Huallen Seed Orchard Company: Overview

2014.05.27

The Huallen Seed Orchard Company (HASOC) was formed in January, 1995, by six companies or divisions in west-central Alberta, to improve efficiency and realise economies of scale among companies within shared breeding regions.

Membership

Member companies are Weyerhaeuser Company (Grande Prairie), Canadian Forest Products, ANC Timber, West Fraser (Hinton Wood Products), Weyerhaeuser Company (Pembina), and Millar Western Forest Products.

Primary Objectives

Primary objectives of HASOC programs are to:

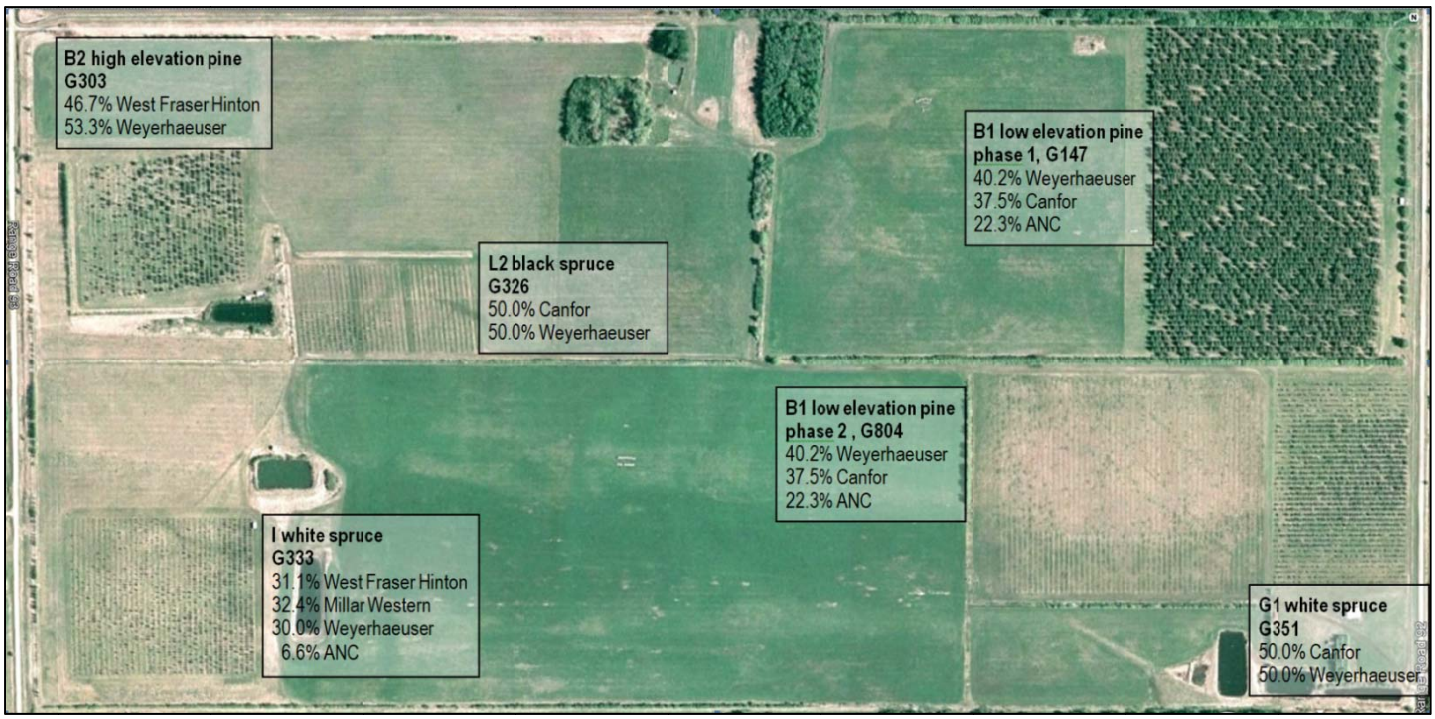
- provide high quality material for reforestation;
- optimise genetic gain;
- maintain genetic diversity and long-term adaptive capability; and
- preserve genetic resources.

Diversity and Climate Change

All orchards are designed to produce seedlots with high levels of genetic diversity, to allow for changes in orchard composition as a result of shifts in program direction, as well as in response to expectations of climate change. The CCEMC project provides valuable information to guide decisions regarding orchard composition. All orchards produce seedlots with sufficient diversity (between 2.5 and 5 times the government standard) to allow significant alteration in composition.

Programs

The HASOC site is shown below. The companies involved in each program are listed, together with ownership shares.



