

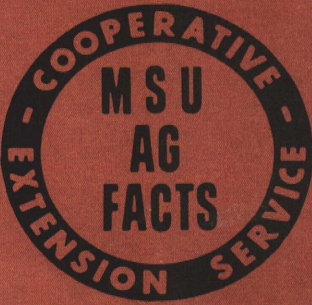
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Nematode Detection
Michigan State University
Cooperative Extension Service
G.W. Bird and Alma Elliott
Nematologist, Department of Entomology
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Nematode Detection

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Extension Bulletin E-800

G. W. Bird and Alma Elliott, Nematologists, Department of Entomology

Plant parasitic nematodes are microscopic roundworms that live in soil and feed on the roots of economically important plants. Some can feed on plant foliage. Nematode feeding results in symptoms such as stunting, yellowing, wilting, yield reduction, root galling and the formation of root lesions. Damage from plant parasitic nematodes costs Michigan growers millions of dollars annually. More important, perhaps, is the fact that many of these losses are never diagnosed as caused by plant-parasitic nematodes.

A laboratory analysis of soil and root tissue is usually necessary for diagnosis of plant-parasitic nematode problems. In Michigan, this service is provided by the Michigan State University Nematode Diagnostic Service Laboratory, which is operated under the direction of the Michigan Cooperative Extension Service. The objective of this publication is to explain the function of the Nematode Diagnostic Service Laboratory, and to provide instructions for taking soil and root tissue samples and submitting them for nematode analysis.

WHEN TO SAMPLE

Soil and root samples can be taken, submitted and reliably processed whenever the soil is not frozen. For the best possible results, however, samples should not be taken until 60 days after the initiation of annual root growth and not after the first frost. Growers considering fall soil fumigation or spring nematicide application should take and submit samples between the end of July and the middle of September.

HOW TO SAMPLE

SAMPLING INSTRUMENT—Samples should be taken with a soil sampling tube, trowel, or narrow-bladed shovel. They should be taken at a 2 to 12-inch depth, with as many feeder roots as possible (Figs. 1, 2, 3, 4, 5).

SAMPLE SIZE—Each sample should consist of a pint to a quart of soil taken from a larger sample composed of 10 or more subsamples (Figs. 1, 2, 3, 4, 5). The number of subsamples (soil cores or borings) needed depends on the size of the area being investigated.

1. Small area (less than 5,000 sq. ft.), take at least 10 subsamples.
2. Medium area (5,000 sq. ft. to 1 acre), take at least 25 subsamples.
3. Large area (1 to 5 acres), take at least 50 subsamples. No one sample should represent more than 5 acres, and each sample should be from an area of a uniform soil type.

The subsamples should be mixed in a clean pail or a plastic bag and one pint to a quart submitted for nematode analysis (Figs. 1, 3, 5, 7).

SUBSAMPLE DISTRIBUTION

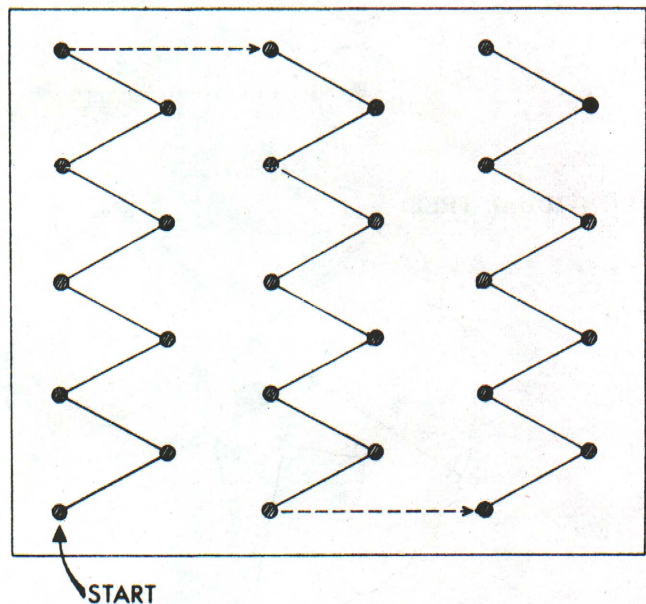
Samples from problem areas

Plant parasitic nematodes feed only on living tissues and are rarely found in dead roots. Soil and root samples, therefore, should be taken from the margin of the problem area where the plants are still living (Figs. 4, 5, 6).

