

# Some Common Diseases of Southern Forests

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**T**O THE casual observer the forest is a home to many plants and animals that are an integral part of the forest ecosystem.

Upon closer examination, one may stumble across some of the smaller creatures, the fungi that also make the forest their home. These fungi are classified and identified using an elaborate system of Latin that is used by trained pathologists. The diseases they cause are identified using both signs and symptoms. A **sign** is simply an outward expression of the actual organism causing the disease. This can be the “fungus” growing out of the tree or the “spores” blowing in the wind. Rarely do we observe the actual organism causing the problem, which is unfortunate, because it makes disease identification much easier.

In contrast, most landowners will notice a **symptom**, which indicates to them that something is very wrong with the tree. This is also unfortunate because many fungi cause needles to turn yellow, brown, and then red, which makes identification much harder.

Throughout the southern United States disease management receives little or no attention in forest regeneration plans. One reason for this is that using fungicides is not a primary option. This is due to high costs, the fact that they are not registered for use in forest settings and because fungicides are generally not effective. Thus, the best pest management plan is to minimize their effects before they appear. There are hundreds of fungi found in the United States; luckily, most are harmless and go about their daily lives without affecting the objectives of landowners. However, a few of them are capable of causing a tremendous amount of damage. The following are some of the more common diseases found in the Southeast, their signs, symptoms and some recommendations to minimize their affects in forest lands.

## Fusiform Rust

In 1896, when fusiform rust was first observed, it was noted that the disease was so rare that foresters could not believe anyone would spend their time on such an unimportant disease. Fifty years after the first report, fusiform rust had the attention of just about every forest industry in the southern United States and millions of dollars were being spent on tree-breeding programs. Today, over 100 years after its discovery, and despite the money and time invested, fusiform rust of loblolly and slash pines is still one of the most damaging forest tree diseases in the southern U.S. The disease is found throughout the southern U.S. as far north as Maryland, south to Florida and west to Texas.

The disease is caused by the fungus *Cronartium quercuum* f.sp. *fusiforme* and has an elaborate disease cycle that uses two hosts, pines and oaks, and five spore stages. The fungus spreads from oaks to pines in late spring of each year infecting the succulent young pine needles. In 6-12 months, infections result in tapered, spindle-shaped (fusiform) swellings or galls on branches and stems. In the spring these swellings produce yellow to orange spores which are blown around the forest infecting oak leaves.

The yellow spores are no threat to oaks, resulting in a tiny leaf spot that takes a magnifying glass to observe. Mortality is heaviest on pine trees less than 10 years old, but the galls are perennial and persist for many years, resulting in deformity, reducing growth and weakening the stems until breakage in a wind storm. Main stem infections are the most serious with branch infections resulting in little affect on the tree. Susceptibility to the fungus varies, but slash and loblolly tend to become infected much more than shortleaf and longleaf.

Planting disease-free stock from 1st or

2nd generation seed orchards will go a long way in minimizing the effects of this disease. Also, refrain from the addition of fertilizer to the stand before age eight as the increase in nutrients results in pine tissue being more susceptible to the fungus. While reducing the amount of oaks present in the plantation can significantly decrease the disease incidence, it is difficult to stop the fungus from neighboring stands.

