

PLANT-PARASITIC NEMATODES ASSOCIATED WITH NON-DELTA COTTON PRODUCTION IN MISSISSIPPI

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Abstract

Sixty cotton fields were surveyed representing fifteen counties in the non-delta region of Mississippi for plant-parasitic nematodes associated with cotton production. A total of ten genera of plant-parasitic nematodes were identified. Root-knot nematodes, (*Meloidogyne* spp.), were identified in 10% of sites sampled, reniform nematodes, (*Rotylenchulus reniformis*), were identified in 15% of sites sampled, and lance nematodes, (*Hoplolaimus* spp.), were identified in 40% of sites sampled.

Introduction

Three genera of nematodes, root-knot (*Meloidogyne* spp.), reniform (*Rotylenchulus reniformis*), and lance (*Hoplolaimus* spp.), are considered important pathogens to cotton throughout the United States. The Cotton Foundation's Beltwide Cotton Nematode Survey and Education Committee with the assistance of a grant from Rhone-Poulenc Ag Company published information on the 1995 distribution of these nematodes for cotton producing areas in the United States (1).

In the Beltwide Cotton Nematode Survey, the known distribution and densities of the root-knot, reniform, and lance nematodes were reported for the 1995 growing season. In 1995, 58 Mississippi counties planted cotton. The Beltwide Cotton Nematode Survey reported on the distribution of root-knot, reniform, and lance nematodes in 33, 41, and 33 Mississippi cotton producing counties, respectively. The presence or absence of root-knot, reniform, and lance nematodes have not been determined for 25, 17, and 25 non-delta cotton producing counties in Mississippi, respectively.

In 1996, we began a plant-parasitic nematode survey that will include all of the non-delta cotton producing counties in Mississippi. The objective of this survey is to identify and obtain an estimate of the distribution of plant-parasitic nematodes associated with non-delta cotton production in Mississippi.

Beginning in August of the 1996 growing season, soil samples were collected from 60 cotton fields representing 15 counties. The fields were located with assistance from

the county agent in each county. The county agent from each county marked the location of cotton fields within their area on a map. We divided the cotton production within each county into four equal size areas. One field near the center of each area was selected for sampling without consideration to field size, cropping history, or cotton condition. A soil sample consisted of a minimum of twenty soil cores collected from ten acres of the selected field.

Nematodes were separated from 250-cm³ soil from each sample by gravity screening and centrifugation (2). Plant-parasitic nematodes were identified to genus and enumerated using a stereomicroscope. Soil from each sample was bioassayed for detection of root-knot species which may not have been detected from soil extractions. The North Carolina Differential Host Test was used to identify root-knot nematodes to species.

Results and Discussion

Ten genera of plant-parasitic nematodes were recovered from soil representing 15 counties (Table 1). The three genera of major importance to cotton production, *Meloidogyne* spp., *Rotylenchulus reniformis*, and *Hoplolaimus* spp., were recovered at a frequency of 10%, 15%, and 40%, respectively. This represented 5, 6, and 11 counties for each of the species, respectively, (Table 2).

Meloidogyne spp. was recovered with a mean density of 365 nematodes/250-cm³ soil with a range of 26—1571 nematodes/250-cm³ soil, (Table 2). Root-knot nematodes were identified in fields from 5 counties: Itawamba, Calhoun, Monroe, Montgomery, and Winston. In 1995, published reports, (1, 3), confirming the presence of root-knot nematodes in cotton did not include Itawamba, Calhoun, and Winston counties.

Rotylenchulus reniformis was recovered with a mean density of 2,095 nematodes/250-cm³ soil with a range of 26—10,789 nematodes/250-cm³ soil, (Table 2). Reniform nematodes were identified in fields representing 6 counties: Grenada, Lowndes, Monroe, Noxubee, Oktibbeha, and Pontotoc. In 1995, published reports, (1, 3), confirming the presence of reniform nematodes in cotton did not include Pontotoc, Oktibbeha, and Noxubee counties.

Hoplolaimus spp. was recovered with a mean density of 39 nematodes/250-cm³ soil with a range of 26—103 nematodes/250-cm³ soil, (Table 2). Lance nematodes were detected in fields representing 11 counties: Chickasaw, Choctaw, Clay, Grenada, Itawamba, Montgomery, Noxubee, Oktibbeha, Pontotoc, Webster, and Winson. In 1995, published reports, (1, 3), confirming the presence of lance nematodes in cotton did not include Pontotoc, Itawamba, Chickasaw, Clay, Choctaw, Oktibbeha, Winston, and Noxubee counties.

Cotton acreage for the 15 counties included in the 1996 non-delta cotton nematode survey totaled 144,564. Samples were collected across 600 acres representing approximately 0.5% of the total cotton production in these counties. At least one species of plant-parasitic nematode with the potential to reduce cotton yields was recovered from samples representing 360 of the 600 sampled acres (60%). This suggest that 86,738 acres (144,564 x 60%) across the survey area may contain a species of nematode with the potential to cause damage to cotton.

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References

1. Blansingame, D. 1996. Know your cotton nematodes....your hidden enemies. National Cotton Foundation.
2. Jenkins, W. R. 1964. A rapid centrifugal flotation technique for separating nematodes from soil. Plant Disease Reporter 48:692.
3. Patel, M. V. 1995. Plant pathology laboratory report 1995: Nematodes soil sample profile. Mississippi Cooperative Extension Service.

Table 1. Incidence of plant-parasitic nematodes in 60 cotton fields representing 15 Mississippi non-delta cotton producing counties.

<u>Nematode</u>		<u>Sites</u>		<u>Density/250-cm³ soil</u>	
<u>Genus</u>	<u>Common Name</u>	<u>No.</u>	<u>Freq.</u>	<u>Mean</u>	<u>Range</u>
Helicotylenchus	Spiral	60	100	614	26 - 2343
Hoplolaimus	Lance	24	40	39	26 - 103
Rotylenchulus	Reniform	9	15	2,095	26 - 10,789
Meloidogyne	Root-knot	6	10	365	26 - 1571
Pratylenchus	Lesion	14	23	43	26 - 129
Scutellenema	Yam	7	12	125	26 - 515
Tylenchorynchus	Stunt	6	10	30	26 - 52
Trichodorus	Stubby Root	3	5	52	26 - 77
Aphelenchus		2	3	26	26
Criconemella	Ring	1	2	26	26

*Mean and range were calculated for samples in which the nematode was found.

Table 2. Occurrence and mean density of *Meloidogyne* spp., *Rotylenchulus* spp., and *Hoplolaimus* spp. recovered per 250-cm³ of soil.

<u>County</u>	<u>Meloidogyne</u>		<u>Rotylenchulus</u>		<u>Hoplolaimus</u>	
	<u>Sites</u>	<u>Mean No.</u>	<u>Sites</u>	<u>Mean No.</u>	<u>Sites</u>	<u>Mean No.</u>
Calhoun	1	52	—	—	—	—
Chickasaw	—	—	—	—	2	39
Choctaw	—	—	—	—	2	52
Clay	—	—	—	—	4	65
Grenada	—	—	1	52	2	39
Itawamba	1	1571	—	—	2	26
Lowndes	—	—	2	8459	—	—
Monroe	1	258	1	26	—	—
Montgomery	2	26	—	—	2	26
Noxubee	—	—	2	26	2	52
Oktibbeha	—	—	2	52	1	26
Pontotoc	—	—	1	1700	3	26
Webster	—	—	—	—	2	26
Winston	2	258	—	—	2	26

*Mean calculated for samples in which the nematode was found.