

YIELD DRAG ASSOCIATED WITH RESISTANCE TO ROOT-KNOT NEMATODES IN HIGH-YIELDING COTTON GERMPLASM**Richard F. Davis****USDA-ARS****Tifton, GA****Peng W. Chee****Edward L. Lubbers****University of Georgia****Tifton, GA****Abstract**

In plant breeding, accidental incorporation of deleterious DNA near a desirable gene is called linkage drag; if it reduces yield, it is called yield drag. Yield drag is best documented by comparing near isogenic lines with and without the DNA containing the desired gene to minimize other genetic differences. In a back-cross breeding program to improve the yield and fiber quality of cotton germplasm with resistance to *M. incognita*, near-isogenic lines with and without resistance were selected. In greenhouse tests, the resistant isoline (GA 120R1B1) reduced reproduction of *M. incognita* by 95% compared to the susceptible isoline (GA 120S1A1). The isolines and the susceptible recurrent parent (PD94042) used in creating the isolines were evaluated for yield drag in 2009 and 2010 in field studies with 8 replications. Although they are not isogenic lines, the source of resistance (M-120 RNR) in GA 120R1B1 also was tested along with its susceptible recurrent parent (Coker 201). The study was conducted in fields with very low to nil populations of *M. incognita*, and the fields were fumigated with 1,3-dichloropropene prior to planting to evaluate yield in the absence of nematode parasitism. No galling was found during this study. The two groupings of genotypes (GA 120R1B1, GA 120S1A1, and PD94042; and M-120 RNR and Coker 201) were analyzed separately. Because there was no interaction between year and genotype, a pooled analysis was conducted. Yield of M-120 RNR did not differ ($P \leq 0.05$) from Coker 201 in either year or in the pooled analysis, so there is no evidence that yield drag occurred with M-120 RNR. In contrast, yield of GA 120R1B1 was less than the yield of GA 120S1A1 in 2009, and numerically, but not statistically, lower in 2010. In the pooled analysis, the yield of GA 120R1B1 was numerically lower but not statistically different from GA 120S1A1. In both years, the yield of PD94042 was numerically greater than the other genotypes, and it was statistically greater than GA 120R1B1 in 2009 and in the pooled analysis; however, PD94042 did not differ from GA 120S1A1 in either year or in the pooled analysis. The yield of GA 120R1B1 was consistently numerically lowest among the genotypes in both years, and such consistency regardless of whether differences were statistically significant suggests that yield drag may occur in GA 120R1B1 even though yield and quality of GA 120R1B1 are improved compared to its resistant parent (M-120 RNR). Yield drag may be more readily observed as yield potential increases. Additional breeding should be able to break this linkage drag thereby further improving yield of this resistant germplasm line.