

# White Pine Blister Rust

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*EDITOR'S NOTE: Much credit should be given to Mr. Kouba in his accompanying article for presenting the white pine blister rust disease problem in such a clear, non-technical and interesting manner. The state of Wisconsin cooperates with the United States Department of Agriculture through the Division of Blister Rust Control, and with the Wisconsin Conservation Department through the Division of Forests and Parks in combating this disease. The state also cooperates with counties, lumber companies, nurserymen, and private owners who wish to protect their white pine from blister rust.*

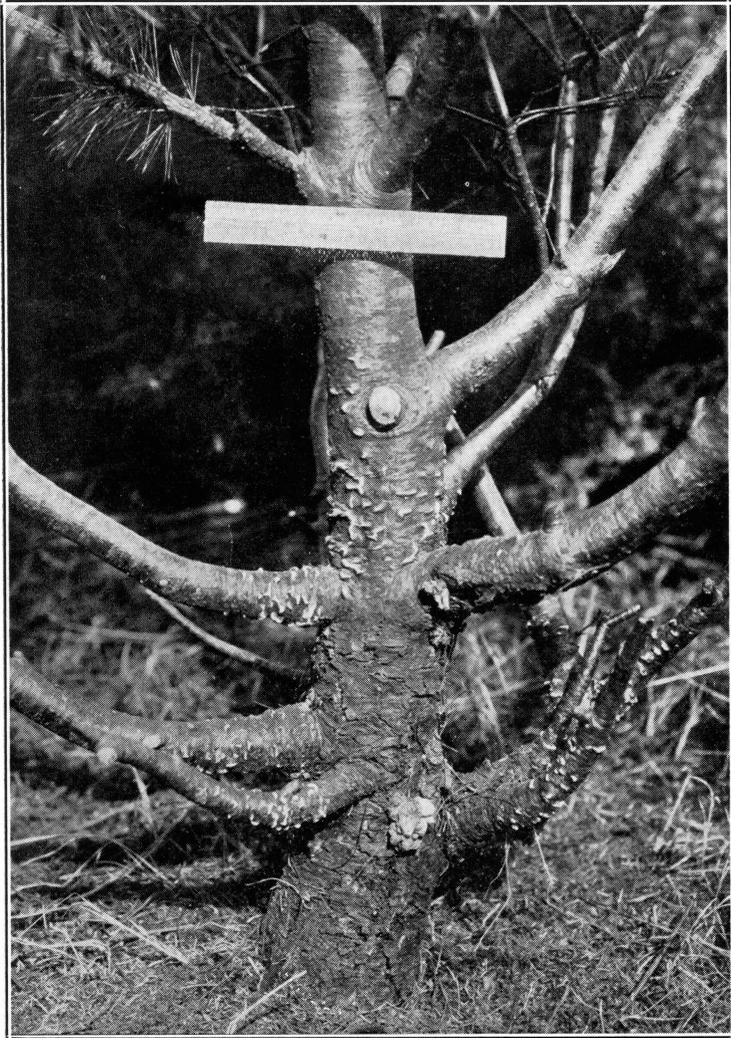
PRIOR to the federal quarantine No. 37, which was a general code governing the importation of plant material into the United States, many millions of small white pines were imported from Europe and planted in this country. It was on these trees that white pine blister rust, a disease of five-leaf pines, was accidentally brought to America. For a time this deadly forest tree disease, white pine blister rust, threatened to wipe out our valuable white pine forests, but simple and effective methods have been developed to bring this rust under control.

Blister rust was first discovered and recognized as such in America in 1905, near Dresher, Pennsylvania. It is now established in the eastern and central states from Maine to Iowa and Minnesota and southward to the North Carolina line. In the West it has been found in Washington, Oregon, Idaho and Montana. It exists in a total of 21 states, all of which are cooperating with the United States Department of Agriculture in a nation-wide effort to control the rust and assure the continued production of white pines as a forest crop. As yet, less than 5 percent of the white pines of the United States are actually diseased, but each year where disease control measures are not carried on the disease continues to spread.

Before blister rust was brought into this country *Ribes*\* bushes and white pine trees could safely grow side by side. Today, however, where these two plants are closely associated the white pines are always in danger because *Ribes* bushes are the alternate host of white pine blister rust.

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\**Ribes* is the Latin generic name of all species of currant and gooseberry plants and will be used instead of the words currants and gooseberries throughout this article.



