

## PROJECT REPORT- ALABAMA COTTON COMMISSION 2007

### Southern root-knot nematode (*Meloidogyne incognita*) sustainable management investigations.

#### INVESTIGATORS:

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#### OBJECTIVE:

Our objectives are to: 1) evaluate *M. incognita* resistant and susceptible cotton varieties' response in conventional and conservation tillage regimes; 2) identify summer and winter weed hosts of *M. incognita* and determine how these weeds affect nematode population during the spring, and 3) determine the efficacy and economics of recommended and experimental nematicides for the management of the root-knot nematode.

#### PROCEDURES:

##### 1. Evaluate *M. incognita* resistant (tolerant) and susceptible cotton varieties' response to the nematode in conventional and conservation tillage regimes.

The yield potential of root-knot nematode tolerant and susceptible cotton cultivars was evaluated under two tillage systems. The conventional tillage plots were chisel plowed, disked, and in-row sub soiled. The conservation tillage plots had a cover crop that had been rolled and crimped with non-inversion in-row sub-soiling underneath the row (strip tillage) to maximize belowground disruption, while maintaining maximum residue cover on the soil surface. Six cotton varieties considered tolerant to the southern root-knot nematode and a standard susceptible variety were planted in both tillage regimes.

At planting, root-knot nematode numbers averaged 107 J2's per 150 cm<sup>3</sup> of soil. Seed cotton stand was uniform between cultivars with or without nematicide. The ST5599 cultivar produced a greater ( $P \leq 0.05$ ) stand than DP 143 or DP515 with the nematicide applications. Seedling vigor was also similar for each cultivar regardless of nematicide application. However, differences in vigor were observed between cultivars with ST5599 and DP117 being more vigorous in growth at 30 days after emergence than DP 555 when treated with a nematicide. Root-knot numbers of J2 from the soil and eggs from the roots varied between varieties and nematicide application. ST 5599 root-knot numbers were numerically lower than all other cultivars and all cultivars exhibited numerically greater numbers of root-knot nematodes in the control plots compared to the nematicide plots. ST 5599, DP 117, and DP 143 did not produce a numerical yield increase with the nematicide combination of Temik 15 G and Avicta thus tolerance is a possibility under the environmental conditions of this growing season. DP 555 and DP 515 did increase yields ( $P \leq 0.05$ ) with the application of the nematicides.

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	<i>Meloidogyne incognita</i>									
	Stand/10 ft		Vigor		Plant height		J2 & Eggs		Lint lb/a	
	row <sup>x</sup>		N	CK	N	CK	N	CK	N	CK
ST5599	N <sup>y</sup>	CK <sup>z</sup>								
	41.6	41.5	4.4	4.0	8.1	7.5	10459	37809	433.7	473.8
DP117			4.4	4.0	8.4	7.2	26631	150924	456.5	460.0
STM			3.9	3.6	7.1	6.6	34821	126303	496.2	486.1

DP555	36.8	40.4	3.7	3.6	7.7	7.6	45309	188556	549.1	480.1
DP143	33.8	37.8	4.3	4.1	7.0	6.3	11447	65908	456.5	509.5
DP515	33.4	36.1	4.1	4.3	8.1	6.9	69194	164616	549.3	509.1
LSD $P \leq 0.05$	6.8		0.6		1.1		144221		59	

<sup>x</sup> Numbers in columns followed by the same letter are not significantly different by Fisher's LSD at  $P \leq 0.05$ .

<sup>y</sup> N is the application of the nematicides Avicta and Temik 15 G.

<sup>z</sup> C stands for the non treated control plots.

## 2) Identify summer and winter weed hosts of *M. incognita* and determine how these weeds affect nematode population during the spring.

Selected weed species commonly associated with corn and cotton production were screened for their host status to *M. incognita* in the greenhouse. Greenhouse trials indicated that of 19 species tested, the majority 63 % of the weed species serve as host to *M. incognita*. Pitted and Ivy leaf Morningglory, Coffee weed, Velvet leaf, Hemp Sesbania, Teaweed, Field bindweed, Wild Mustard, Curly dock, Redroot pigweed, and Smartweed served as host for *M. incognita*. Thus the presence of non-controlled weed species in the cotton-corn rotation system may potentially be related to the persistent *M. incognita* populations when rotating.

