SCREENING COMMERCIAL COTTON VARIETIES FOR FUSARIUM WILT AND ROOT-KNOT NEMATODE RESISTANCE

Jessica Dotray
Texas Tech University
Lubbock, TX
Terry A. Wheeler
Texas A&M AgriLife Research
Lubbock, TX
Cecilia Monclova-Santana*
Jennifer Chagoya
Jonathan Shockey
Texas A&M AgriLife Extension
Lubbock, TX

Abstract

The Southern High Plains region of Texas is the largest cotton production area in the world; however, 40-50 percent of these cotton fields are infested with the root-knot nematode (RKN, *Meloidogyne incognita*). With the aid of root-knot nematodes, *Fusarium oxysporum* f. sp. *vasinfectum* (FOV) race 1 and 2 colonize the vascular system of a susceptible plant, leading to severe crop and yield losses. The objective of this study was to screen commercial cotton cultivars for resistance to Fusarium wilt and root knot nematode. A total of fifty-four cotton cultivars (43 commercial varieties) were tested in 2020 in two fields located in Turkey, TX (Hall County) and Whiteface, TX (Cochran County). The trials were evaluated for stand loss, nematode density, and yield. In 2020, a greenhouse trial was also performed with a subset of 8 cotton varieties, where visual symptoms were rated on a scale of 0 (healthy) to 5 (plant death). The Whiteface, TX trial averaged a yield of 875 lint lbs/A, a plant loss of 13%, and a nematode density of 7,434 RKN/500 cm^3 soil. The top yielding varieties were FM 1730GLTP, PHY 400 W3FE, and ST 4946GLB2. FM 1730GLTP yielded 1,096 lint lbs/A, had a 18% stand loss and a nematode density of 1,765 RKN/500 cm^3 soil. PHY 400 W3FE and ST 4946GLB2 yielded 1,087 and 1,038 lint lbs/A, had plant losses of 15% and 5%, and nematode densities of 2,455 and 2,640 RKN/500 cm^3 soil, respectively. The Turkey, TX trial had an average yield of 1,539 lint lbs/A, a plant loss of 5% and a nematode density of 8,097 RKN/500 cm^3 soil. The top yielding varieties included PHY 480 W3FE, ST 5600B2XF, PHY 400 W3FE, PHY 545 W3FE (new variety) and ST 4946GLB2 with yields of 2,017; 1,875; 1,860; 1,836 and 1,835 lint lbs/A, respectively. PHY 480 W3FE had a stand loss of 21% and a nematode density of 2,865 RKN/500 cm^3 soil while ST 5600B2XF, PHY 400 W3FE, PHY 545 W3FE and ST 4946GLB2 had plant losses of 10, 7, 0 and 0% and nematode densities of 4,690; 5,390; 2,295 and 5,595 RKN/500 cm^3 soil, respectively. In the greenhouse trial, ST 4946GLB2 showed the lowest visual symptom rating with an average of 0.73. Additionally, FM 1621GL, ST 5600B2XF and DP 1840 B3XF were not significantly different and had ratings of 0.85; 1.23 and 1.38, respectively. These varieties all appeared to have some resistance to FOV. DP 1454NR B2RF, DP 1747NR B2XF, PHY 480 W3FE and DP 1522 B2XF were significantly different and had visual ratings of 2.18; 2.35; 2.85 and 2.85, respectively. These varieties were observed to be susceptible to FOV. The top yielding varieties at both locations all have resistant genes to the root-knot nematode. This shows that varieties carrying root-knot nematode resistance genes typically have higher yields than varieties that are susceptible to the nematode. ST 4946GLB2 has performed consistently well in all three trials and carries resistance to both the nematode and FOV. Stand loss and stunting was still observed in all varieties at different degrees. Varieties that carry resistance to RKN and FOV is the most effective management strategy in controlling losses due to Fusarium wilt disease; however, RKN-only resistance is still effective.

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*corresponding author