



NEEDLE CAST DISEASES OF CONIFERS

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Needle infections by fungal pathogens can decrease the value of Christmas trees and landscape evergreens by causing needle discoloration and, more important, defoliation (See Figure 1, above). Severe needle drop not only decreases tree value, but can result in poor tree health and vigor. Although most conifers are somewhat susceptible to needle diseases, certain varieties of Scots pines growing in locations favorable for disease may be severely affected. Needle diseases can be serious in shaded and crowded Kentucky landscapes as well as in Christmas tree plantations.

Scots Pine Needle Casts

Scots pines are widely grown as Christmas and landscape trees. Three important needle blight and needle cast diseases

can affect Scots pines in Kentucky Christmas tree plantations. Although most Christmas tree plantations are relatively free of needle diseases, some serious outbreaks have been observed. Because there are differences in the timing of management activities for each disease, it is important for growers to identify the problem correctly. Look for needle blight diseases in shaded parts of the planting, on lower branches, and on the north side of individual trees.

Lophodermium Needle Cast

Austrian, red, and Scots pines sustain the greatest damage from needle cast caused by *Lophodermium seditiosum*, the causal fungus. In Christmas tree plantations, short-needle strains of Scots pines with seed origins in France and Spain are damaged most. Virginia pines are also susceptible.

In late autumn, small, brown spots with yellow halos appear on current-year needles. The spots may appear more conspicuously in early spring. Needles turn yellow, then brown, and are shed throughout the summer. By late summer, only tufts of green current-season needles may be left. Spores of the causal fungus, produced in tiny, black, football-shaped structures in infected needles (Fig. 2), are spread by wind and infect current needles during moist periods from August to October. Infected needle symptoms are seen the following late fall or early spring. Where the fungus is active, a period of cool moist weather in late summer and early fall can lead to a destructive outbreak.

Needle cast disease reduces photosynthetic capability and reduces growth in small trees. Twigs that bear only diseased needles may wither in early spring, and buds that survive produce abnormally small shoots and needles. Thus, Christmas trees may be stunted and disfigured.

Brown Spot Needle Blight

This disease is caused by *Mycosphaerella dearnessii*, a fungus once known as *Scirrhia acicola*. Needle browning and defoliation of Scots pines due to brown spot is most common, but Austrian, loblolly, mugo, pitch, red, shortleaf, Virginia, and eastern white pines are also susceptible.

In late summer, small, dark spots becoming brown with yellow halos appear on current-season needles (Fig. 3). By fall, needles may be resin-soaked, turn brown, and begin to drop from the tree. Most needle shedding occurs the following spring. Dark, oval fruiting bodies are found on needles, and during late spring and early summer, spores of the causal



Figure 2—*Lophodermium* fungus producing spores on pine needle (enlarged).



Figure 3—Needle spot associated with brown spot needle blight of pine.

fungus initiate new infections. Infections occur readily, and the disease is spread most rapidly during periods of warm, wet weather.

On pines with dense foliage, infection is most common on low branches, leaving bare branches through the winter if infections have been severe. If these branches live, they produce new foliage in spring that may become infected the next season. Light infections may only accelerate loss of second- and third-year needles. Infected trees are not valued as Christmas trees.

***Naemacyclus* Needle Cast**

Scots pines grown for Christmas trees are very susceptible to this needle cast. Austrian, mugo, Virginia, and eastern white pine are also hosts. The causal fungus is *Cyclaneusma minus*, formerly referred to as *Naemacyclus*.

Needle cast disease symptoms begin to appear the year following infection. In late summer and fall, light green spots may be found on second- and third-year needles. Needles soon turn yellow, having dark brown horizontal bands, then turn brown and drop from the tree throughout fall, winter, and spring. The causal fungus produces tiny, elongate, protruding, tan-colored fruiting bodies in dead needles. These structures yield spores that initiate infections primarily from April to June but also at low levels throughout the year depending on the weather. This disease is favored by mild, rainy weather during spring and summer.

Premature yellowing and casting of second- and third-year needles reduce the value of infected trees as Christmas trees. Severely diseased trees appear yellow before needles fall. Current-season needles show no symptoms and are retained, even though infected. In severe cases, first-year needles may be all that are left. Such trees are of little value as Christmas trees.

