

Best Management Practices for Boxwood Blight

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Best Management Practices for Boxwood Blight in the Virginia Home Landscape

This best management practices fact sheet provides guidelines for home growers of landscape boxwood to avoid introduction of the boxwood blight pathogen into a landscape or, if the disease is already present in a landscape, to manage the disease in the most effective manner and avoid spread of the disease to new locations.

What is Boxwood Blight?

Boxwood blight (also known as box blight), caused by the fungus *Calonectria pseudonaviculata*¹, is a serious fungal disease of boxwood that results in defoliation and decline of susceptible boxwood. In Virginia boxwood blight was first identified in a nursery location in Carroll County in 2011. Currently, it has been identified in many localities in Virginia and continues to be introduced to new locations in Virginia and the United States. Once introduced to a landscape, boxwood blight is very difficult and costly to control with fungicides. The major means of spread of this disease is by movement of contaminated plant material (e.g. container or field-grown boxwood, boxwood greenery used for holiday decoration), but boxwood blight spores can also be spread on pruning tools, clothing, equipment, wildlife, and anything that might have contacted infected plants. Home growers can best protect their boxwood by following the measures listed below to avoid introduction of the disease to their landscape.

Symptoms of Boxwood Blight

The most characteristic symptoms of boxwood blight on susceptible boxwood cultivars are brown leaf spots (Fig. 1) that lead to defoliation (Fig. 2 on page 2) and black streaking on boxwood stem tissue (Fig. 3 on page 2). Some cultivars of boxwood can harbor the boxwood blight pathogen, yet show no symptoms; these cultivars are boxwood blight-resistant¹ (also referred to as “tolerant”) cultivars. Fungicides can also mask symptoms of the disease on susceptible cultivars.



Figure 1. Leaf spots are typically circular and brown and develop a dark brown border (photo by M.A. Hansen).

In Virginia, symptoms of boxwood blight typically appear in late summer and fall. However, under prolonged rainfall, the disease may appear at other times, since foliar wetness favors this disease.

¹Currently there are no boxwood cultivars available that are immune to boxwood blight; however, cultivars possessing various levels of resistance to the disease have been identified and research is ongoing to rank cultivars according to their level of resistance or susceptibility.



Fig. 2. Defoliation on boxwood in the planter and the mature plants in the foreground (photo by A. Bordas, Virginia Cooperative Extension).

Other plant hosts

Pachysandra terminalis (Japanese spurge), *Pachysandra procumbens* (Allegheny spurge) and *Sarcococca* species (sweetbox), which are in the same family (*Buxaceae*) as boxwood, are also susceptible to boxwood blight and infected plants of these species could introduce the disease to a landscape. Symptoms of the disease on *P. terminalis* are brown leaf spots. New host plants may be identified as researchers learn more about this disease, but hosts will likely be limited to members of the *Buxaceae* family.

Avoiding introduction of boxwood blight to a landscape

Because the boxwood blight pathogen is not well adapted to long-distance spread by long-distance air currents, the most likely entry point for the disease in a home landscape is by accidental introduction of infected plant material and/or via contaminated tools, equipment, wildlife or domestic animals and wind-blown infected leaves. Home growers who have boxwood in the landscape should carefully adhere to the following recommendations to avoid inadvertent introduction of this devastating disease to their landscape:

- When purchasing boxwood plants for transplanting to a landscape, ask nursery personnel if their boxwood are from producers participating in the [Boxwood Blight Cleanliness Program](https://bit.ly/46NKAo4) (https://bit.ly/46NKAo4). Production nurseries participating in this program adhere to strict management practices that minimize the chance of introduction of this disease to their nurseries and are inspected by the

Virginia Department of Agriculture and Consumer Services (VDACS) for the presence of boxwood blight. A link to information on the Boxwood Blight Cleanliness Program and other useful links can be found at the [Virginia Boxwood Blight Task Force website](https://ext.vt.edu/agriculture/commercial-horticulture/boxwood-blight.html) (https://ext.vt.edu/agriculture/commercial-horticulture/boxwood-blight.html).

- Prior to purchase, carefully inspect plants for symptoms of boxwood blight.
 - Be aware that partially resistant cultivars of boxwood could act as a “Trojan horse” in a landscape because partially resistant cultivars may harbor the boxwood blight pathogen, yet not show obvious symptoms.
 - Be aware that fungicide treatment (e.g. at a nursery) can suppress symptom development.
- Monitor established boxwood and newly planted boxwood on a regular basis for any symptoms of boxwood blight.
- Be aware that boxwood greenery used for holiday decoration could harbor the boxwood blight pathogen.
 - To minimize risk of introducing the disease by this route, do not use boxwood greenery near landscape boxwood.



