

Transitioning British Columbia To Climate Based Seed Transfer



CBST and Genetic Suitability

Information Bulletin 3

In This Issue

- Genetic Suitability under CBST
- Areas of Genetic Suitability – Seed Deployment and Seed Procurement
- Genetic Worth explained
- Building resilience to a changing climate
- GW and CBST

The Ministry of Forests, Lands, Natural Resource Operations and Rural Development Forest Improvement and Research Management Branch is leading the development of a Climate Based Seed Transfer (CBST) system to support forest ecosystem resilience, health, and productivity in a changing climate. On **April 5, 2018** amendments to the Chief Forester's Standards for Seed Use were published to allow the option to use CBST on Crown land reforestation. ¹ Implementation of CBST is phased (incremental) with a minimum of 2 to 3 years currently anticipated for full transition to CBST.

Genetic suitability under CBST

With advancements in the forest genetic program and emergence of climate science, the use of the term "genetic suitability" is now being used to describe the adaptive capacity of climatically-suitable seed and vegetative lots selected under CBST. Genetic suitability under CBST is a measure of the relative height growth associated with transferring seed (climatic distances) between each pair of BEC units (associated with the projected climate space of that species). Transfers where the relative height growth exceeds a minimum threshold are used to identify the area (aggregated BEC units) of genetic suitability.² Minimum genetic suitability thresholds for each species are set by the Forest Improvement and Research Management Branch (FIRM), as determined through extensive analysis, provenance testing, and expert opinion (Forest Genetics research scientists).

Areas of Genetic Suitability

Under CBST, there are two sets of areas (aggregated BEC units) that delineate genetic suitability: 1) a seed deployment area and 2) a seed procurement area. A **seed deployment area**, associated with (assigned to) a seed source (seedlot) is an area identified as suitable for deploying (transfer and use of) seed - commonly referred to as a CBST Area of Use. **A seed procurement area**, associated with a plantation (cutblock) is an area identified as suitable for collecting seed. CBST Areas of Use (CBST AOU) are published in the **CBST Areas of Use for British Columbia** Excel workbook (Figure 1). Seed and vegetative lot seed deployment areas (CBST AOU's) can be viewed on the Seed Planning and Registry (SPAR) system and in the CBST

July 2019

¹ On April 9, 2019, further amendments were published including minor changes for some species (expansion of CBST Areas of Use).

² O'Neill G, Wang, T, Ukrainitz N, et al. 2017. A proposed climate-based seed transfer system for British Columbia. Prov. B.C., Victoria, B.C. Tech. Rep. 099. www.for.gov.bc.ca/hfd/pubs/Docs/Tr/tr099.htm

For more information on CBST:

Climate Based Seed Transfer:

www.gov.bc.ca/climat ebasedseedtransfer

Chief Forester's Standards for Seed Use:

https://www2.gov.bc. ca/gov/content/indust ry/forestry/managingour-forestresources/treeseed/legislationstandards/chiefforester-s-standardsfor-seed-use

For more general information:

BC Government, Forest Improvement and Research Management Branch: Tree Seed https://www2.gov.bc.ca/gov/content/industry/forestry/managing-our-forest-resources/tree-seed

FORHTIP.SEEDHELP@go v.bc.ca

Tool (hosted by Forsite). Seed procurement areas currently can only be viewed on the CBST Tool.

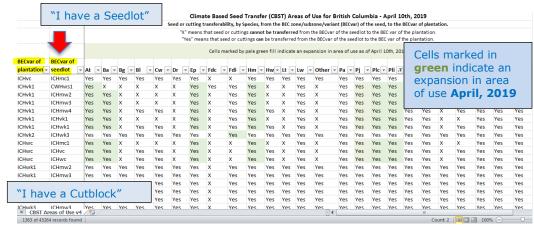


Figure 1: CBST Areas of Use in British Columbia - April 10, 2019

What do we mean by the term Genetic Worth?

The genetic value (gain) of a seed or vegetative lot is expressed as its **Genetic Worth (GW).** Genetic gain is a measure of the percentage increase (or resistance) in a trait of interest (e.g., stem volume, relative wood density, pest resistance) assigned to trees grown from seed orchards or natural stand superior provenances, over those grown from wild-stand seed. The GW of stem volume is measured as the percentage gain in volume expected for a seed or vegetative lot at or near harvest age (60 years on the coast; 80 years in the interior). GW values for orchard and superior provenance seed and vegetative lots are regularly updated on SPAR as new breeding values become available as a result of extensive forest genetic research, testing and tree breeding.

Building Resilience to a Changing Climate

Planting seeds that have been selected for genetic resistance to pests and pathogens is important to help forest professionals maintain **forest health**, especially as climate change is projected to increase the impacts of some insects and diseases. Identifying **resistance** (tolerance levels) of improved seed sources to a range of pests will help natural resource managers and forest practitioners select the most suitable seed to meet their forest health-related management objectives. New GW codes have recently been added to enable the recording of values (scores) that are more specific to the trait of interest (e.g. DFW – Swiss Needle Cast; IWS – White Pine Spruce Weevil).

Genetic Worth and Climate Based Seed Transfer

Genetic worth is a relative measure of how much more volume tested orchard (Class "A") seed will add to a stand at the end of its rotation, compared to that of local populations registered as natural stand seed sources (Class "B"). CBST, including **Assisted Migration**, is expected to affect orchard (Genetic Class A) and natural stand (Genetic Class B) seed sources equally; hence, there is no expectation that the relative difference between them will change. Therefore, no adjustments to GW are anticipated at this time.