

ROOT-KNOT AND RENIFORM NEMATODES ASSOCIATED WITH COTTON PRODUCTION IN MISSISSIPPI

G. W. Lawrence

**Associate Professor, Mississippi State University,
Mississippi State, MS**

K. S. McLean

**Associate Professor, Department of Agriculture,
Northeast Louisiana University,
Monroe, LA**

G. Hankins

**Graduate Student, Mississippi State University,
Mississippi State, MS**

Abstract

Tests were conducted in 1996 to examine the benefits of including Temik 15G and Vydate C-LV for the management of the root-knot (*Meloidogyne incognita*) and reniform nematode (*Rotylenchulus reniformis*) in a cotton production system. Nematode population development was followed by sampling plots monthly. Treatments included Temik 15G applied at 5.0 and 7.0 lb per acre in the seed furrow. Vydate C-LV was applied as a foliar spray at pin-head square and 14 days in combination with Temik 15G at 3.5 lb per acre in the seed furrow. Cotton plots grown in the treated plots produced more bolls per plant with a greater total boll weight. Fruiting position of the first cotton boll was produced on a lower node in the nematicide treated plots. Vydate C-LV applied as a foliar spray in combination with Temik 15 G improved cotton yields over Temik 15G applied at the same rate alone.

Introduction

The root-knot (*Meloidogyne incognita*) and reniform (*Rotylenchulus reniformis*) nematodes are the two most serious pests to cotton production in Mississippi. Cotton yield losses attributed to these two nematodes have averaged 28.7 for the reniform nematode since 1990 and 30.4 percent for the root-knot nematode.

Nematode management techniques available to Mississippi cotton producers are limited. Without the use of cotton cultivars with adequate nematode resistance to these two pests, most producers rely on the use of nematicide to reduce nematode numbers at planting. The use of the insecticide/nematicide Temik 15G has become an important component of cotton production in Mississippi. Recently the insecticide/nematicide Vydate C-LV when applied as a foliar spray in combination with the insecticidal rate of Temik 15G (3.5 lb/A) has been shown to significantly reduce nematode numbers and improve cotton yields. The purpose of these tests were to 1)examine the benefits of

including Temik 15G in a cotton production system and 2) further examine the effects of Vydate C-LV as a foliar application on root-knot and reniform nematode management in Mississippi cotton production.

Materials and Methods

Test were conducted in 1996 to examine the effects of the root-knot (*Meloidogyne incognita*) and reniform (*Rotylenchulus reniformis*) nematodes on cotton growth and subsequent yield. The experiments were conducted in fields that were naturally infested with single species population of either the root-knot and reniform nematode in Leflore and Quitman counties in Mississippi, respectively. And average population density of 140 root-knot nematodes and 6,566 reniform nematodes were recovered from the plots prior to planting.

Temik 15G was applied at planting in the seed furrow with a Case 900 Early Riser Planter equipped with a granular chemical applicator. Temik 15G was applied at 5.0 and 7.0 lb formulated product per acre. Vydate C-LV was applied as a foliar spray at 4, 8, or 16 oz per acre in combination with Temik 15G at 3.5 lb formulated product per acre placed in the seed furrow a planting. Vydate C-LV was applied at pin head square and 14 and 17 days later in Quitman and Leflore counties, respectively. The insecticidal seed treatment, Gaucho, was included in two tests to examine it's benefits to cotton production in a nematode infested field. Di-Syston was also included in all tests to serve as a second control.

In all tests, the experimental design was a randomized complete block with five replications. Plots consisted of four rows 40 feet long with a 38 inch row spacing. Replications were separated by a 20 foot border. Each row was planted with 160 Stoneville 474 and SureGrow 125 seed in Quitman and Leflore counties, respectively. Cotton seeds were commercially treated with Captan and Vitavax plus Apron by the manufactures. All plots were maintained with standard production practices recommended by the Mississippi Cooperative Extension service commonly used in the area. Plots were irrigated as needed using a center pivot irrigation system.

