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BLACK STAIN ROOT DISEASE IN DOUGLAS-FIR ON JACKSON STATE FOREST

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Fig. 1. Black Stain Root Disease as the stain appears in the sapwood of an infected Douglas-fir.

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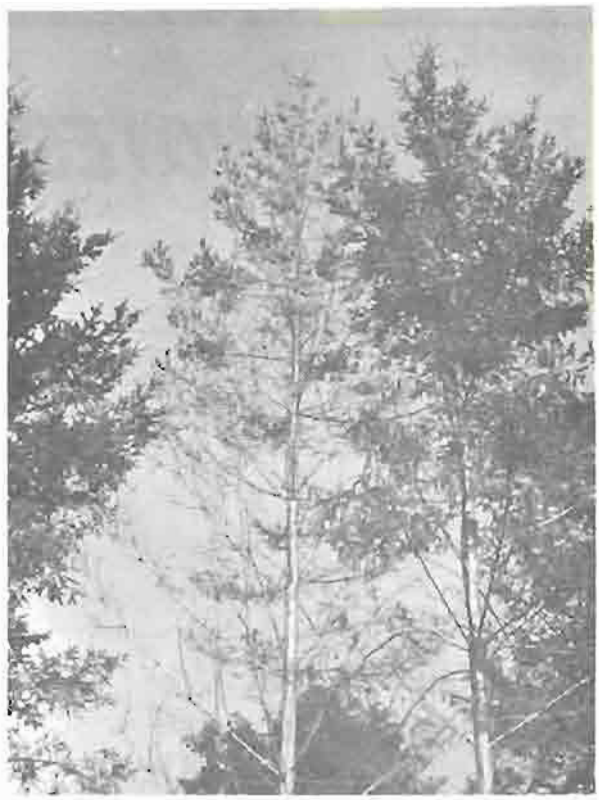

Fig. 2. The tree in the center is infected with black stain root disease.

Fig. 3. One of the plots where an attempt was made to isolate the disease. The dead limbs on the remaining trees was caused by shading.

In 1971, Sam Gossard[3/] reported a small area of dying Douglas-fir, Pseudotsuga menziesii on Jackson State Forest. This stand was 20-25 years old and over-stocked. An examination of these dead trees by the Division's entomologist revealed that the problem was black stain root disease, Verticicladiella wagenerii.

This disease was first found killing ponderosa pine in California in 1938 on Blacks Mountain Experimental Forest, Lassen County. Later it was detected in the San Bernardino National Forest and in Amador County.[4/] According to recent surveys the disease is widespread in Western North America. Black stain root disease is a killer of Douglas-fir and all species of pine. Only the true firs of the genus Abies are resistant to attack.

Very little is known about the life history of this disease. It apparently does not produce a fruiting body like most fungi do. It moves through the ground by live root contact. New infection centers may be caused by insect vectors.

The first infection centers on the Jackson State Forest were found in the Caspar Orchard in dense young stands of Douglas-fir. The centers consisted of groups of dead trees surrounded by a circle of trees showing chlorotic decline. In addition to being yellowish in color, the infected trees had shortened new needle growth. Most of the small seedlings from one to two feet in height were dead.

The initial symtoms of this disease are similar to other root diseases and could be confused with forest insect attacks. The best indicator is the characteristic brownish-black stain running vertically in the outer portions of the sapwood (Fig. 1).

The Plan

After the discovery and identification of the disease, help was requested from the U.S.D.A. Forest Service and the University of California at Berkeley. Pathologists inspected the area and developed a plan for limiting the spread of the disease.[5/]

3/ Deceased, Forester, California Division of Forestry, Jackson State Forest, Fort Bragg, California.

4/ Wagener, Willis W., and James L. Mielke. 1961. A Staining Fungus Root Disease of Ponderosa, Jeffery and Pinion Pines. Plant Disease Reporter. Vol. 45 (11): 831-835.

5/ Richard S. Smith and Robert Scharpf, Research Plant Pathologists, Pacific Southwest Forest and Range Experiment Station, Berkeley, California.
Mike Srago, Plant Pathologist, Regional Office U.S. Forest Service, San Francisco, California.
Arthur MCain, Extension Plant Pathologist, University of California Berkeley, California.

The plan was to isolate the infection centers by cutting all of the dead and live infected trees. Then a ring of healthy trees was removed around the centers to prevent live root contact with infected roots. The ring was about ten or twelve feet wide.

Maps were made of six infection centers to locate each stump and each was tagged with a number. Then every stump was color coded with paint and categorized as to if it were dead, infected or not infected. In addition, three of the cleared plots were planted with white fir, Abies concolor.

The plan also includes long-term studies into the life cycle of the disease, possible vectors, species resistance and rates of spread. Final results will be published by the investigating pathologists.

Preliminary Information

Removal of only a single ring of healthy trees around an infection center is not enough to stop the spread of disease. Clearing a distance of 20 or 30 feet may be more appropriate. The rate of spread through the soil by root contact is about fourteen feet per year.

A good field indicator for locating infected trees is the bluish-white pitch flow on the bark. The characteristic stain frequently shows up when chopping into this resinous area.

Studies of possible insect vectors have led to the discovery of the silver fir beetle, Pseudohylesinus grandis. Pathologists believe this insect may be one of the vectors. Cultures taken from this insect were infected with black stain root disease.