In March 1972, urea at 447, 1121 and 2240 kg N/ha (400, 1000 and 2000 lb N/acre), ammonium nitrate and calcium nitrate at 1121 and 2240 kg N/ha and sodium nitrate at 1121 kg N/ha were each applied to three separate root rot infection centers; the fertilizers were hand spread in two applications at right angles. Soil pH, using a water paste, was measured at the surface and at 15 cm in the mineral soil 1, 4, 8 and 50 weeks following treatment; control samples for the fertilized plots were taken adjacent to the treatments.

Soil pH of the controls varied from 5.1 to 6.0 through the year following treatment. Application of ammonium nitrate and calcium nitrate did not significantly alter this pH. Application of sodium nitrate at 1121 kg N/ha raised the pH sharply to approximately 6.8 in the surface samples during the first 2 months following treatment; the pH returned to the same level as the controls by the 50-week sampling. No significant change was measured in the samples from the 15 cm depth. Urea applied at 447 kg N/ha increased the pH of the surface layer approximately two units during the first 2 months (Fig. 1); however, as with sodium nitrate, the pH approximated that of the control by 50 weeks. No significant effect was seen at the 15 cm depth. Soil pH's of 8.0 to 8.5 were recorded in the first 2 months in the surface soil from areas treated with urea at 1121 and 2240 kg N/ha. By the 50th week, the pH had dropped to more than half a unit below that of the controls and is probably the result of a strong nitrification process in these soils under the conditions created by the urea. At the 15 cm depth, application of urea at 1121 and 2240 kg N/ha increased the pH by 0.5 and 2 units, respectively. These peaks were reached by 8 weeks following treatment and probably resulted from ammonium leaching with the relatively high precipitation on the site (2.4 and 12.7 cm (0.95 and 5.0 inches) for the first week and month, respectively). At 50 weeks, the pH had dropped well below that of the controls, similar to that noted for the surface samples.

With the exception of those sites receiving urea at 1121 and 2240 kg N/ha, minor vegetation showed early increased vigor and a darkening in color compared to the controls. Urea at 1121 kg N/ha caused minor foliage burn initially, but this was no longer evident by the second growing season following application. Minor vegetation growing on sites receiving urea at 2240 kg N/ha was severely damaged, most of the foliage being killed. Resprouting occurred in the second growing season following treatment, but growth was still poor 2 years following fertilization.

Basal area of fertilized dominant and codominant healthy trees increased 20 to 35% in the first 2 years following treatment compared to a 16% increase in untreated trees. Increase in basal area of infected trees was reduced relative to the extent of infection as expressed by the original crown vigor class.

At 12 and 20 months following fertilization, mycelial development on the root collar and peripheral roots was examined and decay samples were removed to the laboratory for culturing. All cultures from infected roots were viable; a profuse fungal growth developed on the surface of infected roots when they were split and wrapped in moist tissue. None of the treatments caused a visible degradation of the mycelium growing on the bark surface *in vivo;* the mycelium was viable, similar in appearance to that on control trees, and unchanged from that present before treatment.

Treated infected trees, except those treated with sodium nitrate, showed a higher mortality rate than untreated trees (Table 1). With few exceptions, foliage of surviving trees, even those with advanced crown symptoms, "greened up" following fertilization. As a result, by the end of the second growing season, 0 to 50% of the treated infected trees were judged to have a more vigorous crown compared to 0 to 4% of the untreated infected trees. However, in none of the trees showing increased crown vigor was there any detectable effect on fungal development, indicating that no reduction in spread of the disease or in losses will be achieved by the application of urea or nitrate fertilizers. — G. W. Wallis and G. Reynolds, Pacific Forest Research Centre, Victoria, B.C.

TABLE 1

Percentage of *Poria weirii* infected trees showing change in crown vigor class or death following fertilization.