Weed	Meloidogyne incognita			RF	
	Eggs per 500 cc soil		Eggs gm root		
Morningglory, Ivy leaf	39622	a	6647	a	19.8
Morningglory, Pitted	37142	a	3873	b	18.6
Coffee weed	21398	b	2290	bcde	10.7
Velvet leaf	13905	bc	3450	bc	7.0
Hemp Sesbania	13148	bc	1206	cde	6.6
Teaweed	12221	bcd	8119	a	6.1
Field bindweed	8443	cde	2944	bcd	4.2
Wild Mustard	5639	cde	726	de	2.8
Curly dock	4604	cde	447	de	2.3
Cotton	4133	cde	582	de	2.1
Redroot pigweed	3835	cde	657	de	1.9
Smartweed	3635	cde	751	de	1.8
Jimson weed	1908	de	101	e	1.0
Coffee senna	1051	e	226	e	0.5
Sicklepod	657	e	114	e	0.3
Corn spurry	579	e	158	e	0.3
Kochia	479	e	675	de	0.2
Lambsquarter	270	e	261	e	0.1
Wild buckwheat	263	e	70	e	0.1
Common Ragweed	251	e	19	e	0.1

<sup>x</sup> Numbers in columns followed by the same letter are not significantly different by Fisher's LSD at  $P \leq 0.05$ .

## 3). Determine the efficacy and economics of recommended and experimental nematicides for the management of the root-knot nematode.

An efficacy evaluation of Avicta, Aeris, Temik 15G and Vydate CLV applied alone and in combinations was conducted at the Auburn University Plant Breeding Unit of the E. V. Smith Research and Education Center in fields naturally infested with the root-knot nematode.

At 6 weeks after planting, reniform nematode numbers increased 25% to an average of 82.8 nematodes per 150 cc of soil while root-knot nematode numbers decreased 46% to 48.9 per 150 cc. Root-knot numbers varied -66.7% to 305% from initial counts. Plant stands and vigor

showed no differences ( $P < 0.10$ ) between any of the treatments versus the control plot. Seed yields ranged from 1608 to 469 lb/A over the control. All treatments showed a significant ( $P < 0.10$ ) increase in yield over the control except the Temik 15 G 5 lb/a (840 gai/ha) side dress rescue treatment. The Temik 15G, Aeris + Temik 15G, Avicta + Temik 15 G treatments demonstrated the greatest increase in yield over the remaining treatments.

Treatment	Rate	Stand 8 m row <sup>w</sup> 5-Jun	Vigor 1-5 sc <sup>x</sup> 5-Jun	Total Nematodes per 150 cc <sup>y</sup>			Seed lb/a <sup>z</sup> 18-Sep		
				<i>R. reniformis</i> 5-Jun	<i>M. incognita</i> 5-Jun	<i>M. incognita</i> 13-Sep			
1	Control	70.4	2.8	135.5	45.2	679.8	605.4	c	
2	Aeris	48 mgai/seed	75.0	3.2	105.4	45.2	334.8	1425.7	ab
3	Avicta	500.4 mgai seed	75.2	3.0	60.2	60.2	391.4	1542.9	ab
4	Temik 15 G	840 gai/ha	82.8	3.3	90.3	30.1	612.9	2213.4	a
5	Aeris	48 mgai/seed	72.8	3.3	75.3	45.2	448.1	1412.7	ab
	Vydate CLV	1120 gai/ha							
6	Avicta	500.4 mgai seed	78.0	3.3	45.2	45.2	391.4	1627.5	ab
	Vydate CLV	1120 gai/ha							
7	Temik 15 G	840 gai/ha	73.4	2.9	60.2	45.2	525.3	1972.5	ab
	Vydate CLV	1120 gai/ha							
8	Aeris	48 mgai/seed	66.8	3.2	75.3	60.2	293.6	2083.2	a
	Temik 15 G	840 gai/ha							
9	Avicta	500.4 mgai seed	78.6	3.7	75.3	30.1	334.8	2213.4	a
	Temik 15 G	840 gai/ha							
10	Aeris	48 mgai/seed	63.0	3.7	120.4	105.4	468.7	1523.3	ab
	Temik 15 G	840 gai/ha side dress							
11	Avicta	500.4 mgai seed	79.2	3.2	75.3	30.1	381.1	1796.7	ab
	Temik 15 G	840 gai/ha side dress							
12	Temik 15 G	840 gai/ha side dress	68.8	3.2	75.3	45.2	293.6	1074.1	bc
	LSD ( $P \leq 0.10$ )		12.4	0.8	77.0	44.7	275.3	553.9	



