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EVALUATION OF SELECTED COVER CROPS TO DETERMINE HOST SUITABILITY FOR ROTYLENCHULUS RENIFORMIS

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Abstract

The reniform nematode (*Rotylenchulus reniformis*) has become one of the most dominant cotton (*Gossypium hirsutum*) pests in Alabama over the last decade. Cover crops that do not serve as hosts for these nematodes could decrease the inoculum for next season's cotton crop. Thirty-one cover crops were evaluated for host suitability to the reniform nematode in the greenhouse. Each cover crop was planted in sterile soil and inoculated with *R. reniformis*. The plots were harvested sixty days after planting. AU Robin crimson clover (*Trifolium incanatum*), Cahaba II vetch (*Vicia sativa*), and Licapo rape (*Brassica napus*) produced a reproduction factor (RF = final population / initial population) of greater than one. Other crops evaluated had a reproduction factor of less than one indicating a reduction in the *R. reniformis* inoculation for the next season. These selected winter cover crops could potentially fit into the cotton production scheme providing an aid in reniform management.

Introduction

Once considered a minor pest, nematodes now cost Alabama producers millions of dollars in lost revenue. The reniform nematode is the most economically damaging nematode pest on cotton in Alabama. Reniform nematodes have spread throughout the major cotton production areas of the state and are now found in approximately five percent of cotton in thirty counties.

Several of the most extensively used nematicides are no longer available due to environmental and health concerns associated with them. Few nematicides are being registered as replacements, and as a result, the use of non-chemical management techniques is essential for control of plant-parasitic nematodes. Furthermore, winter weeds possibly serve as a host for reniform nematode during the crop-free season months when most fields are left bare. In the southeastern United States, winter cover crops are very important in rotation systems. Cover crops affect nematode population densities potentially preventing economic losses due to damage in subsequent cash crops. Winter cover crops increase soil organic matter, improve soil tilth, decrease soil erosion, increase water penetration and retention, and provide grazing for cattle. Therefore, various cover crops were screened to determine effects on reduction of reniform nematode populations.

Materials and Methods

In the fall and spring of 2001 and 2002 thirty-one winter cover crops, including grasses, legumes, and cruciferous species were evaluated in comparison to cotton (Paymaster 1218 BR) in a greenhouse at the Plant Science Research Center at Auburn University for host suitability to reniform nematodes (Table 1). Selected cover crops and cotton were planted in 32 oz Styrofoam cups in a sterile Marvin sandy loam (fine-loamy, siliceous, thermic typic kanhapludult). Each test was arranged in a randomized complete block design with five replications. Seeds were allowed to germinate and grow for fourteen days before inoculating with two thousand *R. reniformis* juveniles and vermiform adults per five hundred cc of soil. Plots were harvested after sixty days. A 150 cc sub sample of soil was taken from each plot and nematodes were extracted using gravity screening and sucrose centrifugation. Nematodes numbers were determined using a stereomicroscope. Fresh and dry shoot and root weights were also recorded. This experiment was repeated three times.

Results and Discussion

All the cover crops tested supported significantly lower populations of reniform nematodes compared to cotton (*Gossypium hirsutum*) (Table 1). Idaho radish (*Raphanus sativus*), Soil Saver oats (*Avena strigosa*), and Slobot radish (*Raphanus sativus*) produced the lowest populations of reniform nematode at the end of the tests. Along with cotton, AU Robin crimson clover (*Trifolium incanatum*), Cahaba II vetch (*Vicia sativa*), and Licapo rape (*Brassica napus*) supported reniform nematode reproduction in the greenhouse trial. Each of these crops produced a reproduction factor of greater than one indicating the nematode was increasing in numbers with only the specific crop as a food source. Therefore, these crops should be limited in rotation systems for management of the reniform nematode. As a group, radishes and grasses supported the lowest nematode populations overall. Grasses produced the highest root matter while canola and radishes produced the most shoot matter.

Table 1: Cover crops evaluated for host suitability of *Rotylenchulus reniformis*

Cultivar	Scientific Name	Common Name	Reproduction Factor *
Idaho	*Raphanus sativus*	Radish	0.09
Soil Saver	*Avena strigosa*	Oats	0.12
Slobot	*Raphanus sativus*	Radish	0.12
Maton	*Secale cereale*	Rye	0.13
Rufus	*Raphanus sativus*	Radish	0.15
Final	*Raphanus sativus L.*	Radish	0.15
Marshall	*Lolium multiflorum*	Ryegrass	0.16
Gulf	*Lolium multiflorum*	Ryegrass	0.17
Coker 9663	*Triticum aestivum*	Wheat	0.19
Coker 227	*Avena sativa*	Oats	0.20
Pioneer 26R61	*Triticum aestivum*	Wheat	0.21
EK 102	*Triticum aestivum*	Wheat	0.26
AU Alpha 310	*Lupinus albus*	Lupin	0.30
Sirola	*Sinipis alba L.*	White Mustard	0.31
Samson	*Brassica rapa*	Mustard Spinach	0.31
AU Homer	*Lupinus albus*	Lupin	0.34
Coker 9835	*Triticum aestivum*	Wheat	0.41
AU Alpha 305	*Lupinus albus*	Lupin	0.42
Salvo	*Sinapis alba L.*	White Mustard	0.44
Bnigra	*Brassica nigra*	Black Mustard	0.58
Barnapoli	*Brassica napus biennis*	Turnip	0.64
Samson "T"	*Brassica rapa*	Mustard spinach	0.66
Liforum	*Brassica napus*	Rape	0.68
Civastro "R"	*Brassica rapa*	Mustard Spinach	0.77
PI2863	*Brassica campestris*	Canola	0.82
PI4048	*Brassica campestris*	Canola	0.83
Tyfon	*Brassica rapa*	Mustard Spinach	0.87
Idaho	*Sinapis alba L.*	White Mustard	0.93
Licapo	*Brassica napus*	Rape	1.08
Cahaba II	*Vicia sativa*	Vetch	1.26
AU Robin	*Trifolium incanatum*	Crimson Clover	1.40
Delta Pine 1218	*Gossypium hirsutum*	Cotton	3.39

LSD = 1.51

*Reproduction factor is final population divided by initial population