(image date 2010.05.28).

Seed orchards have been established for five programs in three species. These programs are for Region B1 and Region B2 lodgepole pine, Region G1 and Region I white spruce, and Region L2 black spruce. Orchards of different programs for the same species are separated from each other by about 1 km, to minimise pollen contamination.

History

The Huallen orchard site was purchased by the Alberta Land and Forest Service in 1982 for seed orchard development. It comprises a half section (320 acres or 130 ha) of agricultural land. The site was evaluated before purchase with respect to agroclimate, soils, and water quality. From 1986 to 1994, the orchard was operated and maintained by industry cooperators, under ALFS management responsibility. In 1995, management of the Huallen seed orchard site became the responsibility of HASOC. The Alberta Tree Improvement and Seed Centre (ATISC) carried out site management and seed orchard operations for the Huallen orchard site under contract to HASOC in 1996. Subsequently management has been the responsibility of HASOC. The site was purchased from the ALFS by HASOC in March, 2003.

Climate

The climate in this area is characterized by moderately warm, moist summers and relatively cold winters. The climate is dry but not arid, with 467 mm average annual total precipitation (30 year average). The area was selected partially for its relatively warm and dry climate. Areas further south were investigated, but were generally found to be colder and wetter.

Soils

The site is undulating with a gentle slope from northwest (723 m) to southeast (698 m). The soils consist primarily of a glaciofluvial sandy loam overlying clay textured lacustro-till. The glaciofluvial veneer varies in thickness from a few centimeters in the northern and southern portions of the site to about one meter in an east-west oriented band through the southern half. The property occurs in an area where soils with relatively thin and dark surface horizons have developed under aspen. The soils are generally low in fertility due to a lack of organic matter. Both nitrogen and phosphorous are lacking in the surface horizon. Subsoils do not contain appreciable quantities of soluble salts.

Site development

Development of the site began in 1985. Early activities carried out included fencing, road development, deep ripping in some areas to improve drainage, establishment of dugouts to provide water for irrigation, construction of irrigation equipment sheds, installation of drip irrigation systems, planting of windbreaks, and cover crop planting.

Irrigation system

Eight dugouts (six large and two small) have been created on the site. Trickle irrigation systems have been installed for the G1, L2, B1 Phase 2, B2 and I orchards; the B1 seedling orchard is not irrigated. The trickle irrigation systems consist of three inch mainlines, two inch feeder lines and half inch surface lines providing water for trickle outlets, which are placed at each tree location. There are no shut off valves on the surface lines. Trickle outlets can be shut off individually.

Shelterbelts

Shelterbelts, consisting of poplar, willow, alder and lilac have been established to the south of the Region B1 seedling orchard and along the south, west and north edges of the property, as well as to the south of the Region L2 orchard and the Region B2 orchard, and around the B1 Phase 2 orchard. Scotch pine has also been planted near the B1 Phase 2 orchard.

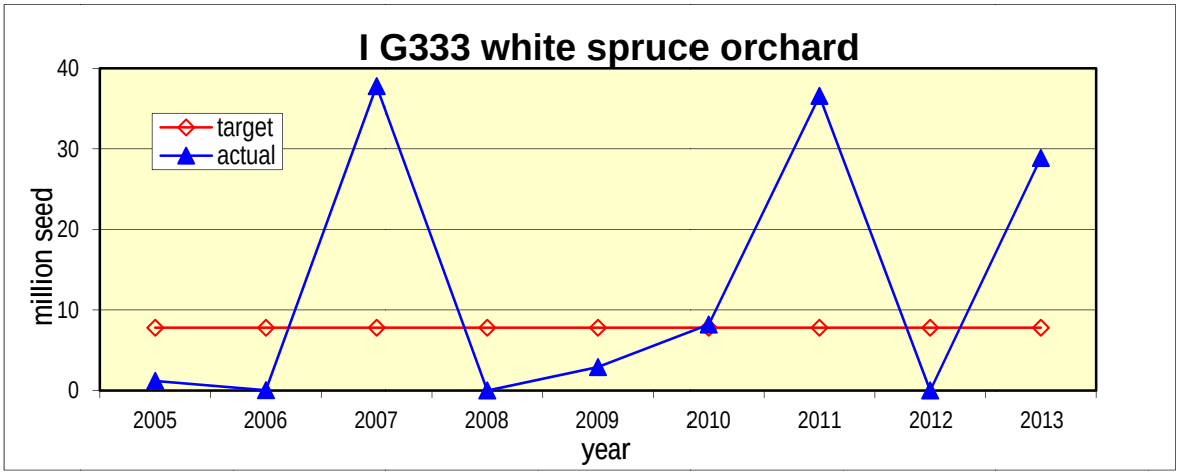
I White Spruce Program: Clonal Seed Orchard, G333

