

# Best Management Practices for Boxwood Blight

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## Best Management Practices for Boxwood Blight in Virginia Production Nurseries WITH Boxwood Blight

### 1. Contain and remove pathogen

A. Remove the pathogen from all blocks or areas where the pathogen is detected in nursery.

I. Destroy all infected plants by burning, burying, or bringing to an approved landfill or incinerator.

a. Bag plants before transporting.

b. If plants are too big to bag, burn or bury them on-site, or transport using a covered trailer.

II. Remove fallen leaf and plant debris from all blocks or areas where the pathogen is detected.

a. Rake, vacuum, or sweep plant debris, collect in bags, and destroy by burying, burning, or bringing to an approved landfill or incinerator.

b. Residual debris can be burned with an agricultural flamer.

c. Do not store, grow, or propagate boxwood over soil surfaces where boxwood blight was detected. Move boxwood production to a new area of nursery and preferably over concrete, asphalt, or weed mat over gravel.

III. Thoroughly clean and sanitize all tools, trailers, and equipment used during plant destruction as outlined in the cultural/sanitation section below.

B. Place healthy-appearing plants under quarantine for six months until released for sale by the Virginia Department of Agriculture and Consumer Services.

I. Clearly mark the quarantine area and restrict access to essential personnel.

II. Suspend use of all fungicides during the quarantine period.



Figure 1. Infected plants should be bagged to contain leaf debris.



Figure 2. Residual leaf debris can be eradicated by burning with an agricultural flamer.

- III. Monitor plants for symptom expression on a weekly basis.
- IV. Symptomatic plants should be reported immediately to the Virginia Department of Agriculture and Consumer Services (VDACS). To report symptoms in nurseries call: 804-786-3515.

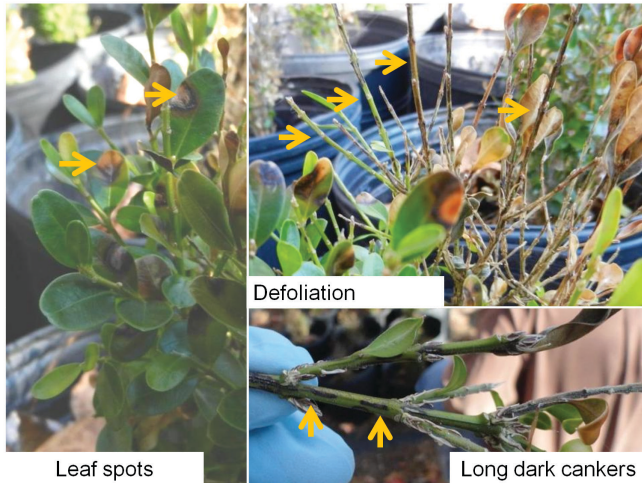


Figure 3. Familiarize yourself with the symptoms of boxwood blight.

- V. Infected plants and those directly adjacent to them should be immediately destroyed and the six-month holding period reset.
- VI. Follow additional sanitation guidelines outlined below for holding newly purchased plants, and as outlined in the cultural/sanitation section.

## 2. Avoid introduction

- A. Propagate locally to avoid accidental introduction by incoming plant material whenever possible.
  - I. Take cuttings from disease-free mother plants.
    - a. Mother plants should be located away from loading and unloading zones, cull piles, and high traffic areas. Limit access to essential staff.
    - b. Avoid treating mother plants with fungicides so symptoms are not masked.
    - c. Inspect mother plants for boxwood blight symptoms before cuttings are taken.

- d. Maximize use of drip irrigation and minimize use of overhead irrigation.

- B. Take extra precaution when purchasing plant material.

- I. Buy from licensed nurseries and request phytosanitary certificates from vendors or a copy of their Boxwood Blight Cleanliness Program Agreement. A link to information on the Boxwood Blight Cleanliness Program and other useful links can be found on the Virginia Boxwood Blight Task Force web site, <http://www.ext.vt.edu/topics/agriculture/commercial-horticulture/boxwood-blight/>.