Fig. 3. Dark streaks on stems (photo by M.A. Hansen).

- When disposing holiday greenery that includes boxwood foliage, double-bag it in sealed plastic bags and dispose of it in the landfill. Do not compost boxwood greenery.
- The boxwood blight fungus can be spread from one property to another via contaminated spray hoses, pruning tools, wheelbarrows, tarps, vehicles, clothing, shoes, lawnmowers, wildlife, domestic animals, shoes, wind-blown infected boxwood leaves, or anything to which the sticky spores of the boxwood blight fungus might adhere. In fact, boxwood blight was reported to have spread from boxwood in one landscape to another landscape in North Carolina on a spray hose used to apply insecticides for boxwood leafminer control.
- Plant samples should be accompanied by a completed [plant diagnostic form](https://www.pubs.ext.vt.edu/450/450-097/450-097.html) (https://www.pubs.ext.vt.edu/450/450-097/450-097.html), available at your local Extension office and the [Plant Disease Clinic website](https://spes.vt.edu/affiliated/plant-disease-clinic/submitting-samples.html) (https://spes.vt.edu/affiliated/plant-disease-clinic/submitting-samples.html).
- Confirmatory diagnosis of this disease by a plant diagnostic lab is important because other problems on boxwood could be mistaken for boxwood blight.

What to do if boxwood blight is suspected in a landscape

Virginia growers should submit suspect plant samples for diagnosis. Your local [Virginia Cooperative Extension \(VCE\)](http://www.ext.vt.edu/offices/) office (http://www.ext.vt.edu/offices/) can assist with submission of diagnostic sample(s) to the [Virginia Tech Plant Disease Clinic](https://spes.vt.edu/affiliated/plant-disease-clinic.html) (https://spes.vt.edu/affiliated/plant-disease-clinic.html).

- Collect symptomatic boxwood samples (stems with black streaks, leaf spots, or defoliation) and double-bag in sealed plastic bags before transporting to your Extension office.

What to do if boxwood blight is diagnosed in the landscape

Boxwood blight is a serious and contagious disease for plants in the Buxaceae family and management decisions will influence the disease progression. Although boxwood blight is serious and spreading in many communities in Virginia, boxwood remains a valuable landscape ornamental. Successful and sustainable landscaping with boxwood currently requires knowledge, attention and care. There are different management approaches for boxwood blight that can be considered, depending on the particular landscape situation and grower preferences. Outlined below are three general management options and their associated actions and/or expected outcomes (Fig. 4).