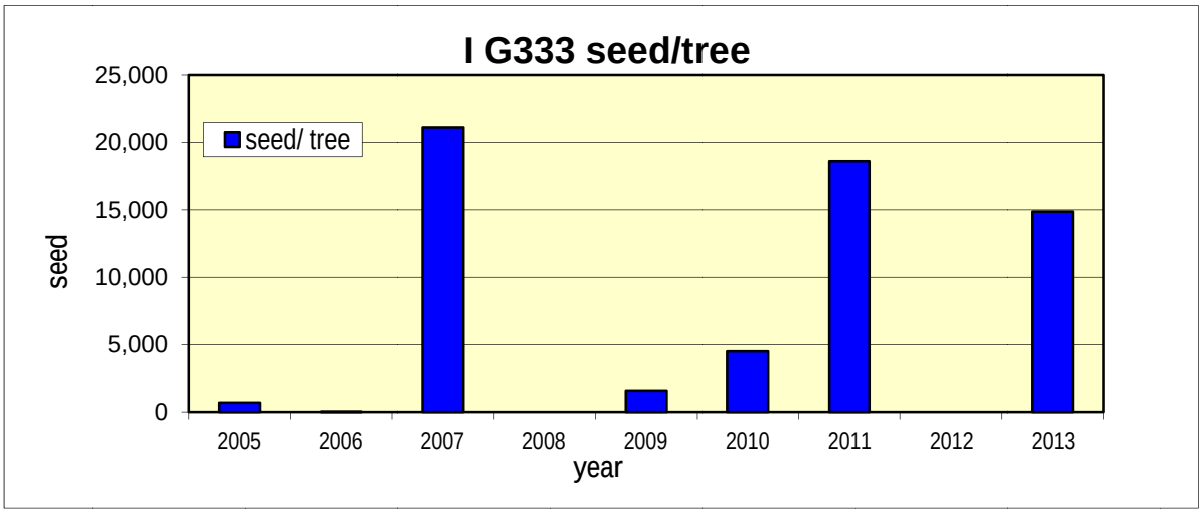
This program, initiated in 1986, is managed by Millar Western Forest Products, Hinton Wood Products (West Fraser), Weyerhaeuser Company, and ANC Timber. Region I lies between 52.36° N and 55.36° N, and 114.61° W and 118.12° W. The core planting area lies between 700 m and 1200 m; elevation limits vary from north to south. It occupies an area of 3,312,731 ha.

The seed orchard includes parents from within Region I and adjacent regions G1 and D, as well as a few outstanding performers from Alberta-wide provenance trials. Planting began in 1998, and by the end of 2013 the orchard contained 1,941 ramets of 172 clones. The first operational cone crop was collected in 2005; almost 295 kg, or 116 million seeds, had been collected by the end of 2013. Average yield has been 1.11 kg/hl, with an average of 29.5 seed/cone.This orchard came into full production six years ahead of plan, and fully meets seed needs for the region.

A series of progeny tests was established in 2001 on five sites; measurements were taken in 2014. A second phase of tests is planned, and will include remaining parents.

Genetic gain for the Region I orchard as presently constituted is ~4%, volume at rotation. Gain is expected to increase to at least 20% (volume at rotation) following analysis of progeny test data, and subsequent roguing.





