Research Memo

Date: September, 1987

No. 004

Re: Planting Stock Improvement Research

The Extension, Demonstration, Research and Development (E,D,R&D) Sub-Program of FRDA's Backlog Reforestation Program specifically identifies the need for planting stock improvement studies. The severe conditions encountered in reforesting many backlog sites in British Columbia demands high quality stock which must be coupled with intensive site preparation, careful stock handling and planting, and stand maintenance to the free-growing stage. To support the planting stock production challenge, nursery-related E,D,R&D initiatives will include improving tests for assessing stock hardiness and vigour and refining cultural practices and stock handling methods. Elsewhere in the E,D,R&D sub-program, interactions between nursery factors and subsequent field performance are also being examined.

E,D,R&D activities, progress, and findings will be communicated widely and regularly to ensure that benefits can accrue to FRDA's Backlog Reforestation Program, 1986-1990. Information concerning E,D,R&D activities for planting stock improvement will be communicated through:

- the FRDA Solutions newsletter
- FRDA Research Memo
- FRDA Research Report
- on-site demonstrations
- workshops
- poster sessions and papers presented at the Nursery Association of British Columbia and Silviculture Committee (OEC, NSC, SIACO) meetings.
- Silviculture Institute of British Columbia and other education/training programs.

Planting stock improvement E,D,R&D work presently funded under FRDA (cost-shared and federal direct delivery) is summarized below. New initiatives are considered annually, with guidance on priority areas provided through the Nursery Technical Committee (Chairman: E. van Eerden, MOFL, Silviculture Branch [387-1191]).

Footnote:


Project 1.30, 1987-1989
An Investigation of the Effect of Non-Refrigerated Handling on Stock Quality of Post Cold-Store Containerized White Spruce Seedlings

Contact: Dr. W. Binder, MOFL, Research Branch (479-7011)

This work is designed to show whether conditions between storage and planting affect survival and, if so, what seedling physiological factors are changed. The work will also show whether further cold storage following non-refrigerated handling is detrimental. Plans for developing a quick test to reveal deleterious changes before planting are under way.

ECONOMIC & REGIONAL DEVELOPMENT AGREEMENT

Canada BC
Project 1.31, 1987-1990
Correlation of Physiological and Morphological Assessments in White Spruce Seedlings to RGC and Chlorophyll Fluorescence

Contact: Dr. C. Hawkins, MOFL, Research Branch (963-9651)

This work examines the dependence of white spruce seedling morphology and physiology on nursery cultural regimes. The relationship of seedling quality to stock storage and growth will be followed and the value of variable fluorescence in this process will be tested.

Project 2.2, 1985-1990
Determination of Minimum Root Growth Capacity (RGC) and Stress Resistance Requirements for Coastal Douglas-fir

Contact: Dr. G. Kruimik, MOFL, Research Branch (387-3040) or Dr. W. Binder, MOFL, Research Branch (479-7011)

Detailed measurements of morphology, RGC, and stress in Douglas-fir planting stock are being taken and then compared with similar measures of stock performance in the forest. The purpose is to relate seedling quality measurements to performance on different planting sites.

Project 2.18, 1986-1990
Drought Adaptation of Forest Planting Stock

Contact: Dr. N. Burdett, Victoria (592-6549)

Drought resistance is an important aspect of planting stock quality because dessication is a common cause of mortality after planting. The physiological mechanisms by which seedlings of coastal species conserve water are to be studied.

Project 2.19, 1986-1988
Variable Chlorophyll Fluorescence Induction Analysis as an Indicator of Tree Seedling Stock Quality

Contact: Dr. W. Vidaver, Simon Fraser University (291-4475)

Chlorophyll fluorescence of dark adapted green tissue provides information about the condition of a seedling’s photosynthetic system. This may be a rapid means of assessing seedling quality and an instrument is being specially built at Simon Fraser University to examine this potential.

Project 2.20, 1986-1990
Testing Planting Stock for Drought Resistance

Contact: Dr. R. van den Driesche, MOFL, Research Branch (479-8521)

Drought resistance in many plants is dependent on turgor maintenance achieved through osmotic adjustment. This may provide a method of measuring seedling drought hardness because osmotic potential is measurable. Provenance and seasonal differences in osmotic potential are under study.
Project 2.21, 1986-1990
Seasonal Course of Water Loss from Conifer Leaves, with Emphasis on the Period Between Bud-Burst and Leaf Maturation

Contact: Dr. J. Worrall, University of British Columbia (228-3516)

The new needles produced by a seedling following planting are essential for photosynthesis, but may result in excessive water loss through transpiration. The part played by new foliage in the overall economy of the seedling following planting is the objective of the study.

