

Pine Shoot Blight and Canker

Branch tip flagging and black dots on cone scales

Pathogen—The fungus *Diplodia pinea* (= *Sphaeropsis sapinea*) causes pine shoot blight and canker. This disease is also known as Diplodia or Sphaeropsis shoot blight. A second species, *Diplodia scrobiculata*, occurs in the United States and may be present in this region.

Hosts—Pine shoot blight is an important disease of pines and other conifers. Seedlings to fully mature pines are affected, and damage occurs in nurseries, plantations, Christmas tree and ornamental plantings, and natural stands. This disease is widely distributed and locally severe in much of South Dakota, Nebraska, and Kansas where it affects mostly ponderosa, Austrian, and Scots pine.



Figure 1. *Diplodia* infected shoot-tip. Photo: James T. Blodgett, USDA Forest Service.

Signs and Symptoms—*Diplodia pinea* can cause shoot blight, canker, crown wilt, collar rot, and root disease. New shoots are killed rapidly by the fungus (fig. 1). Damage may be confined to the new shoots, particularly on trees with shoots that are infected for the first time. Infected needles become discolored (tan to gray) while still encased in fascicle sheaths. Dead needles usually remain attached to the twig. Cankers in new shoots can cause stunting or crooking of the shoots. Repeated infections result in dead branches and tree mortality (fig. 2). Resinous cankers with brown phloem and cambial tissue develop on branches and stems (fig. 3).

Small, black fruiting bodies (pycnidia) are produced abundantly on needles and cones (figs. 4-5). The fruiting bodies can be seen with a hand lens. However, microscopic examination of the spores is necessary for accurate identification.

Disease Cycle—Spores develop in the fruiting bodies on needles, needle fascicle sheaths, scales of second-year cones, and bark. These black fruiting bodies, which erupt through the epidermis, are often numerous at the base of needles and on scales of second-year seed cones.

Spores are dispersed from spring to fall, with large numbers of spores being dispersed during rain and high relative humidity. Rain splash is a common means of spread, but spores can be carried by high wind or by insects.

Moderate temperatures and very moist conditions are needed for spore germination and infection. Young shoots are most susceptible to infection. Spores can penetrate needles and young shoots, or *D. pinea* can infect both current-year and older tissues through wounds. Because this pathogen can persist in stems and branches of pines with no symptoms, wounding might act as a trigger, allowing the fungus to rapidly infect. This could explain the rapid disease development often associated with hail events. Both planting stress and water stress can also result in rapid disease-associated mortality of already infected trees.



Figure 2. Infected ponderosa pine with hail damage. Photo: James T. Blodgett, USDA Forest Service.



Figure 3. Branch with cankered tissue. Photo: James T. Blodgett, USDA Forest Service.

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Figure 4. Pycnidia of *Diplodia* on needles. Photo: James T. Blodgett, USDA Forest Service.



Figure 5. Pycnidia on cone scales. Photo: James T. Blodgett, USDA Forest Service.

The large numbers of spores produced on cones can contribute to infection and branch mortality of older trees or infection of seedlings and young trees growing near the older infected trees. The fungus commonly kills the entire new shoot by the end of summer. Infections may continue to develop into year-old tissues.

Increased disease development has been associated with water deficits; competing vegetation; high soil nutrition; poor site; and damage by hail, snow, and insects. Seasonal variations and climate differences also have been related to differences in the amount of disease caused by this pathogen.

Impact—Pine shoot blight kills current-year shoots and major branches. Severe infections may lead to death of trees of all sizes. The disease can predispose trees to attack by other diseases and insects, including the pine engraver beetles. This pathogen often severely affects trees wounded by hail, insects, or other damage. Pruning and shearing wounds may become infected and are susceptible to infection for several days.

Management—Reducing water stress is an important factor in controlling pine shoot blight. Techniques to reduce disease losses include managing competing vegetation, stand thinning, using planting techniques that reduce drought, and selecting tree species that are adapted to the site.

Pruning or shearing should be avoided during periods when conditions are highly favorable for infection because of the danger of infection through wounds. Pruning tools should be disinfected.

Seedlings and small trees can become infected when they are located close to infected cone-bearing pines. Avoid planting adjacent to infected pines, or remove infected trees.

Fertilization of pines at levels recommended for ornamental and shade trees can result in increased disease and should be avoided.

Infection of new shoots can be reduced significantly by applying an appropriately registered fungicide to pines during the 2-week period when shoots are highly susceptible to infection. This period begins with bud opening, usually from late April to mid-May. Fungicide applications during late April and mid-May will protect new shoots but will not prevent infection of cones.

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