2009 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 on the level of nematode infestation and the estimated nematode-induced yield loss[1]. Planting partially resistant 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 partially resistant cotton varieties in conjunction with the use of seed treatments or Temik 15G.

Objectives

1. Evaluate the performance of ST 5458B2F and FM 9063B2F planted in conjunction with Aeris, Avicta Complete Cotton, Temik 15G at 3.5 lbs, Temik 15G at 5lbs, or Temik 15G at 3.5lbs 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 2009 in a field with a 5 year crop history of cotton, peanuts, cotton, cotton, cotton. The field's soil was 93% sand, 3% silt, and 4% clay. The trial was planted on 7 May. Plots had 40-inch row spacing and were center-pivot irrigated. Plots were 8-rows wide and 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. Production practices were uniform for all treatments. The number of adult and immature thrips were counted by visually inspecting 10 whole plants per plot on 20 May, 27 May, 3 June, and 10 June. The number of galls caused by *M. incognita* were counted by visually inspecting 10 plant roots per plot on 10 June. Soil samples were taken on 16 July to count *M. incognita* second-stage juveniles (J2) and eggs per 500cm^3 soil. Plant height, number of nodes, and Nodes Above White Flower (NAWF) were counted on ten plants per plot on 14 August. The trial was harvested on 19 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 then 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. Lint value was calculated by multiplying lint loan value by lint yield. Net value was determined by adding lint and seed values and subtracting ginning cost. Statistical analysis of data was conducted using the GLM procedure in SAS 9.1 for Windows.

Table 1. Treatments

ST 5458B2F[1] Untreated	FM 9063B2F[1] Untreated
ST 5458B2F[1] & Aeris seed treatment (insecticide & nematicide)	FM 9063B2F[1] & Aeris seed treatment (insecticide & nematicide)
ST 5458B2F & Avicta seed treatment (insecticide, nematicide, & fungicide)	FM 9063B2F & Avicta seed treatment (insecticide, nematicide, & fungicide)
ST 5458B2F[1] & 3.5 lbs of Temik 15G[2]	FM 9063B2F[1] & 3.5 lbs of Temik 15G[2]
ST 5458B2F[1] & 5 lbs of Temik 15G[2]	FM 9063B2F[1] & 5 lbs of Temik 15G[2]
ST 5458B2F[1] & 3.5 lbs of Temik 15G[2] & 17 oz of Vydate C-LV[3]	FM 9063B2F[1] & 3.5 lbs of Temik 15G[2] & 17 oz of Vydate C-LV[3]

[1] Trilex Advance (fungicide) seed treatment was applied to all seed (with the exception of the Avicta seed treatment plots)

[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 22 June

Left *Figure 1.* ST 5458B2F plot and FM 9063B2F plot

Right *Figure 2.* Cotton root on the left is from a ST 5458 plot; Cotton root on the right is from a FM 9063 plot

Figure 3. ST 5458B2F plot and FM 9063B2F plot

Results

Table 2. Number of root galls caused by *Meloidogyne incognita* by variety

Variety	Average No. of Galls
FM 9063B2F	30.5 a
ST 5458B2F	24.8 b
P = 0.054	

Table 3. Number of root galls caused by *Meloidogyne incognita* by chemical

Chemical	Average No. of Galls
Untreated	35.6 ab
Avicta	38.9 a
Aeris	29.2 b
3.5 lbs of Temik 15G	18.1 c
5 lbs of Temik 15G	15.6 c
P < 0.0001	

