DISTRIBUTION OF PRATYLENCHUS SPP. AND OTHER STYLET-BEARING NEMATODE GENERA IN SOILS IN THE FLUE-CURED TOBACCO AREA OF SOUTHERN ONTARIO

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Abstract

In a survey for nematodes associated with flue-cured tobacco, a total of *86* soil and root samples was collected at regularly spaced intervals within a 1,100-square-mile area covering Norfolk county and parts of surrounding counties. Three species of the root-lesion nematode (Pratylenchus) appeared to be randomly distributed throughout the main tobacco area. P. penetrans occurred in 40% of the samples; P. neglectus in 36%, and P. crenatus in 9%. Representatives of eight other stylet-bearing nematode genera also were found, with relative frequencies of occurrence as follows: Tylenchorhynchus, 33%; Paratylenchus, 29%; Tylenchus, 12%; Meloidogyne, 7%; Xiphinema and Hoplolaimus, each 4%; and Heterodera and Aphelenchus, each 1%.

Introduction

Five species of Pratylenchus Filipjev [viz. P. neglectus (Rensch.) Filipjev and Schuurmans Stekhoven (Hopper, 1971), P. penetrans (Cobb) Sher and Allen, P. crenatus Loof, P. pratensis (deMan) Filipjev and P. thornei Sher and Allen] have been found in southern Ontario (Potter & Townshend 1973). With the possible exception of P. thornei, routine procedures used by the Ontario Nematode Diagnostic and Advisory Service are insufficient to distinguish among species. Pratylenchus penetrans is generally recognized as the principal cause of brown root rot of tobacco in southern Ontario (Elliot & Marks, 1972; Olthof et. al., 1973). Mountain (1954, 1955) has shown that P. neglectus also is capable of causing lesions and stunting growth. There is no information on the pathogenicity of the other three Pratylenchus species in Ontario, nor on the relative pathogenicity of the five Pratylenchus species on flue-cured tobacco.

Mountain (1954) found large numbers of Pratylenchus spp. and small numbers of 12 other stylet-bearing nematode genera within and around the roots of diseased tobacco plants from southern Ontario. The relative frequency of occurrence of the three Pratylenchus spp. on tobacco were not indicated; however, 75% of a Pratylenchus population in soil cropped to rye consisted of P. neglectus and the remainder of P. penetrans. Townshend (1966) found that almost all soil samples with a suspected brown root rot problem contained P. penetrans. A survey in 1968 (Potter & Townshend 1973) showed that P. neglectus was the most widespread species in southern Ontario, except for Norfolk county and the Niagara Peninsula, where P. penetrans occurred more commonly. This latter observation confirmed previous findings in peach (Mountain & Boyce, 1958), in celery (Townshend, 1962a), and in strawberry (Townshend, 1962b)

This paper presents the results of a survey of the flue-cured tobacco area in southern Ontario to determine the distribution of different Pratylenchus species and genera of other stylet-bearing nematode associated with tobacco soil and roots. A brief summary of the results has been reported earlier (Olthof et al., 1968).

Methods

To ensure uniform distances between sampling sites and to avoid bias, the flue-cured tobacco area was covered with a grid system that resulted in 86 sampling sites on 4-mile centers. Samples were collected during June, July, and August, 1963, from tobacco fields on or close to the predetermined sites within the 1,100-square-mile area. Soil samples were taken to a

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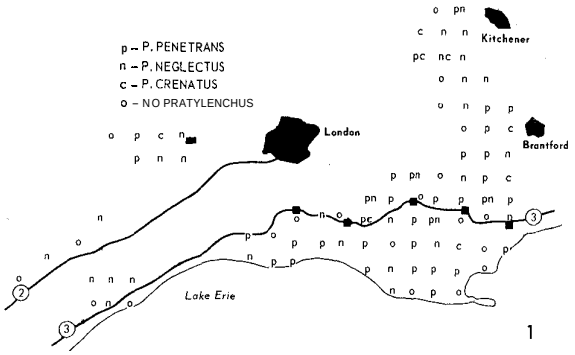

