PHYTOGEN VARIETY AND SEED TREATMENT PRODUCT EVALUATIONS IN RENIFORM NEMATODE INFESTED SILT LOAM SOILS IN MISSISSIPPI

T.H. Wilkerson
T.W. Allen
Mississippi State University, Delta Research and Extension Center
Stoneville, MS
T. W. Eubank
Corteva Agriscience
Greenville, MS

Abstract

The reniform nematode, *Rotylenchulus reniformis,* can be a severe yield reducer in situations where the soilborne populations are greater than the economic threshold (e 1,000/pint of soil in spring and e 5,000/pint of soil post-harvest). Effects of this pest are observed throughout the cotton growing areas of the southern United States. At present, no resistant varieties are commercially available for management purposes, seed treatments may provide some suppression of the pest. The specific objectives of these trials were to determine the benefits of variety and seed treatment combinations in managing the reniform nematode. Field trials were established in two locations to include two seed treatments in combination with six cotton varieties. Soil samples were collected from each plot at pre-plant, and harvest to assess nematode population. Although populations were above threshold throughout the season, no significant differences occurred between treatments with respect to nematode population. Significance was observed in seed cotton weights collected from Field 1 regardless of seed treatment combination applied to PX3A82W3FE. Combinations of varietal resistance and seed treatment may provide protection from losses due to reniform nematode.

Introduction

The reniform nematode, *Rotylenchulus reniformis*, is one of three major nematode pests in Mississippi cotton and current management options are limited. Fields exhibiting high reniform nematode populations within the United States are most often observed in the cotton-growing areas of Alabama, Arkansas, Georgia, Louisiana, Mississippi, Missouri, and Texas where continuous cotton production has been common. In field situations where the soilborne population of reniform nematode is greater than the economic threshold, significant yield reduction can be observed. In Mississippi, the reniform nematode populations reported to produce in yield losses ranges from 1,000 to 5,000 reniform nematodes/pint between spring and fall (harvest) soil sample timings. At present, reniform nematode-resistant cotton varieties are not commercially available. In severe situations, the reniform nematode has been reported to result in yield losses of 30 to 40%. The specific objectives of these trials were to determine the benefits of variety and seed treatment combinations in managing the reniform nematode.

Materials and Methods

Two fields (Field 1 and Peach) at the Delta Research and Extension Center in Stoneville, MS, with a history of moderate reniform nematode infestation were used for trials in 2018. Trials were planted in a randomized complete block design (RCBD) with a split-plot constraint (variety; n=6). Plots consisted of four rows of cotton (40” centers) and were 35 feet long. Treatment combinations consisted of several seed-applied nematicide treatments in combination with variety tolerance. Seed treatments consisted of either a base treatment (fludioxonil + mefenoxam + myclobutanil + imidacloprid) or the base treatment + Trio (azoxystrobin/fluidoxonil/mefenoxam + sedexane + BioST VPH). The BioST VPH serves as the seed-applied nematicide component. Soil samples were collected at two timings that corresponded with a pre-plant collection and a second timing at approximately harvest to assess the reniform nematode population present and determine the effects of treatment combinations on soilborne nematode populations. Nematodes were extracted from 200 cc of soil; however, reniform nematode numbers are presented by pint of soil. Nematodes were extracted by elutriation followed by sucrose centrifugation. Stand counts and vigor were assessed. The center two rows of each plot were machine-harvested post-defoliation with a two row Case IH cotton picker outfitted with a harvest weigh cell system. All data were analyzed in PROC GLIMMIX at the 95% confidence interval.

Results

Spring reniform nematode populations were above the economic threshold (1,000/pint) at the first sampling regardless of location. Nematode populations increased throughout the season and remained above threshold by the harvest sampling. Reniform nematode numbers were not significantly different between regardless of cultivar, or location (Table 1**)**. Even though numerical differences were observed in the vigor and % stand between variety and variety × treatment combination none of these were significantly different. Seed cotton (lb/A) was significantly different for Field 1 regardless of seed treatment composition, but only with the PX3A82W3FE variety component (Figure 1A).

Table 1. Results from variety and seed treatment combinations from two locations during 2018 in Stoneville, MS.

				Reniform nematode numbers (per pint)	
Variety	Seed treatment[1]	Vigor[2]	Stand (%)	Peach	Field 1
PX3A99W3FE	Base + Trio	2.6	83.1	8,181	6,930
PX3A99W3FE	Base	1.9	76.5	7,026	4,812
PHY 312WRF	Base + Trio	2.6	80.2	6,833	7,604
PHY 312WRF	Base	1.6	81.2	6,930	4,427
PX3A82W3FE	Base + Trio	2.6	72.3	8,373	4,620
PX3A82W3FE	Base	1.6	75.4	6,737	5,101
PHY 480W3FE	Base + Trio	2.4	82.3	7,603	6,833
PHY 480W3FE	Base	2.5	78.9	6,930	4,042
PHY 440W3FE	Base + Trio	3.1	80.6	6,737	3,754
PHY 440W3FE	Base	2.2	78.7	8,373	7,892
PHY 444WRF	Base + Trio	2.4	71.1	7,507	8,855
PHY 444WRF	Base	2.1	80.6	7,507	4,427
	p-value	0.0868	0.3526	0.9777	0.3777

[1] The seed treatment packages consisted of: Base treatment = fludioxonil + mefenoxam + myclobutanil + imidacloprid, Base treatment + Trio = base treatment chemicals + Trio (Azoxystrobin/fluidoxonil/mefenoxam + sedexane + BioST VPH).

