	92.5	7.8	6.8	1.0	4.0	6.5	65.3	70.3
MR-3	Styles	96.3	3.3	7.0	5.5	17.5	7.8	52.8	54.0
MR-4	Styles	89.0	1.0	1.0	0.5	0.0	0.8	85.3	95.8
MR-5	Styles	90.8	2.0	1.8	1.0	0.8	0.0	82.0	90.5
MS-1	Styles	79.0	3.3	5.5	2.5	1.5	3.8	59.5	75.5
MS-2	Styles	72.3	5.8	8.3	1.5	0.0	2.8	52.3	71.8
MS-3	Styles	77.3	2.3	4.3	1.5	0.5	3.0	65.8	85.3
M-315		67.3	2.0	4.8	1.0	0.0	0.3	58.5	87.3
Rowden		81.8	10.3	10.0	5.5	22.8	17.0	16.5	19.8
Trial mean		84.0	4.0	5.3	2.1	4.8	4.3	62.3	74.1
C.V. (%)		8.4	101.6	85.7	116.3	158	158.2	26.7	24.6
Pr>F		0.0001	0.0609	0.1795	0.0501	0.0007	0.0459	0.0001	0.0001

*Planted May 29, 2014 on an Independence loamy fine sand.

Table 9. Cotton variety response to Fusarium wilt in central Alabama, 2014: Styles

Plant Breeding Unit, Tallassee AL

Variety*	Breeder	Plant stand	Plants affected					Plant stand	
		Initial	20-Jun	1-Jul	16-Jul	30-Jul	20-Aug	Final	Remaining
		5-Jun	No. plants removed/date					27-Aug	%
MA-1	Styles	88.5	4.8	5.5	1.5	1.0	4.8	69.3	78.5
MA-2	Styles	86.8	8.3	4.3	3.0	2.5	5.5	62.5	72.5
MA-3	Styles	92.8	5.5	5.0	0.8	1.5	0.5	78.5	84.8
MA-4	Styles	88.8	8.5	8.3	2.5	3.0	5.3	57.5	66.3
MA-5	Styles	88.3	4.3	7.0	1.0	0.0	0.3	73.5	83.0
MA-6	Styles	94.3	11.0	14.8	2.3	5.5	10.0	46.8	50.0
MS-4	Styles	80.3	2.8	5.5	1.3	3.3	2.8	59.3	74.0
MS-5	Styles	80.0	4.0	7.0	2.0	2.8	5.8	57.0	71.0
M-315		63.8	2.0	1.3	0.8	0.0	0.0	57.5	89.8
Rowden		83.8	5.0	4.8	5.0	25.3	22.8	19.5	22.5
Trial mean		84.7	5.6	6.3	2.0	4.5	5.8	58.1	69.2
C.V. (%)		9.9	85.5	84	117.9	95.1	103.3	21.1	19.8
Pr>F		0.0015	0.2457	0.125	0.3248	0.0001	0.0004	0.0001	0.0001

*Planted May 29, 2014 on an Independence loamy fine sand.



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