

THE STATUS OF CONTAINER PLANTING PROGRAMS IN CANADA

9. PRINCE EDWARD ISLAND

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Abstract.--A program of forest industry revitalization is under way on Prince Edward Island. An expansion of seedling production facilities began in 1978; the present production capacity is 8 million containerized and bare-root seedlings per annum. Major species for reforestation are black spruce (*Picea mariana* [Mill.] B.S.P.), eastern larch (*Larix laricina* [Du Roi] K. Koch) and red pine (*Pinus resinosa* Ait.).

Résumé.--Un programme de revitalisation de l'industrie forestière est en cours dans l'Île-du-Prince-Édouard. En 1978, on a entrepris d'agrandir les installations de production de semis, dont la capacité actuelle de production se chiffre à 8 millions de plants en mottes emballées et à racines nues par an. Les principales essences utilisées pour le reboisement sont l'épinette noire (*Picea mariana* [Mill.] B.S.P.), le mélèze laricin (*Larix laricina* [Du Roi] K. Koch) et le pin rouge (*Pinus resinosa* Ait.).

INTRODUCTION

The forests of Prince Edward Island were heavily depleted between 1720 and 1920 to clear land for agriculture and to provide lumber for shipbuilding. Unfortunately, past generations neglected to consider the consequences of over-utilization and deliberately high-graded the indigenous forest. Regeneration from inferior seed sources and continuous removal of high-quality material have combined to reduce much of the remaining forest area of 240,000 ha to stands of low commercial value.

Little was done to improve this situation until 1951, when a provincial forest service was established. From 1951 to 1978 the forest service carried out a small but effective reforestation program.

In 1978, a team of forest geneticists led by Dr. Bruce Zobel recommended an immediate expansion of seedling production facilities and concentration on three major species: black spruce (*Picea mariana* [Mill.]

B.S.P.), eastern larch (*Larix laricina* [Du Roi] K. Koch) and red pine (*Pinus resinosa* Ait.).

The fact that forest land in Prince Edward Island is 90% privately owned, and is distributed among 30,000 owners, requires that careful thought be given to seedling production systems, species selection, and planting stock specifications. On the basis of past demand for seedlings and the success of a forest management incentives program for woodlot owners begun in 1980, the Forestry Branch forecasts a steady increase in the demand for reforestation.

CONTAINER PRODUCTION

Production Statistics

The Forestry Branch of the Prince Edward Island Department of Agriculture and Forestry is the province's sole producer of containerized tree seedlings. The main production facility, located near Charlottetown, comprises two gutter-connected, steam-heated, double-poly greenhouses designed for year-round use, with a growing area of 3,700 m² (Fig. 1) and a growing capacity of 6 million trees. This nursery also produces 2 million bare-root seedlings annually on 45 ha.

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Figure 1. Production greenhouse complex, provincial forest nursery.

In addition to the above, two freestanding glass houses with a growing area of 340 m² plus an outplanting area of 12.5 ha are operated for the tree improvement program.

Our first greenhouse crop was sown in the fall of 1979 and produced 1.1 million black spruce seedlings. Production of containerized seedlings to date amounts to 4.2 million seedlings. It is expected that the demand for planting stock will increase to approximately 6 million seedlings per year by 1985, of which 4 million will be grown in containers.

Since containerized seedling production began in 1979, black spruce has been the major species produced, and has accounted for 74.2% of total production. Other species have been grown in lesser amounts, viz.: jack pine (*Pinus banksiana* Lamb.) (18.1%), white spruce (*Picea glauca* [Moench] Voss) (5.6%), larch (*Larix* spp.) (2.6%) and eastern white cedar (*Thuja occidentalis* L.) (0.5%).

Jack pine is produced in the greenhouse in preference to other species of pine because of its suitability as a summer crop, and the ease with which it can be grown. Though more suited to available planting sites, red pine is not adapted to greenhouse rearing, and is currently outplanted as 3-0 or 2-2 bare-root stock. Black spruce and eastern larch were chosen as major reforestation species because of the characteristics of their wood, their adaptability to various planting sites, their positive response to genetic manipulation, and their relative resistance to insects and disease.

It is expected that over the term of the current five-year plan the area planted annually to each of the three major species will be approximately equal, with the proportion

planted to jack pine declining as bare-root red pine becomes available.

Container Systems

Strong public demand for planting stock in the early stages of the reforestation program required the adoption of an appropriate container system. The Forestry Branch has experimented with numerous container systems since 1974. Initially, the Japanese paperpot was employed, but it is now used only for the occasional production of tree improvement stock. In 1978 the Can-Am multipot, styro-block and Spencer-Lemaire "Rootrainer" were tested for use in the new production greenhouse. The Spencer-Lemaire "Rootrainer" was eventually chosen for its ability to reduce root spiralling, its space efficiency, and the expected reductions in cost of delivery to the planting site of seedlings grown in the folding trays (Fig. 2). Since then, Spencer-Lemaire "Rootrainers", with a rooting volume of either 32 or 48 cm³, have been used exclusively.