Project 2.22, 1986-1988
Effect of Certain Synthetic Compounds upon the Survival and Growth of Coniferous Seedlings

Contact: Dr. D. Lavender, University of British Columbia (228-4166)

Two very different compounds—DPTA, which increases growth in some agricultural crops; and Alcosorb, which retains water in a mixture with soil—are being tested to see if they improve survival and growth of seedlings following planting.

Project 2.29, 1986-1988
Oxyfluorfen (Goal©) Trials in British Columbia Forest Nurseries

Contact: G. Shrimpton, MOFL, Research Branch (576-9161)

Weed control in bare-root nurseries has been achieved with selective herbicides over the past 20 years, but few of these have been registered for use. It is now necessary to conduct experiments prescribed by Ottawa, to register a suitable herbicide for use in British Columbia nurseries.

Project 2.38, 1987-1989
Evaluation of Winterization Regimes to Improve Culture, Storability, and Performance of Western Redcedar

Contact: Dr. D. De Yoe, MacMillan Bloedel, Nanaimo (753-1112)

Blackout and drought regimes to control western redcedar growth and dormancy induction are being compared; and the level of cold hardiness and storability, together with measurement of mitotic index, are being used to assess the effectiveness of treatments.

Project 2.39, 1987-1990
Growth, Nutrition, and Outplanting Performance of Containerized Thuja plicata Seedlings Reared Under Exponentially Increasing Nutrient Additions

Contact: J. Kumi, MacMillan Bloedel, Nanaimo (753-1112)

As container nursery seedlings grow larger they can take up more nutrients, but conventional fertilizer regimes supply nutrients at a roughly constant level. Supplying nutrients in amounts proportional to the exponential increase in seedling size may achieve more efficient use of fertilizer and improve growth. In particular, root:shoot ratios may be increased.
Project 2.40, 1987-1990
Stock Quality Improvement of Yellow-Cedar
Contact: J. Russell, MOFL, Research Branch (749-6811)

Yellow-cedar seedlings and rooted cuttings will be raised under different culture regimes in the nursery and then planted in the forest. The effect of nursery regime and propagule (seedling vs cutting) on establishment and growth will be examined.

Project 2.41, 1987-1989
Improving Seedling Production and Stock Quality of Abies lasiocarpa
Contact: Dr. C. Leadem, MOFL, Research Branch (479-7521)

Germination, seedling vigour, and stock quality of Abies lasiocarpa are being studied with a view to determining optimal cultural conditions for production of nursery stock.

Project 3.4, 1985-1988
Drought Adaptation of Forest Planting Stock — Interior Species
Contact: Dr. N. Burdett, Victoria (592-6549)

Drought resistance is an important aspect of plant stock quality because dessication is a common cause of mortality after planting. The physiological mechanisms by which seedlings of interior species conserve water are to be studied.

Project 3.9, 1986-1990
Interpretation of Stock Quality Monitoring Data: Root Growth Capacity Standards for the Southern Interior
Contact: D. Simpson, MOFL, Research Branch (549-5577)

The minimum root growth capacity (RGC) necessary for good survival and growth on the major forest site types in the southern interior of British Columbia is being determined. Nursery RGC tests of various seedlots are being related to seedling performance at various forest sites over several years.

Project 3.10, 1986-1988
Field Guide for Assessing Causes of Seedling Mortality
Contact: D. Simpson, MOFL, Research Branch (549-5577)

Photographs of dead and dying seedlings are to be arranged in a manual stating the likely cause of mortality. This manual will assist field staff in determining the cause of plantation failure, and is to be used for objective description in a plantation assessment program.

Project 3.11, 1986-1988
Review of Monitoring Systems to Control Regeneration Programs in British Columbia
Contact: A. Vyse, MOFL, Research Branch (828-4158)

Changes in the way in which regeneration programs are monitored in British Columbia might be indicated by a thorough review of the British Columbia system and a comparison of it with systems used elsewhere.
Cold Hardiness of Conifer Roots

Contact: D. Simpson, MOFL, Research Branch (549-5577)

A comprehensive study of root cold hardiness is necessary to develop methods of measuring root mortality following low temperature. Seasonal changes in root cold hardiness will also be measured; and the effects of nursery regimes on cold hardiness and recovery from cold exposure are to be examined.

