Boxwood Diseases & Insect Pests

Boxwoods (*Buxus* spp.) are adapted to a wide range of light conditions, and prefer fertile, moist, well-drained soil, which is amended with organic matter. For information on species, varieties and culture, see [HGIC 1061 Boxwood](http://www.clemson.edu/extension/hgic/HGIC%201061%20Boxwood). Boxwood is susceptible to the following diseases and pest problems.

**Diseases**

**Decline:** Boxwood decline is a poorly understood complex involving the fungi *Paecilomyces, Volutella, Macrophoma* and *Phytophthora*, as well as cold injury, drought stress, and nematodes (microscopic round worms). This phenomenon is also closely related to cultural problems associated with boxwoods, such as improper pH and nutritional status, improper irrigation, poor drainage, and improper mulch management. However, *Paecilomyces buxi* has been consistently associated with roots of English boxwood exhibiting the syndrome of boxwood decline, and decline often follows periods of drought stress.

Root rots by *Phytophthora* are usually more of a problem in wet soils (see Root Rot section below). *Macrophoma candollei* can cause leaf blight, but it usually acts as a weak pathogen following root diseases or environmental stresses. *Volutella buxi* may cause a dieback or stem blight on English and American boxwoods, and often follows winter injury (see the Canker section below). More than one problem may exist on stressed boxwoods.

Symptoms consist of weak and spindly plants. Dead or dying branches occur randomly in the bush. The older leaves drop prematurely and the remaining foliage develops a yellow color. Leaves often have pink eruptions of spores on black fruiting bodies. Dead areas or cankers develop along branches or near the crown. Various species of nematodes (microscopic worms that feed on the roots) also appear to be involved (see Nematodes section below).

**Prevention & Treatment:** A thorough diagnosis of the associated factors is important before corrective action is taken. This should include a nematode analysis, soil analysis, and evaluations of drainage in the area and the degree of rooting in surface duff (litter). Samples for root disease should be submitted to the Clemson University Plant Problem Clinic for analysis.

Crowded growth and dead leaves in the branch crotches tend to maintain high levels of humidity in the canopy, making conditions conducive to dieback diseases. Prune dead stems back to healthy tissue. Disinfect pruning shears frequently in household bleach diluted 1:9 with water or rubbing (isopropyl) alcohol for 10 seconds. Removal of dead branches and leaves from crotches of the plant, as well as yearly renewal of mulch material, will also aid in control.

Proper cultural practices, such as providing water when necessary, avoiding over-watering or excessive fertilizing, and thinning shrubs to allow better air circulation are of utmost importance in maintaining a vigorous condition. To prevent winter injury, make sure sufficient soil moisture is available during the fall. Plants in highly exposed situations may require wind protection. This is especially important in upstate areas where the soil can freeze and remain frozen on sunny days. When this happens, the foliage continues to transpire but the roots cannot replace the lost moisture from the frozen soil.

If boxwoods have died and boxwood decline disease is confirmed, do not plant English boxwood (*Buxus sempervirens* ‘Suffruticosa’) in the same site. American boxwood (*Buxus sempervirens*) and
littleleaf boxwood (*B. microphylla*) can be used as a replacement as they are resistant to decline. But if Phytophthora root rot is confirmed, the site should be avoided for future boxwood plantings.

**Root Rot:** Root rot is caused by the fungi *Phytophthora nicotianae* and *P. cinnamomi*. Leaves turn from normal dark green to light green as the plant declines. Roots are dark and rotted. The bark rots and peels at the crown. Death of the entire plant is characteristic of this disease.

**Prevention & Treatment:** Root rot is favored by high soil moisture and warm soil temperatures. The disease is more severe in heavy clays or poorly drained soils. Over-watering plants or long periods of heavy rain also favor disease development. Phytophthora root rot must be prevented, as chemicals are often ineffective in controlling this disease after above-ground symptoms become obvious. The following suggestions may aid in the prevention of root rot:

- Purchase disease-free plants from a reputable nursery.
- In areas where plants susceptible to root rot have died, replant with plants that are not susceptible.
- Plant root rot-susceptible plants in well-drained areas or in raised beds. If the soil is heavy clay, mix it with a porous material such as bark.
- The soil around infected plants may be treated with the appropriate fungicide according to the directions on the label. This may reduce the spread of the fungus among plants, but these chemicals may not kill the fungus in infected plants. Read and follow all directions on the fungicide label.

