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The Occurrence of Laminated Root Rot on Non-Federal Timberland in Northwest Oregon, 1976

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Abstract

The occurrence of laminated root rot caused by Phellinus weirii on non-Federal timberlands in 1976 in northwest Oregon is discussed and its locations are shown.

KEYWORDS: Root rot, Phellinus weirii, timber inventory.

Introduction

Laminated root rot caused by the fungus Phellinus weirii decays the root systems of susceptible conifers, causing them to die or topple which creates circular openings in stands. The fungus spreads from tree to tree at root contacts, starting from the center of infection at the rate of 1 foot a year, progressively killing trees at the margin of the circle. Once established, it may survive in large stump and root remains for 50 years. A typical "root rot hole" in western Oregon and Washington stands is about 1/4 acre in size; however, several discrete areas may merge and create larger stand openings (McCauley and Cook 1980). Individual infestation centers frequently occupy several acres. The area infested is largely eliminated from growing trees and cannot be considered available for timber production for one or more rotations (Hadfield and Johnson 1977).

A 1976 inventory of non-Federal timberland in northwest Oregon by the Renewable Resource Evaluation Unit (formerly Forest Survey) of the Pacific Northwest Forest and Range Experiment Station placed special emphasis on identifying laminated root rot. In this research note we report on the location and occurrence of laminated root rot in the 10 counties comprising northwest Oregon (fig. 1).

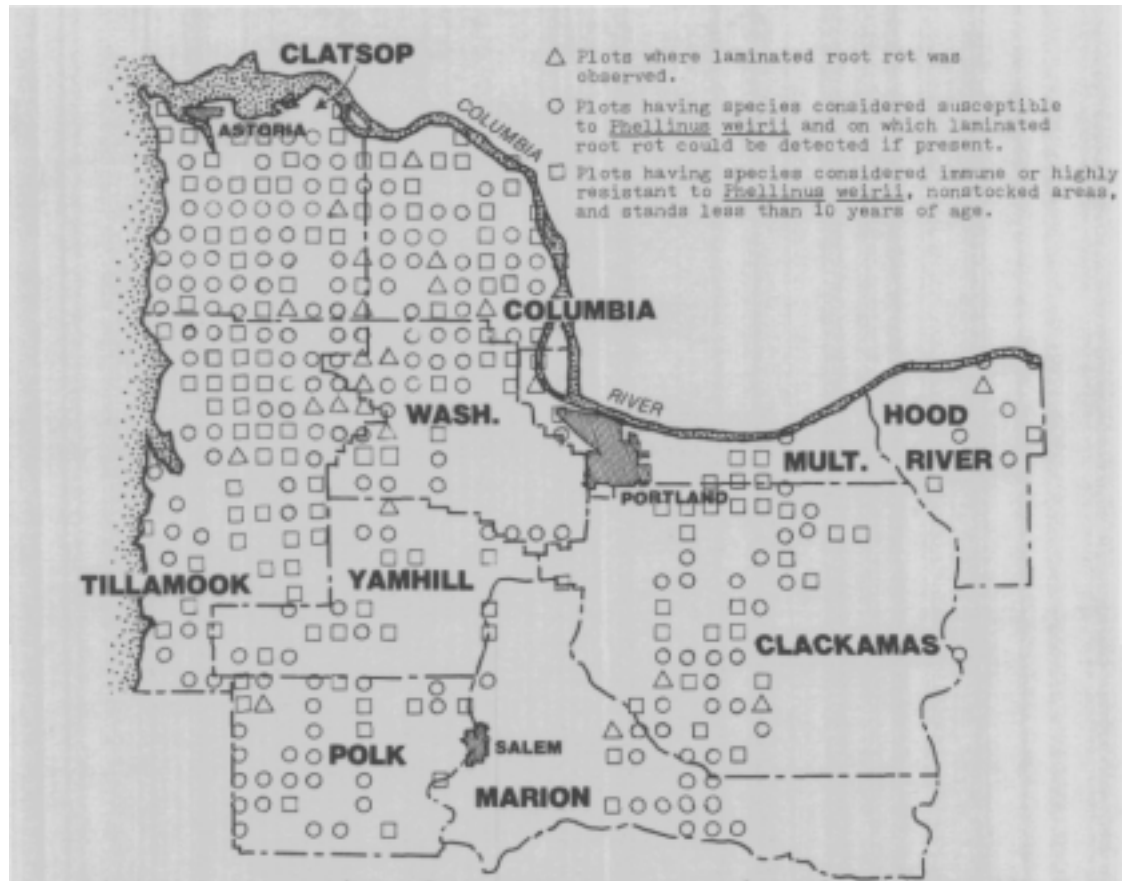


Figure 1. -- Location of treatment opportunity plots in North-west Oregon.

Methodology

Observations for laminated root rot were made on 340 treatment opportunity plots located on a grid with 3.4-mile intervals on private, State, county, and municipal lands. Treatment opportunity plots are 10 acres in size and are adjacent to the 1-acre sample plots from which estimates of timber volume, growth, and related statistics are obtained. Treatment opportunity plots are located within relatively homogeneous forest conditions and identify treatment opportunities such as precommercial thinning, planting, or other cultural or rehabilitative measures. A more complete description is available in a publication by MacLean (1980). A report on the timber resources of northwest Oregon has been prepared by Mei (1979).

The occurrence of laminated root rot on the 10-acre treatment opportunity plots was determined by examining individual dead trees, standing or fallen. Roots were examined where necessary to identify laminated root rot. In some instances, the circular pattern of infestation seemed sufficiently characteristic so that detailed root examinations were not made. Field crews were trained by pathologists to identify the rot. Only the occurrence of the disease was reported; no determination was made of the size of the area infested.

