Martin-Gatton
College of Agriculture, Food and Environment
Cooperative Extension Service

Plant Pathology Fact Sheet **PPFS-FR-S-19**

Phytophthora Root Rot of Blueberry

Nicole Gauthier, *Plant Pathology Extension Specialist*
Brandon Bell, *Agriculture Extension Agent*

Importance

Most of the diseases that affect blueberry crops in commercial or residential production cause minor damage. However, there is one commonly occurring blueberry disease that seriously impacts plant health and yields: Phytophthora root rot. This disease has been so devastating in some Kentucky fields that entire plantings have had to be abandoned. Blueberry root rot results in root decay, stunting, and severe dieback (Figure 1), often leading to plant death.

Symptoms

Symptoms of Phytophthora root rot begin as lesions on small feeder roots (Figure 2). As infection spreads, larger roots (Figure 3) and eventually the root collar (where trunk meets roots) become decayed (Figure 4). Infected roots become brown or black compared to healthy white roots. Plants in poorly drained soil and those in lower lying areas are generally the first to be affected.

Initial root decay symptoms largely go unnoticed until there is sufficient root loss to impact water and nutrient uptake to foliage. As root processes become impaired, aboveground symptoms become noticeable, including leaf yellowing and/or reddening (Figure 5), followed by marginal leaf scorch (browning). Affected plants appear stunted, lack new growth, and terminal buds die. Advanced symptoms include defoliation, branch dieback, and plant death.

Cause & Disease Development

Blueberry root is caused by a soilborne fungus-like organism, *Phytophthora cinnamomi*. It is also known as a water mold because of its requirement for water to complete its life cycle. The pathogen overwinters as chlamydospores, structures capable of surviving adverse environmental conditions for 6 or more years. Once temperatures become favorable (68°F to 90°F) and soil becomes saturated, chlamydospores germinate and produce sporangia (capsule-like structures) containing infective zoospores (motile "swimming" spores with flagella). Zoospores require free water to move into root zones, so wet soils provide the ideal conditions for infections.

Figure 1. A healthy blueberry plant (left) compared to a plant with Phytophthora root rot (right). Infected plants have poor root systems due to root decay, which results in stunting, foliar discoloration, and eventually, plant death.