[2] Vigor was based on a 1-9 evaluation scale whereby 1=poor appearance and 9= dead plant

Discussion

Even though seed treatment did not result in significant increases in seed cotton regardless of location, mathematical differences were observed between treatments suggesting that specific seed treatment and varietal combinations may be beneficial depending on the reniform nematode population present in a commercial field situation. Seed treatment and varietal combinations that may exhibit some tolerance to the reniform nematode are one form of integrated management that may provide some protection against yield losses until a time when reniform nematode-resistant varieties become available.

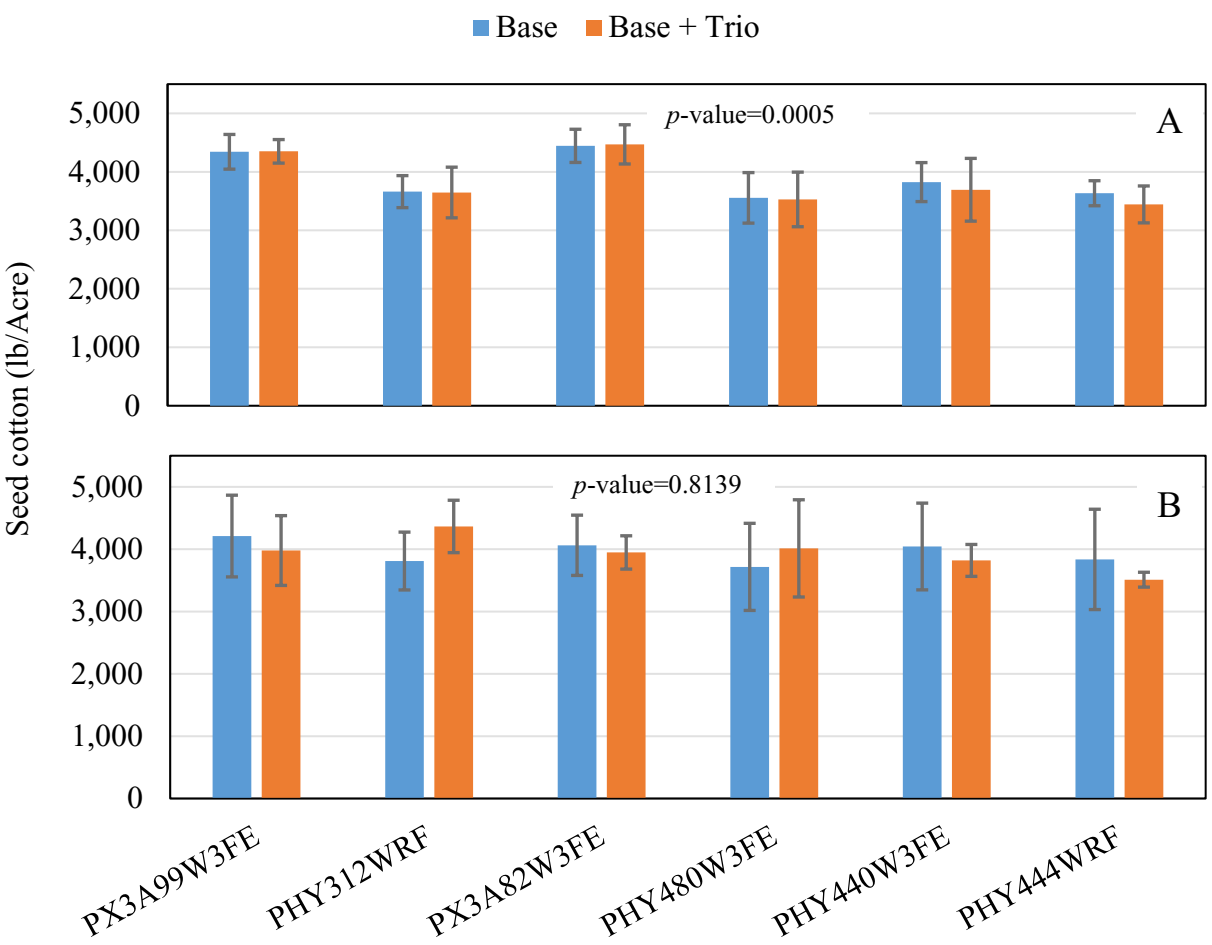

Figure 1. Yield in seed cotton per acre from two different study sites in Stoneville, MS during 2018 A) study site labeled as Field 1 and B) study site labeled Peach. Standard deviation for each value is indicated above bars.