College of Agriculture, Food and Environment
Cooperative Extension Service

Plant Pathology Fact Sheet PPFS-OR-W-20

Boxwood Blight

Nicole Gauthier
Extension Plant Pathologist

Jamie Dockery
Extension Horticulture Agent

Importance

Boxwood blight is a disease of boxwood (*Buxus* spp.) that causes rapid defoliation and plant dieback. Infected plants are eventually weakened, and the resulting plant stress and consequent colonization by secondary invaders often results in plant death. This fungal disease is particularly devastating to American boxwood cultivars, which can defoliate within a week; weakened plants can die within one growing season. Other susceptible hosts within the boxwood family include Pachysandra (Japanese spurge) and *Sarcococca* spp. (sweet box).

Boxwood blight is an invasive disease that originated in the United Kingdom in 1994 and is currently distributed throughout Asia, Europe, North America, and New Zealand. First reported in the U.S. in 2011, boxwood blight was confirmed in a residential landscape in Central Kentucky during October 2014; it is currently present in 27 states. Since its introduction, this disease continues to spread within the nursery trade and in landscapes.

Symptoms

Boxwood blight affects leaves and branches. Roots can become infected and harbor fungal resting structures (microsclerotia), but root rot has not been reported. The earliest symptoms include light or dark brown circular leaf spots with darker borders (Figure 1). However, because plants can defoliate soon after leaf spots develop, this symptom often goes unnoticed. Elongated, dark brown or black streak-like lesions appear on infected stems (Figure 2).

Figure 1. Early symptoms of boxwood blight include leaf spots, but because leaf drop occurs soon afterward, this phase often goes unnoticed.

Symptoms of boxwood blight are different from some of the more commonly observed boxwood problems. For example, stem blight, freeze damage, and drought damage result in bright bronze or straw-colored foliage that remains attached to branches. Boxwood blight, in contrast, results in rapid defoliation of plants (Figure 3). Refer to *Volutella Blight of Boxwood* (PPFS-OR-W-26)to compare boxwood blight with this other disease.

Cause & Disease Development

Boxwood blight is caused by the fungus *Calonectria pseudonaviculata* (synonym: *Cylindrocladium buxicola)*. This fungus produces resting propagules (microsclerotia) that enable it to survive long periods in the absence of a host plant and during extreme weather conditions. Microsclerotia can remain dormant for 1 year buried in soil and for up to 6 years in plant debris.

The most common propagules produced by this fungus are spores called conidia. Conidia are the "repeating" stage of the disease cycle and the main source of inoculum. During warm, humid weather, the fungus produces conidia from infected plant material or debris. Under favorable conditions, conidia can initiate an infection within 5 hours of landing on a susceptible host. Newly sporulating lesions may develop within 7 days after infection. Optimal temperatures for disease and symptom development are 64˚F to 81˚F; disease symptoms are suppressed at temperatures above 84˚F.

Conidia can be spread short distances via splashing water and wind-driven rain. Sticky spores may also "hitchhike" on tools, clothing, holiday décor, or wet hands, but they rarely move unaided by humans. Long distance spread occurs when infected plants or infested soil (debris) and equipment are moved from one location to another. Conidia can survive 3 weeks without a host plant.

Figure 2. Dark stem lesions are one of the most distinguishing symptoms of boxwood blight.

Figure 3. Defoliation of the lower plant canopy is often the first obvious symptom of boxwood blight.

Disease Management

Exclusion (not allowing diseased plant material into a nursery or landscape) and strict sanitation protocols are keys to managing boxwood blight. Cultural practices, which can help prevent conditions that are conducive for disease development, and fungicides may be helpful, but only in combination. In addition, there has only been limited success using fungicides, so they should never be the sole management option employed. Fungicides can be used to protect plants from infection or suppress disease development, but they will not cure boxwood blight.

For more details regarding sanitation, refer to the UK Extension fact sheets, *Landscape Sanitation* (PPFS-GEN-04) and *Greenhouse Sanitation* (PPFS-GH-04) listed in Additional Resources.

Management practices have been divided into two sections to address specific recommendations that apply to the following production systems:

- Nurseries & Retail Centers (commercial)
- Landscapes (commercial and residential)

Nurseries & Retail Centers

Exclusion

- Avoid or limit the introduction of outside boxwood plants (including holiday wreaths and decorative boxwood containers) into existing nursery or retail stock.
- Carefully inspect plants before purchase; avoid plants with leaf or stem lesions and those with an unhealthy appearance.
- Quarantine new plants for at least 4 weeks (under optimal conditions for disease development) before introducing them into production areas.

Sanitation

- Scout frequently to determine if boxwood blight infections are present.
- Section-off boxwoods and sanitize between sections. When working in blocks, begin with those that are healthy and then progress to higher risk blocks.
- Destroy entire blocks of infected stock and leaf debris immediately if disease is detected within a block. This helps remove sources of inoculum and prevents spread. Infected sites warrant extra precautions and attention to sanitation.
- Observe caution when moving and disposing of infected tissue: bag diseased plants on-site and move off-site to destroy.
- Do not compost diseased material.
- Provide cleaning stations with sanitizers for tools and equipment, which should be sanitized between individual blocks, beds, plantings, and properties. Refer to the table on the "Boxwood Task Force" website for sanitizer recommendations.
- Require that workers wear disposable (e.g., Tyvek) or washable coveralls and shoe covers while working in areas where infections have been identified.

Cultural Practices

- Promote rapid drying of leaves by widely spacing plants for increased air circulation.
- Do not use overhead irrigation.
- Some boxwood cultivars are considered tolerant to boxwood blight; however, there is no true resistance. Symptoms on tolerant cultivars are often subtle and go unnoticed, thereby serving as reservoir hosts and sources for inoculum.

