

ECONOMIC ANALYSIS OF SOUTHERN ROOT KNOT NEMATODE CONTROLS

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Introduction

There are 4 nematode species commonly found in Georgia. These are southern root-knot nematode, reniform nematode, columbia lance nematode, and sting nematode. It is estimated that at least one species of nematode is found in 60 to 70 percent of Georgia's cotton acreage (Kemerait, 2005). The most prevalent species in cotton is the southern root-knot nematode. High populations are found in 23 of the state's 78 cotton-producing counties. Medium populations are found in 28 counties.

The most severe problems are in fields not properly rotated to non-host crops. To control nematodes and reduce yield losses, cotton producers have 4 choices– rotation with a non-host crop, use of nematicides, use of seed treatments or seed treatments plus nematicides, or planting of a nematode-resistant variety if available. Lack of profitable rotation crops, however, has been a constraint in managing the nematode problem. A corn-cotton rotation can be a profitable alternative to continuous cotton if corn yield is high but soybeans are not a profitable rotation (Davis, et. al., 2003 and Shurley, et. al., 2003). With the exception of peanuts, few crops offer a solution for many Georgia producers (and peanuts have only become feasible for some producers since quota was eliminated and loan rates increased under the 2002 farm bill).

Methodology

The objective of this study was to determine the benefit of alternative nematicide treatments compared to no treatment on cotton yield and net returns. Tests were conducted at three locations in 2003 and three locations in 2004. These tests were large, on-farm randomized replicated plots in fields that had been planted annually to cotton and had a history of severe nematode losses. Each plot was replicated 4 times.

In 2003, variety DP 555BR was planted at 2 locations (Colquitt County, Craig Perryman farm and Mitchell County, Tom Winhausen farm) and DP 458BR at the third location (Mitchell County, Bryant Collins farm). In 2004, DP 555BR was planted at all 3 locations (Colquitt County, Craig Perryman farm; Coffee County, Mike Nugent farm; and Mitchell County, Tom Winhausen farm).

In 2003, 3 treatments at each location consisted of 3.5 lbs/ac of Temik in-furrow at planting (AP), split applications of Temik-- 5 lbs of Temik AP plus 5 lbs of Temik applied

side-dress (SD), and 3 gallons/acre of Telone applied at rip/bed plus 3.5 lbs/ac of Temik AP. In Georgia, 3.5 lbs/ac of Temik AP is considered a standard regime for thrips control only and for purposes of these tests was considered the check or non-treated plot.

In 2004, 4 treatments at 3 locations consisted of 3.5 lbs/ac of Temik AP, 5 lbs/ac of Temik AP, split applications of Temik-- 5 lbs/ac of Temik AP plus 5 lbs/ac of Temik SD, and 3 gallons/ac of Telone at rip/bed plus 3.5 lbs/ac Temik AP.

Soil sample tests for nematode population counts were taken prior to application of any nematicide/prior to planting and prior to harvest at each location each year. At some locations, sampling was also done mid-summer.

All plots were machine picked and each replication's seedcotton weighed separately. Actual lint yield and fiber quality were not determined. Lint yield was assumed to be 42% of seedcotton weight for DP 555BR and 38% for DP 458BR. All lint was assumed to be Color 41-Leaf 4, Staple 34, and base quality for strength, uniformity, and micronaire.

Net return was calculated as yield per acre times price per pound minus treatment costs. Treatment costs were nematicide plus application costs. Application costs include tractor fuel and repairs, equipment repairs, and labor. Application costs were not considered if the nematicide was applied simultaneously with another input without a separate trip over the field (Temik AP and Telone, for example). If investment in additional machinery or equipment would be required to apply the nematicide, application cost also included annual depreciation, interest, and insurance (Telone injection and Temik SD, for example).

Cotton was valued at the November average Georgia spot cash price for 41-4/34 (USDA-AMS, 2003 and 2004) plus the November average Loan Deficiency Payment (LDP) if applicable (USDA-FSA, 2004).