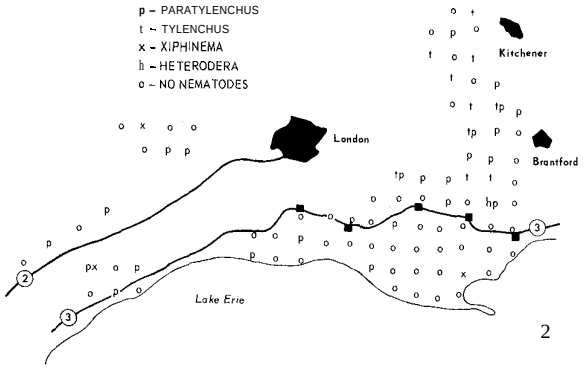

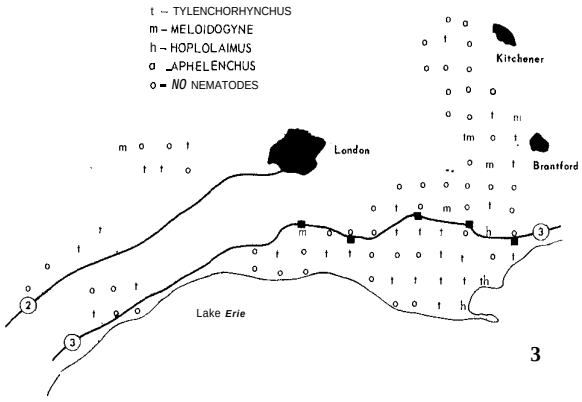

Figures 1–3. Maps of flue-cured tobacco growing areas in Southern Ontario showing distribution of 1) *Pratylenchus* spp.; 2) *Paratylenchus*, Tylenchus, Xiphinema, and Heterodero; 3) Tylenchorhynchus, Meloidogyne, *Hoplolaimus* and Aphelenchus.
Names of towns (black squares) along Highway 3 are, left to right; St. Thomas, Aylmer, Tillsonburg, Delhi, and Simcoe.

depth of 8–10 inches from the root zone of stunted tobacco plants, each sample being composed of 10–20 probes taken with a 1-inch-diameter sampling tube. Two or more root systems of stunted tobacco plants also were collected from each site. The nematodes were extracted from soil or roots for 1 week with the Baermann pan method described by Townshend (1963). After generic identification and counting, the nematodes were killed and fixed in formalin and, when possible, 10–20, specimens of Pratylenchus were mounted in lactophenol on microscope slides (Goodey, 1957) for specific determination.

Observations and discussion

The distribution of the three Pratylenchus spp. found. in this study is shown in Fig. 1. Of the 86 samples, 32% had a pure population of P. penetrans; 29% contained a pure population of P. neglectus; 6% consisted of pure P. crenatus, and in 24% no Pratylenchus spp. were detectable. Mixtures of penetrans and neglectus; penetrans and crenatus; and neglectus and crenatus comprised, respectively, 6%, 2% and 1% of the total number of samples. All three. species appear to be randomly distributed throughout the main area except for two small tobacco growing areas southwest of London, where only P. neglectus was found. Potter & Townshend (1973) also noted the absence of P. penetrans and P. crenatus in these areas and the presence of P. penetrans and P. neglectus in the main tobacco growing area.

In addition to Pratylenchus, eight other genera were found (Figs. 2 & 3). The stunt nematode, Tylenchorhynchus Cobb, occurred in 33% of the samples but never in large numbers. The pin nematode, Paratylenchus Micoletzky, was found in 29% of the samples. Whether either nematode parasitizes tobacco is not known. Tylenchus Bastian occurred in 12% of the samples, indicating that it is more common than Mountain (1954) suggested. The root-knot nematode, Meloidogyne Goeldi, and the cyst nematode, Heterodera Schmidt, occurred in, respectively, 7% and 1% of the samples. The presence of Meloidogyne in tobacco soils is well known (Elliot & Marks, 1972) and, although parasitic on tobacco, it is not considered to be a great threat to tobacco production. The Heterodera was probably the clover cyst nematode, H. trifolii Goffart, which has-survived from a previous rotation crop.

The dagger nematode, Xiphinema Cobb, and the lance nematode, Hoplolaimus Daday, both occurred in 4% of the samples. The former

probably occurs more commonly, but the extraction procedure used discriminates aqainst recovery of the larqer nematodes. Although Xiphinema is a known vector of plant viruses, its role, if any, in Ontario tobacco production is not known. The lance nematode, also reported by Mountain (1954), appears to be confined to a small area near Simcoe, Ontario. No damage to tohacco has been attrihuted to this nematodo, hut as yet only small populations have been found. Only ona sample was infested with Aphclenchus Bastian, althouqh Mountain (1954) reported that this was the most common stylet-bearinq nematode apart from the root-lesion nematode.

Acknowledgment

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