Fungicides

Fungicides are not curative; they can be used to protect healthy plants and/or healthy tissue.

- If disease is detected or risk of infection/transmission is high, destroy infected plant material immediately. Diseased materials cannot be sold.
- Protect entire inventory of remaining healthy boxwoods with fungicides.
- Use chlorothalonil, chlorothalonil + thiophanate-methyl, tebuconazole, or fludioxonil. Spray intervals vary by product; always refer to label.
- Refer to publications listed in Additional Resources for detailed fungicide recommendations.

Landscapes

Exclusion

- Avoid or limit the introduction of outside boxwood plants (including holiday wreaths and decorative boxwood containers) into existing landscapes, especially when valuable boxwood plantings are present.
- Carefully inspect plants before purchase; avoid plants with leaf or stem lesions and those with an unhealthy appearance.
- Quarantine new plants for at least 4 weeks before interplanting with established or valuable boxwood specimens.
- Commercial landscapers and lawn service providers should clean tools and equipment before moving from one site to another.

Sanitation

- Examine plantings frequently to determine if boxwood blight infections are present.
- Destroy infected plants and leaf debris immediately to remove sources of inoculum and to prevent spread. Infected sites warrant extra precautions and attention to sanitation.
- Observe caution when moving and disposing of infected tissue: bag on-site and move off-site to destroy.
- Do not compost diseased material.
- Sanitize tools and equipment between individual plants, beds, plantings, and properties. Refer to the table on the "Boxwood Task Force" website for sanitizer recommendations.
- Commercial landscapers should require workers to wear disposable (e.g., Tyvek) or washable coveralls where infections have been identified. Change overalls between sites.

Cultural Practices

- Promote increased air circulation and rapid drying of plant tissues by widely spacing plants, pruning to raise tree canopies, etc.
- Avoid, or at least minimize, overhead irrigation.
- Mulch underneath plants to expedite decomposition of inoculum and to prevent transmission of conidia via water splash.
- Do not replant landscapes with boxwoods for at least 3 to 6 years following the removal of diseased plants.
- Some boxwood cultivars are considered tolerant to boxwood blight; however, there is no true resistance. Tolerant cultivars may not show prominent symptoms and thereby serve as reservoir hosts.
- Reports have indicated that aggressive pruning, rigid sanitation, and fungicide applications (especially during wet seasons) may help rejuvenate valuable specimens within 3 to 5 years. This process includes repeated removal of diseased tissue and continuous protection of new growth with fungicides. Persistence and patience is warranted in this scenario.

Fungicides

Fungicides are not curative; they can be used to protect healthy plants and/or healthy tissue.

- Protect healthy plants that were located near diseased plants by using a fungicide.
- Fungicides are only recommended on sites where boxwood blight has been confirmed.
- If disease is detected, surrounding healthy plants should be protected with fungicides.
    - Homeowners should use chlorothalonil at 10- to 21-day intervals (refer to label) as long as conditions are conducive for disease.
    - Professional applicators should use chlorothalonil, chlorothalonil + thiophanate-methyl, tebuconazole, or fludioxonil as long as conditions are conducive for disease.
- If fungicides are used in an effort to rejuvenate infected plants or to protect plants in a high-risk area, a consistent schedule is required. This period can extend for most or all of the growing season and may be necessary for the next 3 to 5 years.
- Refer to publications listed in Additional Resources for detailed fungicide recommendations.

Additional Resources

General information on boxwood blight

- Boxwood Blight (ANR-PATH-7-2017, Tennessee State University)
http://www.tnstate.edu/extension/documents/Boxwood%20Blight%20Factsheet.pdf
- Boxwood Blight: An Ongoing Threat to Ornamental and Native Boxwood (Applied Microbiology and Biotechnology, 2018)
https://link.springer.com/article/10.1007/s00253-018-8936-2
- Boxwood Blight Task Force (Virginia Cooperative Extension)
https://ext.vt.edu/agriculture/commercial-horticulture/boxwood-blight.html
- Boxwood Health—Boxwood Blight Best Management Practices
https://www.hriresearch.org/sites/default/files/BoxwoodBlight/HRIBoxwoodHealthBMPs-V3-2020.pdf

Sanitation

- Greenhouse Sanitation, PPFS-GH-04 (University of Kentucky)
http://plantpathology.ca.uky.edu/files/ppfs-gh-04.pdf
- Landscape Sanitation, PPFS-GEN-04 (University of Kentucky)
http://plantpathology.ca.uky.edu/files/ppfs-gen-04.pdf

Cultivar selection

- Susceptibility of Commercial Boxwood Varieties to Clyindrocladium buxicola (North Carolina State University)
https://plantpathology.ces.ncsu.edu/wp-content/uploads/2013/05/final-2012-cult-susc-summary.pdf

Fungicides

- Efficacy Ratings for Fungicides for Boxwood Blight (Virginia Cooperative Extension)
https://ext.vt.edu/content/dam/ext_vt_edu/topics/agriculture/commercial-horticulture/boxwood-blight/files/fungicides-table.pdf
- The Most Effective Products for Preventing Boxwood Blight, caused by Cylindrocladium buxicola (North Carolina State University)
https://plantpathology.ces.ncsu.edu/wp-content/uploads/2013/05/Ivors-box-blight-fungicides.pdf

Other boxwood diseases

- Volutella Blight of Boxwood (PPFS-OR-W-26)
http://plantpathology.ca.uky.edu/files/ppfs-or-w-26.pdf

August 2018

Acknowledgement
The authors thank Norman Dart, Virginia Department of Agriculture and Consumer Services, for his review of the original publication.

Editor: Cheryl Kaiser
Photos: Nicole Gauthier, University of Kentucky