



ALBERTA FOREST GENETIC RESOURCES COUNCIL

*Forest genetic resources:
Conserving diversity, enhancing productivity*

Tree Improvement Deciduous Species

The Council

The Alberta Forest Genetic Resources Council advises the Alberta government, provides input on standards and policies, and helps set directions for research on any matter to do with the conservation, biodiversity and productivity of forest genetic resources.

Members of the Council represent the scientific, government and industrial communities. This fact sheet provides an overview of why and how these groups are engaged in deciduous tree improvement.



Who is Involved

First and foremost, the Alberta government is responsible for the public forest and for implementation of the Standards for Tree Improvement in Alberta (2003). These standards provide a process for approving how parents are selected, how breeding programs are managed, and how products such as cuttings and seedlings are used and tracked over time. The provincial government also maintains the Alberta Tree Improvement and Seed Centre. The Council's membership list includes several provincial, as well as federal government representatives.

Several Alberta wood products companies have their own tree improvement programs, either alone or in cooperation with other companies or the Alberta government.

Deciduous Tree Improvement

The application of tree improvement to deciduous species (trees that lose their leaves in the fall) such as trembling aspen and balsam poplar is relatively new for the forest sector in Alberta. These species are important for production of forest products in the province. When factors arise that cause uncertainty of supply, it becomes important to develop at least some of these trees that can go beyond the historical performance of their parents.

As one example of what can cause this uncertainty of supply, society wants to set aside more of the Crown forest landbase for uses other than timber production – for wildlife refuges, energy exploration and development, tourism sites, agriculture, infrastructure, mining and all manner of recreational activities. To do this, while maintaining Alberta jobs and communities, we now see that more fibre must be grown on a constrained landbase. Selection and breeding programs help address this need by giving us trees that grow faster and produce better wood than wild forest stands.

Breeding programs using both native species and hybrids offer us new varieties that grow many times faster than their parents and are therefore viable choices for private-land plantings.

On the weather front, predictions are that Alberta's climate will experience dramatic change in coming decades. Finding trees that show the ability to survive drier, warmer weather and remain resistant to pests and diseases that might accompany this changed climate will allow us to select and breed for characteristics that will maintain our social and ecological values into the future.

Deciduous tree improvement operates on the same principles that apply to other plant species, including selection, breeding and testing material. Better performing trees are selected from wild stands and then grown together in scientifically designed field trials. The outstanding performers from these tests are selected and can then be used directly for new planting, or they can be used as parents for the next generation of breeding, testing and selection. Tree breeders are particularly interested in three properties: genetic diversity, adaptation to current and future growing conditions, and improvements in desired characteristics.

How is the new material produced?

Cuttings

Balsam or hybrid poplar can be produced from stem or branch cuttings, which root easily. The cuttings may be used directly on the planting site without roots, or they can first be rooted in a greenhouse or nursery bed. These methods are used to produce many genetically identical copies (clones) of the parent.

Planting Guidelines

The Standards for Tree Improvement in Alberta provide guidance for use of native and non-native material. Currently, on Crown land, only native tree species can be planted. Plantings of hybrid trees are restricted to private land. Research testing of hybrid trees can take place on Crown land provided a detailed research plan is approved by the government. The standards and Alberta's Forest Management Planning guidelines ensure that ecological, forest health and biodiversity requirements are fulfilled in any proposal to use these materials.

All genetic material produced through tree improvement programs is subject to rigorous long-term monitoring under the provincial standards.



Roots

Small pieces of trembling aspen root tissue or remnant roots still in the ground after fire or harvesting produce offspring from suckers that emerge from the root material. The offspring produced from the same root tissue are also called clones, because they have the same genetic properties and characteristics of the parent tree.

Where are we today?

You can find the latest summaries of tree breeding work in Alberta by checking the Council's annual report – available via our website, www.abtreegene.com

If you have any further questions, please contact Cliff Smith, Chair of the Council,
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Seeds

Wild seed collections may be used with any tree species but some lend themselves particularly well to controlled cross-breeding in either grafted seed orchards or by using the cut-branch method. In order to produce hybrid poplars using the cut branch method, branches bearing flower buds are collected from for instance, female balsam poplar and male cottonwood poplars. Pollen is extracted from the developing male flowers and applied to female flowers on cut branches maintained in buckets of water in isolation cages. The seeds from a specific cross comprise a family of individuals combining characteristics from both parents. These seeds can be used directly to produce, in this case, hybrid poplar seedlings.

