



***Integrated research activities  
for supply of improved larch to tree planting:  
tree improvement, floral biology and nursery production***

LARIX 2007: International Symposium of the IUFRO Working Group S2.02.07 (Larch Breeding and Genetic Resources)

**Field Trip Guide**

Saint-Michel-des-Saints and Quebec City, September 16-21, 2007



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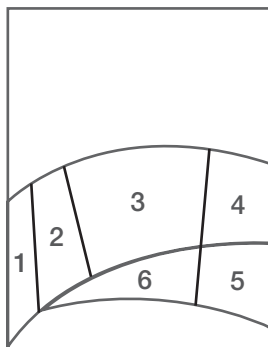
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## A word from the organizers

The *Direction de la recherche forestière* (DRF) of *Forêt Québec*, in collaboration with IUFRO, the *Réseau Ligniculture Québec*, Louisiana-Pacific Ltd.– Saint-Michel Division, Smurfit-Stone Canada Packaging Inc., the *Directions régionales des forêts de Laval-Lanaudière-Laurentides et de la Mauricie* and the *Direction générale des pépinières et des stations piscicoles*, welcomes members of the IUFRO – S2.02.07 (*Larch Breeding and Genetic Resources*) working group to Québec. We hope that the Larix 2007 Symposium, the first of the working group's meetings in North America, will meet your expectations through the program activities we have organized, starting with two days of field visits.

*Forêt Québec*, one of the sectors within the *ministère des Ressources naturelles et de la Faune du Québec*, has the mandate of administering the various facets of sustainably managing Québec's public forests, and of contributing to the development of the forest products industry and private woodlots. Within this broad framework, the mission of the DRF is to participate in improving forest practices in Québec by undertaking research and development projects in diverse fields and by ensuring the transfer of know-how to practising foresters.

The primary aim of the IUFRO – S2.02.07 (*Larch Breeding and Genetic Resources*) working group is to facilitate communications among researchers interested in larch genetics, as well as in associated fields (physiology, wood quality, pathology, etc.), and to pursue the mission of international cooperation on larch. The principal objective of the Larix 2007 Symposium is to share advances in larch research, especially in the fields of genetics, tree improvement, flower biology and plant production, as well as in silviculture and wood processing. We hope that the program will generate dialogue among researchers and practitioners. Such meetings should also promote the launching of new cooperative projects.

This symposium aims at integrating research disciplines related to obtaining and producing improved larch varieties for reforestation. Participants will have the opportunity to discover the regions of Lanaudière and the Mauricie, and to visit natural forests as well as some larch plantations. A number of research and development projects in tree improvement and tree reproduction will be presented; among others, at two government nurseries that produce larch varieties from controlled crosses and multiplied by cuttings or somatic embryogenesis. Afterwards, participants will present the results of their research during poster and communication sessions, which will be held in Québec City as part of the *Carrefour de la recherche forestière*.

For this edition, the Larix 2007 Symposium is being held in conjunction with the 2007 annual meeting of the Poplar Council of Canada by holding the plenary session of invited speakers, a banquet at the *Carrefour*, as well as a visit to the *Centre d'expérimentation et de greffage de Duchesnay*, where the DRF's tree improvement programs will be presented. These two events are designed to emphasize two of our star species, poplar and larch, which have been the subject of the DRF's research programs since the early 1970<sup>s</sup>. We would like to mention that DRF is celebrating its 40<sup>th</sup> anniversary this year. Hosting events like these can be traced back to the actions of visionary pioneers such as Messrs. Gilles Vallée and Ante Stipanovic, initiators of the research projects in tree improvement and intensive silviculture.

Everywhere in the world we see a clear tendency of meeting the increasing demand for wood through the establishment of plantations. In Québec, the *ministère des Ressources naturelles et de la Faune Act* was modified in 2005 to include principles of forest ecosystem management associated with the functional zoning of the territory. Intensive silviculture therefore meets specific production issues on a reduced area, while reducing pressures on our natural forests. In addition, in the spring of 2006 the Québec government announced a silvicultural investment program funded with a \$75 M budget over four years. These investments will allow us to carry out intensive silviculture on high-potential sites, especially the establishment of fast-growing species. Holding this Larix 2007 Symposium integrates well with this thinking.

