2010 Evaluation of Variety Tolerance and Chemical Management of Southern Root-knot Nematodes

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Introduction

The southern root-knot nematode, *Meloidogyne incognita*, is an economically important parasite of cotton in Gaines County, Texas. Higher populations of this pest tend to occur in sandier fields that have had consecutive cotton crops and very little rotation to a non-host, such as peanuts [1]. Management decisions are dependent upon the level of nematode infestation and the estimated nematode-induced yield loss[1]. Planting partially resistant or tolerant varieties is one of the most effective tools in managing this pest[2]. Temik 15G applied in-furrow at planting, followed by a foliar application of Vydate C-LV, has increased cotton lint yields[3]. Seed treatments are another option for the management of nematodes. Therefore, cotton production may be optimized by planting tolerant cotton varieties in conjunction with the use of seed treatments or Temik 15G.

Objectives

1. Evaluate the performance of Stoneville (ST) 5458B2RF and FiberMax (FM) 9180B2RF planted in conjunction with Aeris, Temik 15G at 5.5 lbs, Temik 15G at 7.5lbs, and Temik 15G at 5.5lbs plus a foliar application of Vydate C-LV at the third grown square stage.
2. Compare the net returns between varieties, chemicals and the interaction between varieties and chemicals.

Materials and Methods

The on-farm trial was conducted in Gaines County, TX in 2010 in a field with the 6 year crop history of cotton followed by peanuts, followed by four years of cotton. The field's soil was 93% sand, 3% silt, and 4% clay. The trial was planted on 4 May. Plots had 40-inch row spacing and were center-pivot irrigated. Plots were 8-rows wide by 400 ft. in length and were arranged in a randomized complete block design with 3 replications. See *Table 1* for a complete list of treatments. The number of adult and immature thrips were counted by visually inspecting 10 whole plants per plot on 3 June and 9 June. The number of galls caused by *M. incognita* were counted by visually inspecting 10 plant roots per plot on 9 June (*Figs. 1,2*). Soil samples were taken on 6 August to count *M. incognita* per 500cm^3 of soil. The trial was harvested on 11 October. All plots were weighed separately using a Lee weigh wagon. Burr cotton grab samples were taken from each plot. All grab samples were weighed and ginned using a sample gin with a lint cleaner, burr extractor and stick machine. Ginned lint was weighed and lint and seed turnouts were calculated. Lint and seed yields were determined by multiplying the respective turn-out by field plot weights. Lint samples were collected for fiber quality analysis. Fiber analysis was conducted by the Texas Tech University Fiber & Biopolymer Research Institute, and CCC lint loan values were determined for each plot. Total value was calculated by multiplying lint loan value by lint yield. Net value was determined by subtracting chemical cost from the total value. Statistical analysis of data was conducted using the GLM procedure in SAS 9.1 for Windows.

Table 1. List of treatments

ST 5458B2RF[1] Untreated	FM 9180B2F [1] Untreated
ST 5458B2RF[1] & Aeris seed treatment (insecticide & nematicide)	FM 9180B2F [1] & Aeris seed treatment (insecticide & nematicide)
ST 5458B2RF[1] & 5.5 lbs of Temik 15G[2]	FM 9180B2F [1] & 5.5 lbs of Temik 15G[2]
ST 5458B2RF[1] & 7.5 lbs of Temik 15G[2]	FM 9180B2F [1] & 7.5 lbs of Temik 15G[2]
ST 5458B2RF[1] & 5.5 lbs of Temik 15G[2] & 17 oz of Vydate C-LV[3]	FM 9180B2F [1] & 5.5 lbs of Temik 15G[2] & 17 oz of Vydate C-LV[3]

[1] Trilex Advance (fungicide) seed treatment was applied to all seed

[2] Temik 15 G was applied in-furrow at planting; Temik boxes were calibrate prior to planting the trial

[3] Vydate C-LV was applied in a band at a rate of 17 oz per acre on 4 June

Results

Figure 1. Galling associated with FM 9180B2F

Table 2. Average number of root galls caused by *Meloidogyne incognita* on 9 June and average number of *M. incognita* per 500 cm^3 soil on 6 August by variety