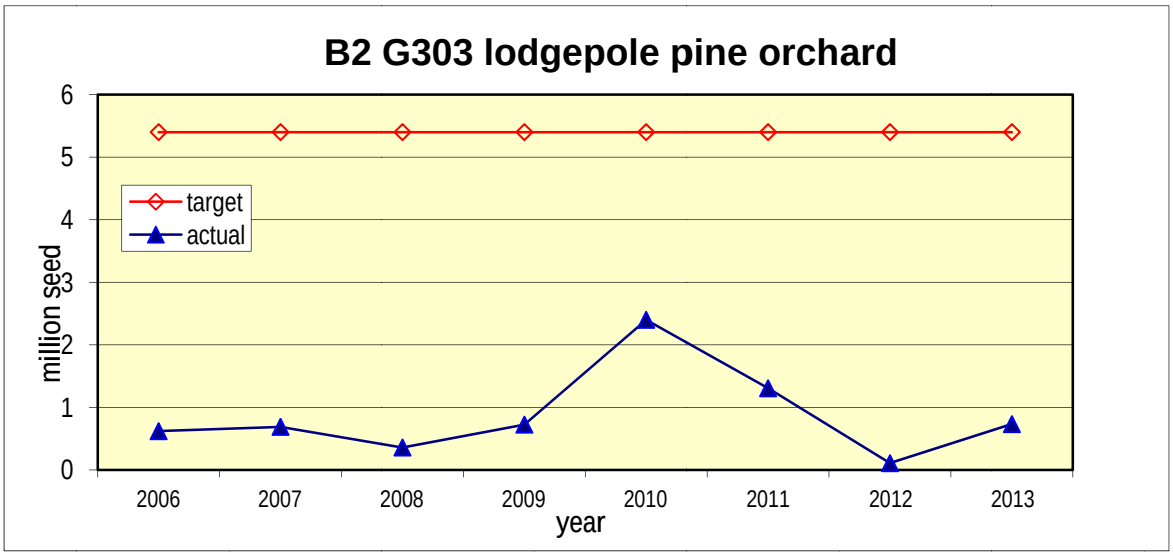
B2 Lodgepole Pine Program: Clonal Seed Orchard, G303

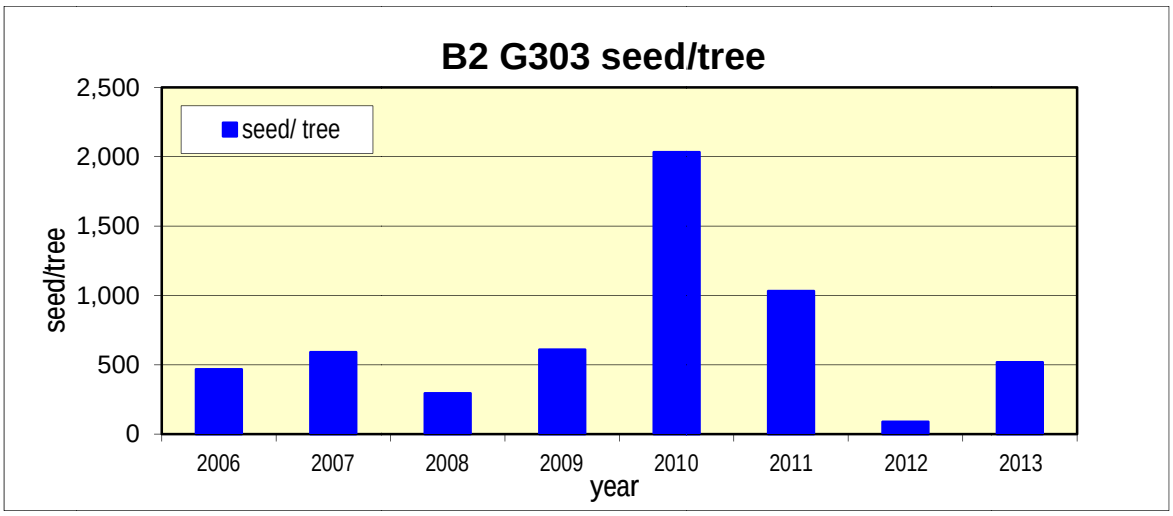
This program was initiated in 1976, and is managed by Weyerhaeuser Company and Hinton Wood Products (West Fraser); it will produce seed suitable for high elevation reforestation in the Upper Foothills. Region B2 lies between 52.65º N and 54.67º N, 116.12 º W and 120.00 º W, and 1,200 m and 1,600 m elevation.

The orchard was designed at 1,550 ramets, but it is unlikely to meet seed needs at that size. Planting began in 1994, and by the end of 2013 the orchard contained 1,417 ramets of 110 clones. Crown management was initiated in 2003 and is ongoing. Since this orchard is not expected to fully meet demand until it is expanded, roguing is not currently planned, but may take place if and when seed supply allows. An expansion is planned; 500 new positions will be laid out in 2014.

Cone collection began in 2006; 34.6 kg of seed had been collected by the end of 2013.Seed yield has averaged 0.374 kg/hl, with 17.5 seed/cone. Gain is ~ 4%, volume at rotation.

Two phases of progeny trials have been planted. Phase 1 trials, established on two sites in 1990, included 455 earlier selections. Phase 2 trials were established on three sites in 1998; this series includes 100 of the 110 orchard parents.