We wish you a pleasant stay in Québec, *la belle province*, and a successful and fruitful Symposium!

The Organizing Committee

## Acknowledgments

We extend our thanks to the *Carrefour de la recherche forestière* and the *Direction de la recherche forestière* (DRF), who made holding the Larix 2007 Symposium possible as part of the joint seminars of the *Carrefour*. Our financial partners played a key role by providing necessary material support for this regionally based multi-day event. Thanks for your support!

In addition to the organizing committee, several persons participated in organizing the Symposium, in the regions as well as at the *Carrefour*, and we cordially thank them for their contributions: Stéphan Mercier, Maripierre Jalbert, Marie Dussault, Mireille Despots, Jean Noël, and Pierre Gagné. Thanks also to members of the Scientific Committee, particularly to Luc Pâques, for their contribution to program development and their many ideas.

We particularly thank Pierre Périnet, Pierre Bélanger, and Marie-Louise Tardif for their collaboration and constant support, and specially Gaston Lapointe for his involvement and unfailing enthusiasm since the beginning with the Larch tree improvement project. Our thanks also are directed to DRF genetics and tree reproduction personnel, as well as to Nathalie Langlois, Sylvie Bourassa, Jessica Groleau and Guillaume Plante for their help with publications. Also, our thanks go to the other persons who participated in organizing the Symposium, particularly to the personnel of Berthier and Saint-Modeste nurseries.

We recognize the invited speakers, authors, moderators and Larix 2007 Symposium participants for their contributions.

Lastly, we wish to underline the indispensable contribution of the organizing committee members and the major support given by *Forêt Québec* managers for this event.

Martin Perron,  
Chair, Organizing Committee

## Thanks to our sponsors!

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The organisers of the Larix 2007 Symposium thank all the sponsors for their valued collaboration and their support for funding.

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## Day 5 – September 21, Stops 1-4, Duchesnay

# Managing second-generation seed orchards and integration of somatic embryogenesis in orchard management

By Fabienne Colas, Mohammed S. Lamhamedi and Mireille Desponts

### Part 1. Management of 2<sup>nd</sup> generation Seed Orchard

*Black spruce (Picea mariana (Mill.) BSP) top-grafting trial (in collaboration with M. Desponts).*

#### Principal objective

Develop an outdoor grafting technique for black spruce plantations to infill gaps at the least cost in 2<sup>nd</sup> generation seed orchards.

#### Material

- Root stock: black spruce cuttings planted in 2001.
- Scions: sampled on 8 trees selected and harvested in 4 tests in the Côte Nord black spruce breeding zone. Depending on the clone, the number of copies grafted is between 7 and 21.

#### Method

- Grafting was done in May 2005, before root stock budbreak. If possible, the choice of root stock should provide good diameter compatibility between the terminal shoot and the scion;
- The classic side veneer grafting method was used. The grafted area is protected by a white plastic bag for one to two weeks;
- Root stock is regularly pruned to ensure that the graft takes.

The high failure rate is mainly due to poor compatibility between the diameter of the scions and the root stock. However, the first flowering was observed in May 2007, two years after grafting.

### Part 2. Integration of somatic embryogenesis in orchard management

*Black spruce (Picea mariana (Mill.) BSP) plantation.*

*Plants grown from seeds off clones produced by somatic embryogenesis (in collaboration with M.S. Lamhamedi).*

#### Results

Tree N°	Number of grafts	N° of living grafts May 07	Success (%)	N° of grafts flowering in 2007
1419	22	7	31,8	2
1421	19	7	36,8	0
1435	7	1	14,3	0
1440	21	5	23,8	1
1467	16	5	31,3	0
1476	17	5	29,4	1
1484	17	8	47,1	0
1490	17	5	29,4	1



Photo 1. a) Black spruce after grafting in the plantation. The graft, done in May 2005, flowered in 2007. b) Black spruce graft with female flowers (see arrows) two years after grafting. (Photos Fabienne Colas).

