4. Dothistroma Needle Blight

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Hosts

Dothistroma needle blight (also known as red band needle blight) damages many pine species and their hybrids and may occasionally affect some other conifers growing in close proximity to diseased pines. Austrian, lodgepole, Monterey, ponderosa, and western white pines can be severely affected, but red and Scots pines appear to be quite resistant. The disease is caused by two fungi that were only recently recognized as distinct species, *Dothistroma septosporum* (sexual stage *Mycosphaerella pini*) and *D. pini* (without a known sexual stage).

Distribution

Dothistroma needle blight occurs widely in the continental United States. Each pathogen's geographic distribution is not completely known, however, with *D. pini* reported primarily from the North Central region.

Damage

Although serious damage to nursery stock is not common, the disease has severely affected landscape trees, Christmas trees, and those in windbreaks, shelterbelts, and some plantations (fig. 4.1). Trees can be almost completely defoliated and may die if disease occurs repeatedly.

Diagnosis

Spots and bands begin to appear on needles early in the fall following infection in the Great Plains region and Central United States, but may develop at any time in areas with more moderate climate. Spots and bands may be tan to orange-red to brown, and needles with bands may die back from their tips (fig. 4.2). Portions of needles between spots and bands often remain green, as may the bases. Lower needles are often affected more severely than those higher in the crowns of established trees. Diseased needles are shed prematurely, but may persist well into the year after infection. On severely affected trees, only the terminal needles may remain, resulting in a "lion's tail" shoot appearance.

The black asexual fruiting bodies of these *Dothistroma* pathogens form within the dead portions of needles and can be seen with the naked eye or a hand lens. Conidia are exuded in a mass through a longitudinal rupture of the epidermis on one or both sides of the fruiting body (fig. 4.3). *D. septosporum* and *D. pini* conidia are colorless, cylindrical, with tapered to rounded tips and slightly

Figure 4.1—*Severe Dothistroma needle blight damage to Monterey pine.* Photo by Glen Stanosz, University of Wisconsin-Madison.

Figure 4.2—*Symptoms of Dothistroma needle blight on lodgepole pine.* Photo from USDA Forest Service Archive at http://www.bugwood.org.

truncated to rounded bases, and usually have two to several cells. *D. septosporum* conidia are 15 to 40 microns long and 2 to 2.5 microns wide. *D. pini* conidia (fig. 4.4) are similar in length, but are 3 to 5 microns wide. Conidia of both *Dothistroma* species can resemble those of the brown spot needle blight pathogen *Lecanosticta acicola*, but *L. acicola* conidia are somewhat olive in color. In the continental United States, *M. septosporum* sexual fruiting bodies have been reported only from the far Western States. These sexual fruiting bodies also rupture the epidermis of necrotic areas of needles and release fusiform, two-celled ascospores that are 10 to 14 microns long and 2.5 to 3.5 microns wide.

Relatively slow growth can make obtaining cultures of these fungi challenging. After surface disinfestation, very small needle segments that bear fruiting bodies can be excised and placed on malt extract agar or potato dextrose agar amended with lactic acid or streptomycin sulfate to inhibit bacterial growth. Alternatively, isolates can be obtained by incubating symptomatic needles in a moist chamber and transferring masses of exuded conidia to culture media. Incubate the conidia at 20 ºC (68 ºF). Species identity confirmation is facilitated using molecular methods.

Figure 4.3—*Fruiting bodies of* Dothistroma pini *on Austrian pine needle.* Photo by Glen Stanosz, University of Wisconsin-Madison.

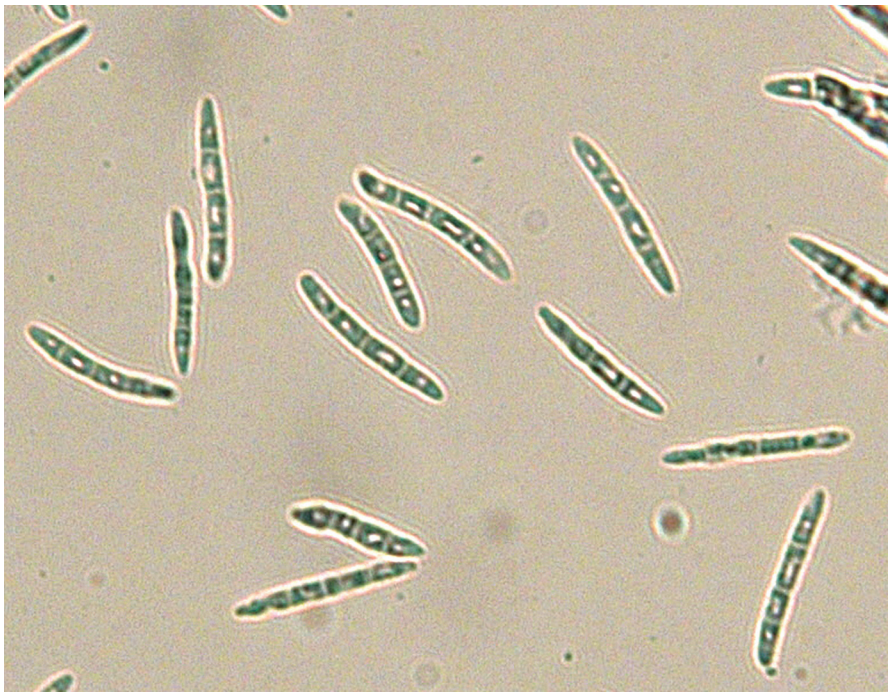

Figure 4.4—*Conidia of* Dothistroma pini. Photo by Glen Stanosz, University of Wisconsin-Madison.

Biology

D. septosporum and *D. pini* survive and sporulate in dead areas of needles on diseased trees. In the Great Plains region, one cycle of disease per year has been observed, with spores exuded in moist weather and disseminated by rain splash from spring to fall. Multiple disease cycles within a single growing season may occur in areas with a more moderate climate.

Control

Biological

Variation in resistance within and among pine species has been reported, and nonhosts should be considered in areas where disease is chronic or severe.

Cultural

Elimination of severely affected trees that provide inoculum will decrease incidence and severity of disease in production areas and landscapes. Improving airflow and decreasing wet foliage frequency and duration can also reduce damage. Host species needles should not be used as soil amendments or mulches. Do not move diseased seedlings into or out of the nursery.

Chemical

Protectant fungicides can also reduce disease incidence and severity. Due to the long duration of inoculum availability, however, repeated applications, perhaps throughout the entire growing season, may be required.

Selected References

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