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INDEX

Reforestation 1
Simulating Growth 2
Cinderella Tree 3
Spruce Losses 3
New Publications 4
Staff 4

INFORMATION **Forestry**
PACIFIC FOREST RESEARCH CENTRE, VICTORIA, B.C.

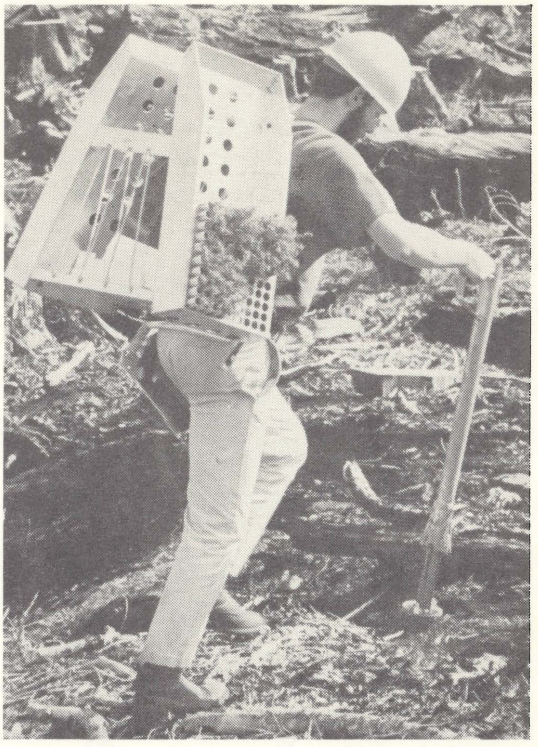
FOREST RESEARCH IN BRITISH COLUMBIA

Research agencies that contribute to the growing fund of information on forestry in this province include the provincial government, the University of B.C., the industrial companies, and the *CANADIAN FORESTRY SERVICE* of Environment Canada.

The CFS, with its *Pacific Forest Research Centre* in Victoria and its *Western Forest Products Laboratory* in Vancouver, performs the greatest share of forest research in B.C. Over 300 scientists and research technicians in the two establishments are involved in projects designed to provide the forest manager and the industrial user with information for the efficient use, management, protection and development of forest resources.

Today, the research program of the *PFRC* includes extensive studies in the silvicultural aspects of fertilization; containerized seedlings and mechanical reforestation; tree breeding; reduction of losses by mistletoe, root rots, bark beetles, nursery diseases, cone and seed insects and spruce weevils; more sophisticated methods of chemical control; slash burning for silviculture purposes; fire danger rating and ignition systems; application of Canada Land Inventory data and other land classification systems; in addition to the overall primary task of developing and improving techniques for growing, managing and protection of the forests.

NEW REFORESTATION TECHNIQUES



Technological innovation and change are now proceeding at an unprecedented rate in the field of reforestation. Through research a number of new methods of growing and planting seedlings are available to the forester, most incorporating the principle of containerization. Assessment of these methods is necessary, both in terms of biological performance and economic factors.

Growing and field-testing seedlings in various types of containers has been under investigation by the Liaison and Development group of the PFRC for the past five years. One of many tasks in the program is a study of the field performance of container-grown seedlings in the COAST FOREST REGION of British Columbia.

In the fall of 1967, the first series of experimental plantations were established over a variety of forest site types within the medium-elevation range of Southern Vancouver Island. The objective was to assess and compare the biological performance of the 4½-inch bullet-plug and 2+0 bare-root reforestation systems.