Nematode population development was determined at planting and at monthly intervals. Ten soil cores, 1-inch diameter and 8-inches deep were collected from the two center rows of each plot in a randomized systematic sampling pattern. Nematodes were extracted using a combination of gravity screening and sucrose centrifugation. Cotton plant growth and yield was determined at harvest by mapping plants from 3 foot of row. Plant height nodes per plant, boll number and boll weights were recorded at harvest. Plots ere hand harvested 117 and 142 days after planting in Quitman and Leflore counties, respectively.

Results and Discussion

Experiment 1: In test 1, Temik 15G was examined for the management of the reniform nematode in Quitman county. Nematode numbers at planting averaged 6,131 reniform per 250 cm³ of soil across all plots. Nematode numbers averaged across the growing season were lower in the Temik 15G treated plots compared with Gaucho, Di-Syston and the untreated control (Table 1).

At harvest more bolls were produced per plant with a greater total boll weight in the plots which received Temik 15G compared with Gaucho, Di-Syston and the untreated control (Table 1). The first fruiting node was also positioned lower on the Temik treated plants compared with the other treatments.

Temik 15G applied at 5.0 and 7.0 lbs per acre significantly improved seed cotton yields. Yields ranged from 1,661.26 to 2,788.57 lbs of seed cotton per acre in the Di-Syston and Temik 15G (7.0lb/A) treatments respectively. Yields were increased 1,104.67 lbs per acre over the untreated control in plots which received Temik 15G at 7.0lb per acre (Table 1).

Experiment 2: In test two, Vydate C-LV was evaluated as a foliar applied nematicide in combination with Temik 15G for the management of the reniform nematode in Quitman county. Nematode population numbers at planting averaged 7,204 reniform per 250 cm³ of soil across all plots. Nematode numbers averaged across the growing season were lower in the Vydate C-LV + Temik 15G treated plots compared with Temik 15G alone, Di-Syston and the untreated control (Table 2).

At harvest more bolls were produced per plant with greater total boll weight in the Vydate C-LV + Temik 15G treated plots compared with Temik 15G alone, Di-Syston and the untreated control (Table 2).

Vydate C-LV + Temik 15G and Temik 15G alone produced significantly greater seed cotton yields compared with Di-Syston and the untreated control (Table 2). Yields ranged from 1,730 to 2,816.6 lbs of cotton per acre in the Di-Syston and Vydate C-LV (16oz/A) + Temik treatments, respectively. Yields were improved 1,066 lbs per acre over the untreated control with two applications of Vydate C-LV in combination with Temik 15G. All Vydate C-LV application improved yields compared with Temik 15G alone.

Experiment 3: In test three, Temik 15G was included for the management of the root-knot nematode in Leflore county. Nematode numbers at planting averaged 113 root-knot nematodes per 250cm³ of soil. Nematode numbers averaged across the growing season were lower in the Temik 15 G treated plots compared with Gaucho, and Di-Syston (Table 3).

At harvest more bolls were produced per plant with a greater boll weight in the plots which received Temik 15G compared with Gaucho, Di-Syston and the untreated control (Table 3). The first fruiting node was also positioned lower on the Temik 15G treated plants compared with the other treatments.

Temik 15G applied at 5.0 and 7.0 lbs per acre significantly improved seed cotton yields. Yields ranged from 2,194.53 to 3,535.89 lb per acre in the untreated control and Temik 15G (7.0 lb/A) respectively. Yields were increased 1,341.36 lbs per acre over the untreated control (Table 3).

Experiment 4: In test four, Vydate C-LV was applied as a foliar nematicide in combination with Temik 15G for the management of the root-knot nematode in Leflore county. Nematode numbers at planting averaged 163 root-knot nematodes per 250 cm³ of soil across all plots. Nematode numbers averaged across the growing season were lower in the Vydate C-LV + Temik 15G and Temik 15 G treated plots compared with Di-Syston and the untreated control (Table 4).

At harvest more cotton bolls were produced per plant with greater total boll weights in the Vydate C-LV + Temik 15G and Temik 15G alone plots compared with Di-Syston and the untreated control (Table 4). The first fruiting node was positioned significantly lower on the Vydate C-LV and Temik 15G treated plots compared with the other treatments (Table 4).

