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COTTON BREEDING LINES FROM GEORGIA WITH MODERATE RESISTANCE TO THE SOUTHERN ROOT-KNOT NEMATODE

Richard F. Davis
USDA-ARS
Tifton, GA
O. Lloyd May
University of Georgia
Tifton, GA
Shelby Baker
Georgia Cotton Commission
Tifton, GA

Abstract

The southern root-knot nematode, *Meloidogyne incognita*, is the most damaging pathogen of cotton in the United States causing annual losses as high as 5% in some states. In addition to direct losses, *M. incognita* infection greatly increases losses to Fusarium wilt. Cotton with resistance to *M. incognita* can significantly reduce losses to the nematode and to Fusarium wilt. The first cotton germplasm with resistance to *M. incognita* was Auburn 623 RNR, which was released in 1974. Germplasm lines with *Meloidogyne* resistance derived from Auburn 623 RNR have been developed, but these lines have not had acceptable yield and agronomic characteristics. Our objectives were to evaluate advanced breeding lines developed in the University of Georgia cotton breeding program to document levels of resistance and tolerance to *M. incognita* and to determine if there is a relationship between resistance and tolerance. Reproduction of *M. incognita* was evaluated on 17 breeding lines, a susceptible control (Delta and Pine Land DP5415), and a resistant control (M-120) in two greenhouse trials with six replications in a randomized complete block design. Seedlings were inoculated with 8,000 *M. incognita* eggs per pot two weeks after planting, and eggs were extracted from the seedlings ca. 56 days after inoculation. Yield was determined in 2001 and 2002 in fumigated (Telone II, 1,3-dichloropropene at 6 gal/acre) and non-fumigated plots in a strip-plot design with three replications in a field naturally infested with *M. incognita*. Eight breeding lines had less ($P \leq 0.05$) nematode reproduction than the susceptible control, with reductions ranging from 45 to 57%. Reproduction on the resistant control was reduced 90%. The eight resistant genotypes had similar levels of *M. incognita* reproduction, and none of them were as resistant as M-120. The amount of yield suppression caused by nematode infection differed among genotypes (a genotype × fumigation interaction; $P \leq 0.05$). Six genotypes in 2001 and nine in 2002 were tolerant to *M. incognita* and had no difference in yield between the fumigated and non-fumigated plots ($P \leq 0.10$), however, only three genotypes had no significant yield suppression in either year. Two of the consistently tolerant breeding lines also were resistant to *M. incognita*. Regression analysis found that yield suppression decreased in a linear manner as nematode resistance increased. The University of Georgia cotton breeding program has developed two breeding lines (GA96-100 and GA96-211) with acceptable yields that support less *M. incognita* reproduction than susceptible cultivars and suffer significantly reduced yield loss in *M. incognita* infested fields.