

Root-knot Nematodes

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Plant parasitic nematodes are microscopic worms that can cause significant damage to plants in gardens, landscapes and nurseries. While there are many types of plant parasitic nematodes, root-knot nematodes (RKN) (*Meloidogyne*) form characteristic knot-like nodules on host roots. The nodules inhibit normal root function, causing various above-ground disease symptoms. More than 90 species of *Meloidogyne* feed on thousands of host plant species worldwide. In the United States, the most common RKNs infesting ornamental plants are *M. hapla*, *M. incognita* and *M. javanica*. Ornamental plants susceptible to RKN are boxwood, birch, gardenia, magnolia, holly, oak, olive, serviceberry, xylosma, and yew.

Description and Symptoms

RKNs live in soil and roots and feed on plant cells. Infested roots are stunted and will not produce many fine feeder roots needed for water and nutrient uptake. They may also be prone to root rot diseases. When the infestation is severe, normal root function is inhibited, and above-ground symptoms are evident (Figure 1).

Symptoms of RKN infestation are similar to other root disorders and include foliage yellowing (chlorosis), wilting, dieback, stunting and defoliation. Because symptoms are general, proper diagnosis and identification of the problem is important.

Pathology

Life cycles of various RKN species are similar. The second-stage juvenile is the infectious stage. These mobile juveniles penetrate the root tissue just behind the root tip, migrate between cells and remain within the root as they mature. Like other plant-parasitic nematodes, they have a pointy mouthpart (stylet) used to pierce and penetrate plant cell walls and take up nutrients.

Figure 1: Boxwood with yellowing foliage (chlorosis) associated with root damage from a RKN infestation

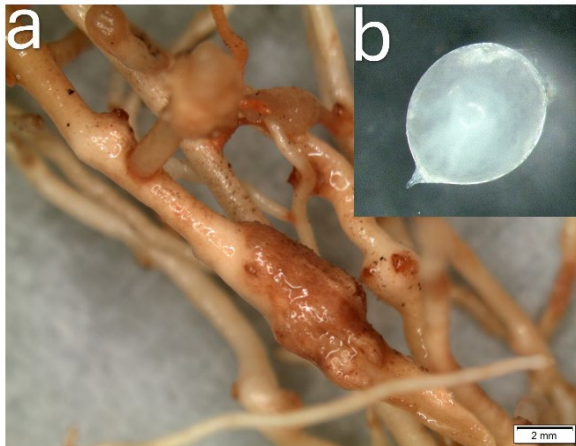


During infection, the nematodes induce the plant to produce tumor-like “giant cells” (Figures 2 and 3). The root knots (nodules) that form because of the swollen giant cells are required to complete the RKN life cycle. With the onset of feeding, the juvenile nematode becomes sedentary and goes through three molts before becoming a mature adult (Figure 3) within the root. A single female lays around 300–1,000 eggs in a mass which protrudes through the root surface.

Figure 2: Lilac roots with galls formed by RKN infestation



Figure 3: a) Boxwood roots with RKN galls and b) mature, adult female removed from a gall



Management

- [1] Incorporate organic matter into the soil to encourage root development and habitat for organisms that prey upon nematodes.
- [2] Mulching: provide 2-4 inches of an organic mulch, such as pine fines or wood chips, over the critical root zone to conserve soil moisture and moderate soil temperature to promote root and soil health.
- [3] Provide supplemental irrigation when necessary to minimize drought stress.
- [4] No product treatments are currently available to directly control RKNs in the landscape. Applications of potassium phosphite fertilizers may help promote a plant defense response to infection.
- [5] Provide supplemental irrigation when necessary to minimize drought stress.
- [6] Avoid root and soil disturbances within the critical root zone of trees during construction and site renovation.
- [7] Apply prescription fertilization to maintain optimal fertility, pH and organic matter through treatments based on soil analysis

Please contact your Bartlett Arborist Representative to learn more about management strategies.



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