



Agriculture, Fisheries  
and Aquaculture

AGDEX: 112.628

## Field Sampling for Plant-Parasitic and Soil Nematodes

March 10, 2005

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### Introduction:

Plant-parasitic nematodes are found in all agricultural crops, gardens, recreational turfs, golf course fairways and greens on Prince Edward Island. These nematodes tend to be small wormlike animals usually around 1 mm in length (Fig. 1A), though some female nematodes are sedentary and spherical in shape (Fig. 1B). The mouth region of plant-parasitic nematodes has a spear-like structure called a stylet which is used to penetrate into and feed on plant tissue. Plant-parasitic nematodes seldom kill plants, but large nematode populations cause wilting, stunting, root malformation, yellowing of foliage, and yield reductions.

Nematicides can be used to reduce the size of nematode populations, but this method is expensive, and there is the risk of chemical residues persisting in plants and soil. More environmentally sustainable approaches such as crop rotations and use of tolerant or resistant plant cultivars can help to avoid nematode problems.

### When to Sample:

Samples can be taken at any time of year when the ground is not frozen. Avoid sampling immediately after a rainfall when soil is very wet. On Prince Edward Island the best time of year to collect samples is in the fall when nematode populations are at their highest levels. It takes at least two weeks to process samples, assess the data and send information back to growers. Therefore, fall sampling also has the advantage of providing ample time to inform growers of the results before spring planting. However, samples taken in early spring may allow enough time to send information back to growers who are planting annual crops.

### Phytosanitary precautions:

To minimize the possible spread of pathogens, clean or disinfect footwear and spray all sampling equipment before moving from one field location to another. Use disposable suits or rubber pants and boots that can be disinfected with a portable hand sprayer. Vehicles should be left on roadways and not driven onto fields. Consider visiting a local disinfection station.

### Equipment:

- Clean pail for collecting soil and/or roots
- Soil probe 2.5 cm (1 inch) diameter
- Shovel or spade
- Plastic bags to hold 1-2 kg of soil
- Labels
- Pencil or marker with waterproof ink

### **How to Sample:**

Fallow or bare-soil fields - Use a soil probe for soil samples in fallow fields or locations where there is little plant growth. Take a minimum of 20 soil cores, approximately 20 cm (8 inches) in depth from an area of 1 - 2 hectares (2 - 5 acres). Individual soil cores should be taken every 10 to 20 metres in a “W” or “zig-zag” pattern (Figs. 2A, 2C). Collect soil cores in a clean pail, mix soil gently by hand, and place composite soil sample in a labeled plastic bag.

Pasture or cropped fields - The soil sampling method for pasture or cropped fields is the same as the method used in a fallow field. Root samples may be obtained using a spade, ensuring that as many fine roots as possible of the predominant crops are part of the sample. Soil and root material is placed in the same well-labeled plastic bag. The roots are separated from the soil in the laboratory prior to nematode analysis.

Row crops - Use a soil probe to obtain samples of soil and a spade for roots of crops planted in rows (see pattern in Fig. 2B). Try to avoid hitting tubers in potato fields and tap roots in crops such as carrots or parsnips, since most of the nematodes will be in the finer roots. As indicated above, about 20 soil cores, approximately 20 cm in depth, and spaced 10 to 20 metres, should be taken from an area of 1 - 2 hectares. Bulk the 20 soil cores in a pail, mix gently by hand, and place composite soil with root material in a labeled plastic bag. If root malformations and galls are visible, the entire root system with adhering soil should be removed and sealed in a labeled plastic bag.

### **Handling samples:**

Soil and root samples should be sealed in plastic bags immediately after collection and labeled. Nematodes will die quickly if the samples dry out. Store samples in a cool dry place at 5<sup>0</sup>C to 10<sup>0</sup>C since nematodes are very sensitive to temperatures above 30<sup>0</sup>C. A refrigerator is an ideal place to store samples. Do not freeze samples. Samples for nematode analysis should be sent to the laboratory as soon as possible after sampling. If samples are sent by mail, insulated packages will minimize temperature extremes and soil from drying out. If possible, submit samples directly to the laboratory to avoid delays by mail. Filling out the attached “*Nematode Analysis Questionnaire for Soil and Root Samples*” provides useful information for making control recommendations.

