

## **Reforestation and Tree Improvement**

Alberta is the fourth largest forestry province in Canada. About 60% of the province is forested and essentially all of the forested area is public lands. Both coniferous and deciduous forests are important. Approximately 70-80 million trees are planted each year of which about 45% are white spruce, 55% lodgepole pine and less than 1% black spruce, jack pine, douglas-fir, aspen and poplars.

Approximately 15% of the provincial annual planting program is produced from genetically improved stock.

The initial focus of Alberta Tree Improvement and Seed Centre (ATISC) was tree breeding and improved seed production, but through time and redefining of government's stewardship role and objectives, it has evolved into a comprehensive forest genetic resources management program. Current ATISC programs include applied tree breeding and improved seed production, reforestation seed, tree gene conservation, forest genetic resource management policy and applied forest genetics research to provide information to support the other programs.

## **Applied Tree Breeding and Improved Seed Production Program**

Atypical for most GoA programs, the provincial tree improvement and tree breeding program is based on a cooperative model between the GoA and forest companies. Technical planning for tree improvement is based on a breeding region concept identified in Alberta as a Controlled Parentage Program (CPP). These CPP regions

are species specific and serve as target areas for development and deployment of regionally adapted genetically improved varieties of trees. Most are supported by a single production seed orchard and a series of field progeny tests to determine genetic worth and adaptation.

## **Reforestation Seed Program**

The ATISC Reforestation Seed Program is responsible for the registration, storage, distribution and tracking of operation reforestation and reclamation seed used on

public land. ATISC documents and maintains records on origin, collection data, seed test results and deployment history on all registered seedlots.

## **Tree Gene Conservation Program**

Tree gene conservation has been a component of ATISC's forest genetic resources management program since its inception. Seed and clone banking efforts include plant material

representing population sampling of native tree species as well as selected individual tree collections used in our applied tree breeding program.

## **Forest Genetic Resource Management Policy Program**

ATISC is a lead in development of policy related to forest genetic resource management and conservation standards (FGRMS) for Alberta's native tree species used in reforestation and reclamation of Public Lands.

registration and storage, reforestation and reclamation materials deployment on public land, tree breeding, testing and verification, production of regeneration materials through CPP programs and some conservation requirements.

These standards deal with managing tree gene resources; they cover seed collection handling,

## **Applied Forest Genetic Research Program**

Alberta started a major applied forest genetics research program in 1976. Field trials to test the adaptive and productive suitability of species and populations, is primarily carried as a stewardship responsibility by Alberta Environment and Parks and of Alberta Tree Improvement and Seed Centre.

Provincial field trials fall into four broad categories including: species testing to test for species suitability in range expansion or new introductions; provenance testing to determine among population adaptive genetic variation used for developing seed zones and transfer functions and rules; progeny testing to determine the adaptive suitability and genetic gain potential of parent trees in breeding programs

and flowering and seed production research to determine the effectiveness of seed production from seed orchards.

Field trials represent a significant investment both in infrastructure and plant material establishment, maintenance and measurement. All data from field trials are stored and managed by ATISC as a provincial heritage resource. A large amount of genetic field trial data has been accumulated which supports the other Alberta Environment and Parks and of Alberta Tree Improvement and Seed Centre programs, industry and cooperative tree improvement programs and provides opportunities for additional research and student development and training.

## **Reforestation and Tree Improvement at CDC South**

The warm dryland of the CDC South has proven a good site for clone banks and seed orchards.

In addition to warmer growing degree days, there is good physical isolation from plant contamination and pests and diseases.



### **Lodgepole Pine Seed Orchard**

The orchard establishment began in 1996 as part of a cooperative breeding project between Sundre Forest Products and ATISC to develop

improved varieties of Lodgepole Pine. It is a 600 graft orchard composed of 60 superior parent trees.

### **Douglas Fir Colonial Seed Orchard**

The Douglas-fir orchard is a small orchard developed to provide a modest amount of improved seed for operational reforestation and to provide a baseline of information on flowering cones and seed production. The

orchard contains 120 grafts from 35 selected wild parents. Initial attempts to establish this orchard at three other locations in Alberta failed. This orchard was established in 1995.

### **Western Larch Seed Orchard**

Western Larch, a species classified as rare in the province.

This orchard is composed of 84 grafts representing 18 parents.

### **Western Larch & Douglas Fir Clone Bank**

A living orchard of grafts of all the parent trees used to preserve the genetic characteristics of

trees for current and future research.