Since 2001, we have female flowering in a black spruce clonal test established in 1997, produced by somatic embryogenesis. This plantation is part of the first demonstration clonal tests (from clones) established in Québec. In 2003 and 2004, 8 clones were pollinated with a mixture of pollen collected from 1999 to 2002, from a 1<sup>st</sup> generation seed orchard. Pollen was held in a pollen bank belonging to the *ministère des Ressources naturelles et de la Faune*. In all, for the two pollination years, we produced 16 seedlots, of which the female parent was a clone produced by somatic embryogenesis. The seeds were extracted and classified according to the international standards of the ISTA (1999).

The plants were grown in IPL 25-350 containers at the Saint-Modeste (Bas-Saint-Laurent, Québec), forest tree nursery, using standard production methods. Control seedlings were produced using seeds from three 1<sup>st</sup> generation seed orchards currently being used for seedling production in Québec.

During the two years of nursery production, we evaluated several of the plants' morpho-physiological variables (growth, mineral nutrition, etc.). Two-year-old plants were planted in May 2007 in a plot at the Centre d'expérimentation et de greffage de Duchesnay. Spacing between trees is 3.5 x 2 m. The plot is divided into six complete randomized blocks. In each block, we planted four plants/seedlot in a row. These were distributed randomly within each block.

Our preliminary results indicate that the growth, morpho-physiological quality and development of the plants produced from seedlots that were produced by clones are comparable to those grown from seeds produced in seed orchards. Preliminary results from this project were presented at the poster session of a IUFRO Tree Seed Symposium. The poster and the abstract are available on the Symposium's CD.

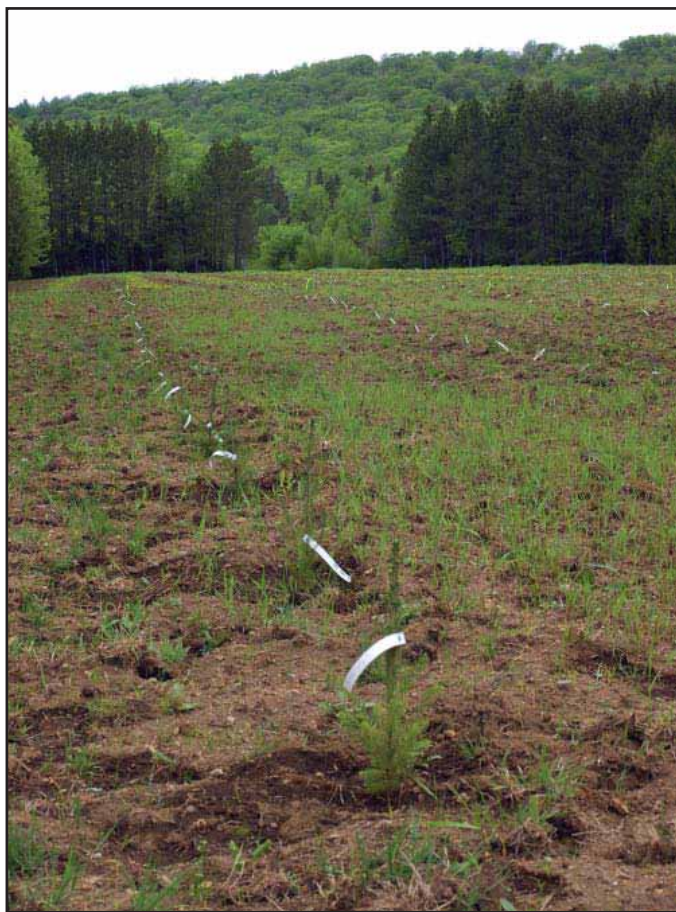


Photo 2. Plantation of black spruce (*Picea mariana* (Mill.) BSP) plants in June 2007. The plants were produced from seeds of trees grown by somatic embryogenesis (Photo Fabienne Colas).

#### Reference:

ISTA. 1999. *Règles internationales pour les Essais de Semences 1999*. Seed Sci. & Technol. 27 (Supplément 1): 1-362

#### Information source:

COLAS F., M. S. LAMHAMEDI, 2006. *Quality of seeds produced from different black spruce (*Picea mariana*) somatic clones*. Affiche et résumé présentés au IUFRO Tree Seed Symposium, Fredericton (Nouveau-Brunswick), 18-21 juillet 2006.

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