



Cone and Seed Improvement Program BCMoF Tree Seed Centre

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Germination Falldowns

The Quality Assurance (QA) program of the Tree Seed Centre (TSC) has been conducting germination tests on sowing requests since 1992. A total of 1972 sowing requests have been germination tested prior to shipping and 499 of these requests have had germination results forwarded from the nursery (Table 1). Sowing requests are selected for QA testing prior to seed withdrawal and grams added for germination and moisture content testing. Just prior to shipping a random sample is withdrawn for testing to determine germination capacity or moisture content at time of shipping. The falldowns indicated are relative to the latest germination capacity (GC), on SPAR¹:

Shipping Falldown = GC at Shipping – GC indicated on SPAR

Nursery Falldown = GC at Nursery – GC indicated on SPAR

Table 1. Sample sizes, germination capacity (GC) and falldown {relative to the latest Lab germination} for sowing requests tested as part of Quality Assurance prior to shipping and at the nursery.

Sp. ²	Tree Seed Centre at Shipping			Nursery Information		
	#	Mean GC	Falldown	#	Mean GC	Falldown
Ba	107	64	2	37	73	-2
Bg	34	76	0	12	71	-6
Bl	75	62	-11	37	69	-7
Cw	290	72	-8	88	73	-2
Fdc	117	91	0	32	91	-1
Fdi	129	89	1	35	88	-2
Hm	32	92	2	4	77	-14
Hw	109	90	-1	44	81	-8
Lw	143	79	-2	22	89	9
Plc	45	92	1	5	92	4
Pli	244	93	1	65	83	-9
Pw	119	61	-17	35	80	3
Py	89	85	-2	1	81	-4
SS	55	94	-1	1	82	-14
Sx	342	87	1	81	87	3
SxS	42	90	2	0		
	1972	82	-2	499	81	-3

¹ SPAR = Seed Planning And Registry system

² Ba=Amabilis fir; Bg=grand fir; Bl=subalpine fir; Cw=western redcedar; Fdc=coastal Douglas-fir; Fdi=interior Douglas-fir; Hm=mountain hemlock; Hw=western hemlock; Lw=western larch; Plc=coastal lodgepole pine; Pli=interior lodgepole pine; Pw=western white pine; Py=Ponderosa pine; SS=Sitka spruce; Sx=interior spruce and SxS=Sitka X interior spruce hybrid.

It is worth noting some differences present in the Quality Assurance testing program to fully appreciate these results.

- 1) The latest lab test GC, indicated on SPAR, is based on 400 seeds (4 replicates X 100 seeds). Lab tests for Cw are based on naked seeds (unpelleted)
- 2) The GC prior to shipping is based on 200 seeds (4 replicates of 50) except for Ba, Bg, Bl, pelleted Cw and Pw which are based on 400 seeds (4 X 100) starting in 1999.
- 3) The nursery germination is highly variable in terms of sample size and count initiation and duration (i.e. no standard method is used to determine germination capacity at the nursery), but these results are the best information we have on a provincial basis.
- 4) Nursery results indicating that upgrading was performed have not been included, but nursery results indicating other practices such as re-soaking in water prior to sowing, hydrogen peroxide treatments or priming have been included.

The overall mean falldown of all requests at the TSC was 2% below germination indicated on SPAR, but the majority of this difference can be attributed to subalpine fir and western white pine. Work is currently underway to explore alternative methods of pretreating Pw and work will be initiated to look at improvements that can be made in Bl. After yellow-cedar, which is 100% pretreated at nurseries, these species exhibit the deepest and most complex dormancy in BC conifers. Western redcedar also showed large falldowns, but a component of this can be attributed to the pelleting process that was previously estimated at slowing germination by four days.

The falldown at the nursery is, on average, surprisingly low at 3%. Both Sitka spruce and mountain hemlock showed falldowns of 14%, but this was based on a total sample of only five requests. It has been recommended that mountain hemlock blocks be covered in the nursery following sowing as light reduced the germination rate, but not the capacity (Edwards and El-Kassaby 1996). A falldown of 9% for interior lodgepole pine was surprising and is considered low for a species, which generally exhibits a very rapid and high germination capacity. A possible explanation is that due to the excellent germination characteristics in Pli it is sometimes sown outdoors under generally sub-optimal conditions. There were also quite a few nursery results of Pli that were excluded as the seed was upgraded to enable single seed sowing in Pli and this may have introduced a slight bias. In general we hear very few complaints about poor germination of Pli crops, but it is very important to be as efficient as possible with Pli due to significant shortages in available orchard seed for this species.

These falldown figures are intended as guidelines and provincial averages. They help establish priorities for the cone and seed improvement program at the TSC. The best estimates for your nursery are based on the values calculated as part of the quality assurance program at your nursery. I encourage all nurseries to perform at least some germination counts following sowing to determine what their actual falldowns are. Clients are becoming more frugal with seed and a proper quality assurance program will help you determine what you can and cannot do to meet the demands of your clients. Finally, I'd like to thank all the nurseries that have supplied germination data and I welcome your feedback on this program.

Reference Edwards, D.G.W. and Y.A. El-Kassaby. 1996. The effect of stratification and artificial light on the germination of mountain hemlock seeds. *Seed Sci. & Technol.* 24:225-235.

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