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HEART-ROT HAZARD IS LOW
IN ABIES AMABILIS REPRODUCTION

INJURED BY LOGGING

by

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Clear-cut units in upper-slope forest types in western Washington and Oregon often have an understory of Pacific silver fir (Abies amabilis) at time of logging. Foresters sometimes hesitate to preserve this advance regeneration, partly because of the possibility that heart rots infecting through logging wounds might considerably reduce the productivity of the resulting stand.

The work reported here was undertaken to determine to what extent heart rots were present in scarred Pacific silver fir reproduction several years after release by logging.

METHODS

The study was conducted on two clear-cut, but unburned, units on the Gifford Pinchot National Forest. The Wind River area, about 15 miles northwest of Carson, Wash., is site IV on a gentle, east slope at 3,100 feet elevation. The stand prior to logging consisted of old-growth Pacific silver fir, western hemlock (Tsuga heterophylla), Douglas-fir (Pseudotsuga menziesii), and noble fir (Abies procera), with an understory of silver fir. Twenty-eight trees, averaging 86 years of age, 2.3 inches d.b.h., and 11 feet tall, were dissected here 9 years after logging. The Randle area, about 15 miles south of Randle, Wash., is poor site III to good site IV on a level-to-gentle,

north slope at 2,900 feet elevation. Before logging, the stand consisted of old-growth Douglas-fir and western hemlock with an understory of Pacific silver fir. Nineteen trees, averaging 69 years of age, 2.6 inches d.b.h., and 14 feet tall, were dissected here 8 years after logging. Of the total of 47 trees dissected on both areas, 64 percent were 50 to 100 years old and 70 percent were 1.5 to 3.5 inches d.b.h.

On both areas, dissections were restricted to potential crop trees of good form with no visible defects except scars.

Before felling, the following information was recorded for each tree: d.b.h., tree height, tree height at time of release, scar position and exposure on the bole, scar condition, and size of open wounds. The tree was then cut and its age determined by a ring count at ground level. Each scar was dissected and the following data noted: scar age, original wound size, and the presence or absence of visible decay. A culture block was taken from the wood behind each scar, and two isolations were attempted from each block.

RESULTS AND DISCUSSION

The ability of Pacific silver fir to recover rapidly from suppression has previously been observed.^{1/} It was conspicuous on the study areas, where average height growth of dissected trees since release was 6 feet. More than half of the trees dissected on the Randle area had averaged over a foot of height growth per year since release.

Seventy-four scars on 47 trees were dissected (table 1). Nearly 92 percent of these scars were less than 0.2 square foot in original area (fig. 1). Thirty-two of them yielded sterile cultures only, and 41 yielded only staining, contaminating, or other nondecaying organisms (fig. 2). No typical decay was found behind any scar, and wood-rotting fungi were cultured from only one scar. The infected scar was 0.02 square foot in original area, was 9 inches from the ground, and was completely grown over.

^{1/} Hanzlik, E. J. Type successions in the Olympic Mountains. Jour. Forestry 30: 91-93. 1932.

These results indicate that, while small scars may occasionally become infected, moderate scarring of advance reproduction is not likely to result in appreciable damage by heart-rotting fungi. Wright and Isaac^{2/} and Hunt and Krueger^{3/} found that infection is much less common in small scars than in large, even in tree species highly subject to heart rot. Trees as small as those in the present study will seldom incur wounds more than a few tenths of a square foot in area without being crushed so badly as to be, for all practical purposes, eliminated from the stand.

It is possible that some of the scars uninfected in 1959 had been infected at one time and that the infections had died when the wounds closed. Childs and Wright^{4/} found that extensive heart-rot infections behind pruning scars on young Douglas-fir died when the wounds healed. Since there is a possibility that some infection may still occur through wounds that have not yet closed, a number of scarred trees on the Wind River area have been marked for further study after all the wounds have closed.

CONCLUSIONS AND RECOMMENDATIONS

Suppressed Abies amabilis reproduction on upper-slope, clear-cut units responds well to release, both in diameter and height growth, and even though moderately scarred is not appreciably infected with decay-producing fungi after 9 years, probably because of the small size of the wounds. It appears safe from the standpoint of heart-rot hazard to preserve Pacific silver fir advance regeneration on upper-slope areas suitable for management of this species and free from dwarfmistletoe. Heart-rot hazard can be reduced even more by exercising care during logging to reduce the number and size of wounds, and by eliminating, during stand improvement work, trees with large scars.

^{2/}Wright, Ernest, and Isaac, Leo A. Decay following logging injury to western hemlock, Sitka spruce, and true firs. U.S. Dept. Agr. Tech. Bul. 1148, 34 pp., illus. 1956.

^{3/}Hunt, John, and Krueger, Kenneth W. Decay under thinning wounds in young-growth western hemlock and Douglas-fir. 1960. (Unpublished report on file at the Pacific Northwest Forest & Range Expt. Sta.)

^{4/}Childs, Thomas W., and Wright, Ernest. Pruning and occurrence of heart rot in young Douglas-fir. U.S. Forest Serv. Pac. NW. Forest & Range Expt. Sta. Res. Note 132, 5 pp., 1956. (Processed.)

Table 1.--Age, original area, position, and condition of dissected scars and wounds on Pacific silver fir trees, 1959

Study area	Total scars and wounds	Age of scars and wounds	Average original wound area ^{1/}	Position of scars and wounds on tree			Wound condition, 1959				
				At ground level	: 0.1 to 2.0 feet	: 2.1+ feet	Decayed scars and wounds	Healed	Unhealed	Average area of unhealed wound ^{1/}	
	<u>Number</u>	<u>Years</u>	<u>Square feet</u>	----	<u>Number</u>	----	<u>Number</u>	---	<u>Number</u>	---	<u>Square feet</u>
Wind River	45	9	0.07	8	29	8	0	29	16		0.03
Randle	29	8	.12	4	21	4	1	19	10		.09

^{1/}Wound and scar areas were computed as 75 percent of the length times the width.

Figure 1.--Nine-year-old logging scar on 110-year-old, 3.8-inch-d.b.h. Pacific silver fir. Original wound area was 0.19 square foot. This scar was not infected.

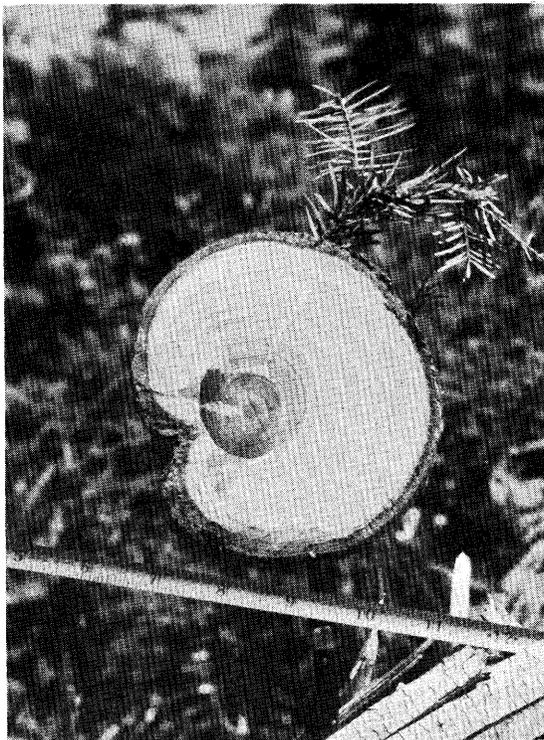


Figure 2.--Cross section through a 9-year-old scar showing stain or pathological heartwood, and rapid closure following injury.