Project 3.15, 1986-1988
Effect of Agrobacterium Rhizogenes on Root Development and Drought Avoidance in Interior Douglas-fir Bareroot Planting Stock

Contact: Dr. D. Lavender, University of British Columbia (228-4166)

The possibility that the root infesting bacterium A. rhizogenes may improve root development, and perhaps performance after planting, of 2+0 bareroot Douglas-fir is to be investigated.

Project 3.16, 1986-1988
Hydrophylic Polymers: Their Use with Interior Douglas-fir and Lodgepole Pine

Contact: Dr. D. Lavender, University of British Columbia (228-4166)

Hydrophylic polymers applied to seedling roots may assist in water retention on dry sites. The post-planting performance of Douglas-fir and lodgepole pine seedlings dipped in hydrophylic polymer preparations is to be examined.

Project 3.17, 1986-1988
Optimal Seedling Espacement for Container-Grown Interior Spruce Seedlings

Contact: D. Simpson, MOFL, Research Branch (549-5577)

The effect of different spacing between spruce seedlings, growing in containers of equal root volume, will be tested to determine which is most suitable for producing planting stock.

Project 3.18, 1986-1990
Day Length and Drought Effects on Shoot-Root Growth in Container-Grown Interior Douglas-fir

Contact: D. Simpson, MOFL, Research Branch (549-5577)

Effects of short days and drought cycles on dry weight, shoot morphology, bud dormancy, cold hardiness, and root growth capacity of interior Douglas-fir will be examined to determine the most suitable regime for producing container nursery stock.

Project 3.43, 1987-1988
Use of Fog-Misting to Improve Root Quality In Container-Grown Douglas-fir and Engelmann Spruce

Contact: G. Hunt, Balco-Canfor, Kamloops (578-7212)

Frequent saturation watering may result in rooting medium being poorly aerated much of the growing period. This could contribute to poor root development, but frequent misting may reduce the requirement for this potentially detrimental saturation watering.
Analytical Techniques for Assessing Stress and Injury In Conifer Seedlings

Contact: Dr. D. De Yoe, MacMillan Bloedel, Nanaimo (753-1112)

Analytical tests that can provide a quick, simple, accurate estimate of a seedling's physiological status will be developed.

Effects of Low Soil Temperatures and Styroblock Design upon the Root Growth and Seedling Vigour of White Spruce and Lodgepole Pine


Contact: Dr. D. Lavender, University of British Columbia (228-4166)

The objectives of this project are to determine whether planting check in cold soils is due to seedling physiology or to a combination of reforestation technique and low temperature; and to examine the value of a container, designed at Oklahoma State University, in promoting root growth under cold soil conditions.

Monitoring Greenhouse Environment to Predict the Need for, or Timing of, Fungicide Applications for Control of Grey Mould (Botrytis cinerea) on Container-Grown Seedlings

Project F52-41-100, 1987-1989

Contact: M. Peterson, Sidney (655-1162)

The purpose of the work is to investigate the efficacy of fungicide application for Botrytis control in a carefully monitored greenhouse environment.

Ecophysiological Assessment of Operational and Improved Seedling Stocktypes In Coastal Forest Regeneration Programs In British Columbia

Project F52-41-010, 1987-1990

Contact: S. Grossnickle, B.C. Research (224-4331)

Physiological and morphological attributes of stock types will be measured and performance under a range of environmental conditions will be examined in controlled environments. Performance in controlled environments and in the forest will be related to stock quality.

Container Nursery Douglas-fir Dieback Research

Project F52-41-005, 1985-1988

Contact: V. Korelus, CIP, Tansis (652-4023)

The objectives of this project are to determine the factors causing dieback in container-grown Douglas-fir seedlings, and to develop operational guidelines to reduce the incidence of the disease.
The Effects of Mycorrhizal Fungi in Coniferous Nursery Stock and Reforestation Success in Interior British Columbia

Contact: T.G. Jeanes, Balco-Canfor, Kamloops (578-7212)

Experiments to determine which local fungi form favourable mycorrhizae with important conifer species are being conducted. Levels of fertilization conducive to adequate mycorrhizal formation in container nurseries will be tested, and planting site assessments of mycorrhizal benefits made.

Project F52-41-104
Container Douglas-fir Dieback Research

Contact: V. Koreius, CIP, Tahsis (652-4023)

This follows up on previous dieback research in this species (Project F52-41-005) and examines the possible part played by a species of *Pythium* in this disease.

For further information on the E.D.R&D activities funded under FRDA, please contact:

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