Fusiform Rust

FR040615

IMPORTANCE: Fusiform rust (*Cronartium quercuum* f. sp. *fusiforme*) is one of the most damaging forest tree diseases in Alabama. While this rust was an obscure and unimportant problem sixty years ago, it has now increased to epidemic proportions and is still increasing. The information now available can be applied on a site specifically to minimize problems and allow profitable pine management.

Loblolly and slash pines are the most affected tree species. Longleaf is fairly resistant; shortleaf is highly resistant. Oak is the alternate host.

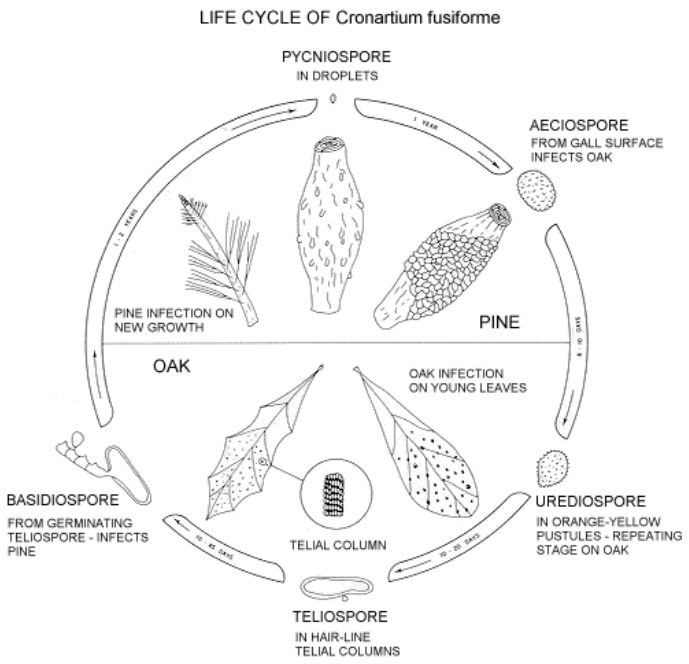
Economic damage caused by fusiform rust is from mortality, lost product value, and disruption of management plans. A single tree can have rust galls or cankers on the main stem, branches, or both. Branch cankers within 12-18" of the stem may grow into stem cankers. Main stem cankers can girdle and kill the tree. This is likely on smaller trees and almost assured on nursery trees infected with fusiform rust.

Stems with cankers are weak and susceptible to wind and ice breakage. They easily catch fire and stay afire, either killing the tree or reducing its value. Cankered stems have greatly reduced saw timber value. Heavily infected stands may need to be thinned earlier and more often with greater logging expenses. Residual saw timber volume may be low, commanding a lower price. Infections within the first 5 years normally cause tree death.

IDENTIFICATION: Spindle-shaped swellings or galls develop on branches or main stems. On older trees, infections are somewhat depressed on one side. The fungus produces orange spores on pine galls in the spring. On oaks, orange spores appear on lower surface of leaves. Infected areas may grow for many years until they eventually girdle and kill the branch or stem, or they may become inactive.

From late March to mid-April, galls produce orange spores. Wind-blown spores infect newly formed oak leaves, especially water, willow, and laurel oaks. In turn, the fungus produces spores on oak leaves, completing the cycle by infecting pines from late April through the middle of June. The timing of this process will vary from year to year and in different geographic areas, beginning earlier if the temperature is higher.

The pitch canker fungus *Fusarium moniliforme* var. *subglutinans* may infect fusiform cankers. Black turpentine beetles (*Dendroctonus frontalis*) and coneworms (*Dioryctria* spp.) may infest rust cankers. These secondary agents aggravate the tree's weakened condition.



RUST HAZARD RATING: A stand with less than 25% infected trees has a low hazard rating. A moderate stand has 25 – 50% infected and a stand with over 50% infected has a high hazard rating. A potential stem gall is a limb gall that could extend into the stem in the near future.

On sites of moderate to high or potentially high rust hazard, conduct site preparation as needed for planting and survival of pine, and to help suppress oak. Although enhanced pine growth results in increased incidence of rust, it is counterproductive to recommend against site preparation, except for practices that might favor invasion of oak, e.g., windrows that are not completely burned.

Fertilization practices which set up young pines for infection should be delayed until trees are eight to ten years of age and less likely to develop lethal stem galls.

MANAGEMENT OF PINE HOSTS: Do not plant rust susceptible pines on high-hazard sites. Better choices for planting stock are resistant species from seed orchards.

If an adequate number of rust-free (rust-resistant) trees are available for use as seed trees, consider a shelter wood regeneration system in high-hazard areas.

Do not increase planting density to compensate for rust-infected trees unless coupled with sanitation thinning to remove infected trees. Just as important, planting densities exceeding maximum carrying capacity often leads to additional problems (including insect problems) later in rotation.

Harvest and regenerate plantations in blocks organized in a "checkerboard" fashion so adjacent stands differ in age by 12 to 15 years. This increases diversity by creating an uneven age distribution among stands. Establish new plantations adjacent to older plantations beyond the age (10 years) of maximum percent infection.

MANAGEMENT OF OAK HOSTS: When practical and not in serious conflict with other important uses of the forest, susceptible oaks (water, laurel, and willow oaks) in and immediately adjacent to pine plantations should be suppressed. Although spores that infect pine can be transported long distances by wind, infected oaks account for most of the infection of surrounding pine.

MANAGEMENT OF PATHOGEN: Avoid movement and planting of rust-infected nursery stock, especially from distant nurseries and sites with abundant oak.

Inoculum should be reduced in young plantations (two to ten years of age) by sanitation thinnings to remove trees with stem galls and trees with many branch galls. Pruning of branch galls also reduces inoculum, but there is evidence that wounds may be colonized by the pathogen. For this reason, avoid pruning between February and June.

Manage rust-free stands in high hazard areas on long rotations.

Burning infected stands to remove limb galls is not recommended because of damage to residual trees with stem infections.

Adequately stocked stands located in high hazard areas that have escaped significant rust infection for at least eight years should be managed for poles or saw timber. This will increase growth of healthy trees, increase uneven age distribution among stands and avoid potential losses to young seedlings.

Attempting to improve growth rate in pine plantations by cultivation and/or fertilization have been found to cause a substantial increase in rust.

Stands with less than 25% of the trees with lethal stem cankers (greater than or equal to 50% of stem circumference girdled) may be grown to pulpwood rotation without sanitation cutting. Longer rotations may require a sanitation thinning.

Stands with more than 25% of the trees with lethal stem cankers should be sanitation thinned. If this would result in inadequate stocking, the stand should be clear cut and regenerated with resistant seedlings or, where appropriate, regenerated by a shelter wood system.

When prescribed burning, avoid igniting resinous stem cankers. This is especially important in stands with 25% stem cankers, because igniting these cankers can result in charring and possible death of trees.

Infected portions of trees removed in clear cuts or sanitation thinning should be used for tall oil, turpentine, and certain kinds of pulp.

When artificially regenerating an area that has high fusiform rust hazard rating, it is recommended to use loblolly or slash seedling that are rust resistant or replant longleaf or shortleaf pine on the site.

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