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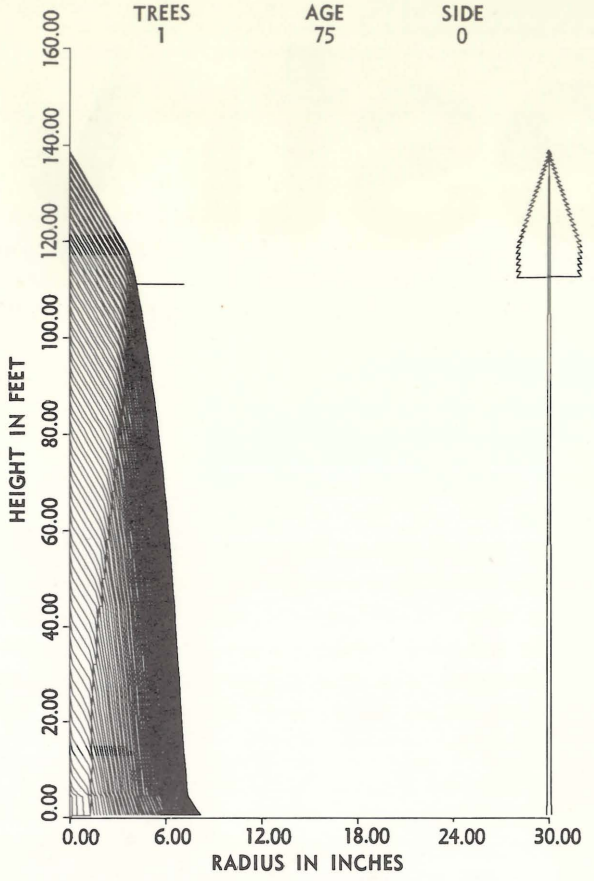
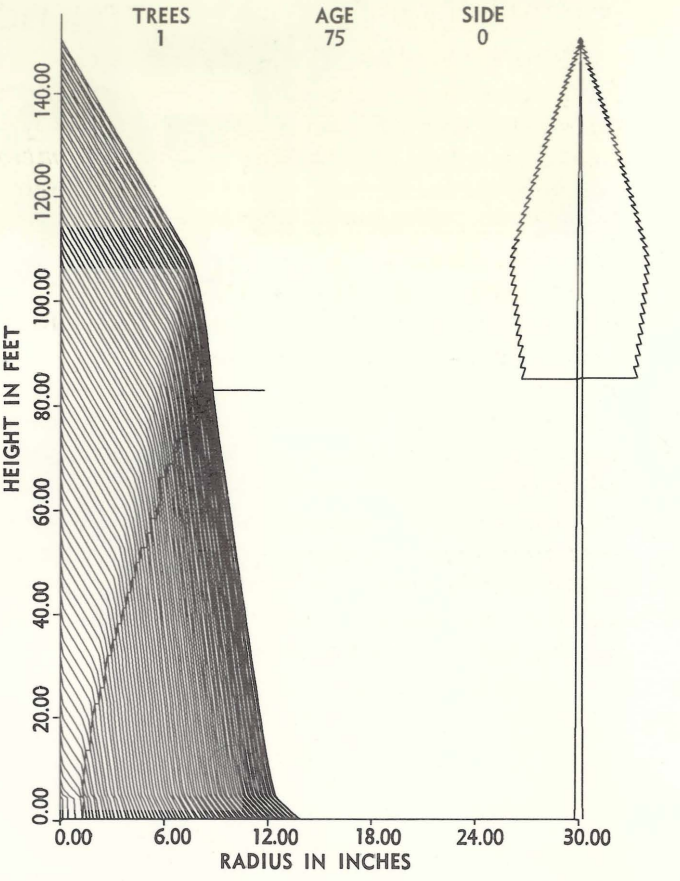


The computer will provide instant stem profiles to help the forester evaluate the results of any management schedule suggested. Figure 1 on the left, is a computer plotted stem profile of a 75-year-old tree from an unmanaged simulated stand on site index 120 (base 50 years). Figure 2, on the right, is a stem profile from an intensively managed



stand at the same age and on the same site. Both stands have approximately 20,000 cubic feet of standing timber per acre; however, the number of stems in the unmanaged stand is 3 times greater than that of the managed stand.

Simulating Growth And Yield of Forest Stands

A mathematical computerized model which will enable foresters to acquire detailed information on the growth and yield of forest stands is being developed by Dr. J. D. Arney of the *Pacific Forest Research Centre,* Victoria. The model is the basis of a stand simulator being tested for use by foresters as a tool to describe how trees grow and which characteristics of stand development are important to measure. It describes the growth of individual Douglas-fir trees over a wide range of stand conditions and management objectives and provides information which, otherwise, would be available only after long-term field studies.

Based on detailed components of growth, the approach provides a framework which precise quantitative relationships can be used to characterize the processes of stand development. The simulator grows each tree in annual increments of crown and stem diameter at every whorl from the top to the stump. Growth in height, diameter, form and volume is a function of site, age and the constraints of competition from surrounding trees.

The real value of the growth model is in predicting yields from stands managed in ways yet undocumented in actual stands. Present stand models give precise volume - growth estimates for unmanaged stands, and those managed stands for which the models were developed. The component-based model being tested is stable enough to simulate a suppressed tree in an unmanaged stand in one computer run, and a residual crop tree in a repeatedly thinned and fertilized stand on the next run. No modification of input is required between these two runs other than stand management criteria.

Tools of this nature, for decision-making foresters, can fulfill many of the needs that 'normal' yield tables, stand tables, and various classifications of growth, stocking and stand conditions have attempted to meet in the past.