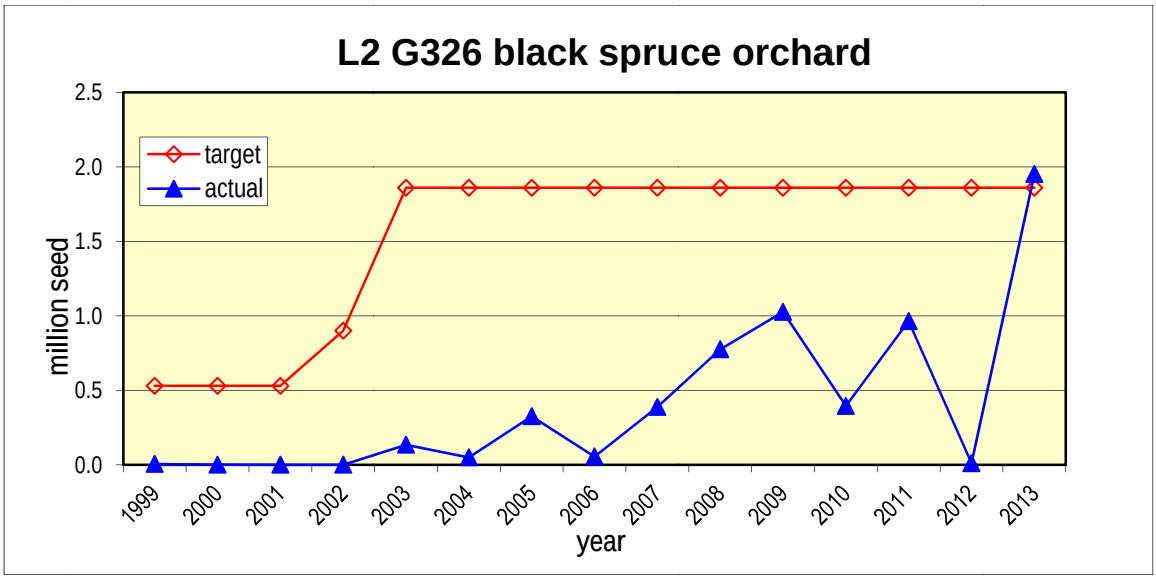


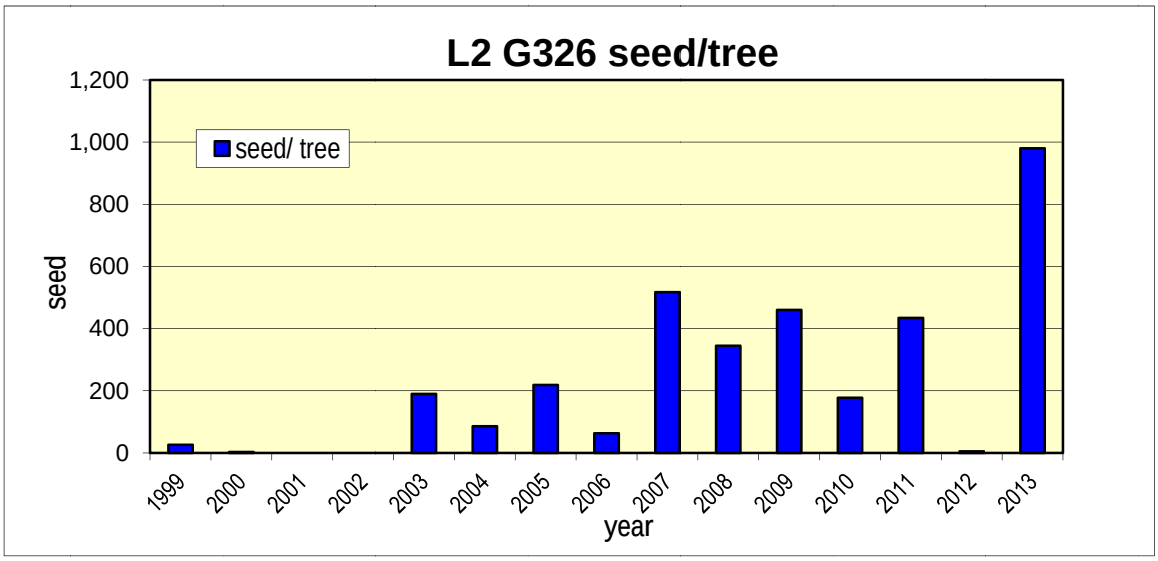
L2 Black Spruce Program: Combined Seedling and Clonal Seed Orchard, G326

This program, initiated in 1992, is managed by Weyerhaeuser Company and Canfor, and covers an area bounded by latitudes 54.15° N and 55.59° N, and longitudes 117.13° W and 120.00° W. It lies mostly between 800 m and 1,200 m elevation, and covers an area of 1,074,023 ha. Eighty-one parents have been selected for this program.

