

MANAGING RENIFORM NEMATODES IN COTTON WITH CROP ROTATION IN 2006.

William S. Gazaway, Kathy Lawrence, Dept of Entomology and Plant Pathology and J.R. Akridge, Superintendent, Brewton Ag Research Unit, Alabama Agricultural Experiment Station, Brewton, AL.

Abstract

This year only yield data for the one year non-host crop/cotton rotation is available for this multi-year rotation study. Peanut/cotton and corn/cotton rotations produced significantly higher yields than continuous cotton 2006. However, the soybean/cotton rotation did not increase cotton yield. The nematicide, Telone II, applied to cotton in the peanut/cotton and soybean/cotton rotations produced an additional increase in yield. Telone applied to continuous cotton appeared to be about as effective in increasing cotton yield as the corn/cotton rotation. Reniform populations rebounded to damaging levels after just one year back in cotton, re-confirming that cotton should not be grown successive seasons in a rotation system. Two year rotation data will be available in 2007.

Introduction

Cotton farmers have routinely used nematicides to control reniform nematodes. Although effective in the short term, nematicides are expensive and do not always produce the desired economical returns. Since there are no reniform nematode resistant commercial cotton varieties, rotation with non-host crops provide the only reliable alternative for their management. Two previous rotation studies indicate that one-year and/or two-year corn or peanut rotations can effectively reduce reniform nematodes to a manageable population. Moreover, rotation with these non-host crops can have additional benefits by improving weed control, soil fertility, and improving soil texture. However, we need to determine if the use of nematicides in cotton following a one-year or two-year rotation with peanut or corn will improve cotton yields.

Our objective is to determine if summer crop rotation can effectively improve cotton production in reniform nematode infested fields and if the use of a nematicide in cotton following crop rotation is profitable.

Methods and Materials

This is the second year of a multi year project that was initiated in 2005. The project was placed near Huxford, AL. in a cotton field, heavily infested with reniform nematodes. The soil in this field is a sandy, loam (56%-sand, 29%- silt, and 15%-clay). The rotation/nematicide treatments are summarized in Table 1. The test is designed so that cotton following 1- and 2-year or 3-year rotations with non-host summer crops can be harvested and compared directly every year after the third year of cropping (Table 1). The test is a split-plot design with nematicides as the primary factor and summer non-host crops as the secondary factor. All non-host crop plots and continuous cotton plots are 16 rows wide. These plots are split into 8-row subplots when cotton follows cotton, peanut, soybean or corn. One of the two cotton subplots is randomly selected and treated with a nematicide. The other cotton subplot does not receive a nematicide. Continuous cotton plots are treated likewise with one subplot (8 rows) receiving a nematicide and the other remaining untreated. Plots are 40 feet long. Treatments are replicated four times. The entire field was planted last winter (2005) with a rye cover crop that was cut in the spring prior to planting the summer crops. The field was planted on raised beds spaced at 36 inch intervals. The nematicide, Telone II (3 gal/a) was injected 18 in deep into raised seedbeds to designated nematicide plots on April 13. Cotton seed (DPL-449BG/RR), treated with Cruiser^R for early season insect control, was planted on May 17, 2006. Corn (Pioneer 33M53RR), peanut (AP3), and soybean (DP5634RR) were planted in the non-host plots on the same day as cotton. Soil samples for nematode analyses were collected from the 2 center rows of each 4 row subplot just prior to fumigation and on Nov. 13, 2006. Corn (Pioneer 33M53RR), peanut (AP3), and soybean (DP5634RR) were planted in the non-host plots on the same day as cotton. Cotton was harvested from the two center rows of each cotton 4-row subplot on October 2, 2006. Insect control, weed control and all other agronomic practices were followed according to Auburn University recommendations.

Results and Discussion

Telone II improved cotton yield overall (Table 2). However, Telone was most effective when applied to cotton following cotton (Table 4). Telone when applied to cotton following soybean and peanut produced a significant increase as well. Telone did not increase yield significantly when applied to cotton following corn, however (Table 4). Telone did appear to be equally effective in increasing cotton yield as a one year rotation with corn. Cotton treated with Telone following peanut in 2005 produced the highest cotton yield in 2006.

Looking at the impact of non-host crops alone, a one year peanut or corn rotation produced significantly larger cotton yields than a one year rotation with soybean or than continuous cotton (Table 3). The yield increase is reflected in smaller fall populations of reniform nematode following one season of peanut and corn (Table 5). It is also noteworthy to point out that the smallest reniform populations occurred in the plots following two years of peanut and corn. Whether the smaller reniform populations in the two year peanut and corn rotation systems will reflect an even greater increase in cotton yield will not be known until next year (2007) when cotton yield data will be taken from both the one year and the two year rotation systems.

This study further confirms previous rotation studies that reniform nematode populations rebound to damaging levels after just one season of cotton, regardless of the crop grown the previous year (see 7-10, Table 5). It also re-confirms that cotton should not be grown in successive years in rotation systems in this area of the state.

Table 1. Rotation scheme for non-host crops.

