

Extension FactSheet

Plant Pathology, 2021 Coffey Road, Columbus, OH 43210-1087

Root Knot Nematode

Richard M. Riedel, Sally A. Miller and Randall C. Rowe
Department of Plant Pathology

Root knot first attracted attention in 1855 when it was found in a greenhouse in England. Since then it has been a cause for concern over much of the world. It affects more than 2,000 species of plants including economically important forage crops, small grains, fruits, vegetables, field crops, nursery crops, and turf grasses. Root knot nematodes are cosmopolitan in distribution and occur widely in the United States.

Symptoms

Root knot is very distinctive because of the galls or swellings produced on roots and underground portions of stems. These deformations can often completely ruin crops for sale. Plants, if infected when young, will be stunted, more susceptible to drought stress, and show symptoms of nutrient deficiency.

Large and small roots may be affected with swellings varying from round sphere-like galls to elongated spindles formed from large numbers of individual galls growing together. Root knot galls involve the entire root in the affected zone. They do not take the form of easily detached galls like those produced by nitrogen-fixing bacteria on the roots of legumes. **Root knot galls should not be confused with the fungal disease, club root, on cruciferous crops.** In most instances, root knot is characterized by smaller swellings, and more uniformly distributed infection on the lateral feeding roots than is typically seen with clubroot. When the galls formed by the root knot nematode are broken open, shiny white bodies about the size of a pinhead, the enlarged female nematodes, are usually found. Also, glistening white to yellow

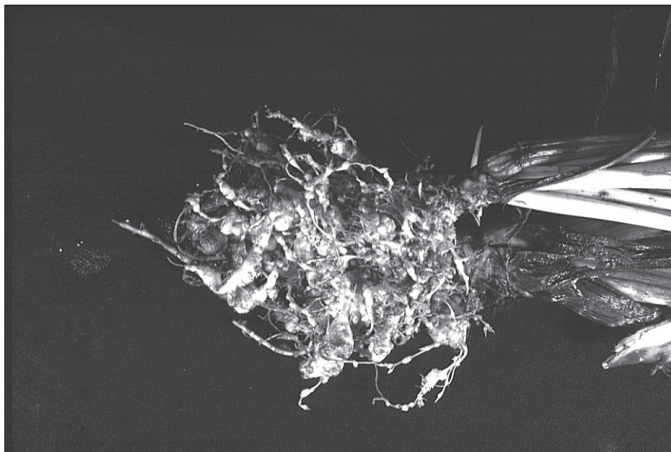


Figure 1. Symptoms of root knot nematode on Chinese cabbage. Note the severe galling and distortion of the roots.

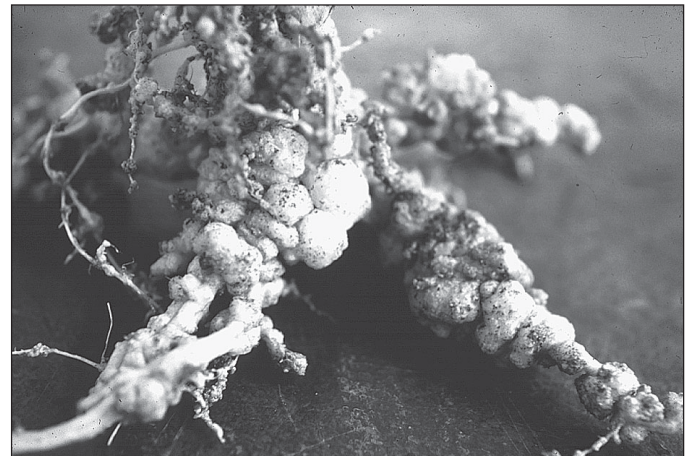


Figure 2. Severe symptoms of root knot nematode on tomato roots.

egg masses are present on the root surface. The galls formed by clubroot do not possess this characteristic and are usually pinkish or brick colored. Phenoxy-type herbicides such as 2,4 D can cause swellings on stems of cruciferous crops which superficially look like root knot galls. Herbicide damage on these crops will not affect the roots, however. On young potato tubers the outer surface appears rough and warty because of the enlarged females underneath the skin.

Causal Organism

Root knot is caused by a small round worm, *Meloidogyne* spp. There are about 40 species at the present time. Not all plants are susceptible to any one species.

Juveniles emerging from eggs in the soil penetrate between and through cells to a position at the center of the root usually near the growing tip. Feeding by the nematodes causes increases in root cell numbers and size. Enlarged cells, called giant cells, serve as food sources for female root knot nematodes.

During feeding, juveniles which will become females undergo a series of molts and enlarge. The female does not move from the feeding site. Each female deposits 300–500 eggs in a protective, jelly-like matrix at the root surface. Eggs, particularly in the egg mass, can withstand unfavorable environmental conditions. They represent one means of overwintering. Root knot nematodes may also overwinter in the soil in a juvenile stage. Root knot nematodes are often introduced into a growing area in infected planting stock.

Control

1. Rotate at least 3 years with non-host crops. While the feeding habits of field populations must be determined before crop rotation plans are set, the most common root knot species in Ohio will not reproduce on grasses, small grains, or corn. Clean cultivation to keep down weed hosts of the nematodes is important.
2. Use transplants and nursery stock certified free of root knot nematode.
3. Plant resistant varieties wherever possible.
4. In commercial production, soil can be treated with fumigant-type nematicides. To be effective, fumigants must be applied properly. Contact and systemic insecticides/nematicides also are available for a limited range of crops produced commercially. Consult the Ohio Vegetable Production Guide (OSU Extension Bulletin 672) for details on chemical control.

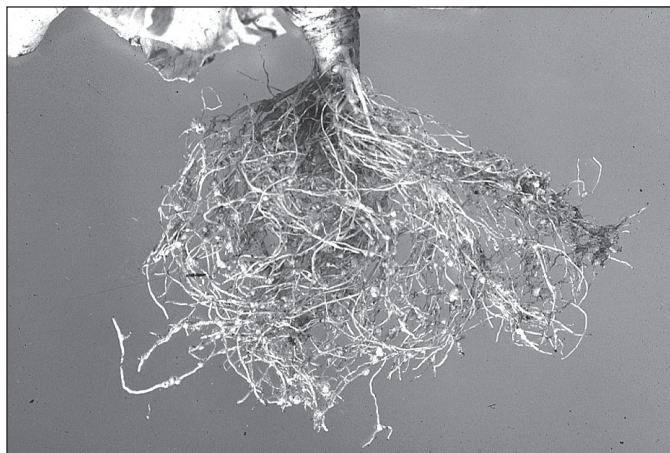


Figure 3. Symptoms of root knot nematode on lettuce. Note the presence of many small galls on the roots.

Visit Ohio State University Extension's web site "Ohioline" at:
ohioline.osu.edu

All educational programs conducted by Ohio State University Extension are available to clientele on a nondiscriminatory basis without regard to race, color, creed, religion, sexual orientation, national origin, gender, age, disability or Vietnam-era veteran status.

Keith L. Smith, Associate Vice President for Ag. Adm. and Director, OSU Extension
TDD No. 800-589-8292 (Ohio only) or 614-292-1868