

## Boxwood Blight: A New Disease of Boxwoods Recently Found in the Eastern U.S.

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Boxwood blight (also called “box blight” in Europe), caused by the fungal pathogen *Cylindrocladium pseudonaviculatum* (= *C. buxicola*), was reported for the first time in the U.S. at two North Carolina production nurseries in October, 2011. Boxwoods originating from an infected block of plants at one of the North Carolina nurseries were planted in two production fields in Virginia. The Virginia Department of Agriculture and Consumer Services and the North Carolina Department of Agriculture and Consumer Services are developing and implementing mitigation strategies aimed at aggressively removing the pathogen from infested fields and stopping the spread of this disease. The disease has also been reported in Connecticut.

### *History*

Boxwood blight was first reported in the United Kingdom in the early to mid 1990’s and had spread through Europe and New Zealand by 1998. The origin of the pathogen is unknown. It is not known how *C. pseudonaviculatum* was initially introduced to the two North Carolina nurseries.

### *Signs, Symptoms, Impacts*

*C. pseudonaviculatum* infects leaves and branches of boxwoods, causing severe defoliation and dieback (Fig. 1). Infected branches develop long blackish-brown cankers that appear as stripes on stems (Fig. 2). In mild, humid conditions the fungus produces clusters of white spores visible to the naked eye. Development of these spore clusters can be stimulated by incubating infected branches in a moist chamber for 24 to 48 hours at 70°F to 75°F (Fig. 3). The spore clusters consist of mycelial stalks (called conidiophores) bearing cylindrical spores in a sticky matrix. The spores can be viewed with the aid of a microscope (Fig. 4).

Repeated defoliation and multiple cankers can predispose plants to other diseases, such as *Volutella* blight, resulting in decline and eventual death. One unique characteristic of *C. pseudonaviculatum* is that it does not appear to affect roots like other *Cylindrocladium* species (Fig. 5). This enables roots to regenerate and support new growth even after a severe infection. Although boxwoods are not typically killed directly by *C. pseudonaviculatum*, rapid defoliation renders boxwoods unmarketable and gardens unsightly. This disease thrives in humid environments, which are typically present in production nurseries and propagation houses. Once boxwood blight is established in production nurseries, regular use of fungicides is required to control the disease to produce a marketable product, thus significantly increasing production costs. Furthermore, *C. pseudonaviculatum* has caused significant damage to boxwoods in European landscapes, which suggests this disease can potentially damage historic boxwood gardens in Virginia.

## ***Biology***

All known species and varieties of boxwoods (*Buxus* spp.) are susceptible to *C. pseudonaviculatum*. The pathogen spreads by wind-driven rain or splashing water over short distances and is most infective during conditions of high humidity. The significance of spore dispersal by wind or air currents is not known but is likely limited to smaller scale distances such as between plants, within hoop houses, or within a field. Long distance spread of this disease occurs via movement of infected plants, infested plant debris, soil or equipment. Spores may also spread by insects or birds. Resting propagules (i.e. microsclerotia and chlamydospores) have been observed in culture and within infected plant tissue (N. Dart, personal observation). The pathogen has been found to survive in leaf debris placed either on the soil surface or buried in the soil for up to 5 years.

## ***Management***

When *C. pseudonaviculatum* is introduced into a production nursery, regular applications of a registered fungicide are required to control outbreaks to produce a marketable crop. Increasing space between plants may reduce humidity in the presence of sufficient air movement and reduce spore production and infection by this pathogen. Overhead irrigation generates the humid conditions optimal for disease development and should be avoided. A drip irrigation system or another suitable irrigation system that does not create excess moisture or humidity is recommended. *C. pseudonaviculatum* is not known to be established in Virginia or any other region of the U.S. The current strategy of nurseries should be to prevent this disease from spreading. Examine newly purchased plants and rooted cuttings carefully for symptoms. Closely monitor the new stock for symptom development and quarantine new plants from other nursery stock for several months after purchase. Asymptomatic boxwoods can act as a “Trojan horse” in the nursery, since symptoms may develop later. Suspect symptoms should be reported to the Virginia Department of Agriculture and Consumer Services or your local county Virginia Cooperative Extension agent (<http://www.ext.vt.edu/offices/>).

## ***Diseases that can be confused with Boxwood Blight***

Symptoms of several other diseases of boxwood, including *Volutella* blight and root rot diseases, could be confused with box blight. Although *Volutella* may follow *Cylindrocladium* infection, *Volutella buxi* is also an opportunistic pathogen that is common on boxwood stems and foliage following spring frost injury (Fig. 6). Like *Cylindrocladium*, it causes dieback of individual shoots but does not infect the roots. *Volutella* can be distinguished from *Cylindrocladium* by the color and shape of the spore masses: in contrast to the white, stellate spore clusters (Fig. 3) of *Cylindrocladium pseudonaviculatum*, *Volutella* forms salmon-colored amorphous, spore masses (Fig. 7). Fungicides are not effective for controlling *Volutella* blight.

Nematode feeding and fungal root rot diseases of boxwood, such as *Phytophthora* root rot and English boxwood decline, cause a more general dieback of the plant. Browning of fibrous roots is obvious when soil is washed from roots (Fig. 8). These soil-borne pathogens do not directly infect the stems and no fruiting structures are formed on stems or leaves. Cultural problems, such as poor drainage or deep planting, can also cause a general dieback on boxwood.



Figure 1: Symptoms of defoliation caused by *C. pseudonaviculatum*.



Figure 2: Dark stripes on stems, caused *C. pseudonaviculatum*.



Figure 3: White stellate spore masses of *C. pseudonaviculatum* on a boxwood stem.



Figure 4: Cylindrical spores of *C. pseudonaviculatum*.



Figure 5: Healthy root system of boxwood on plant with boxwood blight.



Figure 6: Symptoms of Volutella blight caused by *Volutella buxi* on boxwood. Note spore masses on stem.



Figure 7: Salmon-colored spore masses of *Volutella buxi* on boxwood stem (image courtesy of Florida Division of Plant Industry Archive, Florida Department of Agriculture and Consumer Services, Bugwood.org).



Figure 8: Browning of boxwood roots and foliage caused by *Phytophthora* root rot.