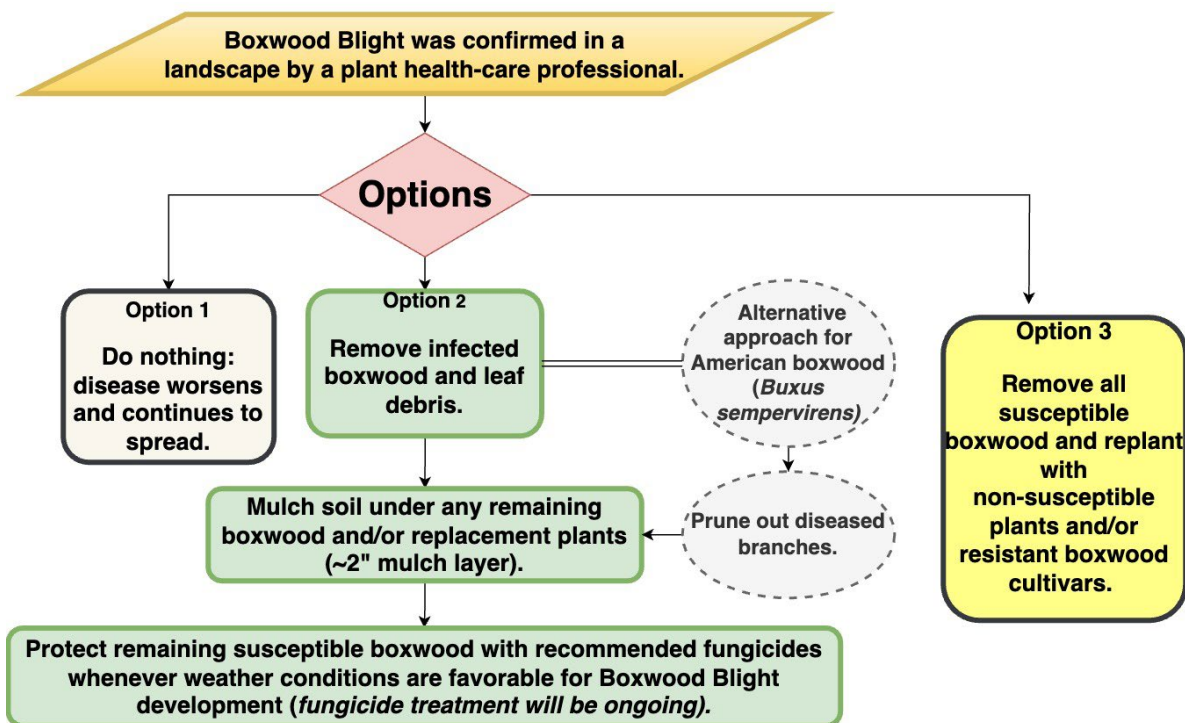


Fig. 4. Diagram of boxwood blight management options.

Since boxwood blight cannot be effectively controlled on susceptible boxwood once the infection begins, prompt removal of susceptible boxwood is recommended. Associated leaf debris should also be removed. Be aware that removing diseased boxwood and leaf debris will not eradicate the boxwood blight pathogen from the location, since the pathogen produces long-lived survival structures that can persist in the soil for 5 to 6 years. Under conducive conditions these survival structures can produce spores to initiate new infection of susceptible replacement boxwood plants. Therefore, replanting susceptible boxwood cultivars in a location where infected boxwood has been removed is not advisable. Resistant boxwood cultivars could be used as replacement plants. (Refer to the [Boxwood Blight Task Force website](https://ext.vt.edu/agriculture/commercial-horticulture/boxwood-blight.html) (<https://ext.vt.edu/agriculture/commercial-horticulture/boxwood-blight.html>) for a list of some resistant cultivars.)

Option 1—Do nothing (not recommended)

1. Infected susceptible boxwood will decline and eventually die.
2. Disease will spread in landscape and locally (e.g. neighborhood, town).

Option 2—Remediation after confirmatory diagnosis of boxwood blight

1. Remove diseased, susceptible boxwood, such as English boxwood promptly. (There is an alternative approach for infected American boxwood and details on that approach are provided below.)
2. Remove leaf litter from soil surface (e.g. raking/sweeping, vacuuming, or by using a burn torch/agricultural flamer.)
 - a. Diseased boxwood, leaf debris and soil should be double-bagged and removed to the sanitary landfill OR buried 2' deep in soil OR burned (if allowed in your locality).
 - b. **Do not** compost boxwood debris or plant material and **do not** place curbside for brush pickup, since this will spread the disease to new locations via wind-blown leaves and/or in municipal mulch.
 - c. Because the fungal spores can stick to tools, equipment, etc., sanitize all tools, equipment, tarps, shoes, gloves, etc., used after removing plants to prevent spread of fungal

inoculum to healthy boxwood. For a list of sanitizer recommendations, refer to Table 1. [The Boxwood Blight Task Force website](https://ext.vt.edu/agriculture/commercial-horticulture/boxwood-blight.html) (<https://ext.vt.edu/agriculture/commercial-horticulture/boxwood-blight.html>) also has sanitizer information. It is recommended that vehicles that have been potentially exposed to the boxwood blight fungus be thoroughly washed of debris (e.g. cleaned at an auto spa).

3. Mulch soil surface under existing boxwood and/or replacement boxwood to a depth of approximately 2". (In research studies, a 2"- to 4"-inch mulch layer effectively prevented splash dispersal of boxwood blight spores to lower leaves, but a shallow mulch layer is a better cultural choice for boxwood.)
4. If leaf debris has been incorporated into the soil, removing soil to a depth of 8" to 12" may help eliminate inoculum of the pathogen, but this is often impractical.
5. Apply preventative fungicides, as recommended on the product label, to the infected and non-infected boxwood in the vicinity **whenever weather conditions are favorable for disease development**. (Note that weather conditions in Virginia are favorable much of the year.)
 - a. Refer to the fungicide recommendation for boxwood blight in the [Home Grounds and Animals Pest Management Guide, p. 4-9](https://www.pubs.ext.vt.edu/456/456-018/456-018.html) (<https://www.pubs.ext.vt.edu/456/456-018/456-018.html>). Fungicide information is also provided on the [Boxwood Blight Task Force website](https://ext.vt.edu/agriculture/commercial-horticulture/boxwood-blight.html) (<https://ext.vt.edu/agriculture/commercial-horticulture/boxwood-blight.html>).
 - b. Fungicide applications should be made in spring when daytime temperatures reach 60F and prolonged rain is predicted. When daytime temperatures are regularly above 80F in the summer fungicide sprays can be stopped. Begin sprays again in the fall when temperatures drop below 80F and prolonged rain is predicted. In winter when temperatures regularly stay below 60F fungicides sprays are not recommended, but pay attention to forecasts for prolonged periods of mild winter weather and rainfall when fungicides might need to be applied.

