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Root Knot Nematodes

Root knot (nematode – *Meloidogyne* spp.) disease occurs in nearly all parts of the state and on most plant species. Certain species are specific to individual plant hosts. Above ground symptoms are similar to many other root diseases or environmental factors limiting water and nutrient uptake. These symptoms consist of wilting during periods of moisture stress, stunted plants, chlorotic or pale green leaves, and reduced yields. Most characteristic symptoms; however, are those occurring on underground plant parts. Infected roots swell at the point of infection and form knots or galls. Several infections may occur along the same area resulting in large fleshy galls. The appearance of galls will depend in part upon the host and the nematode species involved. Generally, fast growing annuals will have a large flesh gall and woody perennials, small hard galls. Infected roots are retarded in growth and lack fine feeder roots. Rotting of roots may develop late in the season. When tubers, corms or other edible root portions are infected, small swellings or pimpling is evident on the surface. ([See Photo](#))

The Pathogen (*Meloidogyne* spp.): Although different species of root knot nematodes vary in their host-parasite relationships, all have basically the same life cycle. The infectious stage of this nematode is the second stage larvae which occurs free in the soil (The larvae has already molted once in the egg). The second stage larvae will penetrate the plant at or near the root tip and become sedentary. An enzyme is released which causes the plant cells surrounding the head region to enlarge, forming giant cells which serve as a source of nourishment for the parasite. The female nematodes swell until they become pear-shaped or oval as shown in [this photo](#). During this time, the nematode undergoes two more molts. Females begin laying eggs around 20 days after penetration of the host. The average female will lay approximately 30 eggs a day for two weeks. The average life cycle is 25 days. Populations will build up rapidly when environmental conditions are favorable.

Control

1. **Crop Rotation** – a three or four year rotation program with resistant crops is an effective program. Most of the cereal crops are fairly resistant.
2. **Resistant or Tolerant Varieties** – Some vegetable and field crop varieties have resistance to root knot nematodes, and are advertised as such. Reaction of several ornamental plants is given in a table at the end of the Shrubs section on root knot disease.
3. **Clean Summer Fallow** – dry summer fallow with cultivations every 3 to 4 weeks is an effective method of reducing nematode populations. This method may be impractical in some instances.

4. **Selection of Planting Stock and Planting Sites** – Select transplants free of root knots. Plant roots should be washed and carefully inspected for signs of nematode injury. Select planting sites free of nematode infestations. An indicator crop of tomatoes, okra or other susceptible plants could be grown in the area if you do not know rotation histories. Submit soil samples to the Plant Nematode Detection Laboratory for analysis.
5. **Chemical Control** – Nematicides are effective, well accepted and can give good economic returns on high value crops. Treatment is sufficient for a year and retreatment usually will be required the following year if susceptible plants are to be grown. Application methods are dependent upon the type of material used, along with conditions in the area requiring treatment. Most nematicides are either injected into the soil or washed in by a water drench. Nematicides may be purchased in liquid or granular forms, with application directions dependent upon the type of plants growing or to be grown. When possible, nematode-infested soil should be treated before planting seed or setting transplants. **C2013 Ong)*

Nematicide Application Methods **Currently there is no labelled chemical nematicide for home owner use. The information presented below is for informational purposes ONLY. (12/16/2013 Ong)*

1. **Preplant-application** – First decide whether row or broadcast treatment is desired. If plants are to be cultivated in a row, treat only the potential root zone. Soil should be tilled deeply to prepare a good seedbed. Cover immediately to prevent material loss. For best results, soil moisture conditions should be just right for cultivation or planting and the soil temperature should be between 60 and 80 degrees F. Nematicides diffuse approximately 6 inches from point of application to give a treatment zone 12 inches wide and 12 inches deep. Applying materials on 12-inch centers results in overall or broadcast soil treatment.
2. **Side dressing nematode-infested plants** – Make sure the material on hand can be used around living plants without causing injury. Dig a trench to the side of the plants as directed on the label. Cover the material immediately and water to cause diffusion of the material into the root zone. Make sure all label precautions are followed as they relate to chemical rate and plant growth stage.
3. **Drench for established shrubs and trees** – Infested shrubs and trees may be treated by building a dike around the tree base that will contain water-diluted materials until they penetrate the root zone. The dike should be large enough in diameter to accommodate a majority of the feeder roots. The nematicide should be accurately measured and diluted in sufficient water to penetrate the root zone. After material penetration, add water to wash the nematicide down into the root zone.
4. **Treatment of established turf** – After application of Granular materials, water to leach the material into the root zone.

Root knot nematode slides were furnished by Dr. James Starr, Department of Plant Pathology and Microbiology, Texas A&M University

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