

FUSIFORM RUST OF PINE

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Fusiform rust, a fungal disease commonly called "cronartium," frequently causes concern to homeowners, nurserymen and timber producers. The disease is of minor economic importance to the Texas timber industry, but it occurs over a wide area and has in some cases caused considerable damage to commercial plantings.

Slash pine is most susceptible to the disease, but some loblolly and ornamental pines also may be affected. Slash and loblolly pine planting stock grown from native East Texas or Louisiana seed sources may have some resistance to fusiform rust. Slash pine planting stock grown from seed sources east of the Mississippi River should be avoided.

Susceptible pines may be attacked at any growth stage from newly emerged seedlings to mature trees 50 years or more in age. The disease usually is lethal when infection occurs in the nursery or soon after outplanting. Infection of larger trees causes a reduction in growth rate and often results in deformed, weakened stems subject to wind breakage, but does not directly cause tree death. Wood from infected sections of trees has reduced commercial value. In urban plantings, fusiform rust causes most of the deformities or growth abnormalities frequently seen on the popular, fast growing slash pine.

Description

Early symptoms of fusiform rust on pine are spindle-shaped or spherical swellings, or "galls," on branches and stems of infected trees. On seedlings, swellings normally develop on the stem close to the

soil line and often are accompanied by a "witches broom" of adventitious branches arising at or near the swollen area. Most seedlings with these symptoms die within a year after outplanting. On older trees, similar galls develop on branches but branches may not die for several years. Branch galls elongate at a rate of 2 to 5 inches per year, developing more rapidly inward toward the stem rather than outward. If branch galls elongate enough to reach the stem, cambium tissue on one side of the stem frequently is killed. The affected area then becomes a canker or open wound, exposing the wood to invasion by insects and a variety of wood-rotting fungi. Such cankers can kill the tree, and infected stems weakened by secondary pest attack are more easily broken by wind or ice. This can create a safety hazard, especially in urban areas where strong winds are common.

The Causal Fungus

Cronartium fusiforme Hedgc. and Hunt. ex Cumm. is a member of a highly specialized family of rust fungi. The common name, rust, is descriptive of the large masses of yellow-orange or orange-red spores released during reproductive stages of the life cycle. The fungus is an *obligate host parasite* because it can only grow and reproduce on living trees, and an *alternate host parasite* because completion of its full life cycle requires the presence of oak as well as pine trees. The disease apparently causes little damage to the oak host. The fungus overwinters each year in infected pine.

The first stage in the life cycle starts each spring when masses of orange spores (aeciospores) are produced in the galls and perennial stem cankers of pine. These spores cannot infect other pines, but are car-

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ried by wind to oaks, where they germinate under proper environmental conditions and infect oak leaves. Shortly after leaves are invaded, often within 8 to 10 days, reproductive structures called telia become visible as brown, thread-like structures on the undersides of the oak leaves. Within the telia, another type of spore (teliospore) is produced. These germinate when humidity is high and evening temperatures moderate, and then produce the pine-infecting spore stage (sporidia). Sporidia are carried back to pine by air currents. With optimum environmental conditions, the cycle from pine to oak and back to pine may be completed in less than 2 weeks. However, completion of the full life cycle of the fungus may require 2 years or more.

Prevention and Control

Commercial Plantings. Distribution of fusiform rust throughout the pine production areas in Texas, together with an abundance of oaks in these areas, provides an almost unlimited source of new pine infections each year. Disease prevention efforts are limited almost entirely to planting resistant pines. Loblolly from native sources in East Texas seems relatively resistant to fusiform rust. Current research is aimed at developing resistant strains of slash pine as well.

Careful culling of suspect seedlings before outplanting may help prevent introduction of infected trees into a new planting site. Spacing trees closely together also has some merit, because in dense stands branches that do become infected can die early before infection spreads to the stem. In established pine stands, the only practical control of fusiform rust is the removal of infected trees during normal thinning operations or salvage harvesting.

It might seem that destroying oak trees in the vicinity of susceptible pine plantings would eliminate the source of new pine infections. But since the sporidia produced on oaks can travel for several miles on wind currents, this would not necessarily be effective.

Ornamental Plantings. If fusiform rust is common in a particular neighborhood, park or golf course, resistant pines should be selected for new plantings. Both longleaf and shortleaf pines are fusiform-resistant, although shortleaf is not a very desirable ornamental species.

Control of the disease on infected trees is limited to pruning and surgical work. Galled limbs should be removed flush with trunks. Pruning wounds 1 inch or larger in diameter may be painted periodically with tree wound paint until the wound is completely closed. Surgical removal of galls on stems generally has not been effective in destroying the fusiform fungus. However, on high value trees surgery may retard gall enlargement and improve tree appearance. If susceptible but uninfected trees are present in a landscape, thought should be given to removal of any infected trees nearby. This decision would depend on the visual effects created by removing diseased trees from the landscape, as well as removal costs.

Homeowners, nurserymen and timber producers should avoid purchasing contaminated planting stock. And when selecting young exotic or imported pines, any developing galls should be removed before the spores appear. This is important because transplants from other geographical areas could introduce new fusiform races or other fungi into Texas. Excluding such infected transplants helps prevent development of new rust diseases.



Fusiform rust gall on young pine.

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