

## Plant Pathology Fact Sheet

# Blueberry Root Rot

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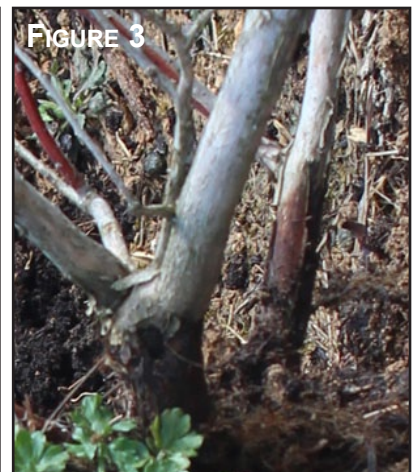
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## IMPORTANCE

Blueberry is considered one of the most disease-free fruit crops in Kentucky. Many of the diseases that affect blueberry result in minor damage. However, the most common disease of blueberry, Phytophthora root rot, can cause severe dieback and often results in plant death. The causal agent of blueberry root rot is *Phytophthora cinnamomi*, a soilborne water mold that occurs world-wide and can infect a wide range of hosts, including woody ornamentals. Under optimal conditions, the pathogen proliferates, and disease symptoms occur.

## SYMPTOMS

The primary symptom of Phytophthora root rot is rotting roots. Lesions begin on small feeder roots (FIGURE 1), later spread to main roots (FIGURE 2), and then eventually appear on crowns (where trunk meets roots) (FIGURE 3). However, aboveground symptoms are usually noticed before roots are examined. Aboveground symptoms are initially yellowing or reddening of leaves (FIGURE 4), followed by marginal leaf scorch (browning). Lack of water and uptake (caused by root loss) ultimately causes stunting, lack of new growth, and death of terminal buds or leaves. Advanced



**FIGURE 1.** ROOT INFECTIONS BEGIN AS SPOTS OR LESIONS. AS INFECTION SPREADS, ROOT DECAY ADVANCES. (Photo: Brenda Kennedy, UK) **FIGURE 2.** DURING ADVANCED STAGES OF DISEASE DEVELOPMENT, ROOTS ARE SEVERELY DECAYED AND NO NEW ROOT GROWTH IS EVIDENT. **FIGURE 3.** AS ROOT INFECTIONS SPREAD, CROWNS AND LOWER CANES BECOME DISEASED. (Photos: Nicole Ward, UK)



**FIGURE 4.** ABOVEGROUND SYMPTOMS BEGIN WITH LEAF YELLOWING OR REDDENING. THIS IS THE RESULT OF REDUCED WATER AND NUTRIENT UPTAKE CAUSED BY ROOT LOSS. (Photo: Michigan State University Extension) **FIGURE 5.** DEFOLIATION AND BRANCH DIEBACK ARE SYMPTOMS OF ADVANCED DISEASE DEVELOPMENT. (Photo: Nicole Ward, UK)

symptoms include defoliation, branch dieback (FIGURE 5), and plant death. Often plants in lowest lying areas are first to be affected (FIGURE 6). Growers may look for water-loving weeds such as sedges as indicators of poor drainage.

### CAUSE AND DISEASE DEVELOPMENT

*Phytophthora cinnamomi* is a water mold that infects and decays roots when soils are warm and wet. Water molds such as *P. cinnamomi* require free water to survive and reproduce. Spores (zoospores) have long whip-like structures (flagella) that assist in their “swimming” movement. Wet soils provide a medium for pathogens to move into root zones.

*P. cinnamomi* is commonly present in soil. Under optimal conditions, the pathogen can infect and destroy highly susceptible crops such as blueberry. Soils that are heavy, poorly drained, slow to drain, or saturated from rain or over-watering are ideal locations for *Phytophthora* spp. to thrive.

Once established, water molds produce overwintering structures (chlamydospores)

that can survive in a variety of climate extremes, including heat and drought. When environmental conditions reach optimal levels (68 to 90 degrees F accompanied by saturated soils), the pathogen breaks out of its resting or overwintering stage and infects susceptible plants. New infections occur when the pathogen releases the motile (swimming) spores that are carried via water. These swimming spores also enable organisms to spread from plant to plant. Spores may also move considerable distances in contaminated soil.

### DISEASE MANAGEMENT

Management of *Phytophthora* root rot requires an integrated approach, which should begin with cultural practices. It is also important to understand that fungicides do not cure infections, and therefore should not be relied upon as sole means for disease management.

#### **Cultural Practices**

- Begin with disease-free plants. Examine plants carefully and avoid those with dark gray or black roots or those that feel mushy. Avoid nursery plants with waterlogged soil. Do not install plants that may be infected.



**FIGURE 6.** LOW-LYING AREAS ARE OFTEN THE MOST POORLY DRAINED, AND THEREFORE, ARE USUALLY THE FIRST TO BECOME AFFECTED BY DISEASE. (Photo: Nicole Ward, UK) **FIGURE 7.** IN ORDER TO INSURE SUFFICIENT DRAINAGE, BLUEBERRY SHOULD BE PLANTED ON BEDS RAISED AT LEAST 12 INCHES HIGH. (Photo: Gary Gao, Ohio State University)

- Select a site with good surface drainage and loose soil with good internal drainage.
- Improve drainage if necessary. For best results, raise planting beds (FIGURE 7) at least 12 inches high. Slope soil away from rows and do not allow surface water to puddle or collect around plants. Install drainage tiles if internal drainage is not sufficient. These improvements are easiest to implement before plant installation.

### **Fungicides**

- Fungicides may be necessary for preventing infections in new plantings. Refer to *Commercial Fruit Pest Management Guide* (ID-232) for current fungicide recommendations. Apply fungicide two times per year in years 1 and 2 until plants are established. These products should be applied when leaves are fully expanded (after flowering) and again 4 weeks later. Blueberry planted in well-drained beds should not require fungicides once established.
- If replanting in an area with known infestations, soil should be treated at the time of replant. Drench with a fungicide containing mefenoxam. Plants should be treated with

phosphorus acid fungicides four times per year in years 1 and 2, then preventatively two times per year indefinitely.

- Infected plants cannot be cured, but a combination of cultural practices and fungicides may help sustain plants that are in early stages of disease development. Lift plants into raised beds and improve drainage as described previously. Apply phosphorus acid fungicides four times per year in years 1 and 2, and then preventatively two times per year indefinitely. Not all plants will respond to this treatment regime, so growers must evaluate individual situations. Determine costs associated with fungicides to determine whether fungicide applications are cost prohibiting. As mentioned above, fungicides are not curative, but should be utilized to protect emerging plant roots from new infections.

### **ADDITIONAL RESOURCE**

- Commercial Fruit Pest Management Guide (ID-232)  
[http://www2.ca.uky.edu/agcollege/plantpathology/ext\\_files/PPFShtml/ID-232.pdf](http://www2.ca.uky.edu/agcollege/plantpathology/ext_files/PPFShtml/ID-232.pdf)

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