Table 4. Number of *Meloidogyne incognita* J2 per 500 cm^3 soil by variety

Variety	Average No. of J2
FM 9063B2F	639 a
ST 5458B2F	333 b
P = 0.06	

Table 5. Number of *Meloidogyne incognita* eggs per 500 cm^3 soil by variety

Variety	Average No. of J2
FM 9063B2F	5720 a
ST 5458B2F	3298 b
P = 0.04	

Table 6. Plant mapping results by variety

Variety	Average No. of Nodes
FM 9063B2F	16.69 a
ST 5458B2F	15.46 b
P < 0.0001	

Table 7. Harvest results by variety

Variety	Lint turnout %	Seed turnout %	Lint yield Lb/acre	Gin cost	Net value
				----------$/acre----------	
ST 5458B2F	36.2 a	48.0 a	1152 a	95.50 a	707.70 a
FM 9063B2F	33.3 b	50.8 b	778 b	70.20 b	489.89 b
	P < 0.0001	*P* < 0.0001	P < 0.0001	*P* < 0.0001	*P* < 0.0001

Table 8. Harvest results by chemical

Chemical	Lint yield Lb/acre	Lint value	Seed value	Gin Cost	Net Value
		----------$/acre----------			
5 lbs of Temik 15G	1062 a	602.97 a	149.03 a	90.70 a	661.30 a
3.5 lbs of Temik 15G	1034 ab	583.48 ab	145.65 a	87.88 ab	641.25 a
3.5 lbs of Temik 15G[2] & 17 oz of Vydate C-LV	957 bc	545.79 abc	134.47 abc	81.60 bc	598.66 ab
Aeris	979 ab	544.21 bc	138.40 ab	84.66 abc	597.95 ab
Untreated	880 c	502.05 c	124.80 cb	76.53 c	550.32 b
Avicta	878 c	499.83	119.28 c	75.8 c	543.31 b
	P = 0.002	*P* = 0.006	*P* = 0.004	*P* = 0.01	*P* = 0.005

Table 9. Thrips counts by date and chemical

Chemical	Adult Thrips 20 May	Immature Thrips 3 June	Adult Thrips 10 June
Untreated	0.15 a	0.12 a	0.07 b
Avicta	0.05 b	0.08 ab	0.02 b
3.5 lbs of Temik 15G	0.05 b	0.00 c	0.07 b
Aeris	0.02 b	0.03 cb	0.07 b
5 lbs of Temik 15G	0.00 b	0.00 c	0.18 a
	P = 0.02	*P* = 0.03	*P* = 0.03

Discussion

ST 5458B2F had significantly fewer galls per root than FM 9063B2F (*Table 2*). Temik 15G at 3.5 lbs and Temik 15G at 5 lbs had significantly fewer galls per root than Aeris, Avicta, and the untreated (*Table 3*). There was no significant interaction between variety and chemical, indicating that the response was consistent with both varieties.

ST 5458B2F had significantly fewer second-stage juveniles and egg counts 500 cm^3 soil than FM 9063B2F (*Table 4 & 5*). There was no significant effect by chemical or by the interaction between variety and chemical.

FM 9063B2F had significantly more nodes per plant than ST 5458B2RF on 14 August (*Table 6*). ST 5458B2RF had significantly higher lint yield per acre and lint turnout than FM 9063B2F which resulted in a significantly higher net value per acre. However, FM 9063B2F had a significantly higher seed turnout per acre (Table 7).

Net value of 5 lbs of Temik 15G was not significantly different from 3.5 lbs of Temik 15G, 3.5 lbs of Temik 15G with 17 oz of Vydate, and Aeris (*Table 8*). However, 3.5 lbs of Temik with 17 oz of Vydate and Aeris did not significantly differ from the untreated and Avicta (Table 8).

The untreated plots had significantly more adult thrips on 20 May and immature thrips on 3 June than the other treatments. Avicta seed treatment immature thrips did not significantly differ from the untreated plots on 3 June (*Table 9*). On 10 June the 5 lbs Temik 15G had significantly more adult thrips than the other treatments (*Table 9*). Thrips were not a limiting factor since treatments never reached the thrips threshold of 1 per true leaf.

Meloidogyne incognita, is one factor that can significantly impact variety performance. Continued evaluations of these varieties and chemicals is needed.

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