1. Brown Spot Needle Blight

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Revised from chapter by Albert G. Kais, 1989.

Hosts

Brown spot needle blight, caused by the fungus *Mycosphaerella dearnessii* (syn. *Scirrhia acicola*, *Eruptio acicola*), is most commonly found on longleaf pine. The fungus also infects seedlings of slash, loblolly, shortleaf, spruce, pitch, pond, Sonderegger (longleaf x loblolly pine), Virginia, Scots, and eastern white pine.

Distribution

Brown spot needle blight occurs in nurseries throughout the Southern United States. It has also been reported on susceptible pines in plantations, landscapes, and Christmas tree plantations in the Central Plains and Great Lake regions, Oregon, and Vermont.

Damage

Infected seedlings are seldom killed in the nursery, but repeated and severe infections result in defoliation that reduces seedling vigor, which, in turn, may result in poor seedling survival and growth following outplanting. Longleaf pine seedlings are most susceptible while in the grass stage as conditions near the ground favor the pathogen and seedling infection. The buildup of fungal inoculum increases the number of infections on needles that eventually coalesce and result in defoliation (fig. 1.1). Generally, after the seedling is out of the grass stage (1 m or 3.2 ft), the disease is not an issue. On some pine species used for Christmas trees, however, the disease can cause significant economic losses.

Figure 1.1—*Longleaf pine seedlings infected with brown spot needle blight in the nursery.* Photo by Edward L. Barnard, Florida Division of Forestry.

Diagnosis

Infections and the appearance of lesions occur from May to October. Infection begins with small, grayish-green spots, which become a straw-yellow color and then light brown with chestnut-brown margins (fig. 1.2). Spots coalesce, and the needle tissue dies beyond and between infection sites. Needles with multiple lesions appear mottled and have three distinct zones: a green basal portion, a mottled middle portion, and a dead apical portion (fig. 1.3). Severe infection results in premature defoliation or needle cast and reduced photosynthetic surface and seedling vigor, which prolongs the grass stage and could eventually effect seedling survival.

Two types of fruiting bodies are produced. (1) Conidia are produced in acervuli, which appear on lesions as small black dots visible to the naked eye (fig. 1.4). Conidia are exuded in sticky masses up to 1 mm long that split the epidermis of the leaf. These spores are cylindrical, curved,

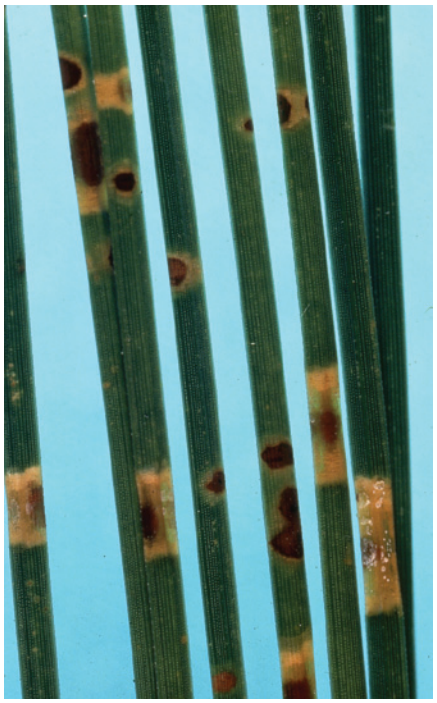

Figure 1.2—*Typical lesions caused by* Mycosphaerella dearnessii *on conifer needles.* USDA Forest Service Archive.

Figure 1.3—*Longleaf pine seedling with advanced symptoms of brown spot needle blight.* Photo by George Blakeslee, University of Florida.

Figure 1.4—*Fruiting bodies (acervuli) of* Mycosphaerella dearnessii *on needle.* Photo by Edward L. Barnard, Florida Division of Forestry.

