EFFECT OF DIFFERENT SOILS ON THE REPRODUCTION OF RENIFORM NEMATODE

Qian Zhao, Robert T. Robbins, and James McD. Stewart[1]

RESEARCH PROBLEM

The reniform nematode, *Rotylenchulus reniformis,* has become a serious threat to cotton and soybean production in Arkansas and the mid-South. Yield losses caused by this nematode in the field range as high as 50%. In the absence of resistant cultivars, nematicides, and crop rotation are the available methods for controlling this nematode (Robbins *et al.*, 1994). Limited information is available on the influence of soil type on reproduction of the nematode.

BACKGROUND INFORMATION

Rotation is an environmentally friendly method that can decrease inputs in energy and agrochemicals and does not generate harmful residues; however, when reniform nematodes are a factor, some soils may be preferred over others to reduce nematode damage for different crops. Reniform nematode reproduces very quickly on castor growing on sandy loam and loam, moderately on clay loam, and very poorly on sandy soil (Sivarkumar and Seshadri, 1972). No comparison in nematode reproduction has been made between cotton and soybean crops grown in the same types of soil. The objective of this study was to determine nematode reproduction on soybean and cotton grown on representative soils of Arkansas.

RESEARCH DISCRIPTION

Both susceptible cotton ('Suregrow125') and soybean ('Braxton') cultivars were grown in six types of soil: Jeanerette silt loam, Dundee silt loam, Convert fine sandy soil, Steele loamy sand, Sharkey clay, and Sharkey silt/clay. Sufficient seeds of cotton and soybean were germinated in vermiculate to allow for transplanting of individual seedlings to each of ten pots 10 cm in diameter of cotton and soybean for each of the six soils. Each pot was inoculated with 2,000-2,500 vermiform of reniform nematodes 1 d after transplanting. At 8 wk, the number of reniform eggs, juveniles, females, and males were determined by sodium hypocholoride extraction of the roots and sieving and sucrose certrifugation extraction from the soil. The total number per pot was determined by adding the root and soil numbers.

---

[1] Graduate Student, Crop, Soil, and Environmental Sciences Department, University of Arkansas, Fayetteville; Professor, Department of Plant Pathology, University of Arkansas, Fayetteville; and Professor, Crop, Soil, and Environmental Sciences Department, University of Arkansas, Fayetteville.

RESULT DISCUSSION

Significant differences ($P \geq 0.05$) were detected with analysis of variance between nematode number among soil types and the two crops. Also, there was significant ($P \geq 0.05$) interaction between soil and crop (Table 1). The average number of nematodes on cotton and soybean was different on six types of soil (Table 2). In Jeanerette silt loam and Steele loamy sand, the number of nematodes on soybean was significantly higher ($P \geq 0.05$) than the number on cotton. This suggests that cotton may be a better management choice than soybean in these two soils, if they are infested with reniform nematode. In Convert fine sandy loam, the number of nematodes on both cotton and soybean was very high. In Dundee silt loam, Sharkey clay, and Sharkey silt/clay the average number of nematodes on cotton and soybean were not significantly different. Reproduction of reniform nematode differed among soil types; however, soil texture appeared not to be a factor in the number of nematodes. The same crop grown in different types of soil supported different levels of nematode reproduction.

PRACTICAL APPLICATION

Both soybean and cotton are important cash crops, and both are hosts for reniform nematode. Although both cotton and soybean must be rotated with nonhost crops when the soil is infested with reniform nematode, the results show that some soils are less favorable for nematode reproduction. Particularly Dundee silt loam resulted in lower nematode reproduction.

LITERATURE CITED

Robbins, R.T., L. Rakes, and C.R. Elkins. 1994. Reniform nematode reproduction and soybean yield of four soybean cultivars in Arkansas. J. Nematology 26:656-658.

Sivakumar, C.V. and A.R. Seshadri. 1972. Effect of soil texture on the reniform nematode, *Rotylenchulus reniformis*. India J. Nematology 2:93-86.

Table 1. Analysis of variance for reniform nematode number in different soil types and crops.

Source	DF	Mean Square	F value	Pr>F
Treatment	11	11033452.6	4.10	<0.0001
Soil	5	13010076.3	4.84	0.0005
Crop	1	13928843.0	5.18	0.0250
Soil x Crop	5	8756952.3	3.26	0.0091
Error	100	2689771.8		

Table 2. The average number of nematodes on cotton and soybean grown in six soil types.

Soil	Cotton	Soybean
Convert fine sand	6262 ab[z]	5351 abcd
Sharkey clay	4833 bcde	4485 cdef
Sharkey silt/clay	3897 def	4111 ef
Jeanerette silt loam	3837 def	6395 a
Steele loamy sand	3830 ef	5674 abc
Dundee silt loam	2990 f	3684 ef
Mean	4275	4950

[z] Values followed by different letters are significantly different at P<0.5.