IMPACT OF AT-PLANT AND POST-PLANT NEMATICIDES ON COTTON PRODUCTION IN RENIFORM NEMATODE INFESTED FIELDS

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Abstract

At-plant and post-plant nematicides were evaluated in three locations over north Alabama for their effectiveness in managing reniform nematodes in heavily infested cotton fields. Both the Temik at-plant rates and the post-plant Vydate and Temik treatments produced profitable yield increases in two of the three field trials. Heavy boll worm and Verticillium wilt in the Jennings field trial nullified any potential yield increases that nematicides may have produced. While Vydate post-plant performed well in two field trials, it is believed to have been instrumental in flaring boll worms in the Jennings field trial. More tests must be conducted to determined if Vydate will fit in the nematicide program for reniform nematodes.

Introduction

Nematicides are one of the most effective and economical treatments for managing reniform nematodes in infested cotton fields. Data, accumulated from multiple field trials for an extended period, indicate that both Temik in-furrow and Telone II, a fumigant, are effective against reniform nematodes in south Alabama. However, when reniform became a problem three years ago in North Alabama, we had no assurance that Temik at similar rates would be effective in that part of the state. In 1995, the first nematicide trial in North Alabama was placed in the Underwood field in Colbert County near Leighton, AL. Temik at-plant rates and post-plant nematicide combinations produced outstanding yield increases that first year. However, further trials were needed over wider area in North Alabama for a prolonged period to determine if these nematicide rates and post-plant combinations were indeed valid.

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The purpose of the 1996 trials is to confirm the standard nematicide rates as effective treatments for reniform nematode in cotton in North Alabama.

Methods

Three nematicide trials were conducted in cotton fields that had high populations of reniform nematode populations. Two trials, the Underwood field and the Isbell field, are located in Colbert County in northwest Alabama and the third trial, the Jennings field, was in Cherokee County in northeast Alabama bordering Georgia. The Underwood and Isbell fields in Colbert County were planted with a worm resistant variety, "NUCOTN33B", and the Jennings field in Cherokee County used a worm susceptible variety "Suregrow 125". Treatments were replicated three times (Underwood-4 replications) and arranged in randomized complete block design. Plots were 8 rows wide. Treatments for the three trials were as follows:

Underwood Field (30 in. row spacing)[a/]

(1) Temik 15G @ 7 lb/A in-furrow at plant
(2) Temik 15G @ 7 lb/A in-furrow at plant
+ two Vydate post-plant applications[b/]
(3) Temik 15G @ 7 lb/A in-furrow + Temik 15G @ 10 lb/A sidedressed at
early square[c/]
(4) Guacho-insecticide seed treatment

Isbell Field

(1) Temik 15G @ 5 lb./A in-furrow at-plant
(2) Temik 15G @ 5 lb./A in-furrow at-plant + two Vydate (0.25 lb. a.i./A)
post-plant applications
(3) Temik 15G @ 7 lb./A in-furrow at-plant
(4) Di-Syston 15G @ 7 lb./A in-furrow at-plant

Jennings Field (38 in. row spacing)

(1) Temik 15G @ 5 lb./A in-furrow at-plant
(2) Temik 15G @ 5 lb/A in-furrow at-plant + Vydate @ 0.25 lb. a.i./A, 2
post-plant applications
(3) Temik 15G @ 7 lb./A in-furrow at-plant
(4) Gaucho insecticide seed treatment

[a/]Temik 7 lb. rate in Underwood field with a 30 in. row spacing is equivalent to 4.75 lb. rate on a 38" row spacing.

[b/]Vydate CLV @ 0.25 a.i./acre applied on 15" band at first square and again @ 0.25 lb. a.i./acre two weeks later.

[c/]Temik 15G @ 10 lb./acre sidedressed at first square.

Soil samples for nematode analyses were collected from the three tests (1)just prior to planting; (2) 6 weeks after

planting; (3) 4 to 6 weeks after the last post-plant nematicide application; and (5) at harvest. All tests were monitored for signs of plant bugs, boll worms and other insects on a weekly basis. Yield data were collected from all trials.

All other cultural and pest control practices including disease and insect control, fertility, and weed control were according to Auburn University recommendations.

Results

The **Underwood Field** was planted on 30 in. rows. Nematicide treatments as listed under methods (see Underwood in Methods section). Nematode soil samples were collected May 2 (at-plant), June 5, July 2 and September 4 (1 month prior to picking). Plots were picked on Oct. 7. Vydate CLV, due to a calibration error, was applied on a 15 inch band (0.50 lb. a.i./acre) at twice the recommended rate on June 4. The second Vydate application was made on June 14 at the correct rate (0.25 lb. a.i./A). Temik 15 (10 lb./A) was sidedressed on June 15 in the plots receiving post-plant Temik.