**Canker or Stem Blight:** This disease is caused by the fungus *Volutella buxi*. The first noticeable symptom is that certain branches or certain plants in a group do not start new growth as early in the spring as do others, nor is the new growth as vigorous as that on healthy specimens. The leaves turn from normal to light green to various shades of tan. Infected leaves turn upward and lie close to the stem instead of spreading out like the leaves on healthy stems. The diseased leaves and branches show small, rose-colored, waxy fruiting bodies of the fungus. The bark at the base of an infected branch is loose and peels off readily from the gray to black discolored wood beneath.

**Prevention & Treatment:** Dead branches should be removed as soon as they are noticeable. The annual removal and destruction of all leaves that have lodged in crotches is recommended. Applications of a copper-based fungicide have been shown to be very effective in preventing canker. The first application should be made after the dead leaves and dying branches have been removed and before growth starts in the spring. See Table 1 for examples of products. As with all pesticides, read and follow all label instructions and precautions.

**Boxwood Blight:** Although boxwood blight has not yet been detected in South Carolina, it may be introduced into the state by shipments of asymptomatic plants to instate nurseries. Boxwood blight is caused by the fungal pathogen *Calonectria pseudonaviculata* (synonym *Cylindrocladium pseudonaviculatum*), which causes leaf spots, stem cankers, defoliation, and death of boxwoods. Other plants that are related to boxwoods may also be hosts, such as pachysandra and sweet box (*Sarcococca species*). There are no known resistant boxwoods, but a few have been tested and found to be more tolerant, such as *B. sinica* var. *insularis* 'Nana' and *B. microphylla* var. *japonica* 'Green Beauty'.

As the disease spreads within a boxwood shrub, additional leaf spots form and coalesce until entire leaf surfaces are infected, and these blighted leaves then drop from the plant. Stems become infected and form dark brown to black lesions or cankers. Once the cankers encircle a stem, the water supply is cut off from that point outward, and the stem dies.
Boxwood blight may also cause black necrotic lesions or cankers on the stems.

The pathogen can survive for at least five years on blighted and fallen foliage, as well as on the stem lesions on the dying or dead plants. Rainfall and overhead irrigation may splash the spores to adjacent plants.

**Prevention & Treatment:** Boxwood blight may be confused with other boxwood diseases, such as boxwood decline or other stem blight diseases. If boxwood blight is suspected, have the disease identified. Plant samples can be sent for identification to the Clemson Plant Problem Clinic.

Prune out the diseased stems, rake up fallen foliage, and dispose of both. Apply fresh mulch beneath the plants to reduce the chances of reinfection from spores that could splash from the soil onto foliage. The more effective homeowner fungicides for the control of boxwood blight are chlorothalonil or chlorothalonil mixed with thiophanate methyl. See Table 1 for examples of brands and specific products.

As boxwood blight advances, leaves and stems become more diseased and then defoliation occurs.

Kelly Ivors, Plant Pathologist, California Polytechnic State University, San Luis Obispo, CA

Other non-susceptible plants can be used in the landscape to replace boxwoods, such as dwarf yaupon hollies and Japanese hollies, both of which have small leaves and look quite similar to boxwoods.

**Nematodes:** Boxwoods are susceptible to several parasitic nematodes (microscopic round worms), including the Southern root-knot nematode (*Meloidogyne incognita*), the ring nematode (*Mesocriconema*), the lesion nematode (*Pratylenchus*), and the stunt nematode (*Tylenchorhynchus*).

Symptoms consist of leaf bronzing, stunted growth and general decline of boxwood. The microscopic worms feed on the roots, which soon die and the plant forms lateral roots above the invaded area. These lateral roots in turn are infested. Repeated infestations and lateral root production result in a stunted root system resembling a witches’ broom.

**Prevention & Treatment:** The life of infested plants may be prolonged by providing good care (fertilization, mulching) and by watering the plants thoroughly during dry spells. American boxwood (*B. sempervirens*) is resistant to root-knot nematodes and tolerant to stunt nematodes. Nematodes cannot be totally eliminated from the landscape. The goal is to keep the population low enough to prevent damaging symptoms that weaken
the plant. Boxwoods should not be grown in soils heavily infested with nematodes. Growing plants that are not affected by nematodes (grasses, marigolds) will reduce nematode populations in the long term.

Nematode-tolerant shrubs such as yaupon holly and Burford holly can be used to replace boxwoods, which were killed by nematodes.

