IMPACT OF VARIOUS CROP ROTATIONS AND VARIOUS WINTER COVER CROPS ON RENIFORM NEMATODE IN COTTON

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Abstract

Cotton alternated with summer non-host crops every other year produced significantly more cotton than continuous cotton with or without a nematicide. Both corn and peanut reduced Reniform populations to safe levels by the end of the 1998 growing season and remained low through the next (1999) spring prior to planting cotton. Winter cover crops did not affect Reniform populations. However, cotton yields from the vetch plots were significantly greater than those from the fallow plots and substantially greater than those from the rye plots. These differences are believed to be due to additional nitrogen in the vetch plots and an induced nitrogen deficiency in the rye plots. Temik 15G^R (aldicarb) failed for the second consecutive year to increase cotton yields in this field.

Introduction

Previous research revealed that certain non-host crops reduced reniform nematode populations to manageable levels within one cropping year. However, reniform populations returned to potentially damaging levels after just one year back in cotton. Some cotton producers also believe that certain winter cover crops have a beneficial effect on cotton production in reniform infested fields. The purpose of this test is to reaffirm non-host crops' ability to reduce reniform populations and to determine if certain winter cover crops or fallow will reduce reniform populations to safe levels.

Methods and Materials

A field belonging to the Ward Bros. near Huxford, AL was selected for the test. This sandy, loam field has had a high infestation of Reniform nematode more than twelve years and, as a result, has suffered substantial cotton yield losses during that period. Corn (*DeKalb 683),* soybean *(Centennial),* peanut *(southern runner),* cotton (*DPL-458 BG/RR),* and cotton treated with a nematicide (Temik 15G^R) were planted May 25, 1998 in assigned plots. Cotton, which did not receive Temik 15G (aldicarb), was treated with the insecticide, Di-Syston 15G^R at 7 LB./A for early season insect control. Vetch (*Cahaba White),* rye *(Wren's Abruzzi),* and fallow followed the summer crop harvest in the fall of 1998.

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The Experimental design is a split plot, randomized design with five replications. Main plots are the winter cover crops and fallow. On May 11, 1999, cotton *(DPL-655 BG/RR)* or cotton treated with Temik 15G^R at 7 LB./A was planted in all plots. Plots were four (36 in.) rows and 25 ft. long. Soil samples were pulled for nematode analyses from the two inner rows of each plot on: (1) May 22, 1998; (2) July 7, 1998; (3) Aug. 19, 1998; (4) Nov. 10, 1998; (5) May 11, 1999; (6) July 22, 1999; and (7) Oct. 7, 1999. Cotton was harvested from the two inner rows of each plot Oct. 21, 1999. All other cultural practices, weed control and insect control were implemented according to Auburn University recommendations.

Results and Discussion

Cotton production varied significantly following rye, vetch and winter fallow (Table 1). Cotton following vetch produced significantly more cotton than following fallow or rye. Plots with winter rye produced the lowest cotton yields in 1999. Considering that rye is not a host to Reniform nematode, these results were surprising. The low cotton yield following rye is believed to be attributed to a nitrogen deficiency, induced by a "green manure" effect. The rye was fairly large when turned under in the late spring. Cotton planted in the rye plots showed signs of nitrogen deficiency throughout the 1999 season. The better than expected cotton yields in the plots following vetch could be attributed to the additional nitrogen produced by this legume. The winter cover crops or fallow did not appear to impact Reniform nematode reproduction since there were no significant differences in nematode populations in the spring of 1999.

Rotation with non-host crops in 1998 did significantly affect both Reniform nematode populations and subsequent cotton yields in 1999. The 1998 peanut and corn crops were the most effective in reducing nematode populations in the spring of 1999. Reniform populations were surprisingly high in plots following the 1998 soybean crop and high, as expected, in plots following cotton and cotton treated with a nematicide (Fig. 1). By the end of the 1999 cotton season (Oct. 1999), Reniform nematode populations had rebounded to lethal levels in all treatments. While non-host crops including corn, peanut, and soybean failed to keep Reniform populations at low levels throughout the growing season, they did significantly outproduce the continuous cotton nematicide treated and untreated plots (Table 2). In this particular field, Temik 15 G (aldicarb) at 7 LB./A failed to increase cotton yields in 1998 and in 1999 (Table 3).

Summary

Alternating non-host crops such as corn, peanut, and certain soybean cultivars(i.e., *Centennial)* every other year with cotton appears to increase cotton production in Reniform

nematode infested fields. Temik's failure to improve cotton yields in this heavily infested reniform nematode field for two consecutive years is surprising since this nematicide has performed effectively in other similar cotton fields. Its failure to get positive yield response could be due to: (1) unfavorable environmental conditions at the time of application; (2) its inability to effectively control high reniform populations; (3) Reniform populations are becoming resistant to the nematicide; or (4) soil microbes in this field could be breaking aldicarb down into compounds harmless to the nematode. More studies must be conducted to determine which might be the cause.

References

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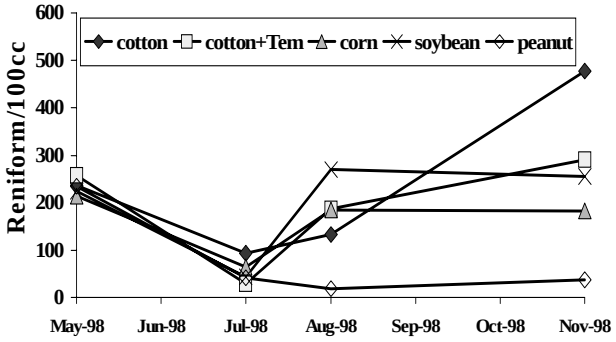

Figure 1. Effect of summer crops on reniform nematode populations in 1998.

Table 1. Effect of 1998/1999 Winter Cover Crops and Fallow on 1999 Cotton Production.

Winter Cover Crop	Seed Cotton (LB./Acre)
Vetch	2485[a]
Fallow	2615[b]
Rye	2085[c]
LSD (0.05)	233

Table 2. Impact of crop rotation with non-host 1998 summer crops on cotton production in 1999.

1998 Crop	Seed Cotton (LB./Acre)
Corn	2808[a]
Peanut	2739[a]
Soybean	2720[a]
Cotton	2175[b]
Cotton + Temik	2139[b]
LSD (0.05)	21

Table 3. Cotton production response to Temik 15G in continuous cotton.

Treatment	1998 (lb./a)	1999 (lb./a)	Avg.(lb./a)
Temik 15G	1995[a]	2139[a]	2067
DiSyston 15G	1786[a]	2175[a]	1981
LSD (0.05)	360	218	