Regional Advisory Committees

To ensure that research programs meet Pacific Coast needs, the CFS has established *REGIONAL ADVISORY COMMITTEES* comprised of senior representatives from the provincial government, the forest industry and the universities. These committees assess, organize and help shape research programs based on current forestry problems.

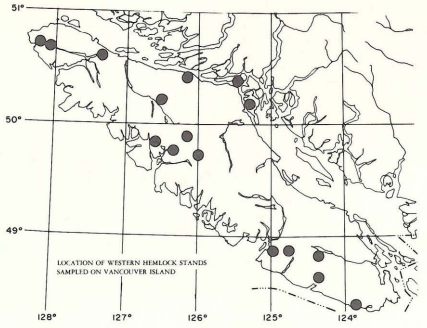
Members of PFRC Advisory Committee

Mr. G. L. Ainscough, B.C. Loggers' Association
Mr. W. P. T. McGhee, Interior Lumber Manufacturers' Association
Dr. J. A. F. Gardner, University of B.C.
Mr. M. F. Painter, Council of the Forest Industries
Mr. J. Richardson, Cariboo Lumber Man. Assoc.
Mr. E. W. Robinson, B.C. Forest Service
Mr. J. S. Stokes, B.C. Forest Service
Mr. D. Ruhl, Northern Interior Lumber Manufacturers' Association
Dr. G. P. Thomas, Canadian Forestry Service.

CINDERELLA TREE GETS ATTENTION

Western hemlock is a major contributor to the forest economy of coastal British Columbia. A primary lumber producer, it is also the major pulpwood species. The desirability of obtaining genetically improved planting stock has been proven in other forest tree species; however, very little is known of the genetics of western hemlock.

In 1968, a western hemlock tree improvement program was initiated by the Pacific Forest Research Centre, in co-operation with members of the Tree Improvement Board of the Tree Farm Forestry Committee. That fall, cones and cuttings were collected from 16 hemlock stands on Vancouver Island and adjacent Islands. Twelve stands were selected because of their apparent superiority. Seedlings derived from seed from these collections were grown in containers at the *PFRC's* nursery in Victoria. In 1971, after two years in the nursery, seedlings were outplanted to various test sites on Vancouver Island.



Two approaches are being followed in the testing phase:

(1) the testing of population (stands) on a crop basis over a range of environments.
Plantations have been established at Coal Harbour, Beaver Cove, Gold River and Franklin River. In each area, five 5-acre blocks were planted at an operational spacing of 8 by 10 feet. A total of one-hundred acres were planted. Plantations will be assessed for survival and growth, periodically, for a number of years. It is anticipated that the plantations will serve as a source for selected breeding material.

(2) the testing of half-sib or wind-pollinated progenies to obtain estimates of genetic variation and heritability.
A study involving 100 half-sib families has been established on a tract of Crown Land near Cobble Hill. Approximately 2,000 rooted cuttings will be planted this spring to serve as a clonal test and future breeding material.

Information derived from this study will provide the basis for selecting the proper seed sources for reforestation of western hemlock, as well as form the basis for subsequent breeding programs. The program will progress from the testing of stands to the selection and breeding of superior individual trees.

ENORMOUS LOSS TO SPRUCE BEETLES

In the past decade, spruce beetles killed over 500 million cubic feet of mature spruce in the Prince George, Prince Rupert and Nelson Forest Districts. Although a percentage of the timber has been salvaged, the kill was equivalent to one quarter of the annual timber harvest in the province, or was equal to a three-year supply of raw material for the largest sawmill on the B.C. coast.

Because of the severity of the infestations and the fact that approximately 40 per cent of all accessible softwood over 7.1 inch dbh in the Interior is spruce, *PFRC* entomologists investigating the population explosion, reported that the increase is partly dependent on the availability of large amounts of wind-thrown trees. In the Prince George region, wind-thrown trees in the forest boundaries of new clear-cut areas were usually abundant where spruce stands were harvested. This material was attacked by the beetle, and broods developed in all the bark of all wind-thrown trees in shaded areas.

In exposed slash or areas where trees are exposed to the elements, solar heat or winter cold can be lethal to broods under the bark. The broods usually require two seasons to mature; however, following a warm summer more than half the larvae may complete development by the first autumn. Survival through the second year is poor in slash but generally good in shaded wind-thrown trees. Because such trees are the principal source of beetle population increase, the removal of this host material within one year, from logging boundaries and road edges, is recommended.