- i. A forecasting app “[Boxwood Blight Risk Model](https://uspest.org/risk/boxwood_app?sta=)” (https://uspest.org/risk/boxwood_app?sta=) is available for free download or via email subscription. The app uses weather data to forecast the risk of boxwood blight infection. The app is intended as a supplement to other factors one should consider when deciding whether a fungicide application is needed and relies on local weather station data for modeling.

6. Monitor other boxwood and members of Buxaceae family (i.e. pachysandra, and sweetbox) in the landscape for development of boxwood blight symptoms.
7. For recommendations on replacement plants refer to information in “Option 3” below.

Alternative approach for American boxwood (*Buxus sempervirens*):

Currently some researchers are suggesting that while American boxwood is susceptible to the Boxwood Blight fungus, it may recover (i.e. produce healthy new growth) during dry weather conditions. Additionally, there have been reports of reluctance of home growers and/or landscape professionals to remove very large American boxwood infected with the boxwood blight pathogen. For these reasons, we have provided an alternative approach for infected American boxwood:

Prune and remove diseased branches on American boxwood.

Because the fungal spores can stick to tools, equipment, etc., sanitize all tools, equipment, tarps, shoes, gloves, etc., used after removing plants to prevent spread of fungal inoculum to healthy boxwood.

Follow Steps 2 through 6 (under Option 2—Remediation after confirmatory diagnosis of boxwood blight)

Precautionary note: This approach may be an acceptable alternative to complete removal of infected American boxwood. However, there is not enough research at this time to know how efficacious this approach will be over time in Virginia. Also, keep in mind that although visibly diseased branches may be pruned out, pruning out affected branches will not eliminate the fungus from American boxwood. Further sporulation of the fungus on the American boxwood is likely and these

spores can serve as a source of inoculum for healthy, susceptible boxwood in the landscape and neighborhood landscapes. Also note that weather conditions in Virginia are generally favorable for development of boxwood blight and repeated fungicide sprays will be necessary for much of the year on a 7-day to 2-week schedule, depending on product label directions and weather conditions. English boxwood (*Buxus sempervirens* ‘Suffruticosa’) is extremely susceptible to Boxwood Blight; therefore, no one is suggesting that this approach be used on infected English boxwood.

Option 3—Replace susceptible boxwood with resistant boxwood cultivars and/or shrub species not susceptible to boxwood blight (*Currently there are no boxwood immune to boxwood blight; however, there are boxwood cultivars that are “resistant” (also termed “tolerant”) to boxwood blight.*)

1. Select boxwood blight resistant cultivars. Resistant cultivars do not develop noticeable symptoms of boxwood blight and are not negatively affected by the disease.
2. Only plants in the Buxaceae family (e.g. boxwood [*Buxus* spp.], pachysandra [*Pachysandra* spp.] and sweetbox [*Sarcococca* spp.]) have been reported susceptible to boxwood blight in the landscape. If you are considering replacing susceptible boxwood with other shrub species, refer to the [Problem-free Shrubs for Virginia Landscapes](http://pubs.ext.vt.edu/450/450-236/450-236.html) (<http://pubs.ext.vt.edu/450/450-236/450-236.html>) Virginia Cooperative Extension fact sheet to avoid species of shrubs commonly afflicted with disease problems in Virginia.
3. It is advisable to purchase replacement boxwood from nurseries that participate in the Boxwood Blight Cleanliness Program (BBCP). A list of participating BBCP nurseries is available at <http://www.vdacs.virginia.gov/plant-industry-services-boxwood-blight.shtml> . It is advisable to identify a retail operation that exclusively sells only boxwood produced in the BBCP to minimize the chance of introducing the disease into a landscape.

