2007 National Cotton Fusarium Wilt Report

January 2008

AGRONOMY AND SOILS DEPARTMENT SERIES No. 289
ALABAMA AGRICULTURAL EXPERIMENT STATION
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AUBURN, AL 36849
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

Information contained herein is available to all persons regardless of race, color, sex, or national origin
Cotton cultivars and elite breeding lines submitted by 29 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 36-inch centers, separated by 6-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).

Lack of moisture delayed planting until June 14. Initial plant counts were made on July 13. Wilted plants were counted and removed on August 10, September 7 and September 26. The remaining live plants were counted and recorded on October 5. 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 17%, with a range from 0 to 62% on an individual plot basis (Fig. 1). Wilt development was quite uniform in all blocks with rep averages ranging from 12 to 18%. The resistant check *M-315* had an average of 2% wilted plants, with a range of 0 to 15%. **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 (susceptible) 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.

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<tr>
<th>Entry</th>
<th>Cultivar/Line</th>
<th>Percent wilted plants</th>
<th>Avg.</th>
<th>P-value</th>
<th>Avg. no. of plants</th>
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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

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### Table 1. continued

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| RHS-2 | 5    | 4     | 0     | 0     | 2     | 0.42  | 62     |
| RHS-3 | 2    | 10    | 3     | 6     | 5     | 0.09  | 54     |
| RHS-4 | 7    | 8     | 5     | 2     | 5     | 0.06  | 57     |
| RHS-5 | 4    | 15    | 3     | 1     | 5     | 0.06  | 63     |
| RHS-6 | 12   | 0     | 8     | 5     | 6     | 0.03  | 69     |
| RHS-7 | 2    | 15    | 5     | 4     | 7     | 0.03  | 62     |
| RHS-8 | 3    | 0     | 2     | 2     | 2     | 0.48  | 67     |
| Rowden| 20   | 7     | 23    | 12    | 15    | 0.00  | 77     |
| M-315 | 4    | 0     | 0     | 1     | 2     | 0.88  | 70     |

| CW-1  | Curtis Williams, Delta and Pine Land Co., 381 William Gibbs Rd, Tifton, GA 31794 | 3    | 9     | 7     | 1     | 5    | 0.07  | 71     |
| CW-2  | 5    | 4     | 0     | 0     | 2     | 0.42  | 62     |
| CW-3  | 2    | 10    | 3     | 6     | 5     | 0.09  | 54     |
| CW-4  | 7    | 8     | 5     | 2     | 5     | 0.06  | 57     |
| CW-5  | 4    | 15    | 3     | 1     | 5     | 0.06  | 63     |
| CW-6  | 12   | 0     | 8     | 5     | 6     | 0.03  | 69     |
| CW-7  | 2    | 15    | 5     | 4     | 7     | 0.03  | 62     |
| CW-8  | 3    | 0     | 2     | 2     | 2     | 0.48  | 67     |
| Rowden| 20   | 7     | 23    | 12    | 15    | 0.00  | 77     |
| M-315 | 4    | 0     | 0     | 1     | 2     | 0.88  | 70     |

| SC-1  | Steve Calhoun, Emergent Genetics, 7624 Moore Road, Memphis, TN 38120 | 3    | 1     | 0     | 0     | 1    | 0.88  | 70     |
| SC-2  | 4    | 1     | 0     | 0     | 1     | 0.82  | 75     |
| SC-3  | 1    | 0     | 0     | 0     | 0     | 0.99  | 79     |
| SC-4  | 5    | 1     | 0     | 0     | 1     | 0.74  | 72     |
| SC-5  | 3    | 2     | 0     | 0     | 1     | 0.72  | 76     |
| SC-6  | 1    | 3     | 1     | 0     | 1     | 0.82  | 78     |

| TC-3  | Tim Culpepper, Emergent Genetics, 7622 Moore Road, Memphis, TN 38120 | 4    | 0     | 0     | 0     | 1    | 0.89  | 84     |
| TC4   | 4    | 1     | 0     | 0     | 1     | 0.71  | 63     |
| Rowden| 18   | 10    | 7     | 3     | 8     | <0.001| 67     |
| M-315 | 4    | 1     | 2     | 0     | 1     | 0.82  | 70     |

*continued*
### Table 1. continued

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Robert Cossar, Emergent Genetics, 7622 Moore Road, Memphis, TN 38120

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Kathryn Glass, Agronomy & Soils Dept., 201 Funchess Hall, Auburn University, AL 36849

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Jeff Klingenberg, Bayer Crop Science, 1602 Paradise Dr., Sellers, SC 25992

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