RESEARCH NOTES

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For increased yield, White spruce is a sure bet

Jean Beaulieu

White spruce, a major resource

White spruce (*Picea glauca* [Moench] Voss) *(Figure 1)* is one of the most important species for the lumber and pulp and paper industries in Canada. It is highly adaptable and grows under a wide range of soil and climatic conditions. In the 1950s, forest geneticists at the Canadian Forest Service began research on the species to take advantage of its potential.

Figure 1

Cone collection on white spruce growing in a natural forest.

Over the years that followed, genetic tests were conducted, characteristics were measured and various provenances were compared. In the 1980s, the best performing provenances were identified and the most superior trees, called elite trees, were selected to make up a breeding population. These trees were then crossed with each other to create full-sib families and provide superior genotypes for advance generation.

A strong partnership

In 1994, the Canadian Forest Service began to evaluate 150 full-sib families using seedlings and cuttings. The research was carried out in collaboration with the ministère des Ressources naturelles du Quebec (MRNQ)'s Centre de bouturage de Saint-Modeste, where the stock was produced. Three farm-field tests *(Figure 2)* were set up in 1996 in Valcartier, Harrington and Saint-Modeste. At the last two locations, the tests were carried out with help from the staff of Bowater Pulp and Paper Canada Inc. and the Pépinière de Saint-Modeste respectively. In 2000, all the plants were measured for the fifth year in a row, and the first recommendations for reforestation can now be formulated.

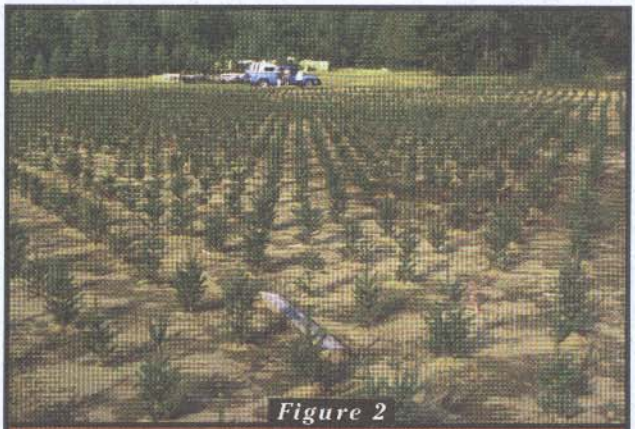

Figure 2

White spruce farm-field test set up at the Harrington Forest Centre.

Natural Resources Canada
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Tangible gains

Five years after planting, some of the full sibs were markedly superior as both seedlings and cuttings compared with those in the control plots *(Figure 3)*. The best 25 full-sib families had an average height of 2 m, or 22% more than the controls, despite the fact that the controls had already performed above average in older plantations. In 45 years, based on the Bolghari and Bertrand (1984) yield tables, plantations created with these families could produce roughly 350 m^3/ha on fertile sites (2.5 m spacing), or 80 m^3/ha more than plantations containing unimproved sources. Rapid growth at a young age gives the selected families a significant advantage in competing for light, which should reduce the need for plantation cleaning.

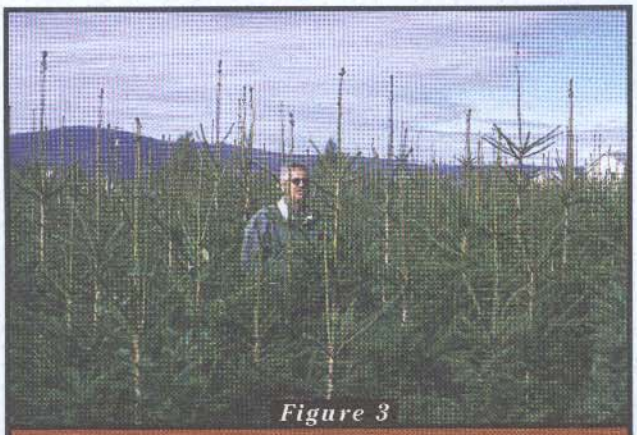

Figure 3

Fast-growing white spruce progenies, five years after planting.

Availability of seeds

The elite trees in the breeding population of white spruce located at the Cap Tourmente National Wildlife Area were made available to the MRNQ's seedling and seed production division, which supplies the province with seeds from the best sources possible for reforestation, from direct harvesting and crosses. The crowns of the trees are now well enough developed to produce several million seeds during a good cone crop year. For Quebec's white spruce breeding program, the time for promises is over. It is time to take maximum advantage of these benefits and to put theory into practice.

Reference

Bolghari, H.A.; Bertrand, V. 1984. Tables préliminaires de production des principales essences résineuses plantées dans la partie centrale du sud du Québec. Gouv. du Québec, Mém. rech. for. nº 79.

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FOR MORE INFORMATION:

Dr. Jean Beaulieu

CFS, LFC, 1055 du P.E.P.S., P.O. Box 3800
Sainte-Foy, Québec G1V 4C7
Tel.: (418) 648-5823
Fax: (418) 648-5849
E-mail: jbeaulieu@cfl.forestry.ca

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Pamela Cheers, Head, Publications
Laurentian Forestry Centre
1055 du P.E.P.S., P.O. Box 3800
Sainte-Foy, Quebec G1V 4C7
Tel.: (418) 648-5253
Fax: (418) 648-3354
E-mail: pcheers@cfl.forestry.ca

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