

# 1. Brown Spot Needle Blight

Albert G. Kais

## Hosts

Brown spot needle blight, caused by the fungus *Mycosphaerella dearnessii* (syn. *Scirrhia acicola*), is common on longleaf pine seedlings within the natural range of longleaf pine, that is, within the Coastal Plain from North Carolina to Texas. The fungus also infects seedlings of slash, loblolly, and white pines in nurseries within or slightly beyond this area.

## Distribution

Brown spot is found in nurseries in nine Southern States. It has also been reported on pines in plantations in nine additional States (fig. 1-1).

## Damage

Infected seedlings are seldom killed, but severe defoliation reduces vigor, which, in turn, may result in poor survival and growth following outplanting.

## Diagnosis

Although lesions may develop on secondary needles at any time, they most commonly appear from May to October. Look for 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 groups of spots. Needles with multiple lesions appear mottled. Infected needles have three distinct zones: a green basal portion, a mottled middle portion, and a dead apical portion (fig. 1-3). The fungus can also infect the cut ends of pruned longleaf pine seedlings. When this happens, entire beds may appear scorched (fig. 1-4).

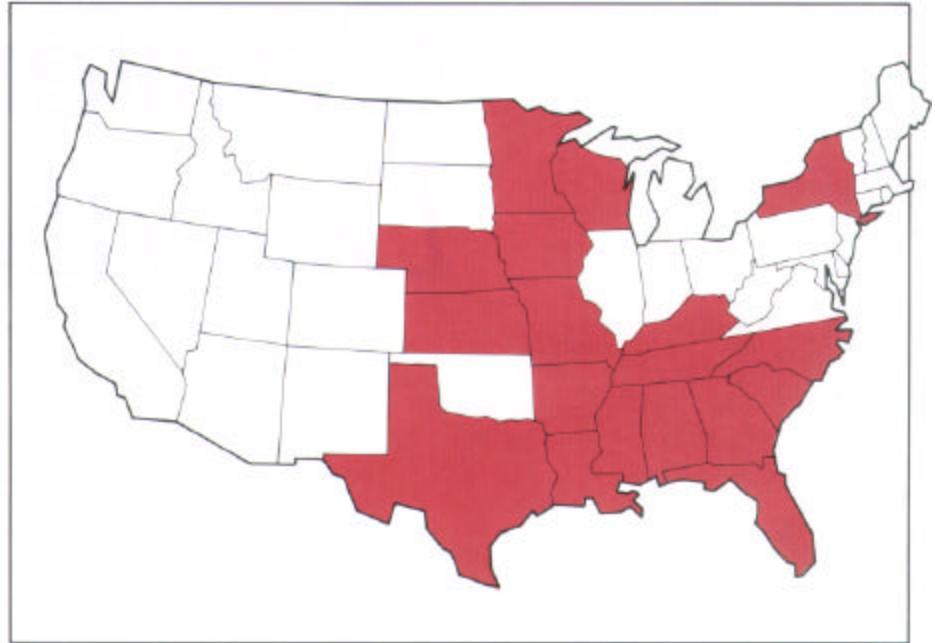


Figure 1-1—Distribution of brown spot.

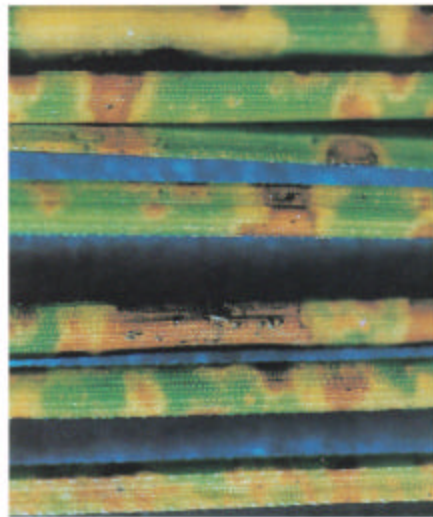


Figure 1-2—Typical lesions caused by the brown spot fungus.



Figure 1-3—Longleaf pine seedlings with advanced symptoms of brown spot.



**Figure 1-4**—Longleaf pine seedlings infected through pruning wounds.

Two types of fruiting bodies are produced. Conidia are produced in acervuli, which appear on lesions as small black dots visible to the naked eye (fig. 1-5). Conidia are exuded in sticky masses up to 1

mm long that split the epidermis of the leaf. These spores are cylindrical, curved, 1-4 septate, olive green to brown, and 19-35 x 3.5-4 microns (fig. 1-6). Ascospores are produced in pseudothecia embedded in dead leaf tissue. They are hyaline, oblong-cuneate, unequally two-celled, and 15-19 x

3.5-4.5 microns, with two prominent oil drops in each cell (fig. 1-7).