TRT #	TREATMENT	Treatment	2005	2006	2007	2008	2009	2010
1	Corn 1 Year	Nematicide	cotton	corn	cotton	corn	cotton	corn
2	Corn 1 Year	No Nematicide	cotton	corn	cotton	corn	cotton	corn
3	Peanut 1 Year	Nematicide	cotton	peanut	cotton	peanut	cotton	peanut
4	Peanut 1 Year	No Nematicide	cotton	peanut	cotton	peanut	cotton	peanut
5	Soybean 1 Year	Nematicide	cotton	soybean	cotton	soybean	cotton	soybean
6	Soybean 1 Year	No Nematicide	cotton	soybean	cotton	soybean	cotton	soybean
7	Corn 2 Year	Nematicide	corn	corn	cotton	corn	corn	cotton
8	Corn 2 Year	No Nematicide	corn	corn	cotton	corn	corn	cotton
9	Peanut 2 Year	Nematicide	peanut	peanut	cotton	peanut	peanut	cotton
10	Peanut 2 Year	No Nematicide	peanut	peanut	cotton	peanut	peanut	cotton
11	Soybean 2 Year	Nematicide	soybean	soybean	cotton	soybean	soybean	cotton
12	Soybean 2 Year	No Nematicide	soybean	soybean	cotton	soybean	soybean	cotton
13	Continuous Cotton	Nematicide	cotton	cotton	cotton	cotton	cotton	cotton
14	Continuous Cotton	No Nematicide	cotton	cotton	cotton	cotton	cotton	cotton
15	Corn 1 Year	Nematicide	corn	cotton	corn	cotton	corn	cotton
16	Corn 1 Year	No Nematicide	corn	cotton	corn	cotton	corn	cotton
17	Peanut 1 Year	Nematicide	peanut	cotton	peanut	cotton	peanut	cotton
18	Peanut 1 Year	No Nematicide	peanut	cotton	peanut	cotton	peanut	cotton
19	Soybean 1 Year	Nematicide	soybean	cotton	soybean	cotton	soybean	cotton
20	Soybean 1 Year	No Nematicide	soybean	cotton	soybean	cotton	soybean	cotton
21	Corn 2 Year	Nematicide	cotton	corn	corn	cotton	corn	corn
22	Corn 2 Year	No Nematicide	cotton	corn	corn	cotton	corn	corn
23	Peanut 2 Year	Nematicide	cotton	peanut	peanut	cotton	peanut	peanut
24	Peanut 2 Year	No Nematicide	cotton	peanut	peanut	cotton	peanut	peanut
25	Soybean 2 Year	Nematicide	cotton	soybean	soybean	cotton	soybean	soybean
26	Soybean 2 Year	No Nematicide	cotton	soybean	soybean	cotton	soybean	soybean
27	Corn 3 Year	Nematicide	cotton	corn	corn	corn	cotton	corn
28	Corn 3 Year	No Nematicide	cotton	corn	corn	corn	cotton	corn
29	Peanut 3 Year	Nematicide	cotton	peanut	peanut	peanut	cotton	peanut
30	Peanut 3 Year	No Nematicide	cotton	peanut	peanut	peanut	cotton	peanut
31	Soybean 3 Year	Nematicide	cotton	soybean	soybean	soybean	cotton	soybean
32	Soybean 3 Year	No Nematicide	cotton	soybean	soybean	soybean	cotton	soybean

Only designated cotton plots received a nematicide. Each treatment 40 feet long x 4 rows wide.

Table 2. Impact of nematicide on cotton yield in 2006.

Treatment	Reniform/ 100CC Soil		Seed Cotton (LB/Acre)
	13 Apr 2006	13 Nov 2006	
Telone II	735	1090	1739 LB
Untreated	724	1523	1540 LB
LSD (.05)	353	803	112 LB
Prob (F)	0.858	.009	.0013

Table 3. Effect of non-host crops on cotton yield in 2006.

	2005 Crop	2006 Crop	Seed Cotton (LB/Acre)
1	Peanut	Cotton	1753 LB
2	Corn	Cotton	1734 LB
3	Soybean	Cotton	1522 LB
4	Cotton	Cotton	1550 LB
	LSD (.05)		158 LB
	Prob (F)		.0086

Table 4. Impact of crop rotation and nematicide on cotton yield in 2006.

	2005 Crop	2006 Crop	Seed Cotton (LB/Acre)
1	Peanut	Cotton + Nematicide	1838 a
2	Corn	Cotton + Nematicide	1766 ab
3	Soybean	Cotton + Nematicide	1619 abc
4	Cotton +Nematicide	Cotton + Nematicide	1733 ab
5	Cotton	Cotton	1366 c
6	Peanut	Cotton	1668 abc
7	Corn	Cotton	1702 ab
8	Soybean	Cotton	1424 bc

Table 5. Impact of summer non-host crop rotation and cotton on reniform nematode populations.

	2005 Crop	2006 Crop	Reniform Nematodes/100CC Soil	
			13 Apr 2006	13 Nov 2006
1	Cotton	Corn	1086	367
2	Cotton	Peanut	1081	383
3	Cotton	Soybean	528	315
4	Corn	Corn	444	74
5	Peanut	Peanut	318	95
6	Soybean	Soybean	830	234
7	Cotton	Cotton	1140	3450
8	Corn	Cotton	753	2592
9	Peanut	Cotton	257	2321
10	Soybean	Cotton	856	3235
	LSD (.05)		418	1004