Winter Cold Damage to Newly Planted Seedlings in the Peace River Country

Field observations of seedling growth and survival provide the first indication of success or failure in reforestation programmes. Swift and direct response to reports of problem sites is critical if action is to be taken to alleviate the problem or monitor its effect.

The Forest Service Research Branch (Forest Renewal) received reports of significant cold stress injury to white spruce research plantations in the Peace River portion of the Boreal zone in 1987. As a result, a workshop was held last March at Red Rock Research Station to discuss and evaluate the cold stress problem. Winter cold injury and summer frost damage were both discussed at the workshop as the cold stress injury problem is not restricted by season or to the Boreal zone.

The Boreal cold stress injury problem seems to be associated with first season over-wintering of one-year old spring planted cold-stored stock. Summer planted and two-year old material have been less frequently damaged. The specific injury-causing mechanism is not known, but it appears that the planting stock, biological clock is not synchronized with the field environment. In the Boreal, this asynchrony may take the form of insufficient dormancy or cold hardiness, and/or a lessened resistance to de-hardening following freeze-thaw cycles or chinooks.

Factors that may cause the asynchrony are nursery management effects, stock handling, or seedling growth in the first outplanted season. For example, planting cannot begin in the Peace River area until ground frost has melted (Figure 1). This two- or three-week delay in the planted seedling’s growing season may, in turn, delay onset of cold hardiness.

Short term recommendations from experts attending the cold stress injury workshop include:

1) consider alternate stock types and planting times,
2) plant lodgepole pine or aspen where consistent with management goals,
3) encourage natural snow cover accumulation by limiting block size and selecting cut pattern,
4) increase operational monitoring of plantations in high risk areas, and

5) increase training regarding recognition of cold stress injury symptoms.

The consensus at the workshop in March was that cold stress injury is a serious problem in B.C. and results from carefully monitored research trials may be indicative of a larger, and presently undetermined operational problem. Although firm data are lacking, this problem can not be dismissed as insignificant. Several recommendations for changes to current operational practice were made. These can be implemented in the short term. Recommended research activities are of a longer term and must be considered not only in the context of the cold stress problem, but also within the ongoing reforestation research strategy involving the FRDA Technical Advisory Committees in the Northern and Southern Interior.

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![Likelihood of frost](image)

FIGURE 1. Likelihood of summer cold stress injury for four different stock types in the Peace River Region