Fertilizer	Crown vigor class*	No. of infected trees	% with increased vigor	% with decreased vigor	% dead
Urea	1 - 2	56	3	12	25
	3 - 4	28	28	0	50
Amm. nitrate	1 - 2	21	5	19	19
	3 - 4	10	10	0	40
Cal. nitrate	1 - 2	26	12	4	15
	3 - 4	7	28	0	71
Sod. nitrate	1 - 2	19	0	5	0
	3 - 4	6	50	0	33
Control	1 - 2	26	4	54	0
	3 - 4	12	0	42	17

*Infected trees divided into four categories on the basis of crown symptoms: 1 = none, 2 = early, 3 = moderate, 4 = advanced.

SILVICULTURE

Germination Dish for Testing Tree Seeds. — Most modern, cabinet-type germinators are equipped to provide 90-95% relative humidity. Such units are generally expensive, not always available or are not suitable for certain types of study, e.g. where uniform lighting is important. The need often arises for inexpensive germinators, either as the basic apparatus or in addition to more sophisticated equipment, that permit a variety of tests to be conducted. In many instances, small dishes can be used.

However, germination tests in shallow containers, such as petri dishes, particularly if left open, are unsatisfactory because they need frequent watering. Even in germinators equipped with humidity controls, water is lost from the substratum by evaporation. If covered, this evaporation is much reduced, but unfavorable gaseous conditions often develop within the closed dishes, particularly in tests on tree seeds that require several weeks to germinate completely. Gas exchange may be seriously limited by the water seal that frequently forms between the cover and the rim of the dish. This usually results in reduced germination (Allen and Bientjes, For. Chron. 30:183-196, 1954). Germination testing in small dishes is more cumbersome than using large water baths from which all samples are irrigated at one time, but small dishes can be fitted more readily into incubators that do not permit the use of larger water reservoirs.

A method for providing a near-continuous, uniform moisture supply while maintaining good aeration around the seeds has been devised from disposable, plastic petri dishes. Plastic dishes are cheaper and more convenient than glass ones, are less likely to break and, for comparable diameters, are deeper and hold more water. A disadvantage is that they cannot be autoclaved.

Dishes 15 cm (5.75 inches) in diameter were used in this method. A 19 mm (0.75 inch) hole was drilled in the center of each lid and a wick was made from two thicknesses of filter paper 125 mm (5 inch) x 19 mm (0.75 inch), folded as shown in Fig. 1. The free ends of the wick were pushed through the lid and into the water in the lower portion of the dish. Filter paper circles, 12.5 cm (5 inch) in diameter, which will accommodate 100 Douglas-fir seeds, were then centered over the wicks and the seeds were placed on the moist paper. The seeds were covered with an inverted glass funnel (Figs. 2, 3).

This system is particularly useful when testing, for example, the phytotoxicity of chemical solutions on seed germination. The treatments can be replicated in various spatial experimental designs; relatively small volumes (150-200 ml in a 15 cm diameter dish) of

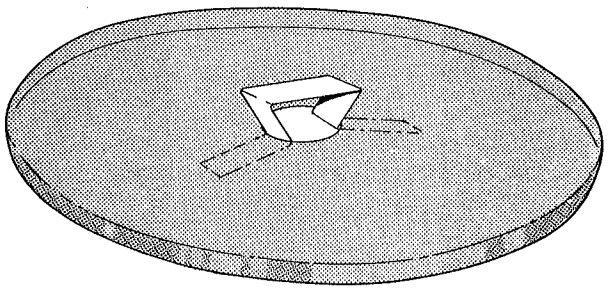

Figure 1. Method of folding and placing the wick.

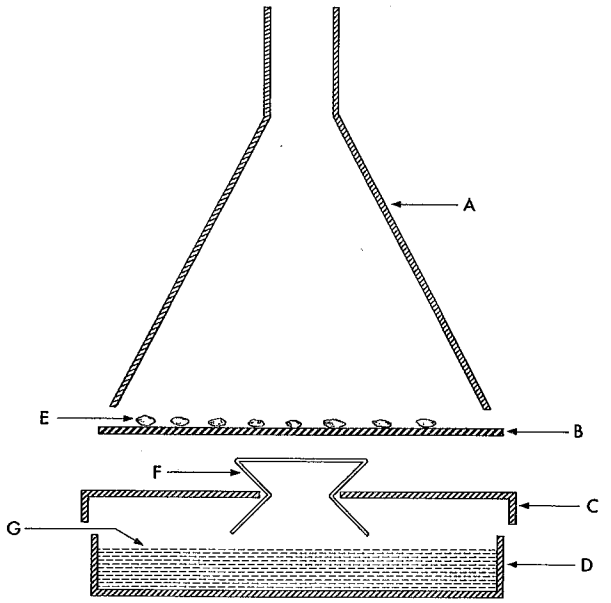

Figure 2. Exploded view of dish germinator.
A — cover; B — filter paper circle; C — lid; D — dish; E — seeds; F — wick; G — water level.