## Pitch Canker

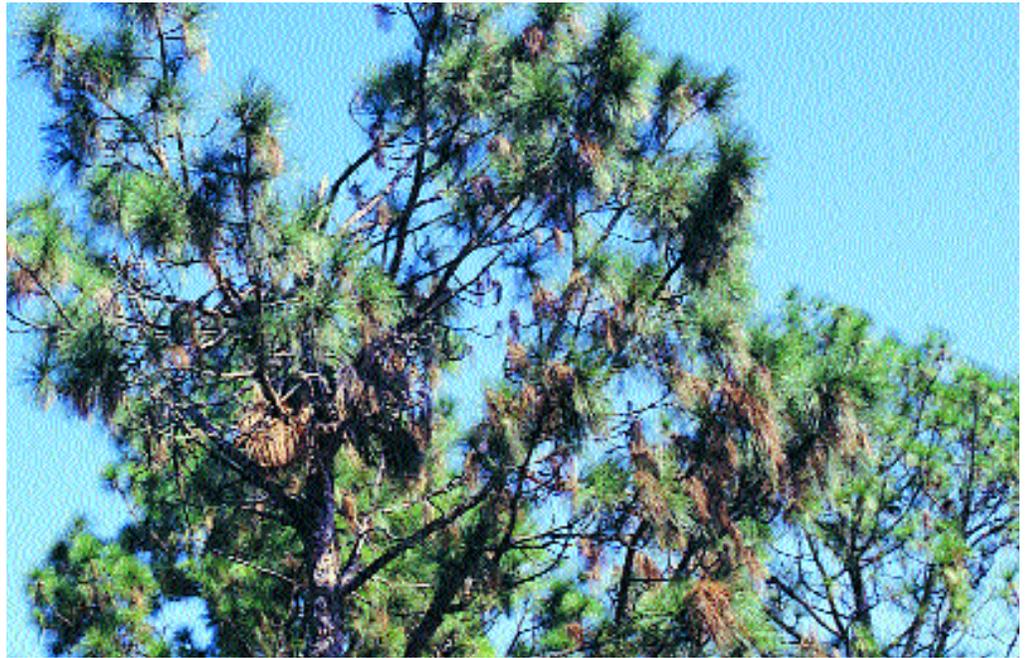
This disease is caused by the fungus *Fusarium subglutinans* and results in deformity, growth loss and mortality in planted pines throughout the southern United States. The most severely affected region appears to be slash pine plantations in Florida; however, the disease is becoming more common on other pine species throughout the South. Recently, this fungus has found its way to California on infected planting stock and is now killing thousands of Monterey pines in that region of the United States. While some insects are commonly associated with pitch canker, other agents such as injury from excess winds, ice or hail damage have been known to cause infection.

Symptoms of the disease are cankers (dead, sunken lesion) on the bole, branches, and shoots of infected trees. Cankers on shoots result in branch dieback characterized by reddening of the foliage (flagging) and thinning (needle cast) of the crown. Needles on recently killed shoots are yellow to reddish brown. Cankers contain a tremendous amount of resin or pitch, thus giving the disease its name, pitch canker. Shoot cankers last a year while cankers on the bole and larger branches are perennial.

The type of damage that can be expected depends upon the age and size



*Signs and symptoms of fusiform rust on loblolly pine. The yellow-orange spores give the disease its name. They will infect emerging oak leaves.*



*Symptoms of pitch canker on longleaf pine. Many of the upper 3-6 inches of every branch have been infected and killed by the fungus.*



*This fruiting body is a sign of annosus root rot at the base of a large loblolly pine. The underside is creamy white while the upper side is brown.*



*Brown spot needle blight appears as a brown spot on the needles of longleaf pine amid a yellow band.*

of the tree. In plantations, pole-size trees with extensive shoot dieback may die, while lesser affected trees will suffer from reduced growth. Normally, younger trees are not killed, but are deformed and have many terminal shoots. Stressed, overstocked stands tend to have this disease more than healthy stands. Thus, maintaining a vigorous stand by proper thinnings, spacing, and matching species to site will reduce the chances of this fungus appearing in your stand.

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*Symptoms of littleleaf disease on loblolly pine. Thin crowns and tufted branches on one tree, which is surrounded by a number of healthy trees.*

## Annosus Root Rot

This disease affects all conifer trees throughout the South. Longleaf pine, however, appears to possess considerable resistance to the fungus. Infected trees typically appear unhealthy with thin, off-colored foliage and tree mortality. Trees are often wind-thrown prior to mortality due to the decay of the structural support roots. Infection and mortality often occurs in groups or clusters referred to as “infection centers.”

Confirmation of the disease requires the identification of conks or sporophores (fruiting structure) of the fungus *Heterobasidion annosum*. These will be found on infected roots, stumps and often in the litter at the base of infected trees. Conks are not always present on infected trees, so the absence of conks does not necessarily mean the absence of infection. The disease is common in thinned plantations due to the colonization habits of the fungus. The fungus is spread long distances by the way of airborne spores produced in the conks. Most infections are initiated as a result of spores being deposited on the surfaces of freshly cut stumps of susceptible pines, thus the close association between this disease and thinned plantations. If temperatures and moisture conditions are favorable, then the newly deposited spores germinate on the stump and the fungus grows downward into the roots. Sites high in sand content are considered high hazard sites and care should be taken to minimize the chance of infection.

