



R&D Update

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Demonstration of a Novel Fungus Inoculation Technique to Screen Coastal Douglas-fir for Genetic Resistance to Laminated Root Rot

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Introduction and Background

Laminated root disease (LRD), caused by the fungus *Phellinus weirii*, is the most serious root disease affecting Douglas-fir in coastal British Columbia (B.C.). Since both host and pathogen are indigenous to B.C. and the U.S. Pacific Northwest, it has been suspected that sources of natural resistance to the fungus may have evolved within coastal Douglas-fir. An opportunity to confirm this suspicion became available with the development of a novel fungus inoculation technique, pioneered at the Pacific Forestry Centre (PFC), which could be used to screen a cross-section of the crosses included in the B.C. Ministry of Forests (BCMOF) Coastal Douglas-fir Tree Improvement Program (CDFTIP) for resistance to LRD.

This report describes a FRDA-II Extension and Technology Transfer project which demonstrates the utilization of this inoculation technique to forest management programs, particularly in the area of forest health.

Project description

During 1993, in cooperation with Pacific Forest Products (PFP) Ltd. and the BCMOF, 3800 Douglas-fir seedlings from 97 full sib crosses, selected from the CDFTIP, were planted into 2 L pots and inoculated with *P. weirii*-colonized inoculum units. Forty each of coastal western hemlock, grand fir and western redcedar seedlings were also inoculated as positive controls.

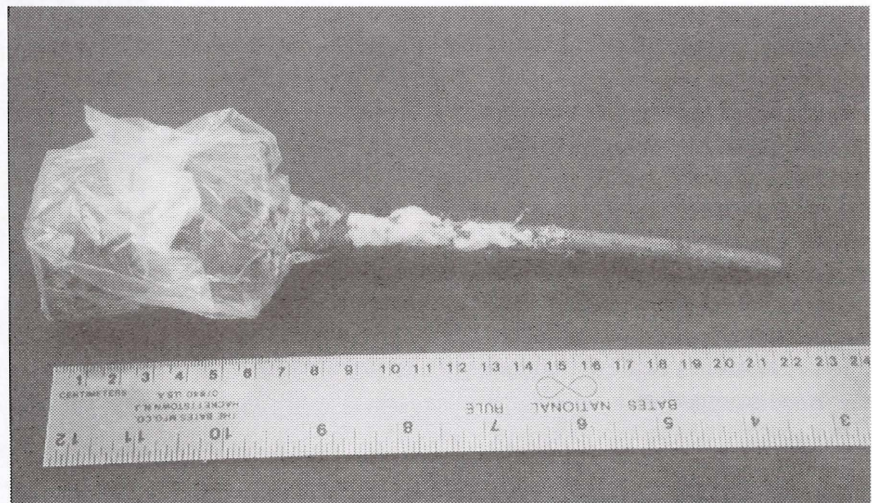


Figure 1. Completed inoculum unit with *P. weirii* growing down the branch



Figure 2. Seedlings with inoculum unit

An inoculum unit consisted of two parts: 1) an alder block with a 5-mm hole drilled in the centre, autoclaved and then inoculated and colonized by *P. weirii*; and 2) a branch segment of Douglas-fir stripped of its needles. The inoculum unit was completed by inserting the branch into the hole drilled in the block, wrapping the block with a small plastic bag and sealing with masking tape (Figure 1).

Seedlings were inoculated by removing a straw placed into the pot at the time of planting and replacing it with the branch segment of the inoculum unit (Fig. 2). Presently, the inoculated seedlings are incubating in the greenhouse at PFC (Fig. 3).

Results

It is anticipated that resistance or susceptibility of the inoculated seedlings will become evident soon after bud break in the spring of 1994. An assessment procedure has been designed to insure that symptomology of all seedlings is recorded. Suspect resistant families and any seedlings not successfully inoculated will be reinoculated in the fall of 1994. Results on coastal Douglas-fir resistance to *P. weirii* will be available in 1995 for integration into the BCMOF's CDFTIP and forest health programs of the forest companies.

In addition to work with the seedlings, four BCMOF coastal Douglas-fir progeny sites (1 each at Bamford and Chemainus, and 2 at Powell River) have been visited to

confirm the presence of root disease and inspect the stands for trees showing resistance to *P. weirii*. One potentially *P. weirii* resistant tree was identified at the Lois Lake progeny site, near Powell River. Mortality due to *P. weirii* and *A. ostoyae* was identified at Lois Lake (Powell River), Bamford and Chemainus. At the second Powell River site, mortality was due solely to *A. ostoyae*.



Figure 3. Seedlings in the PFC greenhouse during inoculation