1 to 4 septate, olive green to brown, and 19 to 35 by 3.5 to 4 microns (fig. 1.5). (2) Ascospores are produced in pseudothecia embedded in dead leaf tissue. They are hyaline, oblong-cuneate, unequally two-celled, and 15 to 19 by 3.5 to 4.5 microns, with two prominent oil drops in each cell (fig. 1.6). Brown spot needle blight can be mistaken for Dothistroma needle blight as the two diseases have similar symptoms and fruiting bodies.

Biology

Seedling infection occurs when spores enter the needles through the stomata. Ascospores are released during periods of high moisture (rain, dew, and fog), can be disseminated by the wind great distances, and are the principal means by which the fungus infects seedling nursery beds. Conidia are produced in acervuli on needle lesions that result from ascospore infection. In contrast to the long-distance movement of ascospores, conidia are disseminated short distances by rain splash

Figure 1.5—*Conidia of* Mycosphaerella dearnessii. Photo by Albert Kais, USDA Forest Service, at http://www.bugwood.org.

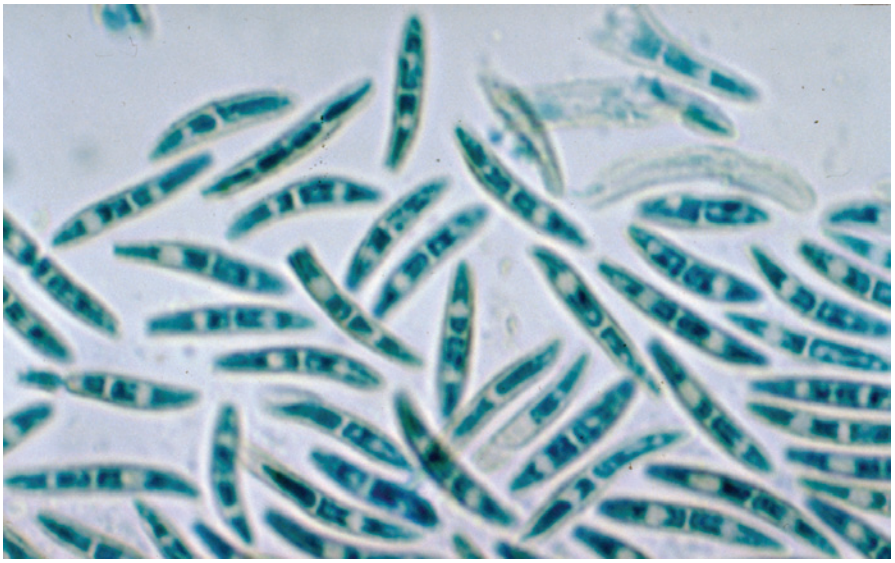

Figure 1.6—*Ascospores of* Mycosphaerella dearnessii. Photo by H.C. Evans, CAB International, at http://www.bugwood.org.

and cause local buildup of the disease in seedling beds. Ascospores are produced on seedlings 2 to 3 months after the seedlings are initially infected. Both spore forms overwinter in dead and infected needle tissue.

Control

Prevention

Inherent susceptibility differences exist in longleaf pine to *M. dearnessii.* The use of longleaf seed sources known to be resistant to infection will decrease the chance of infection and disease in the nursery and after outplanting.

Cultural

Sowing seed in bareroot nurseries at densities of 160 seedlings per m^2 (15 seedlings per ft^2) or less will increase ventilation among seedlings. Mulch is used to reduce mortality from sand splash. Top-clipping longleaf pine needles during the growing season will decrease moisture, decrease conditions necessary for infection, and increase fungicide efficacy. Removing clipped needles from nursery beds decreases the level of inoculum if the fungus is present. This decrease may be important if longleaf pine will be sown in the same area during the next cropping cycle.

Chemical

The most effective control measure is the application of fungicides. Careful monitoring of the seedling crop should be conducted during the growing season. When symptoms first appear, fungicides labeled for brown spot needle blight control should be applied.

Selected References

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