MANAGEMENT OF RENIFORM NEMATODE IN COTTON USING VARIOUS ROTATION SCHEMES

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Abstract

Results from a four -year crop rotation and nematicide study indicate that both rotation with non-host crops and Temik® 15G (aldicarb) can significantly increase cotton yields in fields infested with high populations of reniform nematodes. According to the 1997 test results, three successive years of corn followed by cotton produced the highest cotton yields. Moreover, other crop rotation systems as well as nematicide produced significantly higher yields than continuous cotton with no nematicide.

Reniform nematode populations dropped to non-damaging levels after one year of a non-host crop, but rebounded to damaging levels after just one growing season of cotton. This indicates corrective action must be taken to control reniform nematodes the next growing season following a cotton crop in infested fields.

Introduction

This past year (1997) marks the end of a four-year study to determine if rotation with various non-host crops could effectively control reniform nematodes in heavily infested fields. Nematicides have been used successfully to manage reniform nematode infestations in cotton fields. However, they are not effective when not activated properly at or just after planting or may not provide adequate protection in cotton fields with extremely high population levels. Rotation with non-host crops, on the other hand, would provide a viable alternative and provide additional benefits to future cotton crops such as improved soil texture, more effective weed control, and improved soil nutrition.

Methods and Materials

The cotton/non-host rotation study is located in an Escambia County field near Huxford, AL. The field with a sandy, loam soil (pH 6.1, 2.2% organic matter) has one of the higher reniform nematode populations in the state. Twelve rotation or nematicide systems are being evaluated in the study (Table 1). Cotton (*c.v. DES 119*), corn (*c.v. DeKalb 689*), grain sorghum (*c.v. DeKalb DK64BR),* and soybean (*c.v. Centennial*) were used in the test. Plots are eight rows (38"spacing), 50 feet long. Yield, soil analysis, and nematode data were collected from the two center rows. Treatments were arranged in a randomized, complete block design. Each treatment was replicated eight times. Temik® 15G (aldicarb) was applied in the seed furrow (7 lb./a) at planting to the nematicide treated plots. All other plots received an insecticide, Di-syston® 15G (disulfoton), at planting for early season insect control. All other weed and insect control practices and cultural practices were implemented according to Auburn University recommendations.

Soil samples were taken for nematode analyses from the center two row of each plot just prior to planting and approximately three weeks prior to harvest. Yield data were taken from the two center rows of each cotton plot using a one-row cotton picker. In 1997, eight of the twelve treatments were planted with cotton. Plots were evaluated visually on a routine basis throughout the growing season.

Results and Discussion

A one-year rotation with a non-host crop was sufficient to reduce reniform nematode populations to a safe infestation level (see spring population levels, Table 2). The three-year rotation with non-host crops also reduced reniform populations, but not significantly more than the one-year non-host crop rotation systems. Reniform nematode populations required just one season of cotton to return to damaging population levels, regardless of treatment (see fall population levels, Table 2).

According to 1997 test results, cotton following three-years of corn produced significantly higher yields than nematicide treated continuous cotton or the other non-host cropping systems by a significant margin (Table 3). Cotton following one year of corn, grain sorghum, or soybean produced substantially higher yields than did continuous cotton with no nematicide (Table 3). Continuous cotton treated with Temik® produced similar yields as crop rotation.

Summary

Crop rotation appears to be a viable and efficient alternative to nematicides for managing reniform nematodes in cotton according to this four-year study. The feasibility of rotation will depend upon the availability of profitable non-host crops. The use of nematicides in cotton following a one year rotation with a non-host crop or a two to three year rotation minimum with non-host crops would be advisable in cotton fields that tend to support extremely, heavy infestations of reniform nematodes. According to these results, reniform nematode populations rebound to damaging levels after one season of cotton. Therefore, corrective action will be required for reniform nematodes if cotton is planted in these fields the following spring.

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References

Akridge, J.R., W.S. Gazaway, and R. Rodriguez-Kabana. Crop Rotation—Its impact on cotton production in reniform infested fields. In 1997 Proc. Beltwide Cotton Conference. 6-10 Jan. 1997. New Orleans, LA (ED) P. Dugger and D. Richter, National Cotton Council, Memphis, TN.

Gazaway, W.S., C. Mitchell, C. Burmester, and K. Edmisten. Distribution of nematodes on cotton in Alabama. In 1992 Proc. Beltwide Cotton Conference 10-14 Jan., 1993. New Orleans, LA. (ED) D. Herber and D. Richter, National Cotton Council, Memphis, TN.

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Table 1. Cropping Schemes 1994 through 1997.

Rotation	1994	1995	1996	1997
1	Corn	Corn	Cotton	Corn
2	Corn	Corn	Corn	Cotton
3	Corn	Cotton	Corn	Cotton
4	GS	GS	Cotton	GS
5	GS	GS	GS	Cotton
6	GS	Cotton	GS	Cotton
7	Bahia	Bahia	Cotton	Bahia
8	Bahia	Bahia	Bahia	Cotton
9	Soybean	Soybean	Soybean	Cotton
10	Soybean	Cotton	Soybean	Cotton
11	Cotton	Cotton	Cotton	Cotton
12	Cotton*	Cotton*	Cotton*	Cotton*

* =Temik® 7 lb./acre in-furrow.
GS= grain sorghum

Table 2. One season of cotton growth on reniform nematode populations.

Rotation Number	Previous Crop(s)	Reniform/100 cc soil	
		Spring	Fall
2	Corn- 3 years	10	2397
3	Corn- 1 year	22	3414
5	GS- 3 years	10	2439
6	GS- 1 year	15	3565
8	Bahia- 3 years	14	2384
10	Soybean- 1 year	30	2568
11	Continuous Cotton	174	2440
12	Continuous Cotton + Temik®	197	2133
LSD (P=0.05)		338.8	948.0

Table 3. Effect of crop rotation on cotton production in 1997.

Rotation Number	Previous Crop(s)	Cotton Pounds per Acre		
		Seed	Lint	Increase
2	Corn- 3 years	2166	867	268
3	Corn- 1 year	1791	716	117
5	GS- 3 years	1902	761	162
6	GS- 1 year	1733	693	194
8	Bahia- 3 years	1916	767	168
10	Soybean- 1 year	1898	759	160
11	Cotton	1497	599	-----
12	Cotton + Temik®	1720	688	189
LSD (P=0.05)		301.1	120	76