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Twig, Branch, and Stem Diseases of Pine

by John R. Hartman

Tip Blight

Tip blight, caused by the fungus *Sphaeropsis sapinea* (formerly *Diplodia pinea*), is a serious disease of mature Austrian, Scots (Scotch), and Mugo pines in Kentucky. In the landscape, tip blight is normally not observed until pines reach about 12 years old and begin to bear cones. Severe infections year after year can greatly weaken and eventually kill affected pines.

Symptoms

Infection occurs in spring; however, disease symptoms become more conspicuous in mid to late summer and fall. Needles in early stages of development stop growing as a result of shoot infections. These stunted needles eventually die and turn straw-colored (Figure 1). As infection proceeds

into older tissue, additional needles are killed. The fungus produces small, black fruiting bodies (pycnidia) at the base of infected needles just under the needle sheath (Figure 2). These may be observed with a hand lens.

Sphaeropsis can also infect buds, twigs, and cones. Frequently, the lowest branches of old, well-established trees are affected and the disease gradually spreads upward. Excessive resin flows from infected twigs and branches. Blighted needles may become trapped in this resin "glue" and remain on the tree.

Stunted needles, dead shoot tips, excess resin flow, and needle retention are key diagnostic symptoms for this disease. Pycnidia and microscopic spores are fungal signs that provide confirmation of the tip blight diagnosis.



Figure 1.—Infected, stunted shoot tip of tip blight-infected Scots pine.



Figure 2.—Fungal pycnidia at the base of infected Scots pine needles.

Spread

Tip blight fungus is present in fruiting bodies (pycnidia) throughout the year in dead needles, cones, and twigs. Spores ooze out of pycnidia under wet conditions in spring and early summer. Spores are spread by wind, splashing rain, animals, and pruning equipment.

Control

1. Spray trees with an effective fungicide beginning just before or just as buds swell in spring. Apply a second spray when the candles are about half elongated and a third spray as needles begin to emerge from the needle sheaths. Contact your county Extension office for information on currently recommended fungicides.

2. Prune away and destroy dead twigs, branches, and cones as they occur. Do not prune when trees are wet.

3. Destroy all blighted needles, twigs, and cones present on the ground under the tree.

4. Trees under stress tend to be more susceptible to tip blight. Fertilize and water trees as needed to promote vigor.

Sirococcus Blight

Caused by the fungus *Sirococcus strobilinus*, this disease has not been observed in Kentucky. Because it has been found in nearby states, it represents a potential threat. *Sirococcus* blight kills shoot tips and 1-year-old twigs in both nursery plantings and larger trees. This fungus not only attacks Scots and red pines but also Douglas-fir and several spruce species.

Canker Diseases

Pine-oak Gall Rust

This disease, also called eastern gall rust, results in a conspicuous swelling or globose gall on stems (trunk) or branches of infected pines (Figure 3). The fungus, *Cronartium quercuum*, causes galls on Austrian, Mugo, red, Scots, and Virginia pines and, to complete its life cycle, a leaf rust disease on black, bur, chestnut, pin, and northern red oak. Western gall rust, a related disease of pine, has almost identical symptoms and develops in the absence of oaks. The causal fungus is *Endocronartium harknessii*.

Galls on pines should be pruned out and destroyed. Fungicide sprays may be applied to valuable trees during summer to prevent infections.

White Pine Blister Rust

This disease has received much notoriety for being highly destructive to eastern white pine in several northern states. Blister rust, caused by the fungus *Cronartium ribicola*, must attack two different plants: white pine and *Ribes* spp. (currant or gooseberry) to complete its life cycle. Although white pine and *Ribes* grow near each other in Kentucky, blister rust disease appears to be uncommon.

Atropellis Canker

The fungus *Atropellis tingens* causes branch cankers on Austrian, red, Scots, Virginia, and eastern white pine.



Figure 3.—Pine-oak gall rust showing stem swelling on pine.

The disease kills branches and small stems. Symptoms include resin production around the canker and gray to black discoloration of the wood which can be detected by cutting through the bark at the edge of the canker. Cankers several years old have sunken centers and raised margins. Following branch death, black crusty fungal masses are produced on dead tissue. Control of *Atropellis* canker is best accomplished by pruning out dead branches as they occur.

Another disease, *Scleroderris* canker, caused by the fungus *Ascocalyx abietina*, also causes growth loss and death of pine by forming trunk cankers. A highly virulent strain of this fungus causes tree loss in northern states but does not occur yet in Kentucky.

Systemic Diseases

Pine Wilt Nematode

The first report of pine wilt nematode disease in the United States was in 1979 in Missouri. Since then, this disease has also been identified in a number of other states throughout the country. In Kentucky, the disease has been diagnosed mainly on Scots and Austrian pines. A number of other pine species are also susceptible.

SYMPTOMS

The first visible symptom is discoloration of needles from green to yellow to brown. These symptoms are accompanied by a marked decrease in resin flow that is apparent when a branch is cut and resin does not flow from the wound. Death of affected trees may occur gradually or very rapidly. Trees infected in the spring ultimately wilt and die by late summer.

SPREAD

Long-horned cerambycid beetles carry nematodes (*Bursaphelenchus xylophilus*) from infected to healthy trees. Nematodes enter pines through feeding wounds left by the beetles. They migrate into resin canals where they rapidly multiply.

