



# Cone and Seed Improvement Program BCMoF Tree Seed Centre



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## Broadleaf Seed Longevity

At the BC provincial Tree Seed Centre there are four broadleaf tree species currently in our inventory: *Alnus crispa*; *Alnus rubra*; *Populus tremuloides* and *Betula papyrifera*. All of these species are considered orthodox (seed can be dried and stored at sub-freezing temperatures) and are stored at -18°C at moisture contents under 10%. These species are considered non-dormant and tested dry – they are not imbibed or stratified before testing – moisture to initiate germination is taken up from the moistened media at the start of testing. A previous review of broadleaf storability was presented in volume 28 of the Tree Seed Working Group Newsbulletin (<http://www.for.gov.bc.ca/hti/publications/misc/HWTSWG28.pdf>). This note is intended to provide an update on broadleaf tree seed longevity.

The deterioration rate was calculated as the initial germination capacity (GC) minus the current GC all divided by the time between tests. It is presented as the change in germination percent per year. It provides a basic linear estimate of deterioration and a simple method of comparing species and seedlots within species, especially when limited numbers of tests are available for seedlots over time. Comparisons of deterioration rate estimates performed in 1998 and 2007 and across species is presented in Table 1.

Table 1. A comparison broadleaf seed deterioration rate (DetRate =  $\Delta$ germination / year) estimates performed in 1998 and 2007<sup>1</sup> at the BCMOFR Tree Seed Centre.

Species	1998			2007		
	# Seedlots	DetRate	Ave. Storage period (years)	# Seedlots	DetRate	Ave. Storage period (years)
<i>Alnus crispa</i>	na	na	na	11	+0.27	9.0
<i>Alnus rubra</i>	5	+0.20	3.9	16	-0.68	6.8
<i>Betula papyrifera</i>	12	+0.20	6.0	23	+0.10	9.9
<i>Populus tremuloides</i>	8	-8.6	1.9	8	-3.1	8.7

*Populus tremuloides* showed the highest deterioration rate, although the 2007 estimate (-3.1%/year) was less dramatic than the -8.6%/year estimated in 1998. The more recent estimate is based on an average of nine years of storage compared to only about two years in 1995. Seedlots varied in deterioration rate from a low of -0.2% /year to a high of -18%/year. Removal of the fastest deteriorating seedlot (-18%/year) reduced the average deterioration to -1.0 % /year and only two seedlots were above this level (-1.3% and -3.0%). *Populus tremuloides* displays orthodox seed behaviour, but in general the genus *Populus* is described as having microbotic or short life-span seeds. Under natural conditions the lifespan of *Populus* spp. seeds may only be a few weeks to months, but if seed is collected and immediately processed, dried and stored

<sup>1</sup> For ease of comparison, the 1998 deterioration rate values have changed sign to be consistent with 2007 values. Current methods present negative estimates as indicative of decreases in germination.

at sub-freezing temperatures then seed can maintain high viability for more than ten years (Wyckoff and Zasada 2002).

*Betula papyrifera* seed displayed good storage as a slightly positive deterioration rate was estimated in 1998 and 2007. Seedlots varied from a deterioration of 1.16%/year to a gain of 3.25%/year. *Alnus crispa* also showed an average gain in germination over time and the highest deterioration rate was only -0.30%/year illustrating promising longevity for this species. These positive average deterioration estimates are not intended to imply that germination increases during storage. Sampling of different genotypes (within seedlot variability) over time is the most reasonable explanation for these estimated germination gains.

*Alnus rubra*, our most commercial broadleaf in BC, was estimated to have an average deterioration rate of -0.68%/year. Seedlots varied from a deterioration of -1.16 %/year to a gain of 3.25%/year. Initial 1998 estimates indicated a small germination gain, but the 2007 estimates are based on averages of over three times as many seedlots and almost three additional years of storage.

The broadleaved species described here have generally good storability that falls within the range of BC conifers. There is inadequate knowledge concerning seed storage for other broadleaved BC tree species. The most problematic for seed storage are *Quercus garryana* which is considered recalcitrant (cannot be dried and stored at subfreezing temperatures) and *Acer macrophyllum* which considered intermediate. All other broadleaved trees in BC are considered orthodox, but no specific information on seed storage behaviour is available.

### **Literature Cited**

Wyckoff, G.W. and J.C. Zasada. 2002. Populus L. In Woody Plant Seed Manual. USDA Forest Service. <http://www.nsl.fs.fed.us/wpsm/Populus.pdf> - Accessed June 19, 2007

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