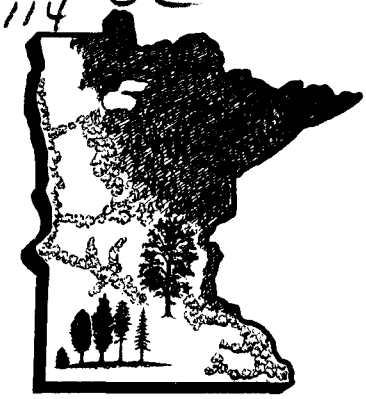

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A WHITE PINE STAND 17 YEARS AFTER CONTROL OF BLISTER RUST

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Local control measures for white pine blister rust caused by Cronartium ribicola Fischer include eradication of the alternate host, Ribes (currants and gooseberries) and elimination of established cankers by pruning or antibiotic chemicals. However, results from the use of antibiotics for killing cankers have not yet shown them to be a practical method for the Lake States according to Van Arsdel (1961) and unpublished results obtained in Minnesota by Stewart and Ritter (1961).

Although removal of Ribes from selected white pine stands and their protective borders reduces the number of new infections it does not cure trees already infected. Stewart (1957) showed that 69% of infected trees can be saved by excising cankers when distance between canker margin and pruning wound is 0.1 to 2.0 inches. Since infected trees can often be saved by eliminating cankers, State Blister Rust Control personnel have recommended pruning white pine stands as a supplement to eradication of Ribes.

Early in May 1945, a pilot pruning project was initiated in a 44-acre stand of second-growth white pine about 20 years old in the Cloquet Valley State Forest where Ribes had been radicated the previous year. The stand was understocked with an average of approximately 220 white pine per acre including saplings 2.5 inches d.b.h. and 12 to 15 feet in height, with a scattering of larger trees up to 25 feet in height and 4 to 6 inches in diameter. Of the 220 white pine per acre, an average of 106 were canker-free, 103 had prunable infections and 11 had nonprunable cankers. Other trees species included an average of about 50 red pine, white spruce, and balsam per acre plus a scattering of aspen and birch.

During May and June 1944, approximately 14,500 Ribes plants were initially removed by hand eradication from the 44-acre stand of white pine plus border strips comprising a control area of 76 acres. Within this control area, about 8,000 bushes or an average of 116 per acre were pulled from 69 upland acres and approximately 6,500 bushes or an average of 922 per acre from 7 swamp acres along a small lake bordering the white pine stand on the south side. No subsequent Ribes eradications have been done in this control area.

Four 1-acre plots were established and 3 of them treated in 1945 by (1) pathological pruning (removal of diseased limbs only); and (2) a combination of pathological and silvicultural pruning (removal of all lower branches and those with cankers in the upper five whorls). One plot (IV) was selected as an unpruned check (Table).

A survey by Blister Rust Control personnel in 1961, 17 years after eradication in 1945, showed 67 acres of upland free of Ribes. However, regrowth of bushes was found along a strip bordering a small lake on the south side of the white pine. A stocked-quadrat survey made at the same time on 180 1/500-acre plots showed less than 1% of the plots were unstocked because of blister rust damage. Of 68 white pines examined on 1/50-acre plots outside of the 4 study plots, 11 had been killed by the rust and 3 were living infected trees or a total of 20% of the trees damaged by rust.

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2/ Special acknowledgment is due J. N. Licke, in charge of blister rust control in Minnesota and R. W. Nelson, U. S. Forest Service, Duluth, Minnesota, for their assistance.

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To determine the effectiveness of Ribes eradication plus pruning, data were collected on the four 1-acre plots in 1945, 1950, 1958, and 1961 which are summarized in the Table. The silvicultural pruning of all trees on Plot II saved 8 trees out of 26 infected or an average of 30% compared to about 20% each for the silvicultural pruning of crop trees only (Plot I) and pathological pruning of crop trees (Plot III). It is doubtful if this difference is significant because of the small number of sample trees saved for all treatments. Of 82 cankered sample trees pruned on three treated plots, 20 or an average of 24% were saved by pruning. An additional 20 trees were not successfully pruned of cankers but by 1961 had recovered through natural death of cankers. The 1950 examination indicated 15 additional trees or 18% of the total could have been saved by a second pruning that same year.

Since only 1 out of 5 infected trees were saved by pruning this stand, pruning as a supplemental control to Ribes eradication does not appear practicable. A second pruning to a height of about 17 feet would have saved additional trees.

Ribes eradication was effective in eliminating bushes on 67 upland acres and in markedly reducing further infection in this pine stand. Only 9 trees out of 127 or about 7% were reinfected after the 1945 pruning on the three 1-acre pruning plots. Although an average of 51% of the sample trees were healthy on the three pruned plots, the infection survey showed 80% of the trees outside of all plots to be canker free. This difference may be due to overlooked cankers on the general survey or the 4 plots were not representative of infection conditions for the 44-acre stand. On the basis of the 1961 survey there was an average of about 176 healthy pines per acre.

The Cloquet Valley State Forest is located in the high-hazard blister rust zone (Van Arsdel, 1961). This thinly stocked natural white pine stand had many openings and a prevalence of Ribes which favored development and spread of the rust. Since the rust was already well established in the stand in 1944 the attempt to control the rust may have been questionable. Nevertheless, one Ribes eradication was effective in limiting further damage and prevented losses from exceeding more than about 20% of the existing trees.

Literature Cited

Stewart, Donald M. 1957. Factors affecting local control of white pine blister rust in Minnesota. J. For. 55(11):832-837.

Stewart, Donald M., and L. B. Ritter. 1961. Unpublished results for treatment of blister rust cankers with Acti-dione and Phyto-actin on plantation pine at Stacy and Wyoming, Minnesota.

Van Arsdel, Eugene P. 1961. Growing white pine in the Lake States to avoid blister rust. Lake States For. Expt. Sta. Paper No. 92.

Table--Blister rust canker pruning plots on Cloquet Valley State Forest (readings taken in 1945, 1950, 1958, and 1961)

Plot No. and treatment	Number of white pine sample trees per acre							
	Treated	With cankers	Saved by pruning	Recovery by death of cankers	Healthy 1961 No.	Healthy 1961 %	Reinfected after 1945 pruning	Additional prunable 1950
I Silvicultural (crop trees)	27	19	4	1	9	33	2	8
II Silvicultural (all trees)	50	26	8	8	32	64	4	3
III Pathological (crop trees)	50	37	8	11	24	48	3	4
Total (treated plots)	127	82	20	20	65	51	9	15
IV Check	None[a]	32	-	7	18	36	-	6

[a]Data collected on 50 untreated trees.

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