Insect pressure was extremely light during the season. Vydate CLV (0.25 lb. a.i./A) was applied to all treatments to control a plant bug problem in late July. Reniform nematode populations by Sept. 4 were about the same as the no nematicide treatment (Gaucho) except for the Temik sidedress treatment (Table 1). The Temik post-plant treatment maintained slightly lower reniform populations through the end of the season. It should be noted that Temik rate in the Underwood field with a 30 inch row spacing are substantially less than the same rates in the Isbell and Jennings fields which have 38 inch rows. The 7 lb. Temik rate in the Underwood field is equivalent to a 4.75 rate and the 10 lb. rate is equivalent to 6.8 lb. on the conventional 38 inch row spacing.

All nematicide treatments produced significantly better yields than the Gaucho treatment (Table 1). Temik at-plant plus Temik sidedress treatment produced the highest yields, but Temik plus Vydate produced the best increase economically.

The **Isbell Field** with a 38 inch row spacing was planted with "NuCotn 33B" variety on April 19. Heavy rains (5 in.) caused the soil to form a crust. This resulted in skimpy stands in the test area. Plants in Di-Syston plots were much smaller and slower growing. Soil samples for nematode analyses were collected on April 18, June 12, Sept. 4 and Oct. 22. Vydate CLV was applied (0.25 lb a.i./A) June 5 and again June 13 to the Vydate treated plots. No other insecticides were applied to the test area. Cotton was overhead irrigated in June and in July.

All nematicide treatments improved yield (Table 2). Temik at 7 lb/A produced the highest yields followed closely by Temik plus Vydate sidedress and the 5 lb. Temik rate (Table 2).

The **Jennings Farm** in Cherokee County was planted May 2 on a 38 inch row spacing with "Suregrow 125". Soil samples for nematode analyses were collected May 2, June 17, July 10 and Oct. 24. Vydate (0.25 lb a.i./A) was applied on June 12 and on June 21.

Plants in the Gaucho treated plots were much shorter than those in the Temik treated plots. Heavy boll worm populations and heavy worm damage was observed on May 2. The Vydate treated plots suffered the most damage. Larvin was applied to all plots in early May to control the boll worm outbreak. No other insecticides were applied during the season. Heavy damage as a result of Verticillium wilt was observed in August.

Both the 5 lb. and 7 lb. Temik rates increased cotton yield significantly. However, only the 5 lb. Temik rate appeared to produce a profitable return (Table 3).

Discussion

The 5 lb. and 7 lb. Temik rates, the Temik + Vydate post-plant, and Temik + Temik sidedress rates produced economical returns in the Isbell field. Temik + Vydate was the most effective and economical treatment for the Underwood field. This contrasts sharply with the Jennings field where Vydate was believed to have created a boll worm problem across the entire field. This phenomenon raises serious questions regarding Vydate as a post-plant nematicide.

The use of nematicides proved to be very effective in managing reniform nematodes in both Colbert County fields. The use of nematicides in the Jennings field was inconclusive; because damage from boll worms and Verticillium wilt masked any yield increases that nematicides may have produced.

It is apparent that the 5 lb. and 7 lb. Temik rates applied in the furrow at planting will be as effective in North Alabama as they are in South Alabama. More studies need to be made on the use of post-plant nematicides, particularly Vydate, before we can determine if they can be used effectively and economically.

Table 1. Underwood Field-Reniform Population and Yield Response.

Treatment	Reniform/100cc			Yield (lb./A)		
(Rate/A)	2 May	2 Jul	4 Sept	Sd. Cot.	Lint[a/]	Increase
Temik 7 lb	315	152	229	3602b	1261	+155
Temik 7 lb + Vydate PP	84	296	481	3801ab	1330	+ 224
Temik 7 lb + Temik 10 lb PP	85	399	75	3835a	1340	+ 236
Gaucho	60	383	687	3162c	1106	--
LSD (.05)	354	414	560	204.7	71.6	

Table 2. Isbell Field-Reniform Population and Yield Response.

Treat-ment (Rate/A)	Reniform/100cc				Yield (lb/A)		
	18 Apr	6 Jun	10 Jul	9 Sept	Sd Cot	Lint	In-crease
Temik 5 lb	416	104	451	675	2589	906	+ 135
Temik 5 lb + Vydate	423	49	847	631	2712a	949	+178
Temik 7 lb	349	61	548	417	2766a	968	+197
Di-Syston 6.6 lb	394	157	519	938	2204b	771	---
LSD (0.05)	198	112	708	459	472	57	---

Table 3. Jennings Field-Reniform Population and Yield Response.

Treat-ment (Rate/A)	Reniform/100cc				Yield (lb/A)		
	2 May	17 Jun	15 Jul	28 Aug	Sd Cot	Lint	In-crease
Temik 5 lb	265	515	341	2025	1842a	645	+ 128
Temik 5 lb + Vydate	311	497	237	1904	2553c	544	+ 27
Temik 7 lb	311	405	268	1344	1718 b	601	+ 84
Gaucho	353	945	925	2908	1478c	517	--
LSD (0.05)	92	359	382	921	119	--	--

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