

## NEMATODES ASSOCIATED WITH TOMATO AND CUCUMBER GREENHOUSE SOILS IN ESSEX COUNTY, ONTARIO

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### Abstract

Six stylet bearing nematode genera, Aphelenchoides, Aphelenchus, Helicotylenchus, Meloidogyne, Pratylenchus and Tylenchus were detected in tomato and cucumber greenhouse soils in Essex County. The root-knot nematode, Meloidogyne sp., detected in approximately 42% of the samples, was the most economically important nematode encountered. The lesion nematode, Pratylenchus sp., occurred in 10% of the samples and appears to be of only minor importance. The spiral nematode, Helicotylenchus sp. was found in only one sample and poses no problem in the greenhouse. Aphelenchoides, Aphelenchus and Tylenchus, predominantly known as fungus feeding genera, are of no economic importance.

### Introduction

Tomato (Lycopersicon esculentum Mill.) and cucumber (Cucumis sativa L.) are the most important greenhouse vegetable crops grown in southwestern Ontario. Two crops per year are usually grown, with tomato and cucumber frequently being rotated. Many growers have found nematodes to be a recurring problem in their houses. A survey of greenhouses in Essex County was conducted in 1969 to ascertain the extent of the nematode problem.

### Methods

Soil samples were obtained in July, August and September of 1969 from 97 greenhouses throughout Essex County, representing approximately 25% of the vegetable-growing operations. Greenhouses were chosen randomly with no previous knowledge of their cropping history or nematode problems.

In each house six soils cores were taken at random with a 2.54 cm diameter soil tube from two depths, 0-15 and 15-30 cm. Samples from the same depth in each house were combined and thoroughly mixed, and two 50 g sub-samples from each were extracted, using a modified Baerman pan method (3). Stylet bearing nematodes in the extract were counted and identified to genus.

Cropping and treatment histories over the past 3 years were obtained for each house at the time of sampling. The data were compiled according to the crops that were grown in the previous 3 years, i.e. cucumbers only, tomatoes only, both cucumbers and tomatoes.

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### Results and discussion

#### Frequency of occurrence

Six stylet bearing nematode genera, Aphelenchoides Fisher, 1894, Aphelenchus Bastian, 1865, Helicotylenchus Steiner, 1945, Meloidogyne Goeldi, 1887, Pratylenchus Filipjev, 1936 and Tylenchus Bastain, 1865, were found in the extracts.

The root-knot nematode, Meloidogyne sp. was the most commonly encountered nematode of economic importance. It occurred in 42% of the 0-15 cm samples and in 38% of the 15-30 cm samples (Table 1). The lesion nematode Pratylenchus sp. occurred in 10% and 6% of the samples, respectively; while only one specimen of the spiral nematode Helicotylenchus sp. was isolated, from one sample at the 15-30 cm depth. The latter nematode does not appear to pose any problem in area greenhouses.

The most frequently encountered nematode was Tylenchus sp., which occurred in 46% of the 0-15 cm samples and 38% of the 15-30 cm samples. It was not possible to establish the Tylenchus sp. extracted from the soil samples on tomato or cucumber plants in steam sterilized soil. It was therefore probably a fungus-feeding species like most other members of the genus (1,2).

Aphelenchoides sp. and Aphelenchus sp. were infrequently isolated and like Tylenchus sp., are probably fungus feeders.

#### Population density

The root-knot nematode, Meloidogyne sp. had the greatest population density with an overall mean in infested samples of 245 and 142 nematodes/100 g of soil at the 0-15 and 15-30 cm depths, respectively (Table 2). This coupled with its high frequency of occurrence and severe damage to both tomato and cucumber makes Meloidogyne sp. the most economically important nematode in area greenhouses.

Table 1. Occurrence of six nematode genera in tomato and cucumber greenhouse soils

Crop and depth of soil sample	No. of samples	Percentage of samples containing the indicated genus					
		Aphelenchoides	Aphelenchus	Helicotylenchus	Meloidogyne	Pratylenchus	Tylenchus
<b>Cucumber (3 yr)</b>							
0 - 15 cm	7	0	0	0	57	14	14
15 - 30 cm	7	0	0	0	57	0	14
<b>Tomato (3 yr)</b>							
0 - 15 cm	21	10	19	0	33	14	43
15 - 30 cm	21	5	10	0	33	10	33
<b>Tomato and cucumber</b>							
0 - 15 cm	69	7	1	0	44	9	51
15 - 30 cm	69	6	0	1	38	6	42
<b>Total occurrence</b>							
0 - 15 cm	97	7	5	0	42	10	46
15 - 30 cm	97	5	2	1	38	6	38

Table 2. Population density of five nematode genera in samples of 97 tomato and cucumber greenhouse soils

Crop and depth of soil sample	Aphelenchoides			Aphelenchus			Meloidogyne			Pratylenchus			Tylenchus		
	No. of samples	Range*	Mean*	No. of samples	Range	Mean	No. of samples	Range	Mean	No. of samples	Range	Mean	No. of samples	Range	Mean
<b>Cucumber (3 yr)</b>															
0 - 15 cm	0			0			4	2-286	87	1		1	1		6
15 - 30 cm	0			0			4	2-156	44	0			1		3
<b>Tomato (3 yr)</b>															
0 - 15 cm	2	2-10	6	4	2-15	7	7	2-5000	1168	3	22-460	177	9	1-164	50
15 - 30 cm	1		1	2	1-6	4	7	2-2500	507	2	2-94	48	7	1-82	23
<b>Tomato and cucumber</b>															
0 - 15 cm	5	1-581	168	1		4	30	1-670	51	6	2-8	4	35	1-200	37
15 - 30 cm	4	4-74	38	0			26	1-504	59	4	1-50	16	29	1-210	25
<b>Total mean density**</b>															
0 - 15 cm	7		122	5		7	41		245	10		56	45		39
15 - 30 cm	5		30	2		4	37		142	6		28	37		24

\* Range and mean number of nematodes/100 g samples

\*\* Total mean density based on total number of positive samples.

The lesion nematode, Pratylenchus sp. had population means of 56 and 28 nematodes/100 g of soil, from infested samples, at the 0-15 and 15-30 cm depths, respectively. Its lower population density compared with Meloidogyne sp., plus its lower frequency of occurrence and less severe damage to tomato and cucumber make Pratylenchus sp. of only minor importance in area greenhouses.

The treatment histories of the houses samples showed that 89% of the growers had applied a nematocide at least once in the past 3 years and 49% had applied a nematocide every year. This, coupled with the high frequency of nematode occurrence in this survey, suggests that additional research may

be required in the area of greenhouse nematode control.

#### Literature cited

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