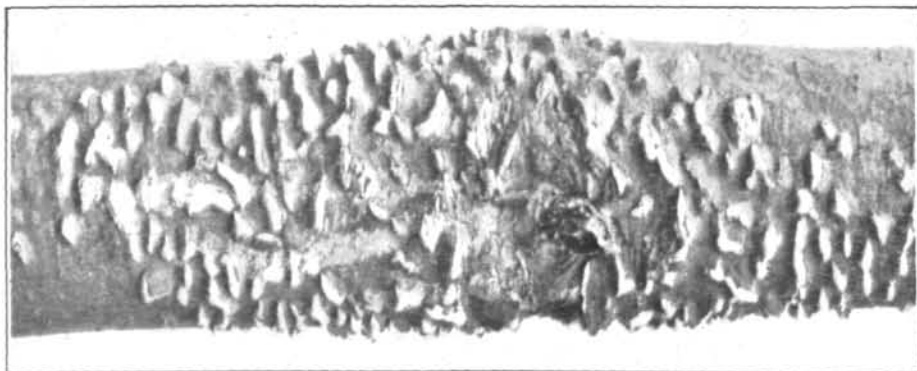


Protecting White Pine From the Blister Rust

By J. F. Martin, Pathologist, U. S. Department of Agriculture

Many golf courses within the natural range of the white pine have this tree in more or less abundance on their grounds. Like other trees, it is subject to the attack of diseases, one of the most destructive of which is the white pine blister rust. This disease is native to Europe and was brought here about 1900 on white pine planting stock. Since that time the disease has spread rapidly and is now present in the New England states, New York, New Jersey, Pennsylvania, the lake states, Quebec, Ontario, British Columbia, and the state of Washington. It will doubtless spread into other states and provinces where the white pine is a valuable forest and ornamental tree.

The blister rust is a parasitic fungus (*Cronartium ribicola* Fischer) which requires two different kinds of host plants to complete its life cycle. In this respect it is like the wheat rust, the apple rust, and similar plant diseases. Its host plants are the so-called white or five-needle pines (that is, those pines which have five needles in each leaf bundle) and all kinds



Infected white pine branch with "blisters" breaking through the diseased bark. Each blister is full of powdery spores, which are carried by the wind to the leaves of currant and gooseberry bushes. The under side of the infected leaves becomes covered with the rust, and it soon produces other spores, which carry the disease back to nearby pines.

of wild and cultivated currant and gooseberry bushes. The disease can not pass directly from one pine to another. From the pine it spreads to currant and gooseberry leaves, where it passes part of its life, and from these returns to the pine. By destroying the currant and gooseberry bushes, the life cycle of the fungus is broken, and pine infection can not take place.

The white pine blister rust is a bark-killing disease which girdles the trees, causing their death. When it becomes established in areas where wild or cultivated currants and gooseberries are abundant, the white pines growing within infecting range of these bushes suffer severe damage. Pines of all sizes are attacked and readily succumb to the disease. Young trees are killed quickly, while older trees withstand the attack of the rust for a much longer period, because the twigs and branches are usually first infected and it takes the disease longer to work back to the trunk.

As a rule, slightly infected young and old trees have a normal appearance. Badly diseased young trees under ten years of age are stunted

in growth, bushy in appearance, and often of a faded yellow color. A twig here and there may be dead, and close examination will probably show the presence of many cankers on the stem and branches. Large white



Trunk of a large white pine girdled by the blister rust 22 feet from the ground. This tree is nearly dead, and many of its branches are dead or dying from the disease. Some of the branches show the blisters bursting through the bark.

pinus attacked by the blister rust ultimately become unsightly from the death of many limbs, and their ornamental value is greatly reduced a number of years before the trees are actually killed. Often one or more dead or dying branches, commonly called "flags," are apparent, depending upon the age of the infection. Sometimes the top of a tree is dead, or it may be broken off where the main stem has been girdled and weakened by the rust. These characteristics are more striking and can be plainly observed from a distance, if a group of pines is badly diseased.

The growing of white pine on golf courses or elsewhere within its natural range should not be given up on account of the danger from blister rust. These trees, whether in natural stands or in forest or ornamental plantings, can be protected against the white pine blister rust at low cost by the systematic eradication of all wild and cultivated currant and gooseberry bushes within 900 feet of the trees. Under especially favorable local conditions, 600 feet is sufficient; but on the other hand experience has shown that large patches of cultivated black currants may cause serious damage if located within a mile of white pine. Cultivated black currants are much more susceptible to the disease than other kinds of currants or gooseberries, and should not be grown in white pine regions. The eradication of all currant and gooseberry bushes in and around white pines will prevent further infection of these trees. In infested regions this work should be done immediately, as the prevalence of the rust is constantly increasing in unprotected areas, and delay may mean the loss of the pines.

