EFFECTS OF SOIL FERTILITY ON REPRODUCTION AND PATHOGENICITY OF RENIFORM NEMATODE (*ROTYLENCHULUS RENIFORMIS*) ON COTTON

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Abstract

A study was undertaken to evaluate the influence of soil nutrients as a method to either compensate for reniform nematode damage or augment nematicide application. The nutrients in this study were P and S since these were low in the test field. The plots treated with the fumigant Telone yielded the highest. Although not statistically significant, the application of a high rate of P did improve yield in both the fumigated and non-fumigated plots. The application of the higher rate of S actually seemed to reduce yields. The fumigant was much more significant in impacting reniform populations at mid-season than rates of P and S.

Introduction

Among the variety of diseases on cotton, nematodes play a major role in reducing cotton yield. Across the United States cotton belt millions of dollars are lost annually due to nematode infestation. In the Mid-south and southeast U.S., root-knot nematodes (*Meloidogyne incognita*) and reniform nematode (*Rotylenchulus reniformis*) are responsible for highest percentage of damage. In the last 15-20 years reniform nematode has become the dominant nematode species in a number of states including Louisiana. Different management strategies are established for the management of nematodes. Unfortunately each strategy has its own drawbacks economically or environmentally. Soil fertility is the driving force for proper plant growth and offsetting some plant diseases. If proper maintenance of soil fertility could affect nematode populations and their pathogenicity it will be an added advantage. Therefore this field study was done to check the effects of soil fertility on reniform nematode pathogenicity and reproduction on cotton.

The objectives of this research were to determine if the application of plant nutrients (Phosphorus and Sulfur) could alter the damage by reniform nematode and if plant nutrients could change the reaction of a fumigant against reniform nematode.

Materials and Methods

The test was conducted at the LSU Ag center Northeast research station in St. Joseph, Louisiana in a heavily reniform infested field that had low levels of phosphorus and sulfur based on preliminary soil tests. Treatments were comprised of different fertilizer combinations with and without Telone II. Telone was applied preplant using a 30" Yetter Coulter and Premier Telone Applicator at the rate of 3 gal/A. Phytogen 565 WRF cotton seeds were planted in treatment plots on 17 May 2011. Fertilizer combinations were phosphorus high and low (P_H and P_L) mixed with sulphur high and low (S_H and S_L) resulted in P_H S_H, P_H S_L, P_L S_H, and P_L S_L treatments. Fertilizer combinations were

prepared by mixing AGRI – AFC Multi Purpose fertilizer (8-24-24) with pelletized soft gypsum (16% S) and applied on 7 June. Each plot was calculated as 1/100 of an acre. Phosphorus high and low (P_H and P_L) regimes received 4.1 lbs and 1.6 lbs of fertilizer per plot where as sulphur high and low (S_H and S_L) received 1.2 lbs and 0.3 lbs of soft gypsum respectively. Each treatment was replicated five times. No fertilizer was added to the control plots. Nematode samples were collected at planting and mid-season. The test was harvested on 3 October 2011.

Table 1. The influence of soil nutrients (phosphorus and sulfur) and application of a soil fumigant on reniform nematode and cotton yield.

	Mean Nematode count (at planting)[x]		Mean Nematode count (mid season)		Yield (lint/acre)	
Treatments	Telone	Untreated	Telone	Untreated	Telone	Untreated
$P_H S_H$	14593 a	25447 a	7797 c	27050 ab	808.99 ab	628.12 cd
$P_H S_L$	24247 a	25687 a	8263 c	20970 abc	879.73 a	787.50 abcd
$P_L S_H$	21527 a	40380 a	18437 abc	33050 a	731.09 abcd	661.25 bcd
$P_L S_L$	16513 a	34887 a	7663 c	22890 abc	842.12 a	612.01 d
Control	18640 a	31640 a	14620 bc	31280 a	752.14 abcd	687.67 bcd

Average of 5 replications. Means within factors followed by the same letter are not significantly different according to LSD 10%.

[x] Nematode populations are per 500 cm^3 of soil.

Results and Discussion

Reniform nematode populations were high in the field at the time of planting. Table 1 presents the development of reniform nematode at planting and mid-season (Figure 1) and cotton yield of all the treatments. The application of telone did result in significantly lower populations in some of the treatments at mid-season. However, no impact on reniform nematode populations was observed with the different rates of P and S. The application of Telone had a significant effect on yield in the P_HS_H and P_LS_L regimes and a numerical increase in the P_HS_L and control. There was a trend toward response to the addition of P at either the low or high rates. However, the addition of the higher rate of S appeared to reduce yields in most of the treatments. Our results show a trend toward an increased yield response particularly with the application of the soil fumigant when low or higher rates of P are applied. The test will be repeated next year in the same location.

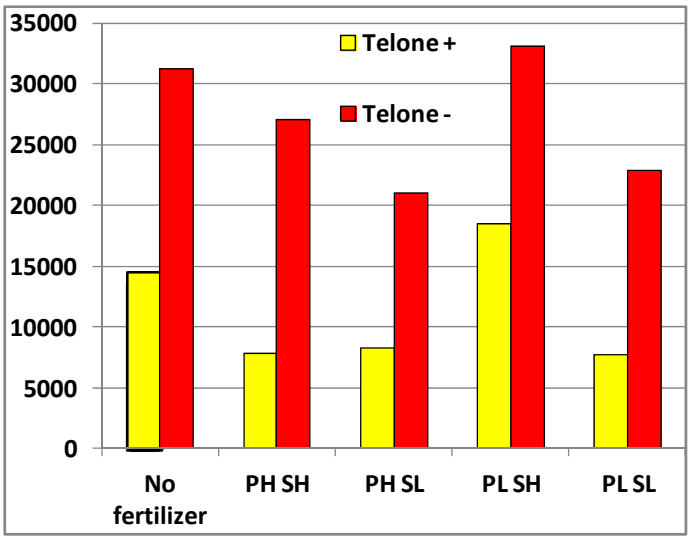

Figure 1. Mid-season levels of reniform nematode across treatments.

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