

Effect of Post-plant Application of Vydate L on Carrot Infected with Southern Root-knot Nematode

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Introduction

Root-knot nematodes (*Meloidogyne* spp.) are the most damaging plant-parasitic nematodes to many vegetable crops. The main species affecting carrots in Georgia are southern root-knot (*M. incognita*) and peanut root-knot (*M. arenaria*).

The problem

A vegetable grower in Screven County, GA was challenged with carrots not growing properly. This field had decreased growth, leaf chlorosis and significant galling from root knot nematode (Fig. 1 and 2). Telone II (12.5 gal/acre) was applied preplant though field conditions showed lack of efficacy for unknown reasons. The carrots were seeded from September 25 to October 1 of 2019.



Fig. 1. Initial damage symptom caused by the southern root-knot nematode in a carrot field showing poor growth and stunted growth.

Project Objectives

- 1) Evaluate the post-plant application efficacy of the nematicide Vydate L in reducing soil population densities of root-knot and stubby root nematodes in a infested field.
- 2) Assess if post-plant applications of Vydate L can help reduce the yield loss in carrot.
- 3) Evaluate the benefit of applying Vydate L through analyzing the economic impact/yield.



Fig. 2. Initial symptoms of the root-knot nematode from the infected field include stunting, chlorosis, and gall formation on both hairy and tap roots.

Research plots and treatments:

Research plots were designed to have treated (with nematicide) plots directly adjacent to an untreated plot. Plots were forty feet long and four beds wide with a minimum of 2 beds for a buffer on each side. Plots were forty-foot-long and four beds wide. Vydate L was applied broadcast by a tractor sprayer covering 9 beds per pass. Two applications of Vydate L were made during the growing season. Upon project completion, 1 foot of the twin rows from each bed was dug, carrots were washed and sorted by size and weighed. Data on gall severity and nematode numbers in the soil were collected and analyzed.

Treatment (oz/acre)	Root knot nematode/100 cm ³ soil	Stubby root nematode/100 cm ³ soil	Gall rating ^x	Yield (oz/1 ft)			
				>1.0 inch-diam.	0.75-1 inch-diam.	<0.75 inch-diam.	Cull
Vydate L - 64 fl oz	8.5 a	0.7 a	1.8 a	9.5 a	10.3 a	1.7 a	0.7 a
Untreated control	22.8 a	3.5 a	2.6 a	8.0 a	9.8 a	2.0 a	0.9 a

^xGall ratings assessed on a scale of 0-5 where: 0 = roots with no gall, 1 = 1-5, 2 = 6-10, 3 = 11-20, 4 = 21-30, and 5 = > 30 galls. Each value represents the mean of each treatment. Within a column, values followed by same letter are not significantly different (P=0.05) based on Tukey's test.

Table 1. Data on root-knot and stubby-root nematode counts at harvest, root galling severity caused by *Meloidogyne incognita* and carrot yield in plots treated with nematicide Vydate L.

Treatment (oz/acre)	>1.0 inch-diam		0.75-1 inch-diam		<0.75 inch-diam		Cull	
	Yield		Yield		Yield		Yield	
	(lbs/acre)	(\$/acre)	(lbs/acre)	(\$/acre)	(lbs/acre)	(\$/acre)	(lbs/acre)	(\$/acre)
Vydate L - 64 fl oz	12931.88	\$5,172.75	14020.88	\$7,010.44	2314.13	\$2,013.29	952.88	N/A
Untreated control	10890.00	\$4,356.00	13340.25	\$6,670.13	2722.50	\$2,368.58	1225.13	N/A

*Calculations were made using a ratio of 1 row ft = 2 ft², and 43,560 ft² = 1 acre.
**Market Prices used were gathered from the USDA Agriculture Marketing Services, Atlanta Terminal Carrot Import Report. Wholesale prices for carrots. >1 inch diam = \$0.4/lb (loose 50-lb sack); 0.75-1 inch diam = \$0.50/lb (10 5-lb film bags); <0.75 inch diam = \$0.87/lb (15 2-lb film bags). Cull carrots were used for cattle feed and were not sold.

Table 2. Yield comparison in plots treated with nematicide Vydate L and those that were untreated.

Results

- Plants affected by nematodes generally produce smaller fruit. Particularly in carrots, nematodes can cause stunted growth, forked growth and galling (Table 1).
- The population density of root-knot and stubby-root nematodes in nematicide treated plots were numerically lower but not significantly different than the nematode count in untreated plots (Table 1).
- Although there was no statistical difference in yield, based on economic analysis we can see an increase in pounds and financial return. The increase in lbs/acre and \$/acre for the >1 inch-diam carrots was 15.8%. (Table 2)
- Numerical reductions were found at harvest in the population densities of both root-knot and stubby-root nematodes as well as reduced gall ratings (Fig. 3 and 4) in treated plots compared to the control.