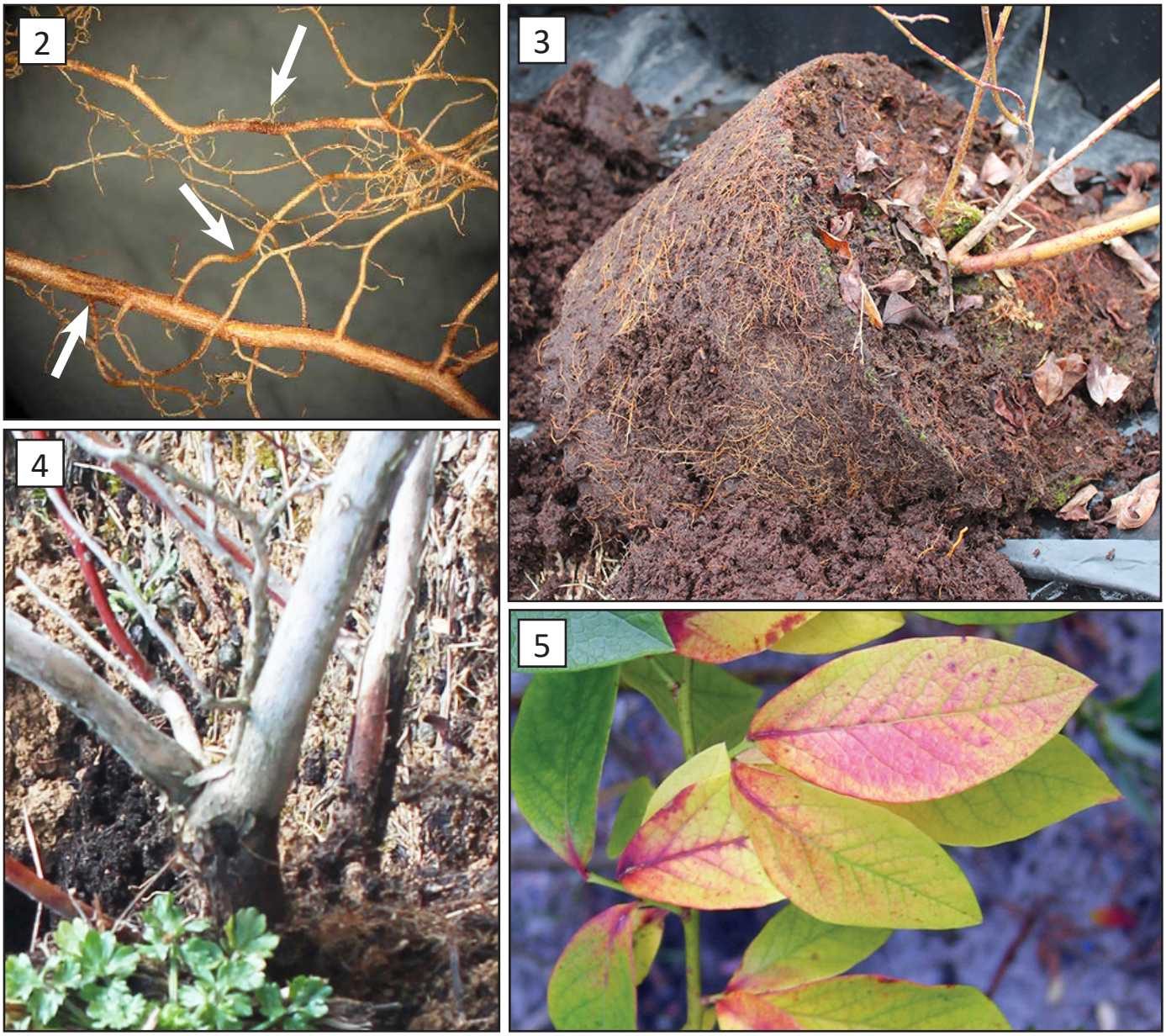

Figure 2. Root infections begin as lesions (darker brown areas) on feeder roots; infections spread to larger roots and root decay results. Note: The white arrows point to some of the lesions present on these roots.
Figure 3. During advanced stages of disease development, roots become brown and severely decayed with no new, healthy white root growth evident.
Figure 4. As root infections spread, root collars and lower stems become diseased.
Figure 5. Aboveground symptoms begin with leaf yellowing and/or reddening caused by root loss, which has resulted in reduced water and nutrient uptake.

Disease spreads short distances when zoospores move in water to nearby plants. Long distance spread occurs when infested soil or infected plants are moved to new sites.

Disease Management

Management of Phytophthora root rot requires an integrated approach, which begins with following good cultural practices. Fungicides do not cure infections, and therefore should not be relied upon as the sole means of disease management.

Cultural Practices

- Purchase disease-free plants. Examine roots carefully and avoid installing plants with darkened roots or roots that feel mushy.
- Select a planting site with loose soil and good internal drainage. Avoid low-lying areas (Figure 6).
- Plant into raised beds (Figure 7) at least 12 inches high to facilitate drainage when necessary.

Figure 6. Low-lying areas are often the most poorly drained, and therefore, are usually the first to become affected by this disease.
Figure 7. To ensure sufficient drainage, blueberry plants should be planted on beds raised at least 12 inches high.

- Avoid these planting practices:
  - Using an auger for digging planting holes; augers often create a compacted "bowl" with glazed sides that retains water.
  - Overusing peat moss, which results in excessive water retention in the root zone.
- Slope soil away from rows and do not allow surface water to puddle or collect around plants.
- Do not over irrigate.
- Nurseries should:
  - Avoid placing pots in areas prone to flooding or water retention.
  - Use a potting mix that promotes good drainage.

Fungicides

While this pathogen is not a true fungus, certain fungicides do have efficacy against *Phytophthora*. Refer to *Commercial Fruit Pest Management Guide* (ID-232) for current fungicide rates.

New planting

If infected plants are nearby or risk for infection is high, apply a phosphorus acid-based systemic fungicide (FRAC 33) as a preventative foliar spray twice a year for the first 2 years until plants are established.

Make the first application when foliage is fully expanded (after flowering) and then again 4 weeks later. Blueberry planted in well-drained beds should not require fungicides once established.

Replanting into a site with a history of disease

Avoid planting into a site that has a history of Phytophthora root rot for at least 5 years. Before replanting, treat soil by drenching with a mefenoxam-based fungicide (FRAC 4). Apply a phosphorus acid-based systemic fungicide (FRAC 33) four times per year for the first 2 years, then preventively two times per year indefinitely.

Infected plants within an existing planting

Infected plants cannot be cured, but a combination of cultural practices and fungicides may help protect emerging plant roots from new infections and sustain plants that are in early stages of disease development.

Lift (dig and raise) plants into raised beds. Drench with a mefenoxam-based fungicide (FRAC 4) at budbreak. Apply a phosphorus acid-based systemic (FRAC 33) fungicide four times per year for the first 2 years after disease was identified. Additional sprays should be applied twice per year indefinitely.

Not all plants will respond to this treatment regime, so growers must evaluate individual situations. Determine costs associated with fungicides to evaluate whether fungicide applications are cost effective.

Additional Resources

- Commercial Fruit Pest Management Guide (ID-232)
https://ag.purdue.edu/department/hla/extension/_docs/id-465.pdf

- Cultural Calendar for Commercial Blueberry Production (PPFS-FR-S-29)
https://plantpathology.ca.uky.edu/files/ppfs-fr-s-29.pdf

- Midwest Blueberry Production Guide (ID-210)
https://publications.ca.uky.edu/sites/publications.ca.uky.edu/files/ID210.pdf

- Sample Fungicide Spray Schedule for Commercial Blueberry (PPFS-FR-S-21)
https://plantpathology.ca.uky.edu/files/ppfs-fr-s-21.pdf

- Disease and Insect Control Program for Home Grown Fruit in Kentucky including Organic Alternatives (ID-21)
https://publications.ca.uky.edu/sites/publications.ca.uky.edu/files/id21.pdf

October 2014

Editor: Cheryl Kaiser, Plant Pathology Extension Support
Photos: USDA—Jerry Weiland (1); University of Kentucky—Brenda Kennedy (2), Nicole Gauthier (3, 4 & 6); Michigan State University Extension (5); The Ohio State University—Gary Gao (7)

Revised from the fact sheet, *Blueberry Root Rot* (PPFS-FR-S-19) by Nicole A. Ward Gauthier