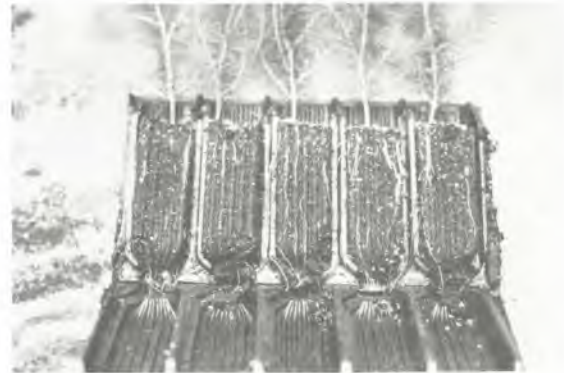


Figure 2. Black spruce grown in 48 cm³ Spencer-Lemaire "Rootrainers".

It has become evident that planting stock specifications must be upgraded, and consideration has been given to the possibility of increasing the volume of container now used to approximately 130 cm³. Although this will have an adverse effect on greenhouse capacity, it is felt that, in view of the problems accompanying the use of herbicides, larger seedlings may be the only alternative for overcoming competing vegetation on the more difficult sites.

Production Schedule

The greenhouses are capable of producing two crops annually and have been fully uti-

lined to date to fill the pressing demand for planting stock. Completion of the second greenhouse provided much-needed flexibility, and will permit us to achieve our objective of producing larger seedlings that are better able to overcome site limitations encountered on private lands.

Winter crops are started in early December and remain in the greenhouse for a minimum of 16 weeks. Seedlings are removed from the greenhouse in early May and placed in a gravelled shade-area covered with nylon shade cloth. They are held in this holding area for a minimum of two weeks before shipping to the planting site. Winter crops are normally culled in the field.

Summer crops are overwintered for planting the following spring. They are sown in early June and seedlings are grown for approximately 10 weeks before removal from the greenhouse. The seedlings are then matured in the shade-area until late fall, when the shade cloth is lowered to cover the trays. Slotted barriers are set up at approximately 9 m spacing throughout the holding area to ensure an adequate snow cover and thereby reduce the incidence of wind burn to seedlings. Early-flushing species, such as jack pine, are graded and wrapped in early March and stored at approximately 2 °C until shipping. Overwintered black spruce is graded, wrapped and shipped as needed without intermediate cool storage.

An automated filling line, modelled after similar machines in Scandinavia, is employed for the filling and sowing of trays. Extended daylength is provided in the greenhouses by incandescent lamps. Seedlings are watered by means of self-propelled electric irrigation booms (Fig. 3), and fertilizers and pesticides are introduced into the irrigation water through an automatic metering device.



Figure 3. Self-propelled electric irrigation boom watering 12-week-old black spruce.

Greenhouse Design and Energy Conservation

Following the province's lead in domestic energy conservation, the Forestry Branch has incorporated into its greenhouse operations a number of measures to increase energy efficiency. The double-poly cover is in itself a tremendous improvement over conventional glass construction. Also, gutter-connected greenhouses reduce relative heat losses and facilitate the collection of rain water, which is used later for irrigation. An energy curtain installed in both greenhouses serves the dual function of reducing heat losses in winter and reducing light and heat levels in summer. A system of movable bench tops incorporated into the second greenhouse has increased space utilization to 90% (Fig. 4).



Figure 4. Movable bench tops in new greenhouse. Each bench measures 2.4 m x 29 m and is moved by a hand crank.

As part of a project funded by the Department of Rural and Economic Expansion (DREE), the greenhouses will be provided with Duvant downdraft gasifiers to reduce oil consumption for heating. These gasifiers produce a clean wood gas which is low in particulates and is suitable for use in either a standard boiler or a diesel-type electric generator. Initially, gas will be consumed as required to maintain greenhouse temperatures, and any excess will be burned off. However, it may be possible to use the surplus gas to generate up to 0.5 megawatts of electricity.

On the basis of current estimates, the cost per million BTU generated from oil on Prince Edward Island is \$7.00, whereas that from wood is only \$3.00. The total cost of the gasifier project is about \$400,000. The units are expected to become operational during the winter of 1982-1983.

PLANTING OPERATIONS

A total of 450 ha was planted with containerized seedlings in 1980. This figure is expected to increase to 1,100 ha by 1983. More containerized seedlings may be grown if it is found desirable to eliminate the nursery seedbed stage for certain species. No bare-root stock of the three major species was planted in 1980 and it is not expected that production will reach capacity until 1984.

All planting operations for containerized seedlings are carried out during the spring, either by Forestry Branch crews or by contractors. Planting costs, as determined by the 1981 contractor prices, vary from 8 to 11 cents per tree depending on the size of planting site and its accessibility and trafficability. The fact that many sites are small and have poor access accounts for the high cost.

Mechanical site preparation of some kind is required before planting. Techniques and

equipment vary, but the machines most commonly used are the C & H plow, Rome disc plow, bedding plow and modified agricultural plow. Site reclamation work is often required to improve drainage and/or remove undesirable vegetation.

In adopting three major species for reforestation we have endeavored to match species to site wherever possible. There are suitable sites for yellow birch (*Betula alleghaniensis* Britton) and sugar maple (*Acer saccharum* Marsh.) as well. Trials are therefore under way to determine whether these and other species can be grown in the greenhouse and outplanted successfully.

We are confident that, with a better knowledge of site preparation techniques and the eventual availability of various types of planting stock, we will be able to improve the success of the province's reforestation program.