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Boxwood Blight: A New Disease of Boxwood 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 found for the first time in the United States in North Carolina, Virginia and Connecticut in 2011. 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. The first reported infestation in the U.S. was in a North Carolina nursery and the disease was introduced to Virginia on plants from that nursery. It is not known how *C. pseudonaviculatum* was initially introduced to North Carolina. Spread outside the two Virginia locations, both of which are fields owned by a single nursery, has not been reported. The Virginia Department of Agriculture and Consumer Services (VDACS) and the North Carolina Department of Agriculture and Consumer Services are implementing strategies to eradicate the pathogen from infested fields. However, growers should be aware of the symptoms of boxwood blight and monitor nursery and landscape boxwoods for symptoms.

Symptoms, Signs and Impacts

The fungal pathogen infects leaves and branches of boxwoods, causing light or dark brown leaf spots with a dark border, defoliation and dieback (Fig. 1). Infected branches develop long blackish-brown streaks on stems (Fig. 2). In warm, humid conditions the fungus produces clusters of white spores visible to the naked eye on the underside of leaves and on stems (Fig. 3). The fungus does not infect roots; thus, plants may re-grow even after a severe infection. However, repeated defoliation and dieback can predispose plants to other diseases, such as Volutella blight, resulting in decline and eventual death.

Figure 1: Symptoms of blight and defoliation, caused by *C. pseudonaviculatum* (N. Dart).

Figure 2: Dark streaks on branch caused by *C. pseudonaviculatum* (N. Dart).

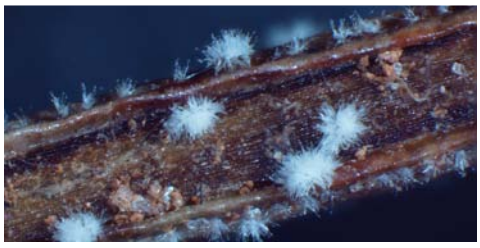

Figure 3. White stellate spore masses of *C. pseudonaviculatum* on a boxwood stem (E. Bush).

Although boxwoods are not typically killed directly by *C. pseudonaviculatum*, rapid defoliation renders boxwoods unmarketable and gardens unsightly. The pathogen 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; however, Cylindrocladium diseases are difficult to control with fungicides. The pathogen 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.

Tactics to Avoid Introduction of the Disease

Although *C. pseudonaviculatum* has been found at two locations in Virginia, it is not known to be established in Virginia or any other region of the U.S. To prevent further introductions of this pathogen, nursery personnel should do the following: 1) Examine newly purchased plants and cuttings carefully for symptoms and closely monitor them for symptom development. 2) Isolate new plant material from other nursery stock for at least three weeks. Asymptomatic boxwoods or cuttings can harbor the pathogen and act as a "Trojan horse". This time period should allow any earlier fungicide treatment to lose its protective ability and allow symptoms to develop on diseased material. 3) If boxwood blight symptoms are observed, report immediately to VDACS or your local county Virginia Cooperative Extension agent (http://www.ext.vt.edu/offices/).

Diseases Similar to Boxwood Blight

Symptoms of several other diseases of boxwood, including Volutella blight, caused by *Volutella buxi*, and root rot diseases, could be confused with box blight. *V. buxi* is an opportunistic fungal pathogen that is common on boxwood stems and foliage following spring frost injury (Fig. 4). It can also follow Cylindrocladium infection. Like Cylindrocladium, *V. buxi* causes dieback of individual shoots but does not infect the roots. The two fungi can be distinguished by the color and shape of the spore masses. In contrast to the white, stellate spore clusters of *C. pseudonaviculatum*, Volutella forms salmon-colored, amorphous spore masses.

Figure 4. Symptoms of Volutella blight caused by *V. buxi* on boxwood. Note spore masses on stem (M.A. Hansen).

Nematode feeding and fungal root rot diseases of boxwood, such as Phytophthora root rot and English boxwood decline, cause root rot and a more general dieback of the plant. 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 of boxwood.