*Figure 1. Characteristic stem infection of the white pine blister rust on white pine 5 feet in height. Note the whitish blisters on the stem and branches and the rough cracked bark of the old fruiting surface of the main stem at the base.*

This blister rust is caused by the parasitic fungus *Cronartium ribicola* Fischer, which lives in the inner bark of white pine trees and in the leaf tissues of currant and gooseberry bushes. Ordinarily it does not kill the bushes, but it does kill the trees. Scientists agree that blister rust can be controlled by taking advantage of two weak points in the life cycle of the rust fungus. The first weak point is the inability of the blister rust fungus to spread from one white pine directly to another. The only possible way for a tree to become infected is from a nearby *Ribes* bush infected with the rust. The second weak point in the life cycle of the fungus is the short life of the pine-infecting spores which are produced on *Ribes* bushes. Although these spores may be blown about by the wind for miles they are so short-lived that they usually die by the time they have traveled only a few hundred feet from the diseased *Ribes*. Because of these two facts a white pine stand can be protected from serious blister rust damage by merely removing the *Ribes* within infecting distance of the pines; this distance, for all practical purposes, is 900 feet in the central and eastern states. In the western states the distance is somewhat greater.

There is one exception to the above rule and that is in the case of the European black currant. This species, which is a cultivated *Ribes*, should not be grown within one mile of white pine trees. The European black currant is so susceptible to blister rust and such an important agent in the distribution and spread of the disease that it has been declared a public nuisance or outlawed in many states possessing native five-leaf pines.

The best time of the year to examine white pines for blister rust is in early spring. The disease is manifest on the limbs or trunk where groups of white blisters burst through the outer bark. These blisters are about the size of a pea and they are filled with orange-yellow spores. Usually there is a characteristic yellowish discoloration of the bark adjoining the infected zone. When the blisters burst open the spores are scattered over the surrounding area by the wind. These spores will grow only when they fall on the leaves of *Ribes* plants. During the remainder of the year no blisters are visible on the pine, but the rust fungus continues growing in the live bark as long as any remains. The following spring another group of blisters will appear, and this procedure will continue until the tree is eventually killed. During late spring, summer, and autumn, until the leaves fall, infected *Ribes* leaves show brownish hairlike outgrowths of rust on their under surface. The final spore developed on *Ribes* is the one which infects white pines.

Five-leaf pines are of economic importance, for they rank among the most valuable coniferous trees of the United States.

The chief commercial pines in this group are *Pinus strobus*, *Pinus monticola*, and *Pinus lambertiana*. Because of climatic and soil conditions and certain other factors, Ribes bushes are usually found in these white pine forests.

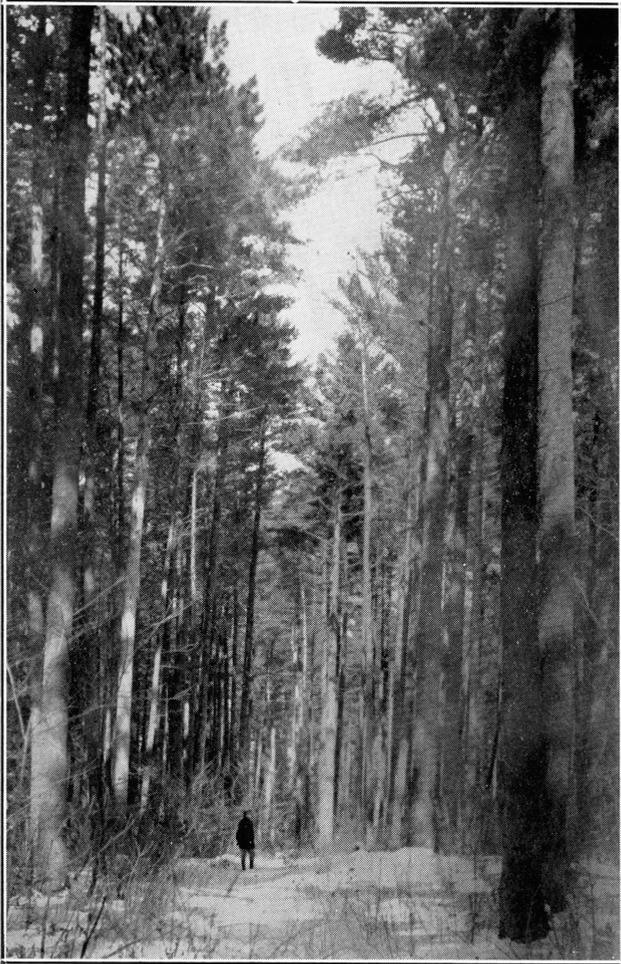


Figure 2. An immature white pine stand, Waupaca County, Wisconsin.

