# ECONOMICALLY IMPORTANT NEMATODES IN CONTRACTED ACREAGE OF PROCESSING PEAS IN EASTERN ONTARIO

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## Abstract

Helicotylenchus digonicus, Tylenchorhynchus brevidens, Pratylenchus minyus and Paratylenchus projectus were the predominant species of economically important nematodes, occurring in 90, 80, 70, and 55% respectively, of the pea fields surveyed in Eastern Ontario. Xiphinema americanum, Criconemoides curvatum, Meloidogyne hapla, and Heterodera avenae occurred in 30, 25, 25, and 15% respectively, of the fields surveyed.

Information on the occurrence and prevalence of economically important species of nematodes in agricultural crops grown in Canada is scanty. Some surveys of this nature have been undertaken in the past, especially in Ontario (e.g., Townshend, 1967; Bird and Boekhoven, 1968). This paper summarizes the results of a survey for nematodes done on contracted acreage for processing peas in eastern Ontario, in cooperation with plant pathologists of the Ottawa Research Station who were undertaking a pea disease survey in the summer of 1970.

## Materials and methods

By means of a table of random numbers, 20 pea fields located in the Bloomington, Cherry Valley, Cordington, Hillier, Richmond Hill, Wellington, Waupoos, and Whitby areas of eastern Ontario were selected. These fields totaled 384 acres or 6.1% of the contracted acreage for processing peas in eastern Ontario. Soil and root samples were taken from the fields June 22-27, 1970, approximately 1 week before harvest. Samples consisting of a portion of plant roots with adhering soil were taken from sites along the arms of an imaginary 'W' pattern over the total area of each field. Collections from 5-8 adjoining sites were mixed together to form a composite sample. Thus a total of 680 sites were sampled to form 114 composite samples from the 20 fields.

The samples were stored in polyethylene bags at 38-40F (3.3-4.4C) for not more than 3 months before processing. Nematodes were extracted from soil by the sugar flotation technique (Jenkins, 1964), relaxed by gentle heat, fixed in 5% foxmalin, and processed in cotton blue lactophenol. Roots stained in a 0.05% solution of acid fuchsin in lactophenol were teased in lactophenol to extract endoparasitic nematodes of the genera Meloidogyne and Heterodera. Identification of specimens was made by the nematologists at the Entomology Research Institute, Ottawa.

## Results

Helicotylenchus digonicus was found in 18 fields. No other species of Helicotylenchus was encountered.

Tylenchorhynchus sp. occurred in 16 fields. Of the two species encountered, T. brevidens was more common than T. maximus.

Pratylenchus sp. occurred in 14 fields. P. minyus was the prevalent species, although P. crenatus also occurred in some fields.

Paratylenchus sp. occurred in 11 fields, P. projectus being the main species identified from six fields.

Xiphinema sp. occurred in six fields, X. americanum being the main species encountered.

Criconemoides sp. occurred in five fields, C. curvatum being the main species encountered in three fields.

Meloidogyne hapla occurred in five fields, both adult females and juveniles occurring inside the roots.

Heterodera avenae was found in three fields. Cysts and juvenile stages occurred inside the roots.

The distribution of these eight genera of economically important nematodes is shown in Table 1. In addition to these, species of the following genera were also encountered in the soil samples.

Acrobeloides Cephalobus

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| | |
|---|---|
| Diplogaster | Tylenchus |
| Rhabditis | Psilenchus |
| Plectus | Ditylenchus |
| Wilsonema | Aphelenchus |
| Dorylaimus | Aphelenchoides |
| Neotylenchus | Mylonchulus |

The role of species of some of these genera, e.g., Aphelenchus avenue (encountered in 75% of fields), Aphelenchoides parietinus (found in one field), Tylenchus sp., and Psilenchus sp., in relation to plant damage, is not clearly understood at present.

## Discussion

This survey indicates that a number of potentially plant-parasitic nematode species occur on peas in eastern Ontario. It is quite possible that they cause economic damage to this crop themselves. There is also a distinct possibility of relationships between some of the pea diseases found in the surveyed acreage and the plant-parasitic nematodes associated with plants grown in the same acreage. As shown in Table 1, species of Helicotylenchus, Tylenchorhynchus and Pratylenchus occurred in 90, 80, and 70% of the total number of fields surveyed. The preliminary results of the 1970 pea disease survey (P. K. Basu, personal communication) also indicate the predominance of fusarium root rot in the acreage surveyed. The role of species of Pratylenchus in causing necrosis of plant roots, their involvement in root-rot complexes and in establishment of root-rotting fungi in plant roots has been shown by various workers (Mountain, 1954, 1961; Graham, 1951; Slootweg, 1956). Species of Tylenchorhynchus have also been shown to facilitate establishment of fusarium wilt in plants (Holdeman, 1956). An increase in incidence of certain bacterial wilts in the presence of Helicotylenchus sp. has been reported (Libman and Leach, 1962). It may be useful to mention here that species of Helicotylenchus appear to be very common in cultivated acreages in Ontario. Towshend and Potter (unpublished data) found Helicotylenchus sp. to be the most common spiral nematode in forage crop soils in central and southwestern Ontario. It is realized that quantitative data on the plant-parasitic nematodes found in these pea fields would be of considerable value in ascertaining the role of these nematodes in plant damage. Unfortunately, such data could not be compiled for this survey. However the qualitative data present herein does show the prevalence of species of Helicotylenchus, Tylenchorhynchus and Pratylenchus in the surveyed acreage. It would be useful, to investigate further the role of these nematodes in root rot and other bacterial and fungal diseases found by plant pathologists in the pea crop surveyed in eastern Ontario. Also, the role of nematodes such as Xiphinema americanum, although found in only 30% of the fields, should not be underestimated since these nematodes could serve as vectors of certain plant viruses.

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Table 1. Distribution of eight nematode genera in pea acreage surveyed in eastern Ontario

| Nematode | NO. of fields | Acreage | % of total acreage surveyed | % of total no. of fields surveyed | Location |
|---|---|---|---|---|---|
| Helicotylenchus sp. | 18 | 362 | 94.27 | 90 | B, C, CN, H, R, W, WP, WY |
| Tylenchorhynchus spp. | 16 | 257 | 66.92 | 80 | B, C, CN, H, R, W, WP, WY |
| Pratylenchus spp. | 14 | 295 | 76.82 | 70 | B, C, CN, H, R, W, WP, WY |
| Paratylenchus sp. | 11 | 204 | 53.12 | 55 | B, C, CN, R. W, WP, WY |
| Xiphinema sp. | 6 | 84 | 21.87 | 30 | B, W, WY |
| *Criconemoides* sp. | 5 | 76 | 19.79 | 25 | B, C, R, WP |
| *Meloidogyne* sp. | 5 | 78 | 20.31 | 25 | B, C, CN, R, WY |
| Heterodera sp. | 3 | 44 | 11.45 | 15 | R, WY |

Total number of fields surveyed: 20; total acreage surveyed: 384 acres; key to locations: B - Bloomfield; C - Cherry Valley; CN - Cordington; H - Hillier; R - Richmond Hill; W - Wellington; WP - Waupoos; WY - Whitby.

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