The orchard was originally designed at 270 positions. It was expanded in 2002, due to concerns over genetic diversity and pollen supply, Due to early and continuing high mortality of planted seedlings, additional plantings were done in 2005 and 2008. The irrigation system has been upgraded to prevent further drought-related mortality. By the fall of 2013, the orchard contained 1,992 trees, including 192 ramets of the 31 original clonal orchard parents and 1,800 seedlings from the 37 newer parent selections. Production to 2013 has been 7.96 kg, or 6.08 million seeds, with a yield of 0.305 kg/hl and 8.5 seed/cone.

A progeny test site was established by the ALFS in 2001. In addition, 20 L2 parents were included in an L1 progeny test on two sites, established in 2001. No gain is anticipated from this orchard; it was established solely as a source of seed.



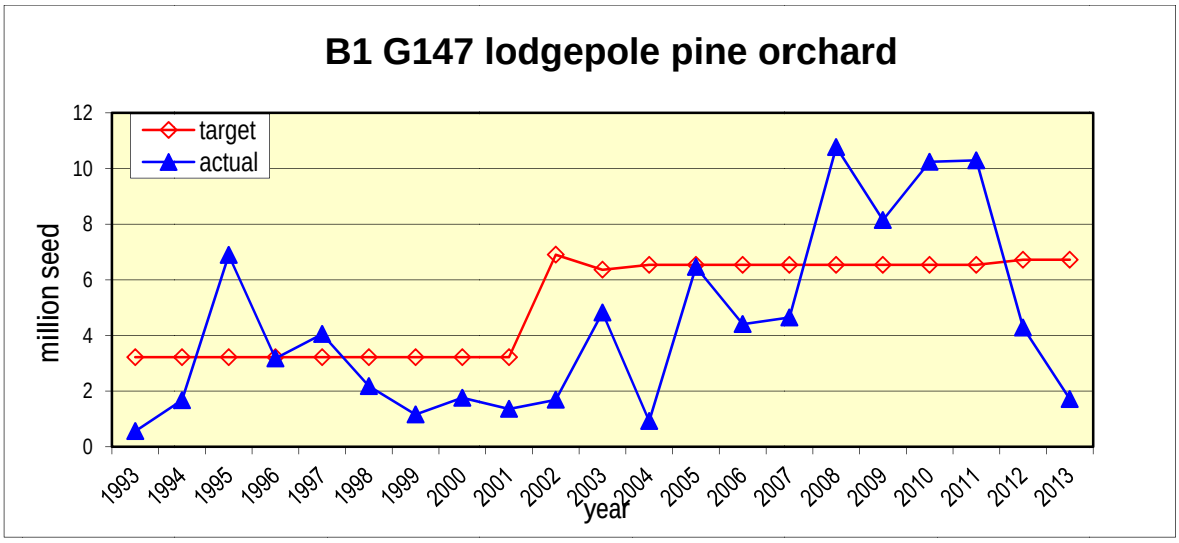


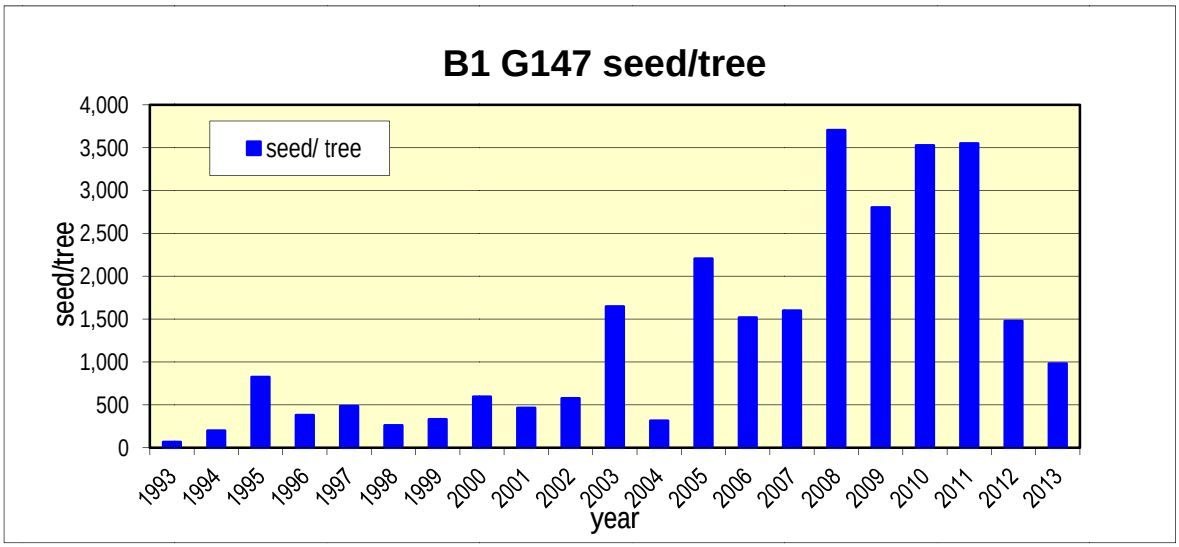
B1 Lodgepole Pine Program: Phase 1 Seedling Orchard, G147