Analysis and Conclusions

Twenty-four treatment opportunity plots were found to contain laminated root rot. This is 7 percent of the 342 treatment opportunity plots (table 1). This estimate is probably conservative as only plots with "holes" or dead trees were recorded as infested.

Table 1—Number and percent of treatment opportunity plots by forest type in northwest Oregon, January 1, 1977^{1/}

Forest type	Plots	
	Number	Percent
Maple	10	3
Oregon white oak	7	2
Red alder	55	16
Other commercial hardwoods	4	1
Noncommercial hardwood	2	1
Western redcedar	9	2
Lodgepole pine	1	--
Sitka spruce	24	7
Western hemlock	2	1
True firs	7	2
Douglas-fir	212	62
Nonstocked	9	3
All types	342	100

^{1/}On private, State, county, and municipal timberland.

How often we found laminated root rot depended on the species and age of stands. Hardwoods are immune to the fungus (Hansen 1975); and redcedar and pines, although capable of becoming infected, experience little mortality (Nelson et al. 1978). For species susceptible to Phellinus weirii, there is a hierarchy of relative tolerance (McCauley and Cook 1980). Identification of root rot is difficult on nonstocked areas or in stands less than 10 years of age.

The following tabulation shows the treatment opportunity plots in which there was a reasonable chance that laminated root rot could be detected, if present. Excluded are hardwood, red-cedar, and lodgepole pine types, nonstocked areas, and stands less than 10 years of age.

<u>Type</u>	<u>Number of plots</u>
Sitka spruce	23
Western hemlock	1
True firs	5
Douglas-fir	<u>172</u>
Total	201

Of the 24 plots observed to have laminated root rot, 22 were in Douglas-fir type and 2 in red alder type. In the two plots in red alder type, Douglas-fir was also present. The 22 infested Douglas-fir plots account for 11 percent of the 201 plots with forest types considered susceptible to Phellinus weirii.

As forest management intensifies and areas are reforested with Douglas-fir, according to common practice, the damage caused by laminated root rot may be expected to increase because of the susceptibility of Douglas-fir to the fungus (Nelson et al. 1978). Of the Douglas-fir type over 10 years of age, 13 percent of the treatment opportunity areas examined were infested with laminated root rot. As pointed out earlier, this estimate may be conservative.

Although we do not have data on the area infested by the disease, our observations suggest that it is large enough to affect intensive forest management.

Tables 2 and 3 compare infested and uninfested Douglas-fir stands 10 to 90 years old by site class and average mean stand diameter. **Occurrence of laminated root rot did not seem to be** influenced by site class or stand diameter.

Table 2—Percent of treatment opportunity plots with and without laminated root rot by site class in northwest Oregon, January 1, 1977.^{1/}

Cubic feet per acre ^{2/}	With laminated root rot	Without laminated root rot
<u>Percent</u>		
225	--	9
165-224	29	11
120-164	63	65
85-119	8	13
50-84	--	2
20-49	--	--
Total	100	100

^{1/}In Douglas-fir type, excluding stands less than 10 years of age, on private, State, county, and municipal timberland.

^{2/}Capacity for cubic-foot annual growth per acre at culmination of mean annual growth in fully stocked natural stands.

Table 3—Percent of treatment opportunity plots with and without laminated root rot by stand diameter class in northwest Oregon, January 1, 1977^{1/}

Quadratic mean stand diameter. ?/	With laminated root rot	Without laminated root rot
<u>Inches</u>		
<u>Percent</u>		
2-4	5	9
5-8	29	29
9-12	33	31
13	33	31
Total	100	100

^{1/}In Douglas-fir type, excluding stands less than 10 years of age, on private, State, county, and municipal timberland.

^{2/}Of principal stand component.

Laminated root rot occurred mainly in the State and forest industry timberlands with the frequency of occurrence greatest on State lands as shown in table 4. Thirty-two percent of the infested plots were on the 21 percent of the timberland in State ownership. Farmer and miscellaneous private timberland had the lowest incidence of rot with 18 percent of the infested plots on the 34 percent of timberland in that ownership.

Table 4—Distribution of treatment opportunity plots by ownership class in northwest Oregon, January 1, 1977^{1/}

Ownership	All plots	With laminated root rot
	<u>Percent</u>	
Forest industry	43	46
State	21	32
County	2	4
Farmer and miscellaneous private	34	18
Total	100	100

^{1/}on private, State, county, and municipal timberland.

Figure 1 shows the location of treatment opportunity plots. It shows (1) plots on which laminated root rot was observed, (2) plots on which no laminated root rot was observed, but having species considered as susceptible to Phellinus weirii and 10 years of age or older, and (3) plots with species considered immune or highly resistant to Phellinus weirii (hardwood, cedar, lodgepole pine), or plots on which laminated root rot could not be detected (nonstocked areas and stands less than 10 years of age).

The plots on which laminated root rot was observed are congregated on the mutual boundaries of Clatsop-Columbia and Tillamook-Washington counties. These boundaries are near the crest of the Coast Ranges.

A conservative estimate of the occurrence of laminated root rot on non-Federal timberlands in northwest Oregon is between 12 and 13 percent. Actual occurrence is probably higher because only dead trees were used to indicate presence of the rot in this survey. Additional work on the actual area of infestation is needed before the real extent of the problem can be defined. The results of this inventory provide a starting point to understanding the extent and importance of Phellinus weirii to future intensive forest management.

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