Telone II® Following Grain Rotation for Nematode Control?

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Abstract

Nine field trials were conducted between 1994 and 1997 in Buckeye and Gila Bend, Arizona to determine the effect of soil fumigation with Telone II on the yield of cotton following rotation with Durum wheat. Telone was shank injected at two or more rates (0, 3, or 5 gal/acre) in fields previously maintained with a cotton-wheat-summer/winter fallow rotation. Eight fields were planted to Upland and one field to Pima cotton. Eight of the nine studies resulted in a statistically significant lint yield increase with the 5 gallon rate compared to the untreated check. Seven of the nine studies resulted in a positive net economic return on investment ranging from $0.78/acre to $103.29/acre. In one trial where all three rates were compared, yield at the 5 gallon rate was increased 141 lint lbs/ac compared to the 3 gallon rate which did not differ from the control.

Introduction

Root-knot nematode infestations can cause economic yield losses of cotton when left untreated. A statewide nematode survey conducted by M.A. McClure several years ago indicated that over 50% of the land used for cotton production in Maricopa County had detectable root-knot nematode populations. Generally, producers recognize the potential decrease in lint yield as a result of nematodes and can identify the infested fields within a farm or a region. Many producers fumigate with Telone II after multiple years of continuous cotton in the known areas of nematode pressure. When a known nematode infested field is rotated out of cotton, common practice is to omit the Telone II in the first year of resumed cotton production. The objective of our multi-year, multi-site field studies is to evaluate possible nematode effects on first year cotton following a grain rotation. All of the 9 field studies reported on consisted of a cotton/grain/summer-winter fallow followed by cotton rotation.

Materials and Methods

Field studies were conducted from 1994-97 at nine locations with eight in Buckeye, Az.(H-Four Farms, Roosevelt Irrigation District), and one on the Paloma Ranch (Gingg Farms) in Gila Bend, Az. Plots were 12 rows wide running the entire field length. Eight of the sites consisted of alternating untreated checks and Telone II treatments (5 gal./acre) with a minimum of 4 replications. The ninth site consisted of an untreated check, 3 gal./acre, and 5 gal./acre with treatments alternating, replicated four times.

Soil samples for initial nematode populations were taken at the field study sites with the objective of developing treatment threshold recommendations. Samples had undetectable levels of root-knot nematode juveniles on the pre-application basis. The center four rows of each twelve row plot were harvested and the data were subjected to Analysis of Variance.

Results and Discussion

Eight of the nine field studies resulted in statistically significant yield increases with the 5 gallon Telone application compared to the untreated check. Seven of the nine studies resulted in a positive net return on investment when assuming Telone cost at $9.50/gallon, $8.00/acre application cost, and $0.67/pound cotton. The positive net return ranged from $0.78/acre to $103.29/acre. In addition, the Paloma site in 1996 resulted in a lint increase of 141 lb./acre with the 5 gal. rate with no significant differences between the untreated check and the 3 gal. Telone II rate (Table 1). The data indicate that reducing Telone II rates below the recommended label is economically disadvantageous.

The data do not offer guidelines relevant to pre-plant nematode levels for application threshold purposes. Further testing will be conducted in 1998 with detailed gridwork soil sampling on a pre-plant basis in an attempt to develop the desirable threshold levels to make well informed decisions. The information contained within this report is primarily intended to offer valid data which indicate that fields with known historic high nematode populations may benefit economically from fumigation with the above described rotation.

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Table 1. 1994-97 Telone tests lint yields on Upland and Pima cotton.

Pima 1994	Lint (lbs/Acre)	R. O. I. ($)
Untreated	1312 b	- 32.72/A
Treated (5gal/Acre)	1346 a	
	C.V. 2.95, OSL 0.0301	
Upland 1994	Lint (lbs/Acre)	R. O. I. ($)
Untreated	1258 b	+ 103.29/A
Treated (5gal/Acre)	1495 a	
	C.V. 6.67, OSL 0.0001	
Upland 1995	Lint (lbs/Acre)	R. O. I. ($)
Untreated	1149 a	- 73.59/A
Treated (5gal/Acre)	1122 a	
	C.V. 7.8, OSL 0.2472	
Upland 1996	Lint (lbs/Acre)	R. O. I. ($)
Untreated	1082 b	+ 90.56/A
Treated (5gal/Acre)	1300 a	
Baseline	C.V. 4.60, OSL 0.0111	
Upland 1996	Lint (lbs/Acre)	R. O. I. ($)
Untreated	1171 b	+ 28.92/A
Treated (5gal/Acre)	1297 a	
Broadway	C.V. 2.92, OSL 0.015	
Upland 1996	Lint (lbs/Acre)	R. O. I. ($)
Untreated	1240 b	- 16.64/A
Treated (3gal/Acre)	1298 b	+ 38.97/A
Treated (5gal/Acre)	1381 a	
Paloma-Byers	C.V. 3.24, OSL 0.0094	
Upland 1997	Lint (lbs/Acre)	R. O. I. ($)
Untreated	1424 b	+ 82.52/A
Treated (5gal/Acre)	1630 a	
	C.V. 2.14, OSL 0.0030	
H-4 Sec. 35-2		
Upland 1997	Lint (lbs/Acre)	R. O. I. ($)
Untreated	1504 b	+ 0.78/A
Treated (5gal/Acre)	1588 a	
	C.V. 0.844, OSL 0.0028	
H-4 Sec. 26-6		
Upland 1997	Lint (lbs/Acre)	R. O. I. ($)
Untreated	1303 b	+ 46.34/A
Treated (5gal/Acre)	1455 a	
	C.V. 2.81, OSL 0.0117	
H-4 Sec. 25-3		

*** Means followed by the same letter are not significantly different following a significant Analysis of Variance Test ($P \leq 0.05$).**
C.V. = Coefficient of Variation OSL = Observed Significance Level