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THE EXTENT OF BLISTER RUST MYCELIA BEYOND BARK DISCOLORATIONS ON SUGAR PINE

by

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Many sugar pines (Pinus lambertiana) can be saved from damage or premature death by the timely removal of threatening blister rust cankers (Cronartium ribicola).

The host-parasite relations of blister rust on eastern white pine (P. strobus) and western white pine (P. monticola) have been the subject of several investigations. Ehrlich and Opie, working with western white pine, reported that mycelial extent beyond canker discolorations ranged from 0.20 to 1.18 inches, with a mean of 0.65 inches.[2/] Since corresponding data for sugar pine have not been available, sanitation pruning allowances for canker removal have necessarily

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1/ Formerly with the Division of Forest Disease Research.

2/ Ehrlich, John, and Opie, Robert S. Mycelial extent beyond blister rust cankers on Pinus monticola. Phytopath. 30:611-620, illus. 1940.

been empirical. Purpose of the present study was to obtain data for sugar pine and thereby determine the probable effectiveness of current pruning practices as a protective measure against blister rust.

METHODS

Eighty cankers were collected at 6 localities in southwestern Oregon during late July, August, and early September 1954; and 19 cankers were collected late in May in 1955 and 1956. Each of these 99 cankers was sectioned on a freezing microtome, stained, and examined microscopically to determine the proximal extent of the fungus mycelia.

Distal extent of the mycelia was not considered in this study, nor was an intensive diagnostic examination of the bark tissue attempted. The presence or absence of mycelia was established by examining 1/4-inch segments from longitudinal strips of bark. Radial and transverse sections of each segment were examined.

RESULTS

The data (tables 1 and 2) show that the spring-collected cankers had a much greater proximal mycelial extent than the cankers collected in late summer. The difference between the means of the two groups is highly significant.

Even in the spring, mycelial extent beyond discoloration equaled or exceeded 3.5 inches in only 2 of the 16 branch cankers examined. Although it is sometimes difficult to determine the precise limits of canker discoloration, these limits can usually be set within 1/2-inch or less. Consequently, the usual pruning allowance of 4 inches between canker discoloration limits and pruning cut will almost always be adequate for elimination of blister rust infection. The occasional instances in spring and early summer where mycelial extent exceeds 3.5 inches could be provided for by increasing pruning allowance to 6 inches at this time of year.

Table 1.--Proximal extent of blister rust mycelia beyond canker discolorations in sugar pine bark, spring-collected cankers.

Twig diameter (inches)	Cankers from--		Proximal extent of mycelia	
	Branches	Main boles	Mean	Maximum
	Number	Number	Inches	Inches
0.1	--	--	--	--
0.2	2	--	1.00	1.50
0.3	--	--	--	--
0.4	5	--	1.62	1/3.00
0.5	3	--	3.00	1/3.50
0.6	4	--	2.12	1/4.50
0.7	1	1	2.00	2.50
0.8	1	--	2.00	2.00
0.9	--	1	1.50	1.50
1.0	--	--	--	--
1.1	--	1	5.00	1/5.00
All cankers	16	3	2/2.03	5.00

1/ The mycelium in one canker extended beyond the collected material. For computational purposes, an additional 1/2-inch was added to the length of the collected material and the total regarded as the mycelial extent.

2/ Standard error: ±0.30 inch.

Table 2.--Proximal extent of blister rust mycelia beyond canker discolorations in sugar pine bark, late summer-collected cankers.

Twig diameter (inches)	Cankers from--		Proximal extent of mycelia	
	Branches	Main boles	Mean	Maximum
	Number	Number	Inches	Inches
0.1	2	1	0.50	0.50
0.2	21	--	0.69	2.00
0.3	18	--	0.75	1.00
0.4	14	--	0.82	1.00
0.5	10	--	1.00	1.50
0.6	3	--	1.00	1.00
0.7	1	--	1.50	1.50
0.8	1	1	1.00	1.00
0.9	--	--	--	--
1.0	--	3	1.50	2.00
1.1	--	--	--	--
1.2	--	1	1.50	1.50
1.3	--	--	--	--
1.4	--	1	1.50	1.50
1.5	--	1	1.50	1.50
1.6	--	1	1.00	1.00
1.7	--	1	1.00	1.00
All cankers	70	10	1/0.86	2.00

1/ Standard error: ±0.03 inch.