Control

- *Cut and remove severely infected trees.*
- *Remove and destroy live, infected branches on stumps of harvested trees.*
- *Shear healthy plantations before diseased plantings to prevent movement of fungal spores from diseased to healthy trees.*
- *Do not shear infected foliage during wet weather.*
- *Remove weeds from the plantation to promote better air movement.*
- *Remove old Scots pine windbreaks.*
- *Apply fungicides, if needed. Fungicide use may be warranted on some highly susceptible, short-needled Scots pine types growing in moist locations. Often, only pockets of trees in shaded or north slope sites need preventive fungicides. During disease susceptible periods, apply sprays at two- to three-week intervals. See below for fungicides and application timing:*

Lophodermium needle cast	Brown Spot needle blight	Naemacyclus needle cast
Bordeaux mixture, chlorothalonil, ferbam, or mancozeb	Bordeaux mixture, chlorothalonil, ferbam, or mancozeb	Benomyl or chlorothalonil
Mid-July through October	Mid-April through June	Mid-April through June and possibly through October during rainy seasons

Summary of Pine Needle Disease Symptom Appearance and Timing

	Lophodermium needle cast	Brown Spot needle blight	Naemacyclus needle cast
When infections occur	August-October	May-July	Mostly April-June, also July-November
When symptoms develop	December-April	August-November	August-November
When needles drop	June-August	May-July	October-May
Symptom appearance	Brown spots with yellow margins; needles turn yellow, then brown. Defoliation leaves nothing but green tufts.	Brown spots with yellow halos; needles turn brown and drop. May affect current as well as older needles.	Brown horizontal bands on needles turn yellow, then brown and drop. Symptoms are on second- and third-year needles only.

Douglas-fir Needle Casts

Two fungi may cause important losses in young Douglas-fir plantations. Both cause needle cast, and trees sustain damage due to defoliation. Neither fungus affects pine.

Rabdocline Needle Cast Disease

This disease, caused by the fungus *Rabdocline pseudotsugae*, begins from infections occurring during cool, moist periods in spring. Succulent, young needles are infected from bud break through shoot elongation. By late summer or fall, infected first-year needles begin to show some yellowing followed by conspicuous brown banding in late fall or early spring, giving the needles a mottled appearance. Needles may begin dropping in winter and continue falling the next season. Eventually, during summer, the tree may be missing most of the previous year's needles.

This disease is often adequately controlled by improving ventilation and air movement around the base of the tree. Weed removal, improved spacing, and removing diseased lower branches and trees will help. Fungicide sprays containing maneb or chlorothalonil can be applied in spring when buds first begin to swell. Continue applications every seven to 10 days for about a month.

Swiss Needle Cast Disease

This disease is caused by the fungus *Phaeocryptopus gaeumanii* and begins from infections that occur during rainy

periods in late spring and early summer. Infected needles may remain green for one or several years, producing spores from inconspicuous black fruiting bodies lined up in rows following the stomata on needle undersides. Diseased needles eventually turn yellow, then brown, and the oldest needles begin falling. Begin fungicide applications for disease control in late spring when new shoots are ½-inch to 2 inches long, and continue into early summer if the weather is rainy. Sprays containing chlorothalonil or mancozeb should be effective.

Needle Cast of Spruce

The fungus *Rhizosphaera kalkhoffii* causes significant defoliation of spruces in landscapes and Christmas tree plantations. *Rhizosphaera* needle cast is characterized by tiny, fuzzy, black fungal fruiting bodies emerging from the surface of infected green and yellowing needles. Diseased needles turn brown or purplish brown a few months to a year after infection.

Infections occur during wet weather throughout spring and early summer. The fungicide chlorothalonil, applied for disease control, is used during this time. Colorado spruces are very susceptible to *Rhizosphaera* needle cast. Most other spruces are also susceptible, and even Douglas-fir and Austrian, mugo, and white pines may become infected.

Pine Needle Rust

Needle rusts can affect Austrian, Scots, Virginia, loblolly, mugo, and red pines in Kentucky. The most distinctive feature of these diseases is conspicuous white to orange, blister-like, sack-shaped fungal structures on infected needles in spring (Fig. 4). Needle rusts may occasionally destroy enough foliage to slow the growth of small trees, but normally they do little damage. The most common needle rust is caused by the fungus *Coleosporium asterum*. This fungus lives on pine for part of its life, and for the rest, on aster, goldenrod, and some other composites. Destroying these alternate host plants breaks the life cycle of the fungus and controls the disease.

For information about twig and stem diseases of pine, refer to Cooperative Extension publication, PPA-16.



Figure 4—Pine needle rust.

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