This program, initiated in 1976, is managed by Weyerhaeuser, Canadian Forest Products, and ANC Timber. It produces seed for low elevation reforestation in the Lower Foothills and Central Mixedwood subregions in the northern Rocky Mountain Foothills. Region B1 lies between 53.27° N and 54.94° N, 115.87°W and 120.00° W, and 800 m and 1,200 m elevation. It covers an area of 1,660,081 ha.

Parent selections began in 1976. Phase 1 progeny tests were established in 1981 on four sites, with 400 B1 and B2 open-pollinated families. New progeny tests were established in 2002 on three sites to test later selections.

Following 6-year measurements of the Phase 1 trials, the best 300 families were established in the B1 seed orchard in 1986. 16,500 seedlings were established at a 1 x 6 m spacing. The orchard has been rogued three times, in 1993, 1999-2000, and 2012. The orchard was also topped to 6.5 m in 2012. This orchard contains 1,710 trees of 76 families and 37 ramets of 11 clones, for a total of 1,747 trees. It can be expected to produce crops with approximately 11% gain, volume at rotation. By the end of 2013 almost 1,072 hl of cones, or 418.4 kg of seed, had been harvested, equivalent to more than 91 million seed. Average yield over the 21 years of orchard production has been 0.39 kg/hl, with an average of 21.2 seed/cone.



