PURDUE EXTENSION

E-79-W

Field Crops

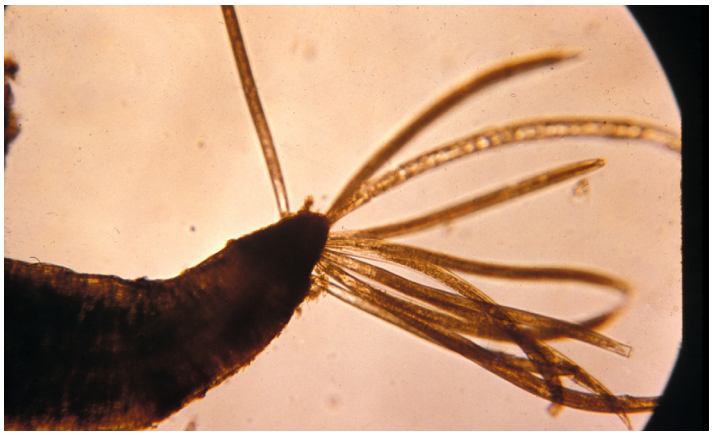
Department of Entomology

NEMATODES

Jamal Faghihi, Research and Extension Nematologist and Virginia Ferris, Nematologist

Nematodes are tiny, thread-like worms so small that most kinds can be seen only through a microscope. Many species live in the soil and water; others invade plant tissues; and some are even parasites in the bodies of animals, including man. Although most soil-inhabiting nematodes will not harm plants, a number can become serious pests. Most plant parasitic nematodes attack the plant roots; however, a few species, like the foliar nematodes, cause injury within the leaves and flowers.

Different nematodes found in soil



Nematodes feeding at root tip

Nematodes seldom kill plants outright, but they can reduce yields, often to a point where it becomes unprofitable to grow susceptible crops in infested soils. Since nematodes are usually too small to be seen without some magnification, the best way to detect their presence is to have a soil and/or plant sample examined by a nematologist. Some problems caused by nematodes can be recognized by specific symptom patterns such as root galls or interveinal yellowing of leaves. However, other symptoms, like stunting or overall discoloration of foliage, can be misleading because insects, diseases, or other factors can cause similar symptoms.

HOW TO DETERMINE DAMAGE

A few kinds of nematodes do produce plant damage symptoms that are rather easy to recognize. Examples are the galls caused by root knot nematodes and dead areas between the veins of chrysanthemum leaves caused by foliar nematodes. More often, the aboveground symptoms are those characteristic of any unhealthy plant: wilting, stunting, yellowing, or lack of plant vigor. This can be caused by those species of nematodes which attack underground plant parts, often causing discolored areas on the roots or producing root galls or other root malformations. Malformation of leaves, flowers, fruits, and seeds is most often caused by nematodes which feed on above-ground portions of plants.

Symptoms of foliar nematode on chrysanthemum

Root knot nematode on muskmelon

Roots of tomato plants with root knot nematode (right); healthy roots (left)

To determine whether nematodes are a problem, first examine the plants carefully to eliminate other likely causes. Check for insects, diseases, possible soil deficiencies, fertilizer damage, frost injury, or too much or too little water. Examine ALL parts of the plant.

After examination, you may send samples of soil and/or plant materials to Purdue University for laboratory diagnosis. Currently, there is a $10 charge/sample for this service. A proper soil sample consists of at least one quart of soil taken directly from the root zone of affected plants. Include some of the roots and place the entire sample in a plastic bag. Do not moisten the soil sample or allow it to dry out. In the summer, samples should be protected from extreme heat. Do not leave them inside a vehicle parked in direct sunlight. If foliar nematodes are suspected, collect both healthy and affected leaves and place them between dry paper towels for mailing. Proper sample collection and shipping are very important to insure a correct diagnosis. For more accurate diagnosis you may consider sending a sample from a non-infected area or plant.

To the OUTSIDE of the bag attach a label, note, or tag giving as much information as you can about the sample. Include location of field, present and past crops grown, and your name and complete address. Send or deliver samples to: Nematology Laboratory, Department of Entomology, Smith Hall, Purdue University, 901 W. State Street, West Lafayette, IN 47907-2089.

CONTROL

Cultural practices. Nematodes are best controlled by cultural practices such as sanitation, crop rotations, summer fallowing, and use of resistant varieties. Such practices are designed to remove the food supply and therefore starve the nematodes. But these practices may prove ineffective unless you know the species of nematodes causing the damage and what other plants they feed upon. Cultural practices work best against species that have a limited number of hosts.

Always obtain plant materials from a reliable plant nursery or dealer who carries only stock which has been inspected and certified free of nematodes, as well as insects and diseases. If roots of plants are infested with soil-inhabiting nematodes, cuttings may be rooted in nematode-free media and transplanted into non-infested soil to obtain nematode-free stock. However, to realize maximum benefits from nematode control measures, plant only clean stock in nematode-free soil. Nematodes can also be killed by heat sterilization. For instance, soil for houseplants can be made nematode-free merely by baking it in the oven at 350°F for 1 hour.

Chemical treatments. In the past nematicides were used to control a wide range of soil nematodes in field crops, vegetables, flowers, and other high-value crops. However, many such chemicals required extreme caution when they were applied and most are now considered too dangerous for such use. Most nematicides are either withdrawn or have disappeared from market. A few nematicides are still available for specialized use to licensed operators.

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