Results

Yield

In 2004, the 5-lb rate of Temik AP did not result in higher yields compared to the check in 2 of the 3 locations. Numerically, yields were highest with the Telone+Temik treatment at 2 of 3 locations. Statistically, yields were highest with the split 5+5 application of Temik or the Telone+Temik treatment at each location (Table 1). At 3 locations in 2003, yields were numerically higher with each nematicide treatment compared to the 3.5 lb Temik check. The Telone+Temik treatment produced the highest yields at each location but was statistically different from the split 5+5 Temik treatment at only 1 location.

Costs

Treatment costs in 2004 ranged from \$10.85 per acre for the 3.5 lbs Temik check to

\$48.41 per acre for the Telone+Temik treatment (Table 2). Application costs were minor compared to nematicide cost. Treatment costs in 2003 were \$10.68 per acre for the 3.5 lbs Temik check, \$35.89 per acre for the split 5+5 Temik treatment, and \$45.10 per acre for the Telone+Temik treatment.

Net Returns

For 2004, net returns were highest for the Telone+Temik treatment at 2 of 3 locations (Figure 1). In Coffee County, net return for the Telone+Temik treatment was \$652.06 per acre-- \$53.89 per acre higher than the 5+5 Temik treatment and \$59.15 higher than the 3.5 lbs Temik check. In Colquitt County, net return was highest for the 5+5 Temik treatment at \$480.21 per acre. This was \$12.83 higher than the Telone+Temik treatment and \$80.22 per acre higher than the 3.5 lbs Temik check. In Mitchell County, the Telone+Temik treatment resulted in net return of \$500.18 per acre-- \$19.46 per acre higher than the check. The 5+5 Temik treatment was slightly less than the check.

In 2003, differences in net returns were generally less pronounced than in 2004 (Figure 2). In the Colquitt County test, highest net returns were from the Telone+Temik treatment. Net return was \$143.60 per acre higher than the 3.5 lbs Temik check and \$109.48 higher than the 5+5 split Temik treatment. At the Mitchell County-Winhausen location, the 5+5 split Temik application gave the highest net return but there was little difference between the treatments and check. At the Mitchell County-Collins location, the check produced the highest net return.

Conclusions

Use of Temik in a split application of 5 lbs/acre at planting plus 5 lbs/acre sidedressed or Telone (3 gallons/acre at rip/bed) plus Temik (3.5 lbs/ac at planting) resulted in statistically highest yield at all 3 locations in 2004. Temik split applications resulted in highest net return at 1 location and Telone plus Temik resulted in highest net return at 2 locations.

Compared to the check of 3.5 lbs/acre, increased rate of Temik in split applications resulted in numerically higher yields at all locations in 2003 but yields were not statistically different. Use of Telone at rip/bed plus 3.5 lbs of Temik at planting resulted in numerically highest yields at all 3 locations in 2003 but was not statistically different from the split application of Temik at 2 of 3 locations. Averaged across all 3 locations, Telone + Temik resulted in the highest net returns in 2003.

Compared to the 3.5 lbs/acre Temik "thrips rate", Temik in split application or Telone + Temik can improve yield and increase net returns.

References

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Kemerait, Bob. "Cotton Disease and Nematode Management", *2005 Georgia Cotton Production Guide*, Cooperative Extension Service, University of Georgia, January 2005.

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USDA, Agricultural Marketing Service. *Cotton Price Statistics*, November 2003 and 2004.

USDA, Farm Service Agency. Farm Service Agency Online, www.fsa.usda.gov, *New Releases*, weekly October-November, 2004.

Table 1. Yield Per Acre (Lbs of Lint) By Location, Year, and Treatment.

	2003			2004		
Treatment	Colquitt Co. Perryman Farm	Mitchell Co. Winhausen Farm	Mitchell Co. Collins Farm	Coffee Co. Nugent Farm	Colquitt Co. Perryman Farm	Mitchell Co Winhausen Farm
3.5 Lbs Temik AP	646 b	1,034 b	686 ab	1,015 b	690 c	826 bc
5.0 lbs Temik AP				999 b	749 bc	782 c
5.0 lbs Temik AP + 5.0 lbs Temik SD	732 b	1,084 ab	692 ab	1,067 ab	869 a	856 b
3 gal Telone PPI + 3.5 lbs Temik AP	902 a	1,090 a	699 a	1,177 a	867 a	922 a

Treatments followed by the same letter are not statistically different, probability 95%

Table 2. Treatment Costs Per Acre, By Year.