solution are required and since evaporational losses are minimized, there is less need for attention in maintaining solution levels. Supply of the solution (or water) to the seed is relatively constant. The system meets most of the requirements of the International Seed Testing Rules (Proc. Internat. Seed Testing Assoc. 31: 1-152, 1966). The amount of moisture in the filter paper, on which the seeds germinate, can be controlled by the size of the wick. Use of the wide-mouthed funnels, as covers, permits air exchange and some evaporation to occur; however, relative humidity of the air surrounding the seeds remains high (90-95%). Distribution of moisture in the filter paper should be more uniform, because of the central position of the wick, than in the procedure recently described by Knudson and Tibbits (Hort. Sci. 8: 472, 1973) in which the wick irrigates one portion of the edge of the filter paper. — D. G. W. Edwards, Pacific Forest Research Centre, Victoria, B.C.

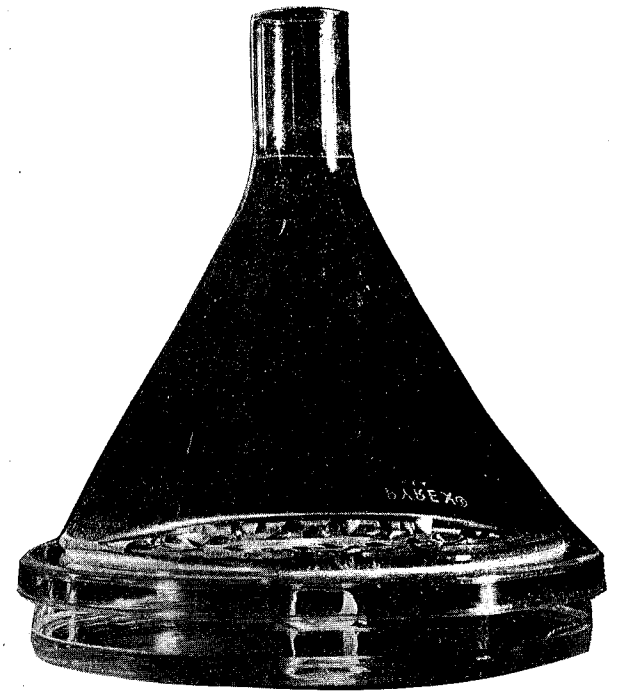

Figure 3. Complete dish germinator.

Long Lasting Labels for Tree Branches. — A Scots pine Christmas tree plantation was selected as the site for several short- and long-term experiments in studies of the scleroderris canker of pines. It was necessary to designate and label trees and branches, some of which served as experimental units in more than one experiment. Labels were sought that could be prepared in the field with ease, provide legible coding for the duration of the experiment, be easily removed, and provide a marking system enabling easy and quick location of any given experimental unit even under adverse weather conditions (i.e., winter).

After some experimentation, we chose one of the inexpensive, commercially available, compact, embossing labellers that uses rolls of vinyl tape. Experiments and treatments were color coded. The code for a branch was embossed on the tape which was then cut to the required length, bent around the branch to be marked, and the two ends stapled together to form a band sufficiently loose to allow unrestricted growth for the duration of the experiment.

After 3 years, no labels were lost due to defective materials, their color did not change, and the coding on them remained legible. Moreover, field collecting of material, especially during the winter was done faster due to color coding.

This method of labelling is easy, fast, reliable, inexpensive and it appears amenable to many types of operations requiring long-lasting labelling. — L. P. Magasi and J. M. Manley, Maritimes Forest Research Centre, Fredericton, N.B.