UTILIZING A DISEASE NURSERY TO EVALUATE COTTON CULTIVAR REACTION TO VERTICILLIUM WILT

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Abstract

Sixteen cultivars which were recommended for grower use or appeared to have potential for production in Tennessee were planted each year during 1994-96 at the Milan Experiment Station at Milan to evaluate their reaction to Verticillium wilt. Plots were located on an area which has a history of Verticillium wilt injury and consistently had moderate to severe wilt damage when environmental conditions were favorable for disease development. The plot area, in a creek bottom (Falaya silt loam soil), had been planted for over 20 years in a highly-susceptible cultivar every other year, and evaluation for wilt reaction was made in alternate years. Seed of the cultivars were packaged and planted May 6-10 with a four-row, tractor-mounted cone planter to assure uniform seeding rates. Fungicide and insecticide granules were applied to the seed furrow for seedling disease and early-season insect control. Plots were planted no-till in 1995 and conventionally in 1994 and 1996.

In 1994, weather conditions were almost optimum for Verticillium wilt development with cool night temperatures and abundant moisture in July and August. Cultivars were rated September 7 and rechecked September 16 and October 5 for extent of wilt symptoms and injury. On a scale of 0 to 10 with 10 being the most severe wilt damage, Paymaster H1244, the susceptible standard, was rated significantly higher than the other 15 cultivars at 8.3. HyPerformer HS-46 and Sure-Grow 1001 had significantly lower ratings than the other cultivars with 2.4 and 2.5, respectively. Others that rated low were Chembred 1135, Stoneville 132, Deltapine 20, and Deltapine 5415 at 3.6, 3.8, 3.9, and 4.0. Deltapine 50, Terra C-40, and DES 119 had low to moderate injury with ratings of 4.3, 4.4, and 4.9. Deltapine 51, Chembred 333, and Stoneville LA 887 were rated 5.1, 5.3, and 5.5 while Sure-Grow 501, Sure-Grow 125, and Stoneville 453 were rated relatively high at 5.8, 6.0, and 6.5. Yields of cultivars ranged from 1.3 to 2.4 bales per acre (harvested October 6 and November 3). Yield of Paymaster H1244 was 632 pounds of lint per acre. Stoneville 132, Chembred 1135, and Deltapine 20 had yields of 1135, 1067, and 994 pounds, respectively. Yields of DES 119, Deltapine 50, and Chembred 333 were 945, 926, and 888 pounds while Sure-Grow 125, Sure-Grow 1001, Stoneville LA 887, Terra C-40, HyPerformer HS-46, and Sure-Grow 501 produced 854, 840, 832, 828, 814, and 801 pounds. Stoneville 453 had a yield of 758 pounds; yields of Deltapine 51 and Deltapine 5415 were 675 and 655 pounds. Yield of Stoneville 132 was significantly higher than those of the other cultivars except Chembred 1135 and Deltapine 20. Yield of Paymaster H1244 was significantly lower than those of the other cultivars except Deltapine 5415, Deltapine 51, Stoneville 453, Sure-Grow 501, and HyPerformer HS-46.

Weather conditions were present for wilt development in June of 1995, and moderate to severe symptoms appeared in some cultivars. Most of the symptoms disappeared until late August as weather conditions improved. Cultivars were rated September 11 and rechecked October 13 and 30 for wilt expression. Paymaster H1244 was rated significantly higher than the other cultivars at 7.2 of a possible 10. Paymaster H1215 and Paymaster H1220 had higher ratings than the other 13 cultivars with 5.7 and 5.6, respectively. Chembred 1135 and Chembred 333 had lowest ratings of 3.4 and 3.5. Sure-Grow 501, Stoneville LA 887, Deltapine 20, and Deltapine 50 had ratings of 3.8, 3.8, 3.9 and 3.9. Deltapine 51, Stoneville 132, Deltapine 5409, Stoneville 474, Paymaster H1330, Sure-Grow 404, and Sure-Grow 125 were rated at 4.0, 4.1, 4.2, 4.2, 4.3, 4.6, and 4.7, respectively. Even with a relatively high wilt rating late in the season, Paymaster H1244 had a yield of 1165 pounds of lint per acre (plots harvested October 10 and 30). Paymaster H1215 and Paymaster H1220 had yields of 1085 and 1169 pounds. Chembred 1135 and Chembred 333 produced 937 and 755 pounds. Yields of Sure-Grow 501, Stoneville LA 887, Deltapine 20, and Deltapine 50 were 815, 898, 1065, and 987 pounds. Deltapine 51, Stoneville 132 (poor stand), Deltapine 5409, Stoneville 474, Paymaster H1330, Sure-Grow 404, and Sure-Grow 125 produced 839, 924, 1080, 1061, 923, 960, and 946 pounds, respectively.

In 1996, weather conditions were again favorable for wilt development. Cultivars were rated September 6 and rechecked September 25 and October 15 for wilt damage. Paymaster H1244 and Sure-Grow 125 were rated significantly higher than the other cultivars at 7.7 each. Paymaster H1220, Sure-Grow 501, Americot 1510, Stoneville 474, Paymaster H1215, Sure-Grow 404, Stoneville 132, and Stoneville 495 had higher ratings than the other six cultivars with ratings of 6.8, 6.8, 6.7, 6.7, 6.6, 6.6, 6.4, and 6.3, respectively. Deltapine 5409, Deltapine 50, Deltapine 20 had lowest ratings of 4.0, 4.2, and 4.5. Deltapine 51, Terra 292, and Paymaster H1277 were rated 4.7, 5.3, and 5.6. With a relatively high wilt rating, Sure-Grow 125 had a yield of 911 pounds of lint per acre (plots harvested October 16 and November 5). Paymaster H1215, Paymaster H1244, and Paymaster H1220 had lowest yields of 719, 720, and 733 pounds. Sure-Grow 501, Deltapine 51, and Americot 1510 produced 801, 842, and 877 pounds. Yields of Stoneville 132, Stoneville 474, and Terra 292 were 897, 942, and 945 pounds. Deltapine 50, Stoneville 495, Deltapine 5409,

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Paymaster H1277, Sure-Grow 404, Deltapine 20 produced 980, 1003, 1010, 1012, 1020, and 1021 pounds.

Use of a disease nursery assured consistent wilt expression that was moderately severe to severe in the two out of three years when weather conditions were favorable for disease development. Information obtained on susceptibility or resistance of cultivars to Verticillium wilt should be very valuable to cotton producers in Tennessee and other states which have areas where the wilt is a problem.