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Fig. 3. Carrots treated or untreated with Vydate L were sorted by size and quality.

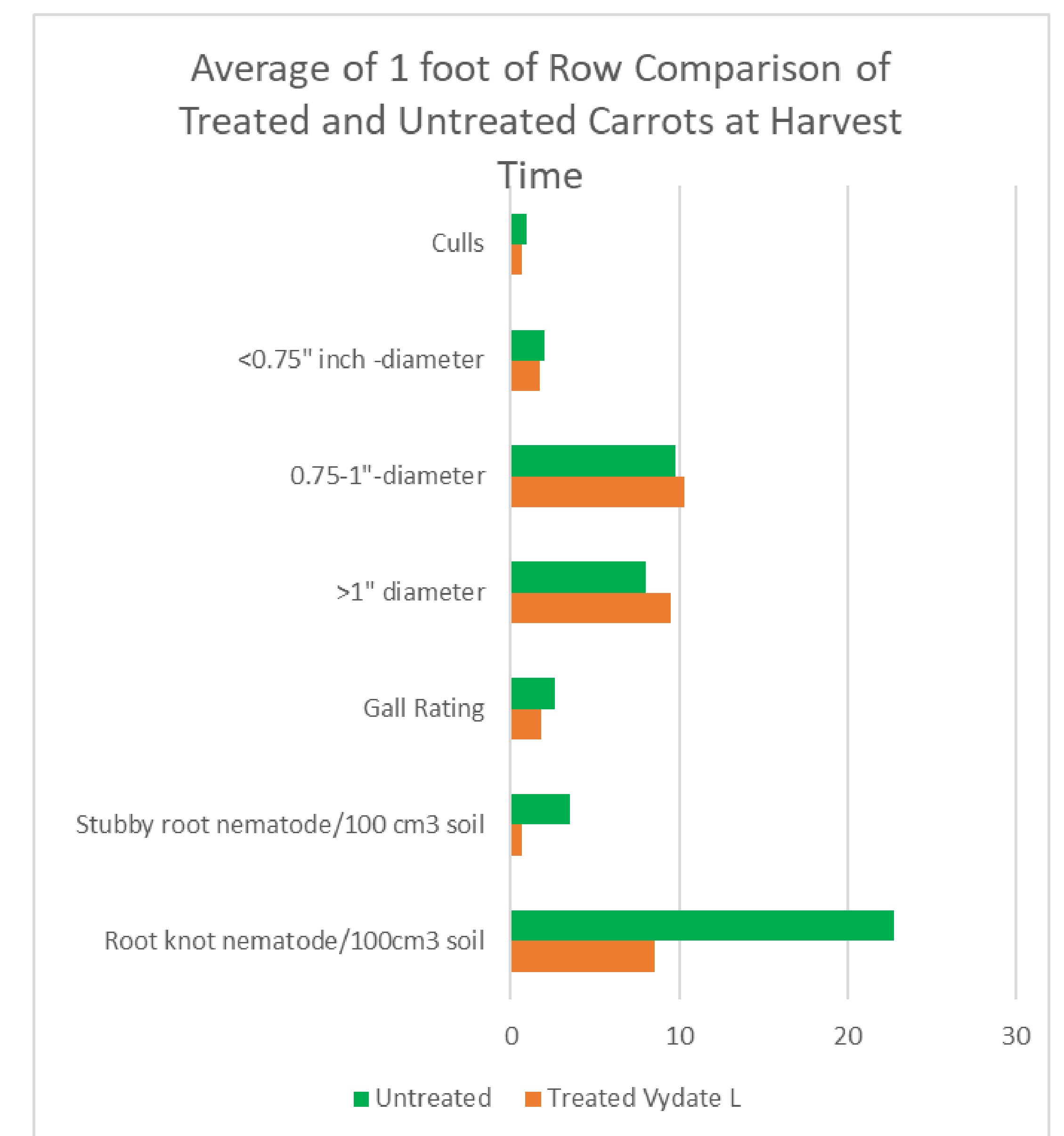


Fig. 4. Average nematode population in one row foot at harvest time.

Conclusion

Overall, the systemic activity of Vydate L suppressed root-knot nematode growth in infected roots resulting in relatively better nematode control. Even with no statistical difference in yield, the economic impact for the yield difference of 15.8% for both lbs/acre and \$/acre in the large carrot category (>1 inch diam.) could be great, especially for farms where large carrots are desired.

Acknowledgment

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