Fungicide management of boxwood blight in the home landscape

Important considerations for home growers when deciding whether to implement a preventative fungicide management program for boxwood in the home landscape are:

1. Fungicides cannot eradicate the disease from infected plants.
2. Once boxwood blight is present in the landscape, it is very difficult to control. Research studies have shown that fungicide applications that are begun after the disease is already present do not provide acceptable disease control for susceptible boxwood.
3. Fungicides labeled for use by home growers are protectant fungicides and must be used preventatively.
4. An effective preventative fungicide spray program will require repeated applications (at 7- to 14-day intervals, depending on fungicide product label and environmental conditions) throughout the growing season.
5. **Post-growing season: Warm temperatures with leaf wetness results in high boxwood blight disease pressure**, so if temperatures are over 60°F and a rain event is expected, a preventative fungicide spray should be in place post-season as well.
6. Thorough fungicide coverage of boxwood foliage is difficult, yet necessary for protection from the disease.

For a list of fungicides labeled for use by home growers for management of boxwood blight in the landscape, refer to the [Home Grounds and Animals Pest Management Guide](https://www.pubs.ext.vt.edu/456/456-018/456-018.html), Home Ornamentals: Control of Ornamental Diseases section (<https://www.pubs.ext.vt.edu/456/456-018/456-018.html>). Fungicide information is also provided on the [Boxwood Blight Task Force website](https://ext.vt.edu/agriculture/commercial-horticulture/boxwood-blight.html) (<https://ext.vt.edu/agriculture/commercial-horticulture/boxwood-blight.html>).

Cultural Practices Recommended to Minimize Chance of Boxwood Blight).

- Purchase boxwood from nursery producers in the [Boxwood Blight Cleanliness Program](https://bit.ly/46NKAo4) (<https://bit.ly/46NKAo4>).
- Minimize leaf wetness and promote good air-circulation in boxwood plantings to minimize disease pressure. Examples include:
 - Choose boxwood blight-resistant cultivars rather than susceptible cultivars, such as English boxwood.
 - Avoid overhead irrigation.
 - Ensure good air circulation in plantings by providing adequate spacing between plants. In general, growers may want to avoid close spacing of boxwood and, therefore, hedges.
- Mulch soil surface under boxwood to a depth of approximately 2". (In research studies, a 2"- to 4"-inch mulch layer effectively prevented splash dispersal of boxwood blight spores to lower leaves, but a shallow mulch layer is a better cultural choice for boxwood.)
- Avoid working in boxwood plantings when the foliage is wet and fungal inoculum is more likely to be spread.
- Practice good sanitation practices to avoid moving infested soil or plant material to landscape locations where boxwood are located.
 - Sanitize pruning tools and other tools/equipment/clothing/tarps between boxwood plantings and also between other members of the *Buxaceae* family.
 - Bag and dispose of all boxwood debris (including holiday greenery) in the landfill or bury 2' deep in soil away from boxwood plantings.
 - Be aware that allowing boxwood tippers onto your property to collect greenery may increase the risk of introduction of boxwood blight if the tippers visit multiple boxwood plantings and do not follow good sanitation practices.

- If you hire landscape professionals to spray or otherwise maintain landscape boxwood, or if you have your lawn maintained and cut by a professional lawn/landscape company, discuss your concern about boxwood blight with them to learn about management practices they may have in place to avoid movement of boxwood blight from one client’s landscape to another. Then you can decide if their approach is acceptable to you.

New Landscape Plantings

When considering new boxwood plantings in the home landscape, choose boxwood blight-resistant cultivars, which have the glossy green, evergreen foliage and growth habits valued by many Virginia home gardeners. The boxwood blight pathogen can live and produce spores on these resistant cultivars, but cultivars with resistance, even if infected, will thrive and do not show noticeable symptoms of the disease

Recordkeeping

Keep accurate records of boxwood cultivar names and locations on your property and where and when plants were purchased (or otherwise obtained). Keep records on location(s) of any diseased boxwood that are removed. Keep records of fungicide applications, including product information and date of application.

Table 1. Sanitizers for equipment/tools.

Follow label directions and precautions on all labeled products. Surfaces must be free of soil and other organic matter for sanitizers to be effective. The highest label rate is recommended. For best efficacy, at least 5-minute contact time with sanitizing agent is recommended for tools; for pots or other surfaces, at least 10 minutes. These products are corrosive, so oil tools after treatment.

Active ingredient	Brand Names
o-Benzyl-p-chlorophenol (1.25 oz/gallon)	Lysol Concentrate Disinfectant
sodium hypochlorite (1 part bleach: 9 parts water)	Clorox, other brands of household bleach (must be prepared fresh)

Note: Read and follow label directions for all products. Commercial products are named in this publication for informational purposes only. The authors do not endorse these products and do not intend discrimination against other products that also may be suitable.