

# Evaluation of Variety Tolerance and Use of Vydate C-LV for 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 peanut<sup>1</sup>. Management decisions are dependent upon the level of nematode infestation and the estimated nematode-induced yield loss<sup>1</sup>. Planting partially resistant or tolerant varieties is one of the most effective tools in managing this pest<sup>2</sup>. Foliar applications of Vydate C-LV, have been recommended for the suppression of nematodes. Therefore, cotton production may be optimized by planting tolerant cotton varieties in conjunction with the use of Vydate C-LV.

## Objectives

1. Evaluate root-knot nematode galling and egg production on Stoneville (ST) 4288B2RF and FiberMax (FM) 9180B2RF with and without 3 foliar applications of Vydate C-LV applied at weekly intervals starting at three true leaves.
2. Evaluate the yield of ST4288B2RF and FM 9180B2RF with and without 3 foliar applications of Vydate C-LV applied at weekly intervals starting at three true leaves.
3. Compare the net returns between varieties with and without the use of Vydate C-LV.

## Materials and Methods

The on-farm trial was conducted in Gaines County, TX in 2011 in a field with the 5 year crop history of cotton. The field's soil was 93% sand, 3% silt, and 4% clay. The trial was planted on 19 May. Plots had a 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 7 June and 14 June. The number of galls caused by *M. incognita* were counted by visually inspecting 10 plant roots per plot on 28 June ([Fig. 1](#)). Soil samples were taken on 12 July to determine *M. incognita* populations per 500cm<sup>2</sup> of soil. The trial was harvested on 9 November. 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. Thirty-five cents was added to the loan values for each plot to represent average loan values that cotton sold for this year. 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](#)

Partially Resistant Variety	Susceptible Variety
ST 4288B2RF Untreated	FM 9180B2F Untreated
ST 4288B2RF & 17 oz of Vydate C-LV*	FM 9180B2F & 17 oz of Vydate C-LV*

\*Vydate C-LV was applied in a band at a rate of 17 oz per acre on 7 June, 15 June, and 24 June

## Results

FM 9180B2RF with foliar applications of Vydate C-LV had a higher number of galls (47.5) than ST 4288B2RF with foliar applications of Vydate C-LV (26.6) ( $P = 0.07$ ). There was a significant interaction between variety and use of Vydate C-LV for root galls caused by the southern root-knot nematode, *M. incognita*. Therefore, galling was inconsistent between varieties. Galling decreased with foliar applications of Vydate C-LV on ST 4288B2RF as compared to the untreated check ([Table 2](#)). In contrast, foliar applications of Vydate C-LV resulted in a significantly higher number of galls on FM 9180B2RF as compared to the untreated check ([Table 2](#)).

[Table 3. Average number of \*M. incognita\* eggs per 500 cm<sup>3</sup> soil on 12 July by variety and treatment](#)

Variety	Average No. of root-knot nematode eggs
FM 9180B2F	7800 a
ST 4288B2RF	4720 b
	$P = 0.04$

Vydate C-LV foliar applications had no significant impacts on lint yield and total value per acre ([Table 4](#)). ST 4288B2RF had a higher lint yield than FM 9180B2RF, which resulted in a higher total value per acre ([Table 4](#)).

[Table 4. Harvest results by variety and treatment](#)

Variety	Treatment	Lint turnout %	Seed turnout %	Loan Value	Lint yield lbs/acre	Total Value (Loan Value X Lint Yield) \$/acre
FM 9180B2F	Untreated	29.3	49.7 a	0.8892 a	384 b	334.42 b
FM 9180B2F	Vydate C-LV	30.0	50.9 b	0.8998 a	384 b	339.96 b
ST 4288B2RF	Untreated	28.3	47.6 a	0.8920 a	500 a	453.21 a
ST 4288B2RF	Vydate C-LV	29.0	47.8 b	0.8558 b	526 a	459.99 a
		NS	$P = 0.0001$	$P = 0.0068$	$P = 0.0154$	$P = 0.0001$



[Figure 1.](#) Galling associated with FM 9180B2F



[Figure 2.](#) Appearance of FM 9180B2F (left) and ST 4288B2RF (right)

## Discussion

Root galls caused by *M. incognita*, were decreased with the use of Vydate C-LV on ST 4288B2RF. In contrast, galling was increased with the use of Vydate C-LV on FM 9180B2RF ([Table 2](#)). Root-knot nematode egg density was affected by cultivar ([Table 3](#)), but was not affected by chemical treatments.

Thrips were not a limiting factor since treatments never had more than 0.025 thrips/plant (data not shown).

Yield was primarily affected by cultivar, with ST 4288B2RF greatly out yielding FM 9180B2F ([Table 4](#)). Yield was not affected by foliar applications of Vydate C-LV ([Table 4](#)). Net value was approximately \$113/acre higher when ST 4288B2RF was planted rather than FM 9180B2F ([Table 4](#)). Three applications of 17 oz of Vydate C-LV were applied starting at the 2<sup>nd</sup> true leaf stage. Each Vydate C-LV application cost approximately \$10.89 per acre, for a total cost of \$32.67 per acre. If treatment cost were subtracted from the Total Value in [Table 4](#), there would be a net loss for those plots treated with Vyate C-LV.

## Summary

Use of Vydate C-LV showed mixed results in the reduction of root-knot nematode galls on partially resistant and susceptible cotton varieties early season. However, at harvest, the differences in galling observed early-season in the treated and untreated plots, did not result in differences of yield.

*Meloidogyne incognita* significantly impacted variety performance. Planting a partially resistant variety resulted in a lower number of root-knot nematode eggs mid season and a higher yield at the end of the season. Based on this trial, planting partially resistant varieties is the most economical and effective method in the management of nematodes.

The environmental conditions prior to and during the growing season were a limiting factor in the varieties performance overall. Above normal temperatures and lack of rainfall during the growing season possibly confounded the year end results. Continued evaluation of the use of Vydate C-LV under various conditions is needed in order to further understand its impact on root-knot nematode management.

## References Cited

- (1) Kirkpatrick, T. L. and C. S. Rothrock, ed. *Compendium of Cotton Diseases, Second Edition*. APS Press, 2001.
- (2) Zhou, E. and J. L. Starr. 2003. A Comparison of the Damage Functions, Root Galling, and Reproduction of *Meloidogyne incognita* on Resistant and Susceptible Cotton Cultivars. *Journal of Cotton Science*. 7:224-230.

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