Insects & Related Pests

Boxwood Leafminer (*Monarthropalpus flavus*): This is the most serious insect pest that attacks boxwood. The leafminer is the larva (immature form) of a small, orangish mosquito-like fly. These flies are less than \( \frac{1}{8} \)-inch long and can often be seen swarming around boxwoods in the spring. The adult female fly inserts eggs with her ovipositor (egg laying structure) into new boxwood leaves through the leaf’s upper surface. When the larvae hatch, they feed inside the leaf, creating a mine. Larvae are orange and about \( \frac{1}{8} \)-inch in length. They overwinter (survive the winter) inside the leaves. Adults emerge from the leaves the following spring, just after new growth occurs on boxwoods. There is one generation per year. American boxwood is the preferred host plant, but English and Japanese boxwoods (*B. microphylla* var. *japonica*) are also susceptible.

Contact insecticides that are effective against boxwood leafminer adults and are labeled for homeowner use are malathion and carbaryl. With these insecticides, begin treatment in mid-April to early May when the adult flies are seen hovering around the boxwood plants. Foliar systemic insecticides, such as acephate and spinosad are effective when leafminers are present in mines. Soil treatments with dinotefuran or imidacloprid will control leafminers, but may take two weeks or more to begin providing season long control. Dinotefuran may move into shrubs more quickly than imidacloprid for faster control. See Table 1 for examples of products. As with all pesticides, read and follow all label instructions and precautions.

Boxwood Mite (*Eurytetranychus buxi*): The boxwood mite or boxwood spidermite, is not an insect but is more closely related to spiders. The adult is green to yellowish brown in color, has eight legs and is tiny, about \( \frac{1}{64} \)-inch long. Since mites are so small and early symptoms are not distinctive, it is easy to overlook the problem until a heavy infestation occurs and greater damage has occurred.
This pest overwinters as eggs on the underside of leaves. The eggs hatch in the spring. Boxwood mites develop and breed rapidly, resulting in eight or more generations per year.

All stages of boxwood mite feed on both leaf surfaces. They pierce the leaf to suck out plant sap. During feeding, they inject toxic saliva, which results in stippling (tiny, yellow scratch-like spots) forming on the leaf’s upper surface. Boxwood mites prefer feeding on young leaves, but damage is most obvious on second- and third-year leaves. From a short distance, the infested boxwood appears unhealthy with a dingy silvery color.

**Prevention & Control:** Naturally occurring enemies of mites include various predator mites, ladybird beetles (ladybugs) and other insects. These predators will usually suppress mite populations. Since insecticide use kills predators as well as mites, insecticides should be avoided unless absolutely necessary.

To determine whether insecticide use is needed, it helps to know how many mites are present. Hold a white sheet of paper under a branch and strike the branch. The mites that are knocked off will be seen crawling around on the paper. If more than 15 mites are seen per whack, serious damage can result.

Mites can be removed with a strong spray of water, if applied on a regular basis. Horticultural oil applied at the summer rate of 1 – 2% (2-1/2 to 5 tablespoons oil per gallon of water) will kill eggs and adult mites. Horticultural oil may be sprayed when temperatures are between 45 and 85 degrees. Insecticidal soaps can also provide control when applied before population numbers get too high. Miticides labeled for homeowner use against boxwood mites include tau-fluvalinate. These products should be applied when mites are present and again in seven to 10 days. See Table 1 for examples of products. As with all pesticides, read and follow all label instructions and precautions.

**Boxwood Psyllid (Psylla buxi):** The adult is a small, greenish insect, about ¼-inch long. It has clear wings and strong legs adapted for jumping. It looks like a tiny cicada that hops or flies away when disturbed. Both the adult and nymph (the immature insect stage which resembles the adult) feed by piercing leaf surfaces and sucking plant sap. Nymphs hatch from eggs in the spring. They produce a white, waxy material that often covers their bodies. Nymphs feed from buds and young leaves. This feeding results in the typical cupping of leaves and stunted twig growth that are seen with this pest. Plants tend to outgrow the injury by midsummer.

After further development during the spring, adults are formed. Adults also feed on boxwood, but are less damaging than the nymphs. Adult females lay eggs under bud scales. The immature nymphs develop within the eggs, where they remain until spring. They emerge in spring to feed and complete development to adults. Only one generation occurs per year.

**Prevention & Control:** Insecticides should only be used if infestations are heavy. Those labeled for homeowner use are acephate and carbaryl. Soil treatments with dinotefuran or imidaclopid will control psyllids, but may take two weeks or more to begin providing season long control. Dinotefuran may move into shrubs more quickly than imidaclopid for faster control. See Table 1 for examples of products. As with all pesticides, read and follow all label instructions and precautions.

