PATHOLOGY

Douglas-Fir Christmas Trees and Premature Needle Fall.—Occasionally Douglas-fir Christmas trees with moderate infection by *Rhabdocline pseudotsugae* Syd. are cut for marketing and when excessive needle loss occurs in transit, or shortly after being sold to the consumer, the fungus has been thought to be responsible. To determine the effects of a number of environmental conditions on needle casting, 15 infected and 12 healthy trees were selected near Invermere, B.C., in mid-November 1964, cut to a height of 5 ft, and brought to the Victoria laboratory. The crowns of infected trees were moderately thin from previous attacks by the fungus and the current year's needles were heavily infected.

Four of the infected trees and three healthy trees were placed upright without water in each of the following areas; greenhouse, heated room and refrigerated room. Three infected and three healthy trees were placed in a lath shade house. Temperatures ranged from 5 to 18° C in the greenhouse, 15 to 18° C in the heated room, —4 to 2° C in the refrigerated room and —15 to 13° C in the lath shade house. For 75% of the experimental period the relative humidity was below 80% in the greenhouse and over 95% in the lath shade house. In the heated room the humidity varied from 65% to 75%. At the beginning, and 8 weeks later at the conclusion of the experiment, the number of current year's needles missing and the number with yellow and red-brown *Rhabdocline* lesions were estimated for each treee as a whole and counted on one branch of each tree. A weekly record was made of the number of needles cast from each tree.

Under the conditions of the experiment, infected needles were not cast and there were no apparent changes in *Rhabdocline* lesions. All needles cast were 2 years old or more, the oldest being the first to fall. Trees in the greenhouse, heated room and lath shade house began casting needles in the seventh week of the experiment. No needles were cast from trees kept in the cold room. At the end of the eighth week the average number of needles cast from each tree in the cool, moist atmosphere of the lath shade house (300) was less than were cast in the warmer and drier atmosphere of either the greenhouse (575) or heated room (500).—A. K. Parker and C. H. Truscott, Forest Research Laboratory, Victoria, B.C.

SILVICULTURE

Spot Seeding to Augment Natural Reproduction of Eastern White Pine.—Five successive seed crop failures have occurred in an 1800 acre block of old-growth white pine near Temagami, Ontario, being harvested in strips over a 15-year period. This refutes the general belief that good crops can be expected every 3 to 5 years and light crops in most intervening years.

To compensate for the lack of natural seed, the Ontario Department of Lands and Forests sowed white pine directly on cutover strips in the autumns of 1960 and 1961, using two manual methods: (a) broadcasting 10,000 seeds per acre by cyclone seeder and (b) "rake and shake", i.e., sowing 20 seeds per shaker on a spot prepared by a fire rake. Some seed lots were coated with the repellents "Endrin" and "Arasan" while others were untreated.

Seeding was confined to the well-drained slopes which predominated in the area, avoiding moist, brushy pockets and dry upper sites where advance reproduction of pine was prevalent. The soil was shallow, loamy till over slatey bedrock. Considerable ground disturbance resulted from the logging which involved machine-skidding in fall, and was concentrated in alternate strips approximately 100 ft wide.

In a cooperative arrangement, the Department of Forestry superimposed seeding tests on the operations, designed to compare the effectiveness of sowing method, seed treatment and seedbed—particularly, compacted skid roads vs. ground loosely scarified by bulldozer. Seed (77% viable) was sown at the rate of 22 to 23 seeds per ¼-milliacre quadrat. In the "rake and shake" method, seed was lightly raked in; in surface broadcasting, it was sown on the most suitable spot on each quadrat. Seeding was carried out in October 1961. Employing a randomized block design, a factorial experiment was set out with 4 treatments × 2 seedbeds in 12 replications of 16 sample quadrats (¼-milliacre) per treatment. Results obtained by two criteria—'stocking' or percentage of quadrats stocked with one or more seedlings, and 'seedling catch' or percentage of seeds which produced surviving seedlings—were:

Sowing Treatment	Scarified by bulldozer				Compacted skid-road			
	% Stocking		% Seedling catch		% Stocking		% Seedling catch	
	1st yr	3rd yr	1st yr	3rd yr	1st yr	3rd yr	1st yr	3rd yr
Spot-seeded, raked in	79	75	16	13	89	89	24	20
Surface broadcast, coated seed	53	51	6	5	70	69	12	10
Surface broadcast, uncoated seed	44	45	5	4	66	60	9	9
Control, no seed sown artificially	2	6	—	—	8	9	—	—

Comparing sowing treatments, the raked spot effect proved consistently superior. Differences between it and the next best treatment were significant at the 1% level in every case, according to range tests (Snedecor, "Statistical Methods", 1956). The broadcast sowings of repellent coated vs. uncoated seed were not significantly different; nor, as the control indicates, was natural seeding of much consequence.

Contrary to expectation, the compacted skid-road seedbed produced somewhat better results than the loosely mixed seedbed effected by bulldozer action (a combination of blade and track scarification).

The "rake and shake" method of spot seeding thus seeems effective as a supplementary regeneration measure where natural regeneration has failed locally. This manual method can be economically applied by concentrating seed spots on and adjoining skidding roads and trails, preliminary scarification being unnecessary. In view of the seedling 'catch' from this test and the usual germination range of 75% for white pine, about 10 seeds per spot should give acceptable seedling density and stocking.—K. W. Horton, Forest Research Laboratory, Maple, Ont.

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Stairs, G. R. 1966. Transmission of virus in tent caterpillar populations. Can. Entomologist 98: 1100-1104.

Stanek, W. 1966. Relative quality of the major forest associations of the southern B.C. Interior for growth of lodgepole pine, Engelmann spruce, Douglas-fir, and alpine fir. Forestry Chron. 42: 306-313.

Stieda, C. K. A. 1965. Photostress analysis of timber structures. *In* Proc. Second Sym. Nondestructive Testing Wood, Spokane, Wash. pp. 349-385.

Thomas, J. B., and J. Krywienczyk. 1966. Preliminary results of a serological examination of some Scolytidae and Curculionidae. Can. Entomologist 98: 1094-1099.

Van Wagner, C. E. 1966. Three experimental fires in jack pine slash. Dept. Forestry Publ. 1146.

Whitney, R. D. 1966. Germination and inoculation tests with basidiospores of *Polyporus tomentosus*. Can. J. Botany 44: 1333-1343.

Wiksten, A. 1966. To thin or not to thin: some Nordic observations on the question. Forestry Chron. 42: 231-243.