Variety	Average No. of Galls	Average No. of root-knot nematodes
FM 9180B2F	32.4	3083 a
ST 5458B2RF	27.4	1176 b
	P = 0.146	*P* = 0.0081

Figure 2. Galling associated with ST 5458B2RF

Table 3. Average number of root galls caused by *Meloidogyne incognita* on 9 June, average number of *M. incognita* per 500 cm^3 soil on 6 August by chemical, Average number of Thrips by date and chemical

Chemical	Average No. of Galls	Average No. of root-knot nematodes	Average No. of Thrips 3 June (4 True Leaves)	Average No. of Thrips 9 June (5-6 True Leaves)
Untreated	35.9 ab	2527	0.30 ab	0.07 ab
Aeris	40.2 a	2444	0.07 b	0.00 b
5.5 lbs of Temik 15G	21.7 c	2610	0.64 a	0.12 a
5.5 lbs of Temik 15G + 17 oz Vydate	26.7 bc	1337	0.60 a	0.13 a
7.5 lbs of Temik 15G	24.8 c	1730	0.37 ab	0.07 ab
	P = 0.0097	*P* = 0.6264	*P* = 0.0538	*P* = 0.6053

Table 4. Harvest results by variety

Variety	Lint turnout %	Seed turnout %	Loan Value	Lint yield lbs/acre	Total Value (Loan Value X Lint Yield)	Net value (Total Value -Chemical Cost)
					----------$/acre----------	
FM 9180B2F	32.6	52.0	0.5638	648	365	270
ST 5458B2RF	34.2	48.6	0.5479	1069	585	489
	P = 0.01	*P = 0.0001*	*P = 0.0031*	*P = 0.0001*	*P = 0.0001*	*P = 0.0001*

Table 5. Harvest results by chemical

Chemical	Lint yield	Seed yield	Total Value (Loan Value X Lint Yield)	Net value (Total Value -Chemical Cost)
	----------lbs/acre----------		----------$/acre----------	
Untreated	783 b	1162 b	434 b	355
Aeris	824 ab	1226 ab	457 ab	369
5.5 lbs of Temik 15G	882 a	1311 a	489 a	390
5.5 lbs of Temik 15G + 17 oz Vydate	904 a	1344 a	501 a	393
7.5 lbs of Temik 15G	898 a	1335 a	497 a	392
	P = 0.0417	*P* = 0.0554	*P* = 0.0445	*P* = 0.408

Discussion

Root galls caused by the southern root-knot nematode, *M. incognita*, were decreased with the use of 5.5 lbs and 7.5 lbs per acre of Temik 15G, but not by Aeris (*Table 3*) or variety (*Table 2*). Root-knot nematode population density was affected by cultivar (*Table 2*), but was not affected by chemical treatments (*Table 3*). Thrips was not a limiting factor since treatments never reached the thrips threshold of 1 per true leaf (*Table 3*). Yield was primarily affected by cultivar, with ST5458B2RF greatly out yielding FM 9180B2F (*Table 4*). Yield was affected to a smaller degree by chemical treatments that included Temik 15G (*Table 5*). Net value was $219/acre higher when ST 5458B2RF was planted rather than FM 9180B2F (*Table 4*), and was not affected by chemical treatments (*Table 5*). There was no significant interaction between variety and chemical, indicating that the response was consistent with both varieties.

Summary

Meloidogyne incognita is one factor that can significantly impact variety performance (*Fig. 3*). Based on this trial, planting tolerant varieties is the most economical and effective method in the management of nematodes. Chemical management also showed some increased control of nematodes. However, there was no additional value over the untreated plots when chemical cost were subtracted from the lint value per acre.

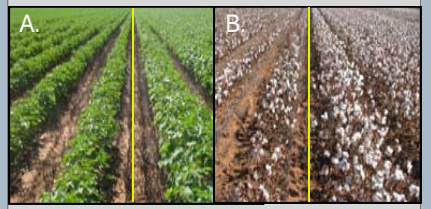

Figure 3. Appearance of FM 9180B2F (left) and ST 5458B2RF (right) plots in July (A) and September (B)

References Cited

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(3) Siders, K. T. 2008. *Using Nematicides for Southern Root-Knot Nematode Management in the High Plains of Texas.* Proc. Beltwide Cotton Conf., National Cotton Council, Memphis, TN. 129

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