FACT SHEET

L-781

CONTROL OF PLANT PARASITIC NEMATODES AROUND THE HOME AND GARDEN

C. Wendell Horne and Jerral D. Johnson*

Plant parasitic nematodes, slender wormlike animals that move among soil particles and root surfaces, attack numerous ornamental and garden plants as well as lawn grasses. They are too small to be seen by the naked eye; however, their damage is apparent in stunted, unproductive plants.

Nematodes puncture plant cells and withdraw juices with a hollow stylet in their forepart. Enzymes (digestive juices) secreted into plant cells to predigest food often cause abnormal responses detected as root knot galling, the most common symptom observed by homeowners.

Root knot nematode damage is most noticeable to the observer, but other nematode types cause plant damage just as severe with less obvious symptoms. These include a stubby root condition, dead areas within roots, excessively branched roots or death of an entire root branch. Roots should be dug and not pulled from the soil when symptoms are sought. It may be necessary to wash soil from roots to see more definite symptoms.

After preparing for observation, compare suspected roots with healthy plant roots to enable clearer identification of nematode symptoms. If plants are legumes such as beans and peas, do not confuse nitrogen nodules caused by nitrifying bacteria with root knot nematodes. Nitrogen nodules, attached to the side of the root, can be removed by the thumbnail without destroying the root. However, root knot galls are formed within the root and cannot be removed without root destruction.

Nematodes are commonly introduced into a noninfested area by bringing in contaminated soil or planting infested transplants. Sterilization of soil or mulch before placing in flower beds or gardens will prevent nematode occurrence. Transplants introduced into the area should have been grown in sterilized or nematode-free soil.

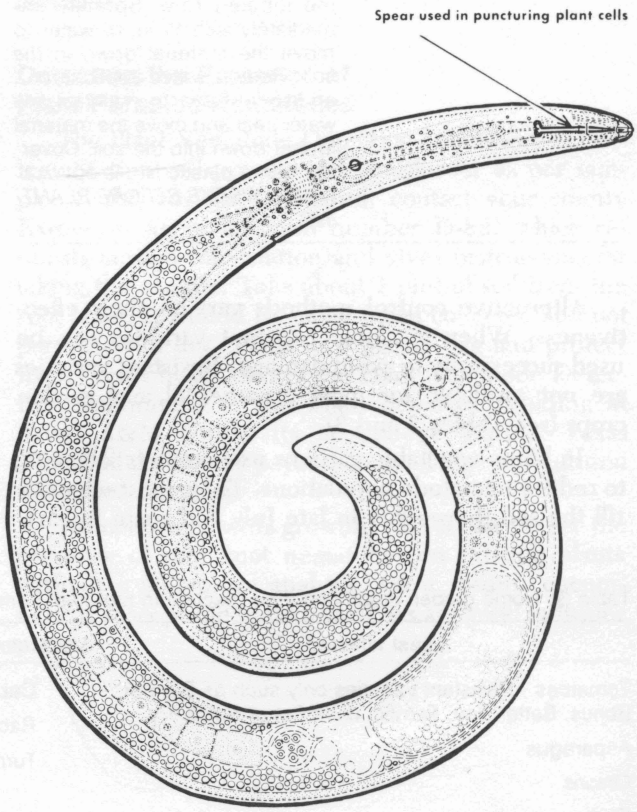

Fig. 1. General shape of a nematode. They may range in length from 0.2 mm to 10 mm, but most plant parasitic types range below 2 mm.

*Extension plant pathologists, The Texas A&M University System.

Texas Agricultural Extension Service • The Texas A&M University System • Daniel C. Pfannstiel, Director • College Station, Texas

Soil may be sterilized physically or chemically. Small amounts may be treated in an oven at 160 degrees F for 3 to 4 hours. Higher temperatures cause release of toxic substances in the soil. Steam sterilization with steam generation equipment is satisfactory if soil is well tilled and covered with an airtight cover before steam exposure. Time required for adequate steam sterilization may be determined by placing a raw Irish potato under the cover at the beginning of the operation. When the potato is baked throughout, sterilization is complete.