Information Report BC-X-62 contains additional data on the production of spruce beetles in slash and wind-thrown trees in B.C.

(Continued from Page 1)

The plug concept is a recent local innovation within the container field. It is simply the molded mixture of root and soil which is extracted from the container before outplanting. The prefix identifies the type of container which, for the initial field trials, was the 4½-inch Walters' bullet. By planting bullet-plug seedlings along side those contained in bullets, it was possible to obtain a valid biological appraisal of the container influence on survival, height growth and root development.

The Douglas-fir and western hemlock container seedlings for these trials were grown for the full year in 4½-inch bullets in outdoor shadehouse facilities at the PFRC, Victoria. Outplanting covered three seasons; fall, early and late-spring, and was replicated over a three-year period.

Seedling performance was assessed annually. Three years after planting, average survival of Douglas - fir bullet - plug seedlings was 84 per cent; 2+0 bare-root 80 per cent; and bullet seedlings 68 per cent. For western hemlock, these respective figures were 66, 29 and 56 per cent. Fall or early-spring planting produced the best survival results. Not only did the bullet - plug seedlings provide substantially higher survival rates, but their growth rate was slightly greater than the seedlings planted in bullets.

Recent studies by the Economics Unit of the PFRC indicate that if bare-root planting production on a site was 800 trees per man day we can expect styroblock planting production to reach 1600 trees per man day on the same site, and bullet planting production to reach 2400 trees per man day. 'Mud-packs', bare-root seedlings with their roots covered with a compressed cylinder of peatmoss and clay, (*produced by Pelton Reforestation Ltd. of Haney, B.C.*) reach the same planting rate as the styroblock system of 1600 trees per man day.

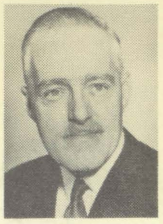
Further details may be found in the Information Reports BC-X-59 and 63.

NEW PUBLICATIONS

BC-X-63—Field Performance of Douglas - fir and Western Hemlock Container Seedlings on Vancouver Island.

BC-X-64—Annual Forest Insect and Disease Survey Reports—British Columbia, 1971.
Part I —Vancouver Forest District
Part II —Prince Rupert Forest District
Part III—Prince George Forest District
Part IV—Kamloops Forest District
Part V —Nelson Forest District

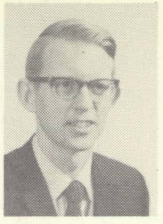
STAFF



NEW HEAD OF CFS

Dr. G. P. 'Phil' Thomas has been selected to fill the role of Director General of the *Canadian Forestry Service,* Environment Canada, Ottawa. Dr. Thomas has been Director of the *PFRC* since 1969, previously he was Director of the (now) Northern Forest Research Centre, Alberta.

Responsibilities of his new position include directing the management, planning and co-ordination of research and development programs carried out by the *CFS* across Canada. Dr. Thomas assumes his new position on March 20, 1972.



FOREST HYDROLOGIST

Eugene D. Hetherington has been appointed to the staff of the *PFRC* to study the effects of forestry operations on the water cycle within the forest environment. The objective is to ensure that hydrological aspects of the forest environment are adequately covered in the formulation of guidelines for improved forest management. He will work in close co-operation with forest industrial companies, provincial and federal government resource agencies and universities in the region. Eugene's work experience includes weather forecasting with the Department of Transport; hydrology with Quebec Hydro and with engineering consulting firms in Montreal and Vancouver.

RESEARCH SILVICULTURIST

J. M. 'Mike' Finnis, who served with the BCFS from 1948 to 1960, returns to B.C. to join the staff of the resources research group of the *PFRC* in Victoria. Mike will participate as a silviculturist in research and development aimed at developing wood production procedures that are consistant with multiple use of forest lands and the enhancement of forest environments. Mike will render technical advisory service to forest managers of land based resources and to the public on silvicultural questions. He will work in collaboration with other elements of the Department of the Environment, the BCFS and other provincial resource agencies, and the forest industry.

INFORMATION FORESTRY

This is the first of a series of newsletters being issued by the Pacific Forest Research Centre, Victoria, B.C.
Our objective is simple — we hope to keep you up to date and continuously informed on the work being undertaken on your behalf by the Canadian Forestry Service.
Where reference is made to specific reports, copies are available from the Information Office, Pacific Forest Research Centre, Victoria.

ENVIRONMENT CANADA
HON. JACK DAVIS, MINISTER

PACIFIC FOREST RESEARCH CENTRE
CANADIAN FORESTRY SERVICE
506 West Burnside Road
Victoria, British Columbia

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