	2003			2004		
Treatment	Nematicides	Application	Total	Nematicides	Application	Total
3.5 Lbs Temik AP	\$10.68	N/A	\$10.68	\$10.85	N/A	\$10.85
5.0 lbs Temik AP				\$15.50	N/A	\$15.50
5.0 lbs Temik AP + 5.0 lbs Temik SD	\$30.50	\$5.39	\$35.89	\$31.00	\$5.83	\$36.83
3 gal Telone PPI + 3.5 lbs Temik AP	\$43.68	\$1.42	\$45.10	\$46.85	\$1.56	\$48.41

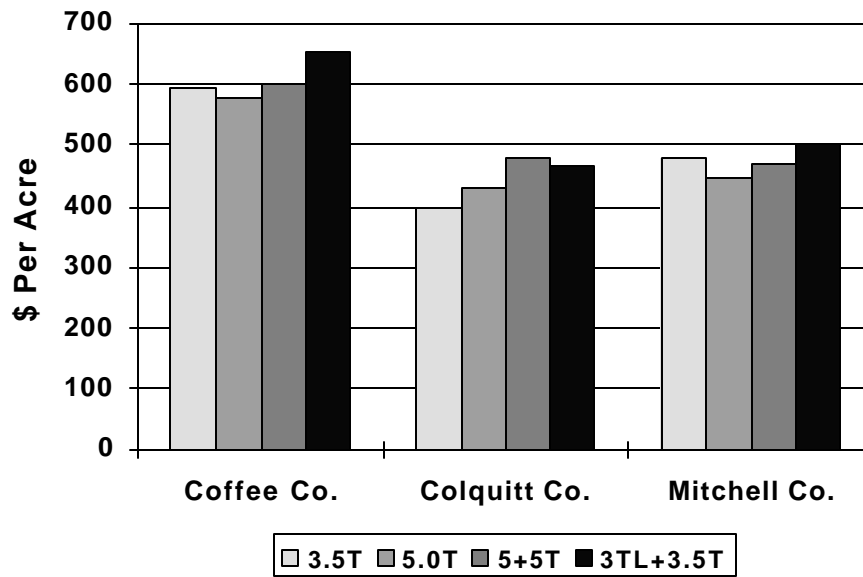


Figure 1. Net Return Per Acre, Treatment and Location, 2004

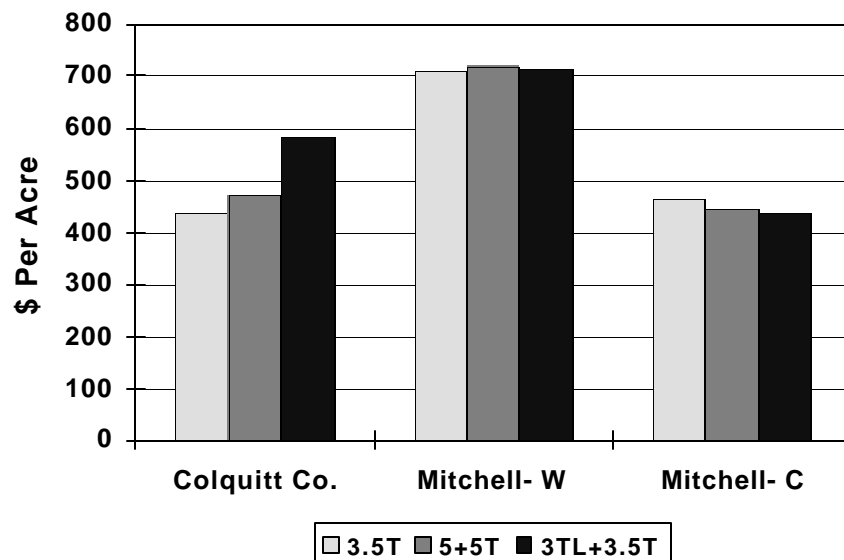


Figure 2. Net Return Per Acre, Treatment and Location, 2003