Tree Improvement Branch

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Germination Comparisons: Tree Seed Centre Lab, Before Shipping and at the Nursery

For 1993 and 1994 sowing, germination information was received from nurseries on 196 requests tested at the Tree Seed Centre (TSC) prior to shipping. This allows a comparison of i) Lab germination [Lab] available on SPAR ii) germination on sowing requests prior to shipping [QA] and iii) germination experienced at the nursery [Nurs]. I would like to thank the 21 nurseries that provided information as these comparisons would not be possible without their co-operation. The overall relationship between Lab test results [Lab] and nursery germination [Nurs] produced a correlation of 0.83 [r=0.83; r^2=0.68]. This indicates that 68% of the variation in nursery germination can be explained by the Lab test results. The remaining variation can be attributed to the germination environment.

In Table 1 the comparisons of Lab, QA and nursery germination capacity (GC) are presented by species. The falldowns between Lab and nursery germination and between shipping and the nursery [QA] are also presented as estimates of expected nursery falldowns. The number of sowing requests sampled and the number of nurseries providing feedback on germination will influence the reliability of these estimates. I have eliminated data in which nurseries indicated problems existed (i.e. bird damage, extreme temperatures) or those that received nursery upgrading and do not reflect the state of the seed tested.

Species showing a negative falldown (i.e. Plc & Py) actually achieved higher germination in the nursery compared to Lab and/or QA germination. The most likely explanations for higher nursery germination are i) extended stratification of requests before shipping and at the nursery before sowing ii) the extended count dates used by nurseries for many germination counts compared to 21 or 28 day counts used in testing and iii) the inclusion of abnormal germinants in nursery counts.

The more important issue is which species germinate at the nursery below the level expected. In this category *Abies* sp. appear to predominate in addition to western larch and western white pine. Amabilis fir showed the highest decline, but only one nursery and two sowing requests from 1993 were included and I do not feel this reflects the average falldown in B.C. nurseries. It is difficult to obtain better estimates of nursery germination on Ba as most requests [57%]are received after an abbreviated TSC stratification for nursery upgrading or dry [34%] based on 1993 and 1994 requested sowing services. For growers of *Abies* several references are enclosed. I would like to stress that extended stratification, beyond 12 weeks, in *Abies* is beneficial if sub-optimal conditions are expected to occur during germination. Nurseries wishing to extend stratification can do so by contacting the TSC {with consideration for the required timelines}, perform their own pretreatment or delay sowing and keep the seed in stratification at the nursery.

Table 1. Comparison of Lab, Quality Assurance [QA], and Nursery [Nurs] germination capacity [GC] with number of requests, number of nurseries and estimates of nursery falldowns in germination % by species.

Sp	# Requests	Lab GC	QA GC	Nurs. GC	# Nurs	Lab/Nurs. falldown %	QA/Nurs. falldown %
Ba[1]	2	59.0	67.5	32.0	1	27.0	35.5
Bg	6	80.0	79.5	72.3	4	7.7	7.2
Bl	7	62.0	58.1	50.9	4	11.1	7.2
Cw	17	84.9	82.1	80.1	6	4.8	2.0
Fdc	11	92.3	94.5	90.1	5	2.2	4.4
Fdi	21	87.8	89.2	87.3	8	0.5	1.9
Hm	2	91.0	92.0	90.0	2	1.0	2.0
Hw	4	93.0	91.3	89.5	2	3.5	1.8
Lw	8	78.3	78.3	67.9	4	10.4	10.4
Plc	9	90.1	91.3	91.6	5	-1.5	-0.3
Pli	28	93.2	93.8	92.8	5	0.4	1.0
Pw	4	79.5	60.5	68.3	6	11.2	-7.8
Py	13	84.1	79.5	84.5	4	-0.4	-5.0
SS	6	96.8	97.3	93.2	1	3.6	4.1
Sx	55	85.3	87.9	85.8	12	-0.5	2.1
SxS	3	85.7	89.0	85.0	1	0.7	4.0
Total	196				21		
Mean		83.9	83.2	78.8		5.0	4.4

Western Larch also showed a large nursery falldown in germination. Information is limited on Lw culture, but the results of Sorenson (1990) and some initial TSC lab results indicate that western larch responds to extended stratification. Sorenson (1990) indicates that if temperatures are below 55°F [≈12.8°C] that 40 days of stratification is required to obtain complete germination. If western larch is grown as an open compound crop growers should be aware that low temperatures may impact total germination and extended stratification may be worthwhile. The work of Sorenson was based on constant temperatures and the effect of temperatures intermittently falling below this level during germination is unknown. The TSC will be investigating extended stratification and its relationship to germination temperature of Lw in the near future.

In Pw, nursery germination was below lab test results, but nursery germination performed superior to seed sampled prior to shipping. The increased germination at the nursery is probably due to

[1]Ba-amabilis fir; Bg-grand fir; Bl-subalpine fir; Cw-western red-cedar; 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 - white pine; Py-yellow pine; SS-Sitka spruce; Sx-interior spruce; SxS-Sitka X interrior spruce hybrid.

increased stratification before sowing. White pine germination has been problematic and we are currently in the process of changing our testing procedure to increase cold stratification and replace the warm stratification, which is conducive to mould and pregermination of non-dormant seeds, with an extended soak. Full implementation and test results will not be available for the 1995 sowing season. If you would like more information on Pw pretreatment please contact myself at the TSC.

I consider the remaining species to be within expected lab germination [nursery germination within 5% of Lab germination]. These are species averages and specific seedlots may deviate from these figures. In Cw, QA germination and germination at most nurseries includes the feature of pelletization. Lab test results are based on 'naked' seeds. Based on this data the process of pelletization accounts for a 2.8% decrease in germination and the impact of the nursery environment accounts for a further 2% reduction resulting in a total falldown of 4.8%.

The provided nursery falldowns are estimates based on available information. The sample size [196] is small relative to the number of sowing requests shipped over the past two years [10 605]. The best information for your site is available at your site. I encourage all nurseries to compare lab germination with that realized in the nursery. A comparison with the presented provincial falldowns will indicate how your site performs and where you want to concentrate enhancement and monitoring efforts. We are always interested in hearing about seedlots that deviate from lab expectation and are continually working to try and improve the quality of seed you receive. Your feedback is always welcome.

References

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