Uprooting all Ribes bushes within infecting distances (900 feet has been found sufficient in Wisconsin) of federal, state, and privately owned white pine stands is considered local control,

and such activity may begin as early in the spring as the foliage appears on the bushes. The Ribes ordinarily can be removed at a very reasonable cost. This work is usually done by a crew of men who systematically examine all of the ground in parallel strips and mark the edge of each strip with suitable markers so that no portion of the ground will be overlooked or needlessly reworked. The foreman works directly back of the crew. He not only checks on the efficiency of the work, but he also helps to keep the men in proper formation.

The bushes are usually uprooted by hand, or, if large and firmly rooted, with a Ribes pick. The uprooted bushes are hung in the crotches of trees or in other places where they will not come in contact with the soil.

Another method of destroying Ribes is by means of chemical sprays. This has been found highly effective and less expensive than pulling the bushes by hand on sites where Ribes are very numerous.

The cost of Ribes eradication varies. During 1932 in Wisconsin these costs ranged from \$.03 to \$2.91 an acre. This variation was due to differences in the number and size of the bushes, density of undergrowth, roughness of the ground of the area worked, and certain other factors. Of the 19,712 acres covered in the state this year the average was \$.33 per acre. The cost in the Northeastern states is somewhat less, due chiefly to fewer Ribes in their pine stands. Ribes eradication cost in the western states run proportionately higher than in either the Northeastern or Lake States.

A re-examination of areas worked to determine the re-growth of Ribes bushes is advisable about five years after the first working. In sections where such bushes have again become a menace a systematic reworking is necessary. Unless delayed too long the cost of reworking an area is generally much less than that of the original protective work. Two or three workings are ordinarily sufficient to protect the pines to maturity.

Different species of five-needled pines vary in their susceptibility to white pine blister rust. *Pinus monticola* is much more readily infected with the disease than is *Pinus strobus* of the eastern United States. Hence with the same number of Ribes present in the woods *Pinus monticola* would be subject to more severe damage than would *Pinus strobus* under the same conditions. To increase the difficulty the wild Ribes are particularly numerous along stream types in the *Pinus monticola* forests.

Blister rust does not only destroy young pines; it kills large trees with the same deadly certainty as small ones. However, small trees die within a few years after the attack while large ones usually live 10 or 15 years or longer before they succumb.

Blister rust enters a white pine tree through its needles and the first readily-visible outward sign of infection appears about 3 years or more after a tree has become infected.

Many foresters and others engaged in reforestation work in states where blister rust is established avoid the blister rust problem by selecting planting sites that have very few *Ribes* and by eradicating the *Ribes* from these sites before planting the trees. This line of reasoning is sound. When white pine is the species best adapted to the site one can determine the cost of *Ribes* eradication and let that decide whether white pine or some other tree species is the most profitable on the area.

Of utmost importance to those using white pines in reforestation work or in establishing shelterbelts or ornamental plantings is the guarantee that disease-free stock is being used. It is possible for white pines within a nursery to become infected with blister rust unless the environs of the nursery are free of all *Ribes* plants. To insure the best protection possible a systematic eradication of *Ribes* bushes should be made of the area adjoining the nursery. The European black currants within one mile should be removed.

Today, in the United States, we have white pines growing native on several million acres of land. These forests not only create considerable wealth, but in addition they possess esthetic and recreational value. Some of these forests are located at strategic points and are important for watershed protection. A serious loss would ensue should these forests be destroyed.

If we wish to grow white pines we must protect them. This protection must be thorough. It must be as systematic and regular a procedure as is fire prevention.



### OUR HERITAGE

Oh Thou who watchest over all,  
 Who ruleth wisely, great and small,  
 Give us the sense to care for these  
 Great works of thine—our wondrous trees:  
 Teach us to hold in trust, and not destroy  
 These gifts we wish our children to enjoy.  
 Oh teach us all what we may do,  
 To save and help the forests, too:  
 Grant that, when in the woods, we show  
 More care with fire—the forest's foe,  
 So that Posterity may rise and bless  
 The hands that saved, for them, this loveliness.