RESPONSE OF COTTON CULTIVARS AND STRAINS TO RENIFORM NEMATODES

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Abstract

Reniform nematodes have quickly become a major pest of cotton, causing severe losses across much of the U.S. cotton acreage. Presently there are no commercial cultivars available to growers with a significant level of resistance. This study was conducted in the 2000 growing season at the USDA-ARS North Farm reniform nematode nursery. The objective of the study was to determine the response of 40 commercially available cultivars and promising new strains of cotton in the presence of reniform nematodes. Twenty five of the better performing entries were reported in this paper. Average lint yield in the fumigated plots was 11.3% higher than for the reniform nematode infested plots. The top five producing entries in the reniform nematode infested plot averaged 46% more lint than Stoneville 474. A similar trend was observed in the fumigated plots. The experimental entry, NK 2723, produced the highest yield in the nematode infested plots and produced 15% more lint than the second highest yielding entry, MAR 280K-1-98. Final nematode population counts indicated that Stoneville 474 was the most susceptible of the 25 entries. Eleven entries had significantly lower counts than Stoneville 474. Fiber length in the reniform plots was longest for FiberMax 832 and TAMU 94L-25. Although no entry can be considered resistant, the results indicated that some cultivars and strains possess good tolerance to reniform nematodes.

Introduction

Reniform nematodes (*Rotylenchulus reniformis* Linford & Oliveira) can be serious pests of cotton (*Gossypium hirsutum* L.) (Robinson, 1999), with parasitism typically causing stunted, unhealthy appearing plants, and reduction in lint yield (Birchfield, 1963; Jones et al., 1959). The commercial cultivars which have dominated the cotton acreage since 1950 were shown to be highly susceptible to reniform nematodes (Robinson et al., 1999). With the increase in cotton acreage being infested by reniform nematodes, this study was conducted to evaluate the performance of commercially available cultivars and promising new strains when grown in the presence of the reniform nematode and in Telone II fumigated soils.

Materials and Methods

The field study was conducted at the USDA-ARS North Farm, Weslaco, TX on a Hidalgo sandy clay loam soil that has been in continuous cotton for 15+ years. The plots have been maintained as a reniform nematode nursery since 1991. The experimental design was a split-plot, with four replications in the reniform nematode infested plots and three replications in the Telone II fumigated plots. The Telone II fumigation and fertilizer (40 lb N/acre as Ammonium Sulfate) were applied on 14 December 1999. A sidedress application of 40 lb N/acre (N32) was applied on 5 May 2000. Pendimethalin was applied at 1.0 quart formulation/acre as a preemergence weed control. Due to the number of entries and limited space, experimental plots were one row, 30 ft long and spaced 3.3 ft apart. Planting date was 8 March and harvest dates were 21 July and 2 August. Nematode counts were taken from soil samples obtained at the end of the season. Measurements reported are lint yield, fiber length, strength, and micronaire, and final nematode populations (no. nematodes/pint of soil).

Results

Average lint yield was significantly reduced by reniform nematodes. The Telone II fumigated plots had an 11.3% yield increase over the reniform infested plots. Lint yield in the presence of reniform nematodes was highest for NK 2723 and lowest for DPL 565. Eleven entries produced significantly higher yields than the check, Stoneville 474. In the Telone II fumigated plots, a similar trend was observed, with 14 entries producing significantly higher yields than Stoneville 474. Reniform nematode population counts of the 25 entries ranged from 2276 to 9815 nematodes/pint of soil. The lowest nematode counts were observed for MAR 280-1-98 and NK 2387C, followed by NK 2638, NK 2723, and TAMU 94L-25. Stoneville 474 had the highest nematode population count of the 25 reported entries. Fiber length was longest for FiberMax 832 and TAMU 94L-25 and shortest for TAMU 94C-18 and SureGrow 501 B/RR. Fiber strength ranged from 23.5 g/tex for STPSA 229 to 29.0+ g/tex for TAMU 94C-18, MAR 280K-1-98, and FiberMax 832. With the exception of a few high values (>4.8), most entries had acceptable micronaire. Based on the reniform nematode counts, none of the evaluated cottons could be considered resistant; however, several entries showed very good tolerance when grown in the presence of reniform nematodes.

References

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Table 1. Lint yield in reniform nematode-infested (RN) and Telone II fumigated (TL) soils and reniform nematode population (RNP) counts of 25 cultivars and strains.

Entry	RN lb/acre	TL lb/acre	RNP nema/pint soil
NK 2723	1413 **	1367 **	2891 **
MAR 280K-1-98	1222 **	1287 **	2276 **
NK 2638	1207 **	1214 *	2768 **
NK 97363	1205 **	1286 **	6335
TAMU 96WD-22	1169 **	1407 **	6248
NK 2108ss	1137 **	1261 **	3481 **
NK 2165C	1120 **	1248 **	3198 **
NK 2387C	1110 **	1302 **	2276 **
STPSA 229	1076 *	1201 *	4613
Delta Pearl	1071 *	1035	6150
CUQPI2LBGS-3-97	1065 *	1316 **	4526
SureGrow 747	1008	997	3998 *
MSU 8806-3-2-19	992	1280 **	7872
Paymaster 1218 B/RR	989	1203 *	3137 **
JaJo 8125	981	1064	2952 **
TAMU 94C-18	976	1152	7109
FiberMax 832	962	1242 **	6925
STPSA 208	937	1326 **	3296 *
TAMU 94L-25	907	977	2891 **
CUQPISXLBH-4-97	881	1163	5756
Suregrow 501 B/RR	865	783	5141
Stoneville 474 (Check)	852	957	9815
MSU 8839-3-10-2	800	1053	5720
DPL 565	584 **	782	3358

, Significantly different from Stoneville 474 at the 0.05 and 0.01 level of probability, respectively.

Table 2. Fiber length, strength, and micronaire of 25 cultivars and strains in reniform nematode-infested soil.

Entry	Length inches	Strength g/tex	Micronaire units
NK 2723	1.14	25.1	3.9
MAR 280K-1-98	1.10	29.2	5.0
NK 2638	1.13	25.4	4.0
NK 97363	1.13	24.4	4.5
TAMU 96WD-22	1.17	27.7	4.2
NK 2108ss	1.10	26.1	4.5
NK 2165C	1.11	25.3	4.5
NK 2387C	1.14	26.5	4.5
STPSA 229	1.10	23.5	4.3
Delta Pearl	1.18	28.6	4.3
CUQPI2LBGS-3-97	1.13	26.8	4.4
SureGrow 747	1.13	26.0	4.9
MSU 8806-3-2-19	1.14	27.9	4.9
Paymaster 1218 B/RR	1.13	24.3	4.7
JaJo 8125	1.14	26.8	4.9
TAMU 94C-18	1.08	29.3	3.9
FiberMax 832	1.25	29.1	4.2
STPSA 208	1.12	24.6	4.3
TAMU 94L-25	1.24	28.9	4.3
CUQPISXLBH-4-97	1.13	28.3	4.1
Suregrow 501 B/RR	1.09	26.8	4.9
Stoneville 474 (Check)	1.14	27.4	4.9
MSU 8839-3-10-2	1.18	26.8	4.6
DPL 565	1.17	28.7	4.8