Predicting Planting Stock Quality

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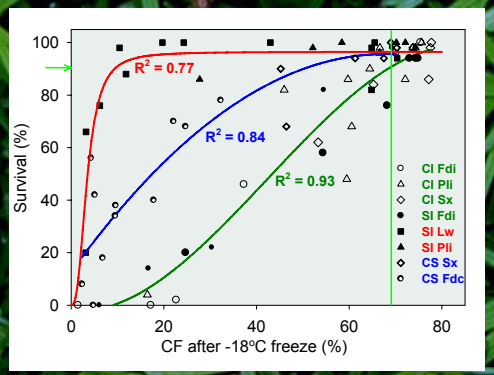
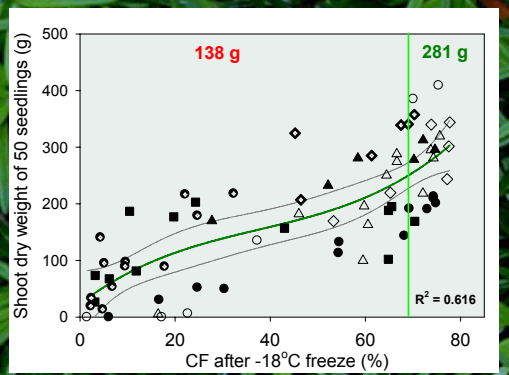
Storability

Stock-testing facilities need a fast, reliable method to estimate overwinter storability of seedlings (ability to survive and grow after cold storage). We compared two methods using container-grown seedlings of coastal and interior Douglas-fir, interior spruce, lodgepole pine, and western larch from British Columbia nurseries.

- Fall frost hardiness was estimated using visible injury (VI) of foliage or stems and chlorophyll fluorescence (CF) of shoots after freezing to -18°C. Seedlings were then put into overwinter cold storage (-2°C).
- In spring, seedlings were planted in nursery beds; survival and growth assessed after one growing season.
- There were close correlations ($r \geq 0.93$) between VI and CF.
- Seedlings lifted after they reached 69% or higher for CF and 25% or lower for VI had over 90% survival at harvest and doubled shoot dry weight compared with seedlings lifted earlier.
- **Measuring CF was the fastest and most easily replicated method to estimate successful storability, and reduced testing time by 6 days relative to VI tests.**



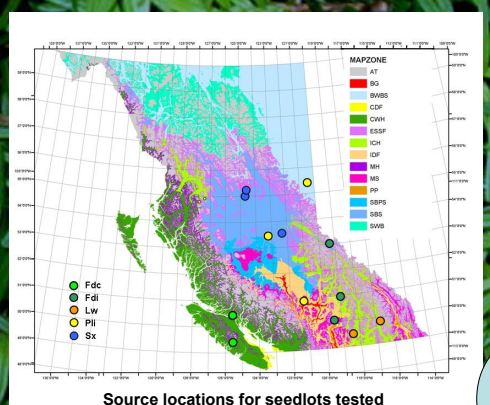


Measuring CF after freezing in the fall is useful for estimating conifer seedling storability

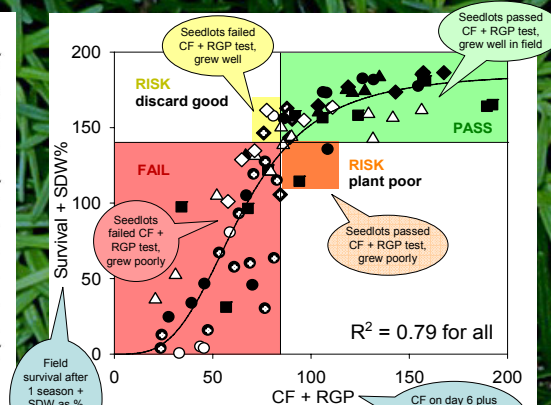
Field Performance

After cold storage, conifer seedlings in British Columbia are tested for field growth potential before planting. We compared two tests of performance potential using container-grown conifer seedlings.

- Thawed seedlings were assessed for root growth potential (RGP) and chlorophyll fluorescence (CF).
- Seedlings were planted in nursery beds; survival and growth were assessed after one growing season.
- Performance tests were significantly correlated with each other ($r \geq 0.53$).
- The best performance predictor was the sum of CF + RGP ($R2 = 0.79$ for 78 seedlot x lift-date combinations), which minimized the risk of planting poor seedlings and not planting good seedlings.
- A sum of 83 for CF + RGP provided a threshold above which survival and growth were good.
- **We recommend a combination of CF + RGP to assess vigour of shoot and root systems before planting.**



Source locations for seedlots tested



Key to abbreviations

Fdc	coastal Douglas-fir	CI	central interior test location
Fdi	interior Douglas-fir	SI	southern interior test location
Lw	western larch	CS	coastal test location
Pli	interior lodgepole pine	CF	chlorophyll fluorescence
Sx	interior spruce	VI	visible injury
SDW	shoot dry weight	RGP	root growth potential

Sum of 83 for CF + RGP in the spring seems best to minimize both risks; gives combined % survival + SDW of 140

References:

L'Hirondelle S.J., Simpson D.G. and Binder W.D. 2006. Overwinter storability of conifer planting stock: Operational testing of fall frost hardiness. New For. In press.

L'Hirondelle S.J., Simpson D.G. and Binder W.D. 2006. Chlorophyll fluorescence, root growth potential, and stomatal conductance as estimates of field performance potential in conifer seedlings. New For. In review.

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