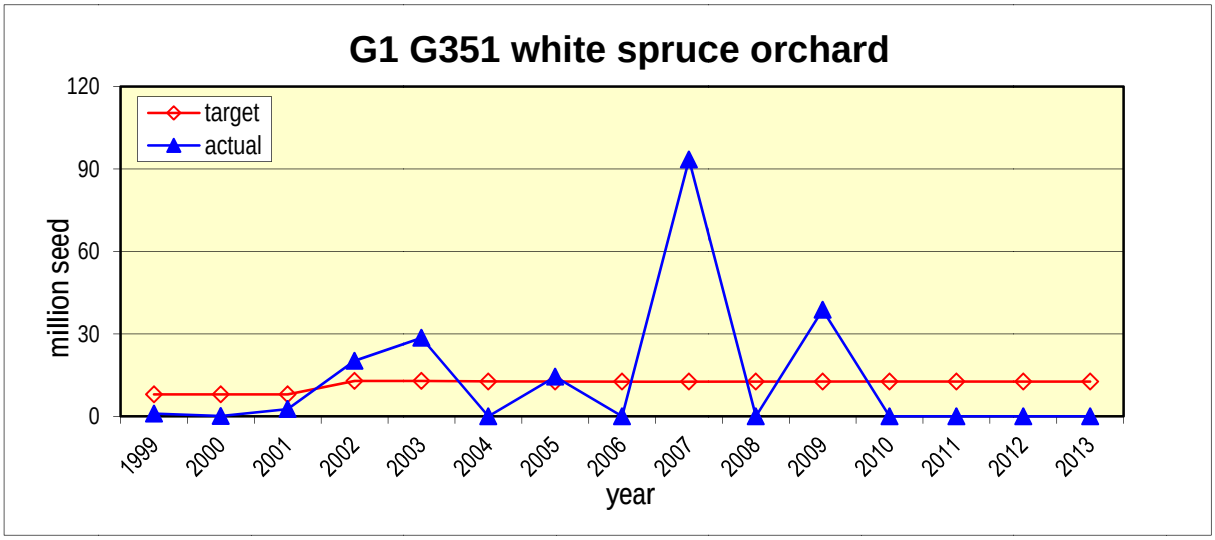


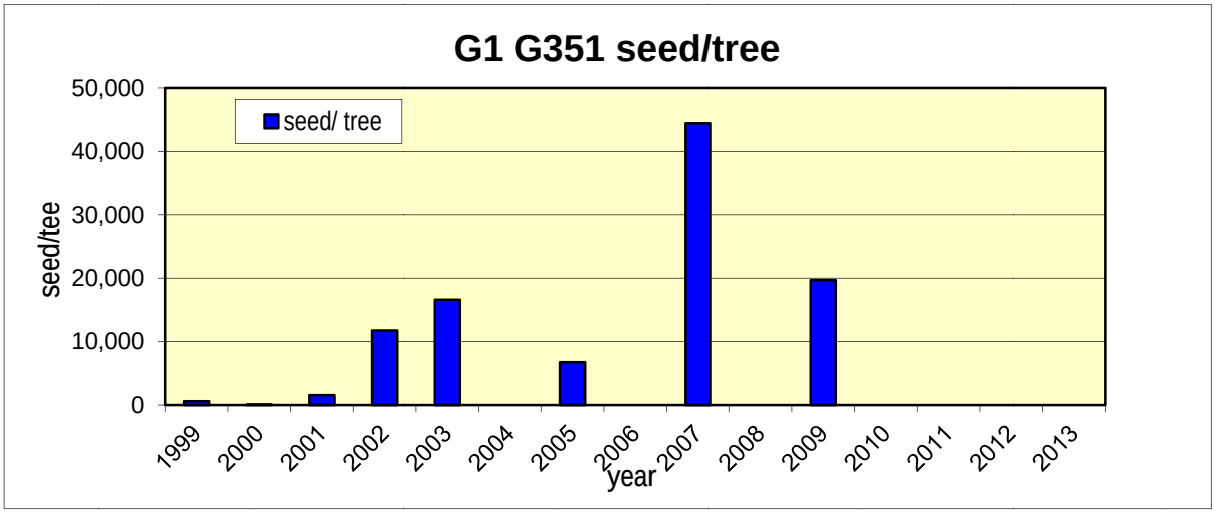
G1 White Spruce Program: Clonal Seed Orchard, G351

This program, initiated in 1977, is managed by Weyerhaeuser Company and Canadian Forest Products. The G1 Region occupies an area of 2,646,559 ha, and is bounded by latitudes 54.24° N and 56.29° N, and longitudes 116.97° W and 120.00° W. It lies mostly between 650 m and 1,050 m elevation.

Two hundred parents were selected prior to 1999. A further 140 selections were made in 1999-2001, to improve geographic coverage and broaden the genetic base. 340 genotypes are currently included in the breeding population. Two test sites were established in 1988. A second phase of progeny tests was established in 2005, to test new selections and previously untested orchard parents. Results from measurements in 2017, at age 14, will be used to rogue the orchard. At that time new high-gain parents will be selected, and will replace rogued trees. Genetic gain for this orchard is approximately 7.5%, volume at rotation. Following roguing, gain is expected to exceed 20%, volume at rotation.

The orchard is fully stocked, and, as of December 2013, contains 1,657 ramets of 139 clones. The first operational crop was collected in 1999. Almost 360 hl of cones, or 518 kg of seed, have been harvested, equivalent to almost 200 million seed. Average yield has been 1.45 kg/hl, and of 40.3 seed/cone. This orchard fully meets seed needs, and large surpluses have accrued. For this reason no crops were collected in 2010-13, and the next collection will be following roguing, likely in 2018.





B1 Lodgepole Pine Program: Phase 2 Clonal Orchard, G804

This program, initiated in 1976, is managed by Weyerhaeuser, Canadian Forest Products, and ANC Timber. It produces seed for low elevation reforestation in the Lower Foothills and Central Mixedwood subregions in the northern Rocky Mountain Foothills. Region B1 lies between 53.27° N and 54.94° N, 115.87°W and 120.00° W, and 800 m and 1,200 m elevation. It covers an area of 1,660,081 ha.

When it is in full production, this advanced (Phase 2) orchard is expected to replace the Phase 1 orchard (G147). Of the planned 3,060 positions, 47% have now been filled. Extensive grafting is being done this spring, and it is hoped that the orchard will be full by 2017. Higher seed requirements due to Mountain Pine Beetle infestations mean that the older orchard will be maintained for longer than originally anticipated.

Parent trees represented in this clonal orchard were selected from the first series of progeny tests for the B1 program, established in 1982 on four sites. Scions have been collected from 101 high breeding value individuals and grafted.

The first crop was collected in 2010. A total of 5.13 hl of cones, or 1.52 kg of seed, have been harvested to date, with an average yield of 0.296 kg/hl and 18.6 seed/cone. Genetic gain for this orchard is anticipated to exceed 20%, volume at rotation.