One chemical control option is available for homeowner use. Vapam®, a soil fumigant-type chemical can be used as a preplant soil treatment on small areas where no living plants are present (see Table 1).

Table 1. Chemical control information

Material and characteristics	Suggestion for use
Vapam® is a toxic liquid with an offensive odor which reduces the chance of exposure. It is safe for use around the home landscape and garden. Follow label directions.	Use on well tilled soil which is free of large clods. For most effective control the soil should be from 60-90 degrees F with moisture ideal for planting. Avoid too wet or dry soil. *DO NOT USE WHERE ROOTS OF LIVING PLANTS ARE LOCATED.* Apply with water at the labeled rate. Sprinkle immediately with ½ in. of water to move the material down in the soil. Repeat water application 2 additional days to maintain the water seal and move the material further down into the soil. Covering with a plastic film is optional. *WAIT 3 WEEKS BEFORE PLANTING.*

Alternative control methods vary in their effectiveness. When available resistant varieties can be used successfully to avoid damage. Resistant varieties are not available for most ornamental and garden crops (see Tables 2 and 3).

In home vegetable gardens use summer fallowing to reduce nematode populations. To be most effective till the soil thoroughly in late July and again in early August. This practice is most effective if rainfall is low and temperatures are high. Do not expect eradication, since nematode eggs are not as susceptible as the free living stage.

Table 2. Reaction of certain ornamental plants to root knot nematodes

Least affected	Moderately affected	Heavily damaged
Dwarf yaupon	Periwinkle	Boxwood
Liriope	Virbena	Ajuga
English ivy	Sweetpea	Zinnia
Trailing lantana	Annual phlox	Snapdragon
Bamboo	Pansy	Hollyhock
Pampas grass	Day lilly	Cape jasmine
Russina olive	Iris	Morning glory
Juniper	Phlox	Petunia
Cherry laurel	Wisteria	
Dogwood	Sasanqua	
American holly	Euonymous	
Crape myrtle	Ligustrum	
Wax myrtle	Pittosporium	
Chinese tallow		
Box elder		
Deodora cedar		
Sycamore		
Most oaks		

Avoid relying on control methods such as growing marigolds or using sugar in the soil since they are ineffective and may cause secondary problems. Using recommended procedures saves time and money and avoids disappointment.

Facts About Plant Parasitic Nematodes Related to Their Occurrence and Control

Nematodes are capable of moving only about 1 foot per year by their own motion; therefore, they must rely on movement of soil, water or plant material for major distribution. Cultural practices of soil tillage and transplanting result in the inadvertent movement of nematodes. Soil clinging to tillage equipment is one of the most common means of distribution.

Table 3. Home garden crops and their reaction to root knot nematodes

Least affected	Moderately affected*	Heavily damaged
Tomatoes - Resistant varieties only such as Big Set, Bonus, Better Boy, Terrific, Jack Pot or Small Fry	Cabbage	Tomatoes - All varieties without proven resistance.
Asparagus	Radishes	Potatoes, Beans, Peas, Beets, Okra, Cucumber, Cantaloupe, Carrots
Onions	Turnips	
Garlic		
Corn		
Southern Peas - Resistant varieties only such as Mississippi Silver and California Cream No. 5		

*Damage escape is due mostly to their being grown during the cool season. All may have some galling of the root system.