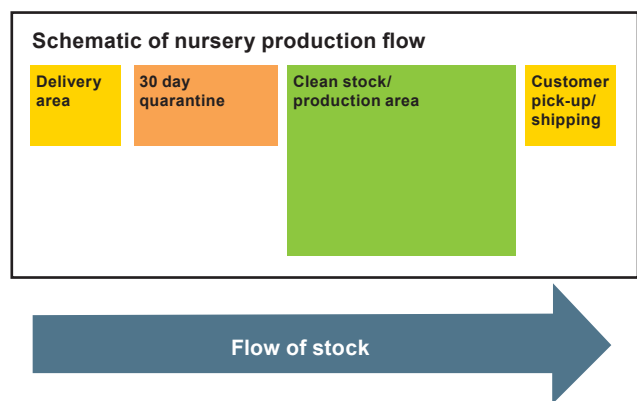


Figure 4. Schematic showing flow of nursery stock. Plants should be held for 30-day quarantine period before releasing into production areas of nurseries.

- II. Inspect all newly purchased plant material upon receipt. If a shipment displays boxwood blight symptoms, report immediately to the Virginia Department of Agriculture and Consumer Services. To report symptoms in nurseries call: 804-786-3515.
- III. Create a holding area for all incoming boxwood and other plant materials.
  - A. Holding area must be at least 3 meters (approximately 10 feet) from other blocks of plants, but preferably farther. Alternatively, a physical barrier such as an enclosed greenhouse can be used.
  - b. Locate the holding area on concrete, asphalt, or weed mat over gravel to facilitate the cleaning of leaf debris and spilled potting mix.



Figure 5. Store plants on easy-to-clean surface such as weed mat over well drained gravel.

- c. Place all incoming plant material and new cuttings in the holding area for 30 days.
  - d. Plants should be inspected regularly for boxwood blight symptoms by trained staff.
  - e. Clean plant debris by vacuuming, sweeping, or raking on a regular basis.
  - f. Keep all boxwood stock separated by source, and keep stock well labeled so plant origin can be easily identified.
  - g. Suspend use of all fungicides during the holding period.
  - h. Consider placing “sentinel plants” (those which are highly susceptible to boxwood blight such as English or American boxwood) in your holding zone to detect boxwood blight if you are holding more resistant cultivars.
- C. Avoid unintentional introduction of this disease by large equipment rentals and contract labor.
- I. Avoid bringing in plant diggers or large equipment that may have worked on sites where boxwood blight has been introduced.
  - II. If you must bring in large equipment:
    - a. Check to make sure that the equipment has not been used in areas where boxwood blight has been found.
    - b. Have equipment cleaned and sanitized as completely as possible before it enters nursery property.
- III. Require contract work crews to clean and sanitize all equipment, footwear, and work clothes before they enter nursery property.
- a. Contractor vehicles should be washed and be visibly free of mud and plant debris before they enter nursery property.
  - b. Contractor vehicles should not be driven directly into boxwood production and growing areas.
  - c. Consider supplying Tyvek™ boot covers and overalls, as well as disposable rubber or nitrile gloves, to work crews and require work crews to put on protective gear before entering boxwood production and growing areas.
- D. Customer returns and traffic management
- I. Do not reintroduce plants to the nursery after they have left nursery property.
  - II. Require customers and drivers to clean their trucks and trailers before arriving at pickup zones. Do not allow customers and drivers to sweep their trucks or trailers, or unload any debris once arriving at the nursery property.
  - III. Do not allow customer vehicles into the production areas of the nursery.
- E. Shipping and receiving
- I. Locate loading and unloading zone on surface that can be easily swept and cleaned between shipments.
  - II. Sweep or vacuum and sanitize trailers between loads. Brooms and other tools from the shipping/receiving area should only be used in the shipping/receiving area.

### 3. Cultural practices

#### A. Sanitation

- I. Minimize host plant debris accumulation by regularly cleaning the ground below plants.
  - a. Debris should be bagged and incinerated or buried, not added to compost.



Figure 6. Clean and sanitize boots between hoop houses and production fields.