Boxwood psyllid feeding causes cupped, stunted leaves.
Daniel Herms, Ohio State University, Bugwood.org
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<tr>
<th>Insecticides &amp; Fungicides</th>
<th>Examples of Brand Names &amp; Products</th>
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<tr>
<td><strong>Acephate</strong></td>
<td>Bonide Systemic Insect Control Concentrate</td>
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| **Carbaryl**              | Garden Tech Sevin Bug Killer Concentrate  
Ferti-lome Liquid Carbaryl Garden Spray |
| **Chlorothalonil**        | Bonide Fung-onil Concentrate (29.6%)  
GardenTech Daconil Fungicide Concentrate (29.6%)  
Monterey Fruit Tree, Vegetable & Ornamental Fungicide (29.6%)  
Ortho MAX Garden Disease Control Conc. (29.6%)  
Ferti-lome Broad Spectrum Landscape & Garden Fungicide Conc. (12.5%)  
Hi-Yield Vegetable, Flower, Fruit & Ornamental Fungicide (12.5%)  
Southern Ag Liquid Ornamental & Vegetable Fungicide (12.5%)  
Tiger Brand Daconil (12.5%) |
| **Copper-based Fungicides** | Dexol Bordeaux Powder (8% Copper)  
Lilly Miller Kop-R-Spray Concentrate (8% Copper)  
Monterey Liqui-Cop Fungicide Concentrate (8% Copper)  
Southern Ag Liquid Copper Fungicide (8% Copper)  
Bonide Liquid Copper Concentrate (1.8% Copper)  
Camelot Fungicide/ Bactericide Concentrate (1.8% Copper)  
Natural Guard Copper Soap Liquid Fungicide Concentrate (1.8% Copper) |
| **Dinotefuran**           | Gordon’s Zylam Liquid Systemic Insecticide (10% concentrate)  
Valent Brand Safari 20SG Insecticide (20% concentrate)  
Valent Brand Safari 2G Insecticide (2% granules)  
Ortho Tree & Shrub Insect Control Ready to Use Granules (2% granules) |
| **Horticultural Oil**     | Bonide All Seasons Spray Oil Concentrate  
Ferti-lome Horticultural Oil Spray Concentrate  
Lilly Miller Superior Type Spray Oil Concentrate  
Monterey Horticultural Oil Concentrate  
Southern Ag ParaFine Horticultural Oil |
| **Imidacloprid**          | Bayer Advanced 12 Month Tree & Shrub Insect Control  
Bonide Annual Tree & Shrub Insect Control with Systemaxx  
Ferti-lome Tree & Shrub Systemic Insect Drench  
Gordon’s Tree & Shrub Insect Killer Concentrate  
Monterey Once A Year Insect Control II  
Ortho Bug B Gon Year Long Tree & Shrub Insect Control  
Spectracide Tree & Shrub Insect Spray Concentrate |
| **Insecticidal Soap**     | Bonide Insecticidal Soap Concentrate  
Espoma Earth-Tone Insecticidal Soap Concentrate  
Natural Guard Insecticidal Soap Concentrate  
Safer Brand Insect Killing Soap Concentrate  
Schultz Garden Safe Insecticidal Soap Concentrate |
| **Malathion**             | Bonide Malathion 50% Insect Control  
Gordon’s Malathion 50% Spray Concentrate  
Hi-Yield 55% Malathion Insect Spray  
Martin’s Malathion 57% Concentrate  
Ortho Max Malathion Insect Spray Concentrate  
Southern Ag Malathion 50% EC  
Spectracide Malathion Insect Spray Concentrate  
Tiger Brand 50% Malathion Spray |
<table>
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<th>Pesticide</th>
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| Spinosad | Green Light Lawn & Garden Spray with Spinosad Conc.; & RTS<sup>1</sup>  
Southern Ag Conserve Naturalyte Insect Control Concentrate  
Bonide Colorado Potato Beetle Bait Concentrate  
Bonide Captain Jack’s Deadbug Brew Concentrate; & RTS<sup>1</sup>  
Ferti-lome Borer, Bagworm & Leafminer Spray Concentrate  
Monterey Garden Insect Spray Concentrate  
Natural Guard Spinosad Landscape & Garden Insecticide RTS<sup>1</sup> |
| Tau-Fluvalinate | Bayer Advanced 3-in-1 Insect, Disease & Mite Control Conc. |
| Thiophanate methyl | Cleary’s 3336-WP Turf & Ornamental Fungicide  
Southern Ag Thiomyl Systemic Fungicide |

<sup>1</sup>RTS = Ready to Spray (a hose-end spray bottle)

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