SAMPLING FOR DIAGNOSIS

Positive diagnosis of this disease requires microscopic identification of the nematode (Figure 4). A recently wilted or killed pine can be sampled by removing a piece of sapwood from the trunk or main branches using a hatchet or an increment borer. The part of affected branches ½-inch or more in diameter closest to the trunk also makes a good

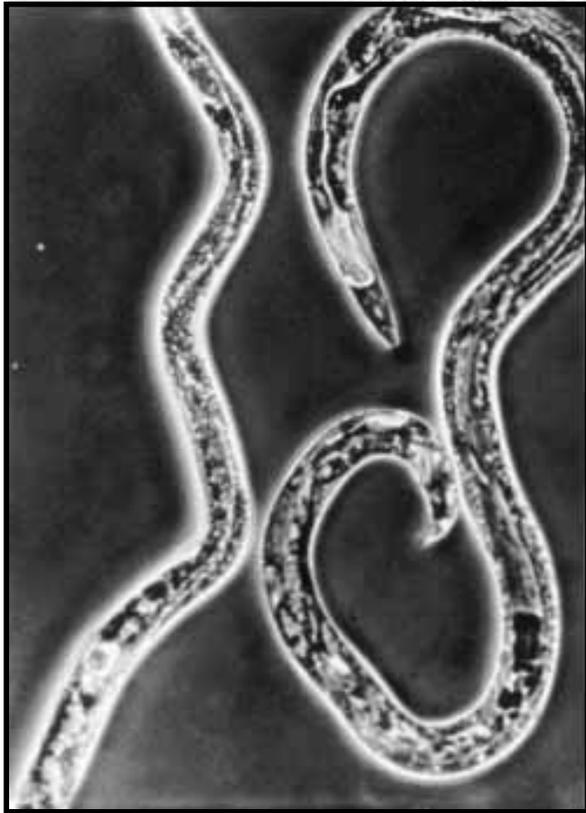


Figure 4.—Microscopic view of pine wilt nematode.

sample. It is best to submit several samples from various portions of the tree. Put the wood samples in a plastic bag and take them to your county Extension office.

CONTROL

If pine wilt nematode disease is confirmed in a planting of pines, remove and destroy the affected trees. This measure will help prevent spread of the disease to nearby healthy pines.

White Pine Decline

White pine decline has been observed in landscapes in all regions of Kentucky. This disease appears to be caused by a complex of abiotic factors. Often, trees appear to be healthy in the landscape for a decade or more before decline symptoms begin to show.

SYMPTOMS

Declining trees have needles that appear lighter green or yellow compared to healthy trees. Needles are shorter than normal and needle tips may be brown. Needles from the previous season often drop prematurely, giving the tree a tufted appearance. Annual shoot growth is also reduced. Bark of individual branches appears shriveled (Figure 5), and the branch and needles may appear limp.



Figure 5.—White pine decline showing wrinkled branch.

CAUSE

Several factors related to growing conditions appear to be associated with white pine decline. Declining trees frequently appear on sites having (a) high soil pH, (b) high soil clay content, (c) restricted rooting area, (d) compacted soil, and (e) mechanical disturbances causing injuries to roots.

CONTROL

The best way to manage white pine decline is through prevention. Select sites with the following characteristics:

- a soil pH of 5.5 and not 6.5 or above;
- sandy or loamy rather than clay soils;
- a large area for root development.

Avoid soil compaction and root injuries.

After planting, maintain adequate watering, use mulch around the tree base, allow fallen needles to accumulate under the tree, control insect pests, and fertilize trees as needed.

Once decline starts, stopping or reversing the problem is usually futile. The following treatments might be attempted: adjust soil pH by treating the soil with granular sulfur, aerify the soil by vertical mulching or other means, and fertilize and water as needed.

Root Diseases

White Pine Root Decline

White pine root decline, also called procera root disease, has been diagnosed in a limited number of Christmas tree plantations and landscapes in Kentucky. The causal fungus, *Leptographium procerum* (also called *Verticicladiella procera*), infects the inner bark and sapwood of the roots and lower trunk of white pine. Although the disease is most serious on white pine, the fungus also can kill Scots and Austrian pines.

SYMPTOMS

Trees, age 3 to 15 years, infected for several years show delayed bud break and reduced candle elongation in spring. Mature foliage then fades, droops, and turns brown, in stark contrast to healthy trees nearby. Mortality appears to be at random with a few trees dying each year. A 20 percent loss is common, but some stands may lose half of the trees. Resin flow is visible at the tree base and is associated with a girdling chocolate brown to dark olive-brown canker under the bark. The trunk may be flattened on the affected side. Galleries of insects such as the pine root collar weevil may be found in the canker and provide a place for the fungus to sporulate. Weevils and other bark-infesting insects may serve as vectors for this disease.

SPREAD

Trees planted on wet sites often seem to be more susceptible to the fungus; however, a wet site is not essential for this disease to occur. Although the fungus does not

survive well in the soil, it may be spread by contaminated insects as they emerge from diseased trees and feed on healthy trees nearby.

CONTROL

Controls are intended to reduce disease spread by insect vectors. Avoid planting eastern white pine on wet sites, and do not replant eastern white pine among the stumps of recently killed trees. Remove and destroy infected trees including stumps, if possible. Growers who suspect white pine root decline in their Christmas tree planting, forest, or landscape should collect samples from the canker face (bark removed), place them in a plastic bag, and, while keeping them cool, take the samples to their county Extension offices so they can be shipped to the lab for culturing.

Phytophthora Root Rot

Pines, especially white pines growing in wet sites, are also subject to *Phytophthora* root rot disease caused by one or more of several *Phytophthora* species. These fungi, which are water molds, usually do little harm to pines in well-drained sites. When *Phytophthora* causes roots to become brown and decayed, the tree tops show small, yellow needles, gradual stunting, and dieback. *Phytophthora* is normally controlled by providing good soil drainage; however, soil drenches with fungicides can be used in some circumstances. Planting pines in suitable sites is important for control of many pine diseases including this one.