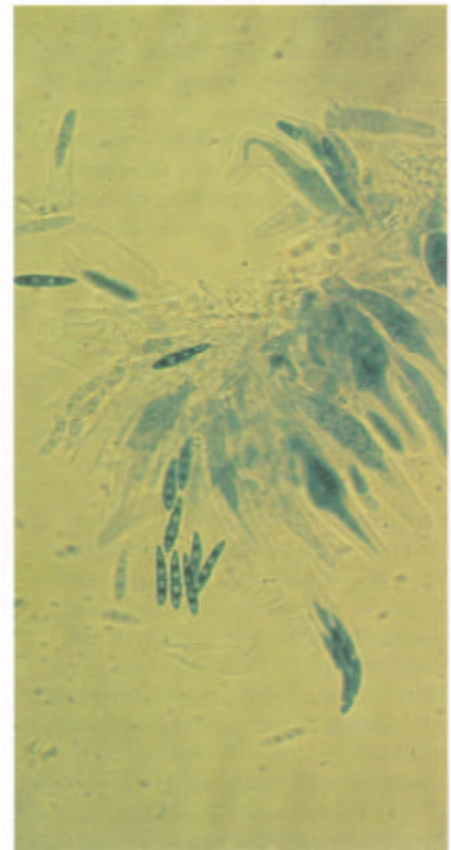
Brown spot needle blight can be mistaken for *Dothistroma* needle blight: the two diseases have similar symptoms and fruiting bodies. See chapter 4 for a more detailed comparison of these two diseases and their causal organisms.



**Figure 1-6**—Conidia of *M. dearnessii*.



**Figure 1-5**—Acervuli (arrow) of *M. dearnessii* on needles.



**Figure 1-7**—Ascospores of *M. dearnessii*.

### Biology

Ascospores, discharged during periods of rain, dew, and fog, are the principal means by which the brown spot fungus invades nursery beds. Ascospores are disseminated by the wind and initiate light, scattered infections, sometimes at great distances from the source.

Conidia are produced in acervuli on the lesions resulting from ascospore infection. Conidia are disseminated short distances by rain splash and cause local buildup of the disease. Ascospores are produced on seedlings 2 to 3 months after the seedlings are infected.

Both spore forms over winter in dead and infected needle tissue.

### Control

**Prevention**—Use superior seed that is resistant to the disease. Remove and destroy all infected seedlings and infected pines growing in and around the nursery.

**Cultural**—In the spring, plant seed in rows at low densities of about 15 seedlings per square foot. Plant in well-drained beds. Use mulch to reduce mortality from sand splash, but do not use pine needles as mulch. Promote growth of existing ectomycorrhizal fungi by controlling soil pH (less than 6.0 is optimal) and avoiding excess levels of phosphorus. If necessary, inoculate beds with the mycorrhizal fungus *Pisolithus tinctorius*.

Clip needles periodically during the growing season to prevent toppling and to expedite spraying and

lifting. Remove clipped needles from nursery bed areas. Avoid pruning when it is raining or at any time when the seedlings are wet.

Root prune seedlings to a depth of 7 inches from 6 to 12 weeks before lifting.

**Chemical**—Spray with Bordeaux mixture, maneb, or chlorothalonil, which are effective and registered for use on brown spot. Seedlings should be sprayed with a foliar fungicide at 10- to 30-day intervals—depending upon the amount of rainfall—from the beginning of April through October. Begin spraying in the spring when the new secondary needles are 1 to 2 inches long. Four to six applications are usually sufficient.

Spray with a fungicide the day before pruning and again immediately after pruning. Swab cutting blades with denatured alcohol or a 10-percent solution of sodium hypochlorite.

A seedling root-dip treatment in a 5 percent active ingredient benomyl-kaolin mixture prior to packing at the nursery or at the reforestation site is very effective in reducing brown spot in the field. This treatment is very economical and significantly improves both growth and survival of out-planted seedlings.

### Selected References

- Kais, A.G. 1978. Pruning of longleaf pine seedlings in nurseries promotes brown spot needle blight. *Tree Planters' Notes*. 29(1): 3-4.
- Kais, A.G.; Cordell, C.E.; Affeltranger, C.E. 1986. Benomyl root treatment controls brown spot disease on longleaf pine in the Southern United States. *Forest Science*. 32:506-511.
- Phelps, W.R.; Kais, A.G.; Nicholls, T.H. 1978. Brown spot needle blight of pines. For. Insect & Dis. Leaflet 44. Washington, DC: U.S. Department of Agriculture, Forest Service. 8 p.