### **Submit Samples to:**

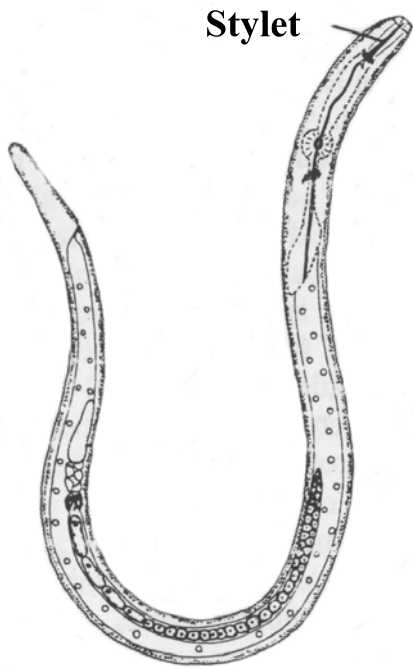
**Nematology Laboratory, Room #161  
Agriculture and Agri-Food Canada  
Crops and Livestock Research Centre  
440 University Avenue  
Charlottetown PE C1A 4N6**

### **NOTE:**

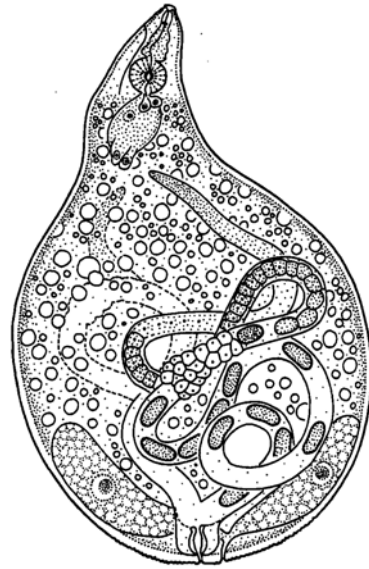
- Do not allow samples to dry out**
- Store samples in a cool location such as a refrigerator**
- Do not freeze samples**

<sup>1</sup>Agriculture and Agri-Food Canada, Crops and Livestock Research Centre, 440 University Avenue, Charlottetown, P.E.I., C1A 4N6

<sup>2</sup>Prince Edward Island Department of Agriculture and Forestry, P.O. Box 1600, Charlottetown, P.E.I., C1A 7N3

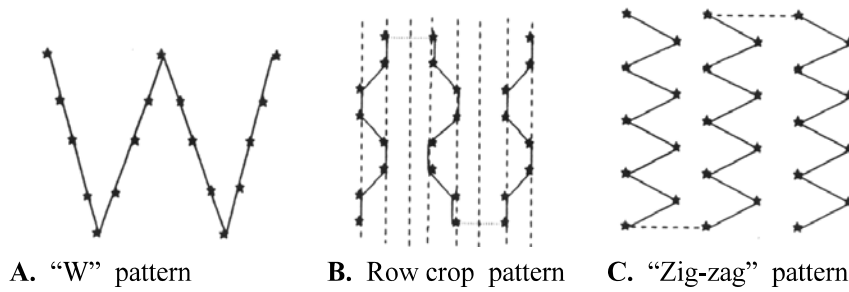


**A. Female root lesion nematode**  
(W. R. Jenkins and D.P. Taylor)



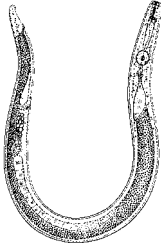
**B. Female root-knot nematode**  
(G. M. Cliff and H. Hirschmann)

**Fig. 1. Plant-parasitic nematodes**



**Fig. 2. Sampling patterns**

**NEMATODE ANALYSIS QUESTIONNAIRE FOR SOIL AND ROOT SAMPLES**

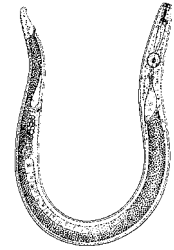


Name of Grower: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_



Sample Date: \_\_\_\_\_ Field No.: \_\_\_\_\_ Location of Field: \_\_\_\_\_

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Sample Submitted by: \_\_\_\_\_  
(if different from above)

Address: \_\_\_\_\_  
(if different from above)

\_\_\_\_\_

\_\_\_\_\_ Phone: \_\_\_\_\_

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check here  
to receive a copy  
of results

Present Crop: \_\_\_\_\_ Disease Symptoms: \_\_\_\_\_

Crop History Past 3 Years: 20\_\_ \_\_\_\_\_

20\_\_ \_\_\_\_\_

20\_\_ \_\_\_\_\_

Last tillage practice prior to planting, When: \_\_\_\_\_

Future Crop: \_\_\_\_\_

Soil Type: \_\_\_\_\_

Additional Information: \_\_\_\_\_

\_\_\_\_\_

<p><b>LAB USE ONLY</b> SAMPLE ID #: _____ DATE RECEIVED: _____</p>
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**Note: Failure to recover nematodes from a sample does not necessarily indicate the field to be free of plant-parasitic nematodes.**