Lodgepole Pine (Pinus contorta) Comparison of in-use provenances and improved material from Sweden:

12-year-old provenance trial in Iceland

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Background

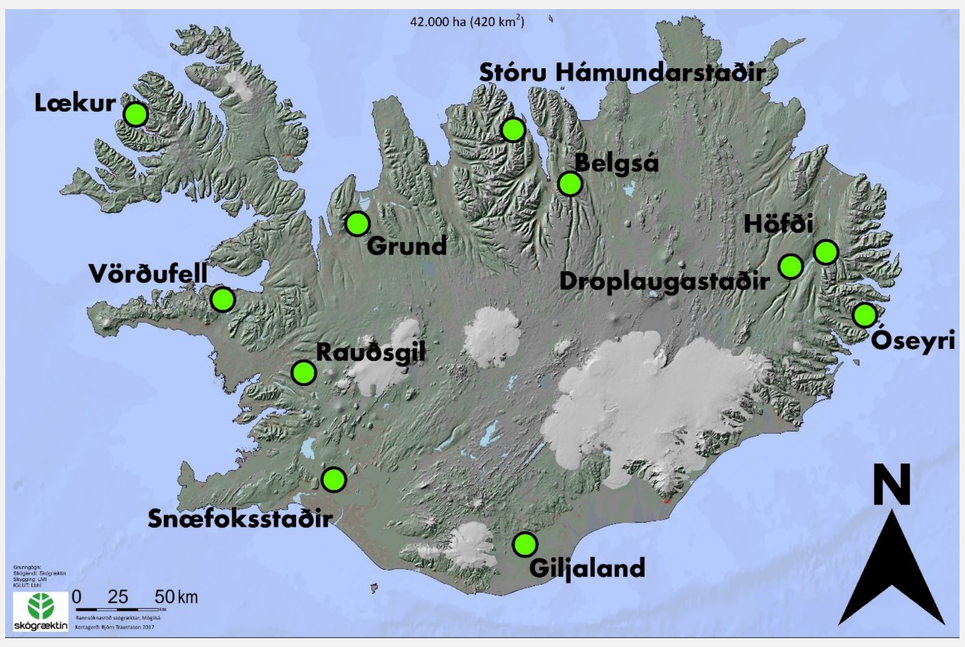
Lodgepole pine (*Pinus contorta*) was introduced into Icelandic forestry in the 1950s[1]. Since then, the provenance Skagway has become the most used provenance in Iceland[2]. Lodgepole pine is known for its fast growth, ability to survive under challenging conditions, frost-resistant seedlings, and growth in nutrient-poor soils. This makes the species suitable for afforestation[3]. Icelandic climate is challenging for tree growth. Therefore, provenance trials are essential for identifying the best genetic material in trees. This country-wide provenance trial of lodgepole pine in Iceland aims to determine the most suitable genetic material for future afforestation projects in the country.

Trial site Stóru Hámundarstaðir in North Iceland

Which provenance/s of Pinus contorta will be the most suitable for further afforestation in Iceland?

Methods and Material

For this trial, five improved seed source from seed orchards in Sweden (Närlinge, Oppala, Skörserum, Larslund, and Rumhult) were compared with provenances established in Iceland originating from Alaska and Canada (Skagway, Tutshi Lake, Watson Lake, and Carcross). Seeds for the Skagway provenance were obtained from a forest stand in Þjórsárdalur, located in southern Iceland. Seedling production for all nine provenances was carried out at the Sólskógar plant nursery in northern Iