TOLERANCE TO THE SOUTHERN ROOT-KNOT NEMATODE IN COMMERCIAL COTTON CULTIVARS

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Introduction

The southern root-knot nematode, *Meloidogyne incognita*, causes significant yield reductions throughout the U.S. cotton belt. The term susceptible means the nematode can reproduce freely, and tolerance means that crop growth and yield are affected relatively little by the feeding of nematodes. Though resistant plants are often tolerant, susceptible plants may also be tolerant. Virtually all cotton cultivars on the market are susceptible to the southern root-knot nematode, but their tolerance is not known. We measured the amount of yield suppression caused by root-knot nematodes in high-yielding, high-quality cotton cultivars that are known or believed to be susceptible to the southern root-knot nematode.

Materials and Methods

Tolerance to *M. incognita* was measured in 2003 in field experiments with six replications in a strip-plot design at the University of Georgia Gibbs Farm in Tifton, GA. The field was naturally infested with *M. incognita*. The horizontal factor was genotype and the vertical factor was fumigation treatment (non-fumigated or 1,3-dichloropropene [Telone II®] at 6 gal/acre). All plots received aldicarb (Temik 15G) at 2.0 lbs/acre for thrips control: this rate is believed to have no effect on nematode populations. Delta and Pine Land DP5415 has been documented to be susceptible and intolerant to *M. incognita*, so it was included as an intolerant control treatment. The genotype GA96-211 has been documented to be moderately resistant and tolerant, so it was included as a tolerant control treatment. The tolerance of all other genotypes in this study were not adequately documented prior to this study. Yield was measured from two forty-foot rows for each genotype by fumigation combination. Plots were oversprayed as necessary with acephate (Orthene® 75) at 0.18 lbs a.i./a for supplemental thrips control. All plots received fertilizer, insecticide, and herbicide according to the University of Georgia Cooperative Extension Service recommendations. All plots were managed identically except for the genotype planted, which varied by treatment. Irrigation was applied as needed, though very little irigation was needed in 2003. Yield data were collected at harvest on 23 October 2003. Seed cotton from each plot was harvested and weighed, and lint yield was estimated by using the percent lint measured in the University of Georgia Official Variety Trials to calculate a lint yield for the plot. Percent yield loss was calculated as (((yield in fumigated plots) - (yield in non-fumigated plots)) / (yield in fumigated plots)) × 100. Percent yield loss values were subjected to analysis of variance and means separation by $LSD_{(0.05)}$.

Results and Discussion

Yields in fumigated plots generally were high which illustrates the excellent yield potential of these cultivars (Table 1). Yield suppression ranged from 8.5 % for GA96-211, which is moderately resistant and tolerant to *M. incognita*, to 35.7 % for FiberMax 989R. It was anticipated that the pounds lost per acre would increase as yield potential increased but the percent yield loss would be similar among the cultivars. However, the percent yield loss differed among the cultivars (Table 1). The data from 2003 were combined with the data from the first year of this study in 2002 and there was a significant regression in which cultivars with higher yield potentials also had greater percent yield loss to root-knot nematodes (Figure 1). Data from the two years of the study were analyzed to verify that year was not a significant factor and that slopes did not differ between years; therefore, it was appropriate to combine data from the two years to calculate a single regression equation. Nematode reproduction differed among the cultivars (Table 1), which was unexpected. It has been shown previously that cotton genotypes which support more nematode reproduction tend also to suffer greater yield losses, and that may have played a role in this study. Based on this preliminary data, it appears that nematode management may be of greater importance in cultivars with higher yield potentials.

Table 1. Yield suppression caused by the southern root-knot nematode, *Meloidogyne incognita*, in commercially available cotton cultivars in 2003.