One recommendation to control this disease is to apply granular borax to the surface of freshly cut stumps during thinning operations. Borax is toxic to the germinating spores and is effective in preventing stump colonization. Summer harvesting, when spore levels are lowest, is also a good method to decrease the chances of fungal infection of the stumps.

## Littleleaf Disease

This disease is actually a root disease caused by a soil-inhabiting fungus. It gets its name from the symptoms that appear late in the stages of infection—little

leaves. Hosts include loblolly and slash, but is most serious on shortleaf pine, resulting in a reduction in available areas for planting. Like the other diseases mentioned, littleleaf is found throughout the Piedmont plateau of North and South Carolina, Georgia and Alabama, which has the distinction of the first report of the disease in 1934.

The disease is most serious in areas with a thin topsoil, cover clay subsoil with poor internal drainage, low fertility and limited aeration. The fungus responsible is called *Phytophthora cinnamomi*, which attacks the tree’s fine feeder roots. Crown symptoms develop as the uptake of nutrients slows and becomes critically low as the fungus feeds on the roots. Needles on affected trees usually become short (thus little leaf) and turn yellowish. Twig growth slows and only the current year’s needles are retained, giving the crown a tufted appearance. Symptomatic trees do not appear as an “infection center” like annosus root rot, but occur randomly in a stand, with trees in various stages in decline and mortality. Also, leaf symptoms do not appear until 20-30 years after planting. Typically, stressed trees attract the Southern pine beetle, which usually gets the blame for tree mortality.

The disease cannot be controlled once a stand has become infected, so establishment of a stand must recognize the high-risk sites and avoid susceptible tree species and/or plan for shorter rotations. Decreasing the planting density will reduce the root competition and lower plant stress. If symptoms appear, then remove high risk trees and consider thinning to reduce the stress and Southern pine beetle risk. Consider fertilizing to increase the supply of nutrients as this has been shown to decrease mortality and increase growth to allow the stand to go to rotation.

## Brown Spot Needle Blight

This disease occurs in most of the pine growing regions in the United States but is most severe in the southern and north central parts of the country. This

disease is caused by the fungus *Mycosphaerella dearnessii*, a foliage pathogen, and is a concern in reforestation programs that use longleaf pine. The disease results in defoliation, reduced seedling vigor and seedling mortality. Continual defoliation with subsequent reduction of seedling vigor delays the initiation of height growth and increases stand rotations. The disease is only a problem while the tree is in the grass stage, so control measures need not be long-term. With a renewed interest in converting areas to longleaf plantations, this disease will become more important to reforestation programs.

Symptoms of the disease appear as small irregular circular spots of a light gray-green color. The spots will then turn brown and encircle the needle, increasing in size until the needle dies. The suppression of fire has had a significant effect on the increase of this disease in the southern United States. The infected needles are cast in October and November, with defoliation often more severe on the lower half of the north side of the tree. In plantations, clearing the area or burning prior to planting will help reduce the disease for a growing season or two. After establishment, controlled burning in the winter will significantly reduce the incidence of the disease and increase seedling growth.

## Summary

While trees are a long-lived species—400 years for longleaf pine—they are not immortal, and diseases play an important part in the forest. Maintaining a healthy forest with proper species and site selection to reduce stress will go a long way in minimizing tree diseases and not interfere with stand objectives. 🌲

## MEMORIAL

Butler County TREASURE Forest landowner Albert Morris Middleton passed away July 15, 2000. He was 75. Mr. Middleton was a well-known business and community leader in Georgiana and Butler County and served over 20 years as director of the First National Bank in Greenville. Mr. Middleton’s 1,100-acre TREASURE Forest was certified as #173 in 1982.

Visit the Alabama Forestry Commission Web Site at:  
**[www.forestry.state.al.us](http://www.forestry.state.al.us)**