Vydate C-LV + Temik 15G treated plots produced significantly greater seed cotton yields compared with Temik 15G alone, Di-Syston and the untreated control (Table 4). Yields ranged from 2,726.27 to 3,747.22 lbs of seed cotton per acre in the untreated control and Vydate C-LV (16oz/A) + Temik 15G treatments respectively. Yields were increased 1,021 lbs per acre over the untreated control with two application of Vydate C-LV in combination with Temik 15G. All Vydate C-LV application significantly improved cotton yields compared with Temik 15G alone.

Disclaimer

The interpretation of data presented may change with additional experimentation. Information is not to be construed as a recommendation for use or as an endorsement of a specific product by Mississippi State University or the Mississippi Agricultural and Forestry Experiment Station.

Table 1 The Effect of Temik 15G on the Production of Stoneville 474 Cotton in a Reniform Nematode (Rr) Infested Field.

Treatment Rate/Acre	Rr/ 250cm ³	Open bolls	Boll (gm)	Fruit Node	Seed Cotton Yield (lb/A)
Temik 15G 5.0lbs	11,068	33	151	5.9	2,500
Temik 15G 7.0 lbs	10,605	45	156	6.0	2,788
Gaucho 4.0 oz/ai	13,293	29	121	6.9	1,943
Di-Syston 0.75lb/ai	13,768	22	94	6.8	1,661
Control	12,883	16	65	7.1	1,683

FLSD= (0.05)

All data based on the means of 5 replications. Means compared using Fishers least significant difference test.

Rates calculated based on 38-inch row spacing.

Table 2. The Effect of Vydate C-LV used as a Foliar Nematicide on the Production of Stoneville 474 Cotton in a Reniform (Rr) Nematode Infested Field.

Treatment Rate/Acre	Rr/ 250cm ³	Open bolls	Boll (gm)	Fruit Node	Seed Cotton Yield (lb/A)
Vydate 4oz	10,368	36	150	6.3	2694
Vydate 8oz	10,355	39	173	6.3	2,738
Vydate 16oz	9,295	43	185	5.5	2,817
Temik15 G 3.5lb	13,205	36	139	6.0	2,567
Di-Syston 0.75lb/ai	12,575	15	59	8.0	1,730
Control	14,665	19	75	7.6	1,750

FLSD= (0.05)

All data based on the means of 5 replications. Means compared using Fisher's protected least significant difference test.

All Vydate C-LV treatments received Temik 15G at 3.5 lb/A at planting. Rates calculated based on 38-inch row spacing.

Table 3. The Effect of Temik 15G on the Production of SureGrow 125 Cotton in a Root-knot (Mi) Nematode Infested Field.

Treatment Rate/Acre	Mi/ 250cm ³	Open bolls	Boll (gm)	Fruit Node	Seed Cotton Yield (lb/A)
Temik 15G 5.0lbs	1,155	54	273	4.5	3,286
Temik 15G 7.0 lbs	1,439	55	266	4.7	3,353
Gaucho 4.0 oz/ai	1,689	28	123	5.2	2,419
Di-Syston 0.75lb/ai	1,594	24	120	5.7	2,299
Control	1,386	21	93	5.6	2,194

FLSD= (0.05)

All data based on the means of 5 replications. Means compared using Fisher's least significant difference test.

Rates calculated based on 38-inch row spacing.

Table 4.The Effect of Vydate C-LV used as a Foliar Nematicide on the Production of SureGrow 125 Cotton in a Root-knot (Mi) Nematode Infested Field.

Treatment Rate/Acre	Mi/ 250cm ³	Open bolls	Boll (gm)	Fruit Node	Seed Cotton Yield (lb/A)
Vydate 4oz	847	49	240	4.1	3,479
Vydate 8oz	952	56	290	4.1	3,576
Vydate 16oz	632	69	345	3.7	3,747
Temik15G 3.5lb	977	54	270	4.1	3,122
Di-Syston 0.75lb/ai	1,475	28	134	5.6	2,824
Control	1,547	20	115	5.8	2,726

FLSD= (0.05)

All data based on the means of 5 replications. Means compared using Fisher's protected least significant difference test.

All Vydate C-LV treatments received Temik 15G at 3.5 lb/A at planting. Rates calculated based on 38-inch row spacing.