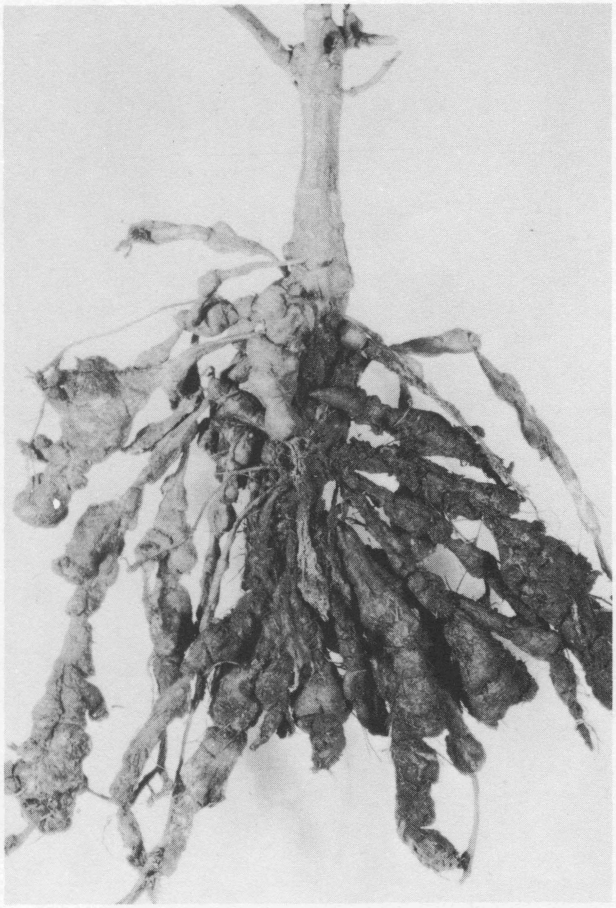

Fig. 2. Root knot galls on lima beans. Galls are produced as a result of feeding and presence of the nematode inside the roots.

Since nematodes are aquatic animals they must reside in moist soil or plant material. Tilling the soil regularly during summer months and exposing it to heat and drying reduce populations considerably. Do not expect to eradicate nematodes by cultural or chemical means. A combination of suggested control practices reduces nematode numbers so that a successful crop can be grown.

Plant parasitic nematodes usually can be found as deep in the soil as roots penetrate. This insures that no control procedure will be completely effective.

Feeding and reproductive rates of nematodes are faster during warm temperatures, but may be suspended almost completely in cold soil. Some winter garden crops such as cabbage and onions often produce well even though there is some nematode damage.

Growing susceptible crop species continuously increases nematode populations to the point where it becomes virtually impossible to produce a susceptible crop. Grow less susceptible crops in rotation with more susceptible types.

Nematodes that feed on plants are obligate parasites which do not survive and reproduce without the presence of a suitable host plant. Depriving these nematodes of a host plant for 1 or 2 years usually is adequate to reduce the population to a very low level. Certain weeds and grasses can serve, however, as host plants. If not controlled, they can maintain the population.

Some feel that nematode populations develop if susceptible crops are grown. This is not the case. Development occurs only if nematodes are present initially or have been introduced to the new growing site.

Nematodes can be controlled so that desired crops can be grown by using cultural and chemical control methods.

Detecting the Presence of Plant Parasitic Nematodes

The Plant Nematode Detection Laboratory at College Station will process soil samples for $2 per sample. If this service is desired, contact your county Extension Agent for form number D-827 which requests certain information and gives instructions for taking the sample. Take about 1 pint of soil from the root zone. It should be moist when collected and not permitted to dry. Place in a plastic bag and protect from excess heat. Mail to the Plant Nematode Detection Laboratory in the Plant Sciences Building at Texas A&M University at College Station, Texas 77843. Make checks payable to the Texas Agricultural Extension Service.

Homeowners with growing plants can detect the presence of root knot nematodes on existing plants without a laboratory analysis. Okra, beans, cucumbers or susceptible tomato varieties are good indicator plants.

Educational programs conducted by the Texas Agricultural Extension Service serve people of all ages regardless of socio-economic level, race, color, sex, religion or national origin.

Cooperative Extension Work in Agriculture and Home Economics, The Texas A&M University System and the United States Department of Agriculture cooperating. Distributed in furtherance of the Acts of Congress of May 8, 1914, as amended, and June 30, 1914.
30M—10-78, Revision PP