Before starting the eradication of wild currants and gooseberries, information on the best methods of finding and destroying these plants should be obtained from the State Forest Service or the United States Department of Agriculture, to assure efficient work. These agencies are now cooperating in the control of white pine blister rust in the north-eastern and lake states, where the white pines greatly exceed the currants and gooseberries in value. The destruction of currant and gooseberry bushes in these regions is provided for by state laws. At the present time there are about forty blister rust control agents located in the principal pine growing counties of New England and New York. These men are engaged in organizing property owners for the cooperative eradication of currants and gooseberries in a concerted community-effort to secure the prompt protection of the white pine forests.

Ornamental white pines already infected with blister rust can be saved by cutting out the diseased parts, if the treatment is applied before the fungus has so far girdled the trunk as to make the saving of the tree impossible. Whether a heavily infected pine is worth treating in this manner depends on the value of the tree. The individual forest tree is not of sufficient value to make the use of tree surgery methods practicable, but the cost of treating valuable ornamental white pines in this way is less than the expense of replacing the trees.

The practicability of saving a pine must be governed by the extent of the injury already caused. If the disease has nearly girdled the main stem, it is a waste of time and money to try to save the tree. It is also unwise to spend money on a pine which has so many limbs infected that it will be left weak or unsightly after the diseased parts are removed. Where new pine infections are annually occurring in abundance, it is necessary to cut them out each year to prevent the disease from reaching the trunk and killing the tree. The yearly repetition of this operation will be expensive, and soon the pines will become so badly mutilated that their ornamental

value will be destroyed. Therefore currant and gooseberry bushes in the immediate vicinity should be destroyed in order to eliminate the source of new infections before an attempt is made to cut out the diseased parts. Details of the treatment of ornamental white pine infected with blister rust can be obtained from Circular 177, United States Department of Agriculture.

Less Serious Diseases of White Pine

By Haven Metcalf, Pathologist. U. S. Department of Agriculture

Compared with the blister rust, all other diseases of white pine are of negligible importance. The most conspicuous one, if it may be called a disease, is the so-called "white pine blight." There have been several occurrences of this trouble, of which the most sensational was that of 1907 and 1908. Over a large area of country from central Maine to central Pennsylvania the young trees, and particularly the ends of the youngest needles, suddenly appeared brown. This was at first popularly believed to be an epidemic of some kind, but no specific causal organism was ever isolated, and after about two years all but about three per cent of the trees recovered. The cause of the trouble is not definitely known, but it is generally believed to be an unusual type of winterkilling. Frequently dead areas of sapwood will be found inside of the sound bark. Conditions of this kind are sometimes local, but usually widespread over a considerable area of country. Under conditions surrounding the golf course, the most important thing to remember, in a case of this kind, is to refrain from cutting down a tree because it looks unsightly. As indicated above, more than 97 per cent of such trees recovered spontaneously. It is good advice in general, in dealing with ornamental trees, particularly conifers, not to cut them down until you are absolutely sure they are dead.

In general, the white pine is a sensitive tree, particularly liable to serious and permanent injury from wounds which may appear to be almost of a trivial nature. If a young tree becomes sharply bent, without any external indication of breakage, it is almost sure to die. A comparatively small wound extending less than one-third the circumference of the stem will usually kill a tree, especially the very young trees. On this account greatest care must be taken that white pines are not injured by being bent, by having bark knocked off by lawn mowers, or otherwise injured.

The white pine, although often broken by ice storms, the weight of snow, and high winds, does not as a rule suffer as seriously in this regard as many other trees. Any damage of such a nature should, however, receive prompt attention, following the lines of treatment advocated in Farmers' Bulletin 1178, United States Department of Agriculture. The principles of tree repair and tree surgery discussed in that bulletin are too extensive to consider within the limits of an article as short as this, but they are easily put into practice. Every caretaker of a golf course should have a copy of that bulletin, which can be obtained free upon request made to the Department of Agriculture.

The white pine is sensitive to smoke, and particularly to a great number of chemical by-products which frequently occur in the smoke of manufacturing cities. The death of white pines, and indeed of all conifers on many old golf courses which are within the atmospheric influence of manufacturing cities, is thus easily explained. There is no remedy for