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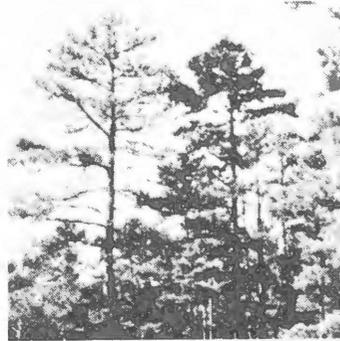
Forest Tree Diseases of Virginia

February 1972

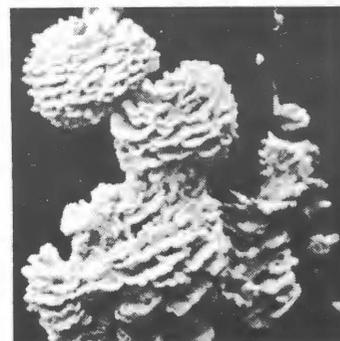
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Blister Rust of White Pines

by

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White pine blister rust is one of the most famous tree diseases in the United States. It is caused by the fungus Cronartium ribicola and like many introduced pathogens or insects, the spread throughout the range of its hosts was rapid and in many areas devastating. Since its introduction in the 1900-1910 period on both coasts of the country, this disease has remained a severe deterrent to white pine production in many western states. Due to the easy and effective removal of the alternate host Ribes spp. throughout the eastern portion of the country, the disease is no longer considered a serious immediate threat to eastern white pine plantations. However, somewhat serious losses may still occur in high value plantings such as Christmas tree plantations where eastern white pine has found a significant use due to its excellent response to shearing. As more white pines are planted for this and for reforestation purposes, white pine blister rust may once again become a serious pest due to the termination of Ribes control programs in this section of country.

All field work (detection and control) is under the supervision of the Virginia Division of Forestry, Charlottesville. They are concentrating their efforts in high hazard areas of the state and have active survey



Figure 1. Recent invasion of white pine stem. Infection usually occurs around branch axil.

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programs in many white pine plantations. They will assist in the examination of plantations upon the owners request.

Range:

White pine blister rust affects white pines from Maine to North Carolina in the east and can be found westward to Minnesota, California, and Wyoming in a band across the northern states. The disease occurs in white pine stands located in the mountainous or piedmont sections of Virginia.

Suscepts:

All five needle pines (white pines) are susceptible to the attack of the causal fungus to varying degrees but there are no commercially important white pine species resistant to infection. In the past, the disease has been particularly damaging to eastern and western white pine and sugar pine with other species being somewhat less affected.

Ribes spp., commonly called gooseberry, wild currant, or black currant, serves as the alternate hosts for the pathogen. About 80 different species have been proven susceptible. Ribes spp. are small shrubs or bushes found in the understory of forests in the East. In the western region of the United States, the species grow much larger and are therefore more difficult to eradicate.

Symptoms and Disease Control:

Infection takes place through pine needles in the summer or early fall of the year. Subsequent growth of the fungus occurs through the needle and twig into larger branches or the main stem of the tree (Figure 1). There the fungus begins to ramify throughout the host tissues, (cambium and bark). A slight sunken area that is reddish brown may appear during the next growing season within the area of the developing canker. Initial swelling of the tissue above the cankered area may be noted during the end of the next year's growing season. Two to three years after initial infection, the fungus produces



Figure 2. Aecial stage of Cronartium ribicola is characterized by bright orange fruiting bodies around the edge of developing cankers.



Figure 3. The telial stage of the white pine blister rust fungus is found on the underside of Ribes leaves. Note small hair-like projections.

duced germinate in place and give rise to the fifth spore stage called sporidia. These spores are wind blown back to the pine host. The disease cycle may be completed within 3 to 5 years after initial infection of the pine host.

Little damage is done to the Ribes plants. Cankers that develop on affected pines eventually girdle branches or main stems. Brown branches or dead tops of trees occur as a result of this girdling. Small and large trees may die from infection but the death of trees depends upon diameter of infected stems and the growth rate of the fungus. In many instances, hundreds of cankers have been found on a single tree. Trees with trunk cankers usually turn pale green or yellow several months prior to death. Old cankers are characterized by abundant pitch flow and the remnants of the pycnial and aecial stages are usually evident (Figure 4).

Control:

The fact that the blister rust fungus requires two hosts to complete its life cycle has made control effective and practical in high value stands, i.e., by the removal of Ribes species within distances of up to one mile from white pine stands. Removal of Ribes within 500 to 900 feet will greatly reduce the number of infections. Within Virginia, Ribes are easily pulled and the plant should then be destroyed or left hanging on a nearby tree limb to desiccate the root system. However, sprouts will occur from roots left in the ground. In some areas chemical sprays provide a more practical method of eradication when numerous plants are involved.

its first spore stage on the pine--the pycnial stage. This stage can be identified by ooze on the bark surface that remains shiny after drying. The fungus continues to colonize adjacent tissues each year and the cankered area enlarges. One year after the production of the pycnial state, the bright yellow-orange aecial stage is produced in pustules directly on the canker surface (Figure 2). The aeciospores produced here are wind blown and often appear as a cloud of dust emitted from a tree that has been blown by the wind or shaken. This spore stage infects the alternate host Ribes over distance of several hundred miles during the spring and early summer seasons. Within a few weeks, the fungus colonizes the leaf tissue of the Ribes and produces the third fungal spore stage termed the uredial stage. Orange pustules on the upper and lower leaf surfaces indicate this stage of the development and the urediospores produced are capable only of re-infecting Ribes. Thus, the fungus is able to increase in population on the Ribes plants. During the mid to late summer season a fourth stage is produced on the lower surface of the Ribes leaves as evidenced by the presence of brown, hair-like projections (Figure 3). This stage is termed the telial stage and the teliospores produced

The disease will, of course, also be reduced in areas of white pines by removal of severely infected trees. Christmas tree growers should constantly check for this disease and any suspect trees with cankers should be promptly removed from the plantation. In some instances, branch cankers may be pruned out and stem cankers may be excised from larger stems through the removal of bark at least one inch about the periphery of the affected areas. However, this approach is time consuming and because of questionable effectiveness it is recommended only for trees of exceptional value.



Figure 4. Abundant pitch flow is characteristic of older cankers.