

58. Diplodia Blight of Pines

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The fungus *Diplodia pinea* (*Sphaeropsis sapinea*) damages plantings of both exotic and native pine species in the United States. The effects of this disease are most severe in landscape, windbreak, and park plantings in the central and eastern United States. The fungus is seldom found in natural pine stands.

Hosts and Distribution

D. pinea is known to occur in 30 eastern and central States and in Hawaii and California (fig. 58-1). The fungus infects more than 20 pine species; it is frequently reported on Scots, red, ponderosa, and Mugo pines in the United States. It is a serious problem on Austrian pine, which, since the early 1900's, has been widely used in landscape, windbreak, and park plantings in the central and eastern United States.

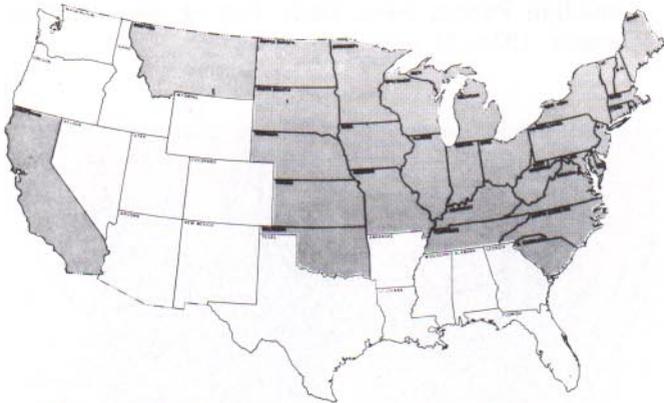


Figure 58-1. *Diplodia pinea* occurs in shaded states.

Symptoms and Signs

The most conspicuous symptom of *Diplodia* blight is brown, stunted new shoots with short, brown needles (fig. 58-2). Needles on infected new shoots often become discolored (tan, brown) while still encased in fascicle sheaths. Presence of resin droplets and one or a few very short needles are usually the first indications that a new shoot is infected. Entire new shoots are killed rapidly by the fungus.

New shoots throughout the crown may be infected, although damage is generally first evident in the lower crown. Usually infection varies considerably among major branches. Occasionally, after 2 or 3 successive years of infection, there is extensive killing of branches at the top of trees. Repeated infections reduce growth, deform trees, and ultimately kill them.

Seed cones of Austrian, ponderosa, and Scots pines are susceptible to *D. pinea* their second year, but not the first.

Disease Cycle

Small, black fruiting bodies (pycnidia), in which spores develop, form on needles, fascicle sheaths, scales of second-year seed cones, and bark. The fruiting bodies can be seen with a 10X hand lens. These black bodies, which erupt through the epidermis, usually are numerous at the base of needles (fig. 58-3) and on scales of second-year seed cones (fig. 58-4). Fruiting bodies are found easily on short needles of shoots infected the previous year, particularly on those that have turned ashen-gray and are easy to detach. When rainfall is above normal in late summer, unusually high numbers of pycnidia may develop on current-year needles and second-year cones. In most years, however, pycnidia are not numerous on these needles and cones until the following spring.

Highly moist conditions are needed for infection. Large numbers of spores (fig. 58-5), are dispersed only during rainy periods and high relative humidities are required for spores to germinate and for germ tubes to grow and penetrate needles and shoots. If rain is sparse when new shoots are highly susceptible, infection levels usually are very low. Once the fungus penetrates needles, however, tissues are rapidly destroyed, resulting in stunted shoots and needles.

New shoots of Austrian, ponderosa, and Scots pines are most susceptible during a 2-week period starting when buds begin to open, and continue to be susceptible until about mid-June. Symptoms on new shoots can readily be detected in late May; extent of infection can be effectively determined in late June or July.



Figure 58-2. New shoots of Austrian pine killed by *D. pinea*.

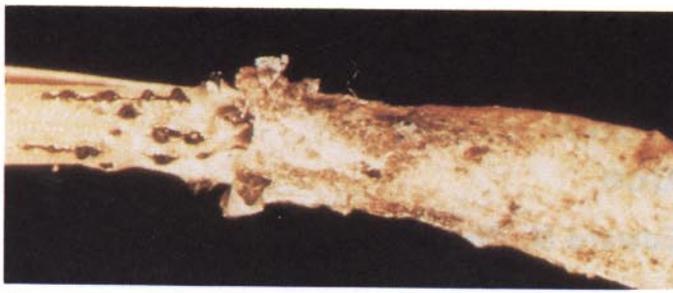


Figure 58-3. Fruiting bodies (pycnidia) of *D. pinea* at the base of Austrian pine needle.

Second-year seed cones are initially infected in late May. Numerous fruiting bodies develop on these cones, and the increased damage to older trees is probably related to this fungus buildup. Infected seed cones are often observed on otherwise healthy pines, which indicates that, on older pines, inoculum builds up on seed cones before new shoots are infected extensively.

Although unwounded new shoots can be infected, *D. pinea* infects both current-year and older tissues through wounds. *D. pinea* may severely damage trees wounded by hail or insects. Tissues wounded during pruning or shearing operations may also become infected. Wounded tissues remain vulnerable to *D. pinea* infection for several (at least 12) days.

Damage

Although pines of all ages are susceptible to *D. pinea*, damage is more severe in older plantings. In Great Plains windbreaks that were 20 to 22 years old, only a few pines were infected by *D. pinea*. Incidence and damage increased as the trees approached 30 years of age. Damage often is severe in pines that have an abundance of second-year seed cones.

D. pinea kills current-year shoots, major branches, and ultimately entire trees. Damage may be confined to the new shoots, particularly on trees with shoots infected for the first time. The fungus will infect older stem tissues, but the way this occurs is not always evident. Commonly, when new shoots are killed, only a small percentage of the subtended stem tissue and second-year needles show evidence of infection. On severely damaged trees, however, the fungus usually can be isolated from all segments of major branches.

Control

Infection of new shoots can be reduced significantly by fungicide applied during the 2-week period when shoots are highly susceptible to infection. This period, approximately from the third week in April through the first week of May in eastern Nebraska, begins with the opening of buds. During this short period, two applications of 4-4-50 Bordeaux mixture [4 lb. copper sulfate, 4 lb. hydrated lime, and 50 gal. water] approximately 1 week apart are more effective than one application.

Fungicide applied during late April and early May to protect new shoots does not prevent infection of seed



Figure 58-4. Pycnidia on an Austrian pine seed cone infected by *D. pinea* (left); uninfected cone (right).

cones. Thus, it would probably not be practical to try to reduce inoculum (spores) on seed cones with protective fungicides, because one or more additional fungicide applications would be required. Removal of infected branches may be justified on the basis of improving tree appearance, but probably will not reduce the amount of infection significantly.

Pruning or shearing in Christmas tree or other pine plantings should be avoided when conditions are favorable for infection because of danger of infection through wounds.

Young pines in plantings and pine seedlings in nursery beds usually become infected if they are located near old, cone-bearing pines. Either the old infected pines should be removed, or pine seedling beds or plantings should not be located near them.

Information on resistance to *D. pinea* among geographic seed sources of pine species is too limited for use in making recommendations for planting. However, Scots pine is often recommended for landscape plantings in eastern Nebraska because it is damaged less by *D. pinea* than the frequently planted Austrian and ponderosa pines.

Selected References

Peterson, Glenn W. Infection, epidemiology, and control of diplodia blight of Austrian, ponderosa, and Scots pines. *Phytopathology*. 67: 511-514; 1977.



Figure 58-5. Spores of *D. pinea*.