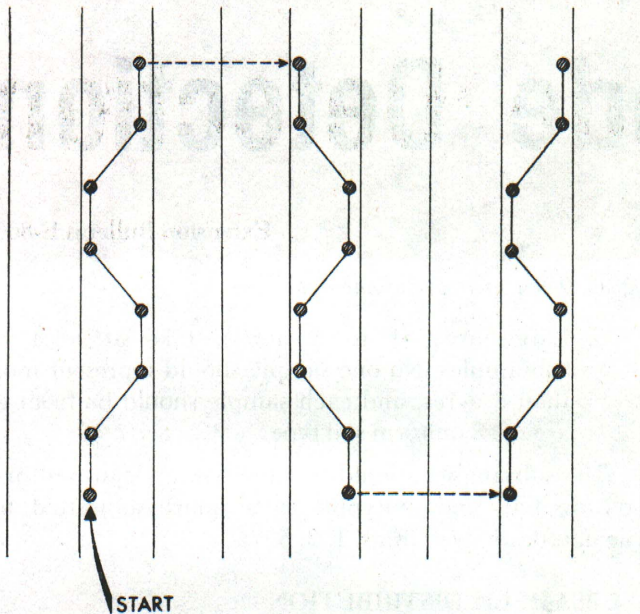
SAMPLE CONTAINER—Either the special nematode sample container provided by the Extension Service or a plastic bag can be used for nematode samples (Fig. 7). All samples should be placed in plastic bags as soon as possible. Nematodes will be killed if the sample is allowed to dry, and it is important that nematodes are living when the sample arrives at the laboratory.

SAMPLE STORAGE—Soil and root samples should be regarded as perishable, handled accordingly, and pro-

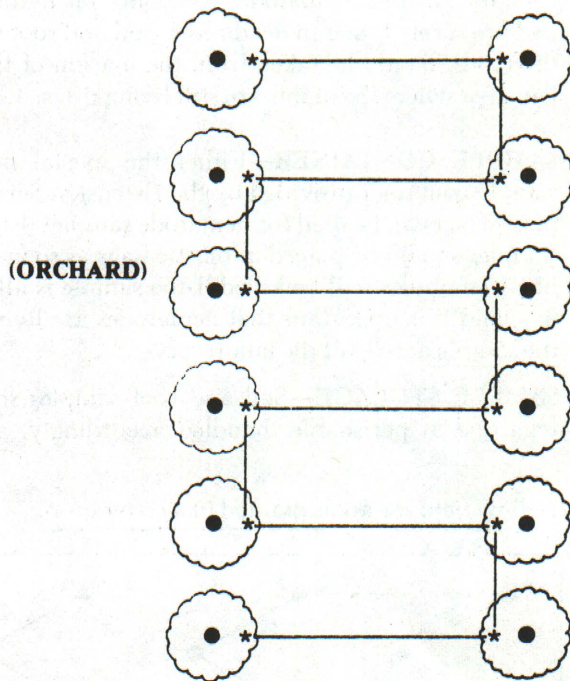
Fallow fields or areas planted in a cover crop.



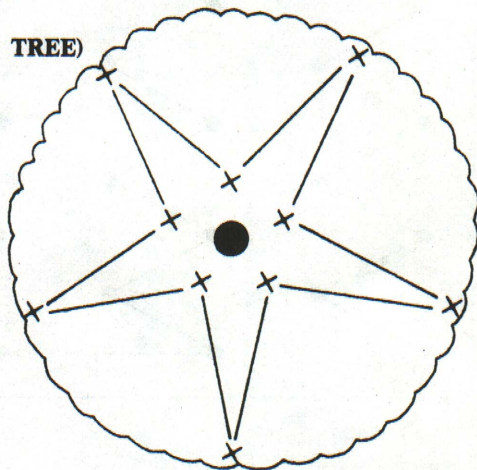
Row crops (take samples from feeder root zone).



Trees (take samples from feeder root zone).



(INDIVIDUAL TREE)



cessed as quickly as possible. Ideally, they should be stored at 10-15C (50-58F). Samples should not be exposed to direct sunlight or stored in trunks of automobiles. Temperatures greater than 40C (100F) will kill nematodes.

HOW TO SUBMIT SAMPLES

All samples must be submitted through the local extension office, accompanied by a completed form (Figs. 7, 8). The information requested on the form is essential for diagnosis of nematode problems and proper recommendations for nematode population management. A special form should be used for sugar beet samples (Fig. 9). A multiple sample form is also available (Fig. 10).

It generally takes two weeks from the time a sample is taken until the results are returned to the grower by the local extension agent. The rapid root and soil assays used for mineral soils, however, are not always satisfactory for analysis of organic soils. In a few cases, a bioassay that requires a 45-day incubation period is used for analysis of organic soils. When this procedure is recommended, the grower will be immediately notified of the delay and will receive the results within two months after the sample was taken.

RESULTS AND RECOMMENDATIONS

All results and recommendations will be returned to the grower by the local extension agent. The types and numbers of nematodes will be recorded on the assay form, along with an indication of whether or not nematodes are a problem. (Figs. 7, 8, 9, 10, 11). If nematodes appear to be a problem, you will be referred to an appropriate Extension Bulletin for a recommendation. The recommendation should be discussed in detail with the local extension agent.

POST-TREATMENT SAMPLES

The best way to analyze the success of nematode population management is to submit a post-treatment sample for nematode analysis. These samples should be taken four to six weeks after treatment. Special post-treatment assay forms can be obtained from the local extension office (Fig. 11). It is important that the forms be completed so the post-treatment results can be compared with those of the original sample.

ADDITIONAL INFORMATION—Extension bulletins on the control of nematodes that damage fruit, vegetable, field and ornamental crops are available at County Extension offices or by writing the MSU Bulletin Office, P.O. Box 231, East Lansing, Michigan 48824.

