

From seeds to plantation

Thirty years of research development at the operational level to improve white spruce (ws) productivity

André Rainville, ing. f., M. Sc.¹, Fabienne Colas, biologist, DES¹, Laurence Tremblay, ing. f., M. Sc.^{1,2}, Mohammed S. Lamhamedi, ing. f., Ph. D.¹, Denise Tousignant, biologist, M. Sc.¹, Guy Prigent, ing. f., M. Sc.¹ and Jean Beaulieu, ing. f., Ph. D.³

¹ Direction de la recherche forestière, Ministère des Ressources naturelles et de la Faune du Québec

² Direction de la production des semences et des plants (Pépinière forestière de Saint-Modeste), Ministère des Ressources naturelles et de la Faune du Québec

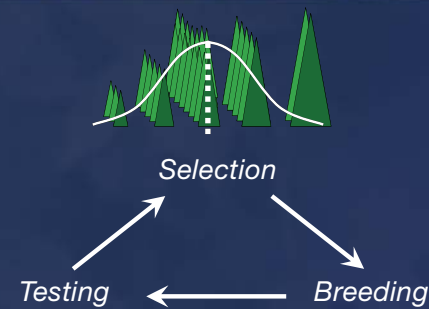
³ Natural Resources Canada, Canadian Forest Service, Fibre Centre

Introduction

One particularity of the Québec reforestation program is that the provincial government has the responsibility for producing both seeds and seedlings, and establishing transfer rules. This situation creates a unique opportunity for rapid transfer of research advances to the operational scale. Due to its superior growth and wood quality, white spruce is one of the most important species for reforestation; approximately 26 million seedlings are planted annually, of which 85% are grown from genetically improved seeds.

By capitalizing on the knowledge and material gained from more than thirty years of tree improvement, seed orchard management, nursery cultural practices and tree seedling production through rooted cuttings and somatic embryogenesis, Québec is in a position to increase its forest productivity by reforesting with improved material.

Tree improvement



Reproduction

Performing the best controlled crosses for vegetative propagation

Elite seeds (from the best families and clones)

Rooted cuttings

Cutting are rooted inside a double enclosure

Cuttings after 12 weeks in culture

Somatic embryogenesis

Embryonic tissue

Maturation

Germination stage

Cryopreservation

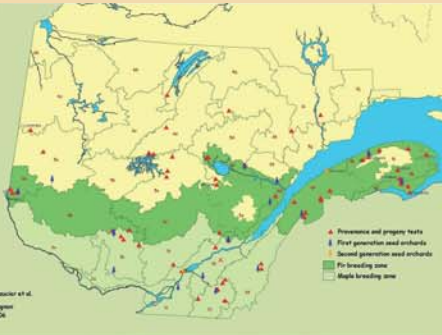
Transfert into soil after 1 week

Vegetative propagation

Improved seeds

Production of improved seeds in seed orchards composed of selected trees

17 first-generation, 2 second-generation and 1 third-generation seed orchards in Quebec



Seedling production

A total of 2,4 MM WS seedlings are produced by rooted cuttings and somatic embryogenesis, and 22,7 MM by seeds.



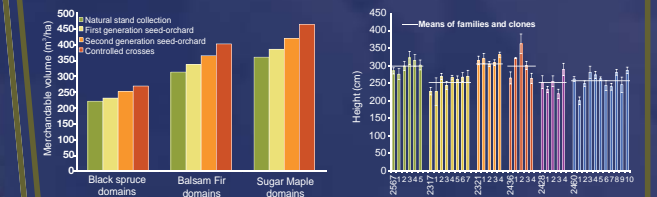
Protecting the environment

Tools for optimizing irrigation and reducing leaching



Outputs

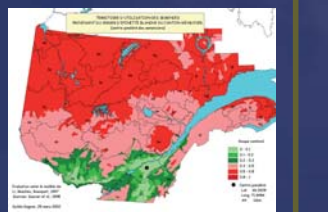
Improvement of plantation yield



Delimitation of breeding zones

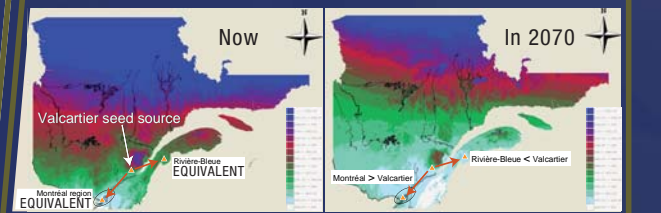


Establishment of transfer rules



Climate change adaptation measures

Moving seed sources that could be adapted to the future climate



For. Chron. 81 (5), Sept-oct. 2005

Ressources naturelles et Faune

Québec