- b. Residual host plant debris that is too small/fine to be raked or vacuumed can be burned on-site with an agricultural flamer.
- II. Sanitize tools as frequently as practical when working with boxwood. Shears, clippers, and other cutting implements should be treated with sanitizer between blocks, groups of plants, etc. Between hoop houses or larger production blocks and at the end of the workday, tools such as shears, pruners, shovels, and rakes should be completely rinsed, dried, and a sanitizer applied following label instructions. See appendix 1 for a list of effective sanitizers.
- III. Boots should be cleaned and sanitized between hoop houses or larger production blocks and at the end of the workday. Alternatively, Tyvek™ boot covers or other similar products can be ordered from a commercial vendor and changed between production units.
- IV. After every crop production cycle, remove all crop debris and sanitize all propagation mist beds, cutting benches, machines, and tools.
- V. Use new or sanitized pots/flats that have been thoroughly cleaned of soil and plant debris for host plant production. Do not reuse potting mix previously used in host plant production.

## B. Water management

- I. Maximize the use of drip irrigation and minimize the use of overhead irrigation. When using overhead irrigation, water plants so as to reduce leaf wetness period.
- II. Minimize water runoff such that it does not run from one host plant production area into another.
- III. Minimize standing water in host plant blocks.
- IV. Avoid working with plants when they are wet.



Drip irrigation

Overhead irrigation

Figure 7. Use drip irrigation to reduce leaf wetness period whenever possible.

## 4. Inventory, stocking, storage, and displays

- A. Keep stock at a lower inventory and turn over stock more frequently.
- B. Consider growing stock that is resistant to boxwood blight. No boxwood are known to be immune to boxwood blight; only partial resistance is available. Contact your local county Extension office for a list of the more resistant cultivars.
- C. Do not store or display boxwood on soil surfaces where boxwood blight was detected. All new boxwood should be stored and displayed in a new area of nursery and preferably over concrete, asphalt, or weed mat over gravel.
- D. Store and display all future boxwood inventories in an area of the nursery where customers will not

have to walk through. Do not store or display boxwood inventories in areas where boxwood blight was previously detected.

## 5. Scouting

- A. Scout all host plants (Buxus, Pachysandra, and Sarcococca) in the nursery on a weekly basis.
- B. Symptomatic plants should be reported immediately to the Virginia Department of Agriculture and Consumer Services. To report symptoms in nurseries call: 804-786-3515.
- C. Restrict access to and do not sell symptomatic boxwood until they have been examined and cleared by VDACS.



Figure 8. Scout host plants frequently.

## 6. Recordkeeping

- A. Maintain records of the following for a minimum of 12 months:
  - I. Incoming host plants, including quantity and source(s)
  - II. Location of isolation area(s) for incoming host plants
  - III. Shipping records (dates, quantity, plants shipped, destinations)
  - IV. Inspection records
  - V. Personnel training (dates, attendees, subject matter, trainer)

## 7. Training

- A. Educate and train appropriate personnel to:
  - I. Understand the potential impacts of spreading this disease and the importance of strictly following quarantine protocols when handling diseased plants in infested areas.
  - II. Recognize and report signs and symptoms of boxwood blight.
  - III. Learn about the disease biology.
- B. Develop site-specific sanitation protocols and best management practices in addition to those outlined in this document.
- C. Training sessions should be provided at least once each year.
- D. Contact your local Cooperative Extension office for information on training opportunities on boxwood blight.

**Appendix 1. Recommended sanitizers for disinfesting pruning tools and other equipment of the boxwood blight pathogen**

Active ingredient	Brand name	Rate	Recommended Contact Time for Best Efficacy
Sodium hypochlorite (5.25%)	Clorox, other brands of household bleach	Prepare 1:9 solution. Must be prepared fresh.	5 min. for tools; 10-15 min. for equipment surfaces
Hydrogen dioxide	Oxidate, Zeritol	Prepare 1:100 – 1:300 solution for clean, non-porous surfaces. Prepare 1:50 solution for unclean surfaces.	5-10 min.
Hydrogen peroxide, peroxyacetic acid, and octanic acid	Xeroton 3 (X3)	Prepare 1:500 – 1:1,500 solution for clean, non-porous surfaces. Prepare 1:150 solution for unclean, non-porous surfaces. Prepare 1:300 – 1:1,000 solution for tools.	10 min.
Phenolic compounds (O-benzyl-p-chlorophenol)	Lysol Brand Concentrate Disinfectant	Prepare solution of 1.25 – 2.5 oz/gal.	At least 5 min.

*Note that some disinfectants are corrosive. It is advisable to oil tools after treatment. Also, sanitizers will be most effective if surfaces are free of plant debris and soil prior to treatment.*