Cultivar	Yield in fumigated plots (lbs/acre)	% yield loss in non-fumigated plots	Nematode reproduction (eggs/gram root)[2]
SG215BR	1327	23.9 a[1]	11,989 bc
FiberMax966	1231	34.2 a	14,954 ab
ST4892BR	1197	14.6 bc	12,786 bc
DP555BR	1197	28.4 ab	14,032 ab
DP451BR	1190	11.9 bc	11,583 bc
DP545BR	1142	12.2 bc	11,748 bc
DP458BR	1065	22.0 abc	7,583 cd
FiberMax989R	1062	35.7 a	18,973 a
DeltaPearl	1007	24.6 abc	14,916 ab
GA96-211	990	8.5 c	5,064 d
DP5415	966	22.1 abc	13,647 ab
DP5415R	827	17.2 abc	9,949 bcd

[1] Values followed by the same letter are not significantly different according to Fisher's protected $LSD_{(0.05)}$.
[2] Nematode reproduction data is the mean of two greenhouse tests with six replication in each test.

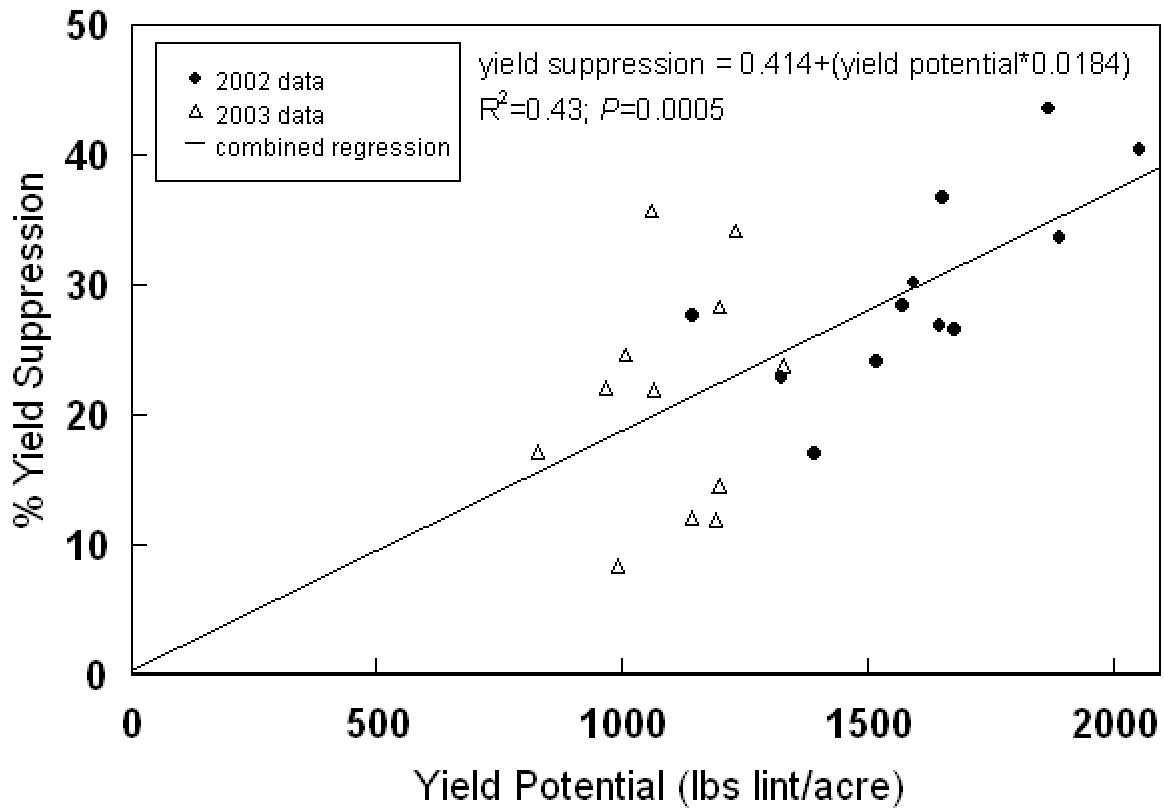

Figure 1. Relationship between estimated yield potential (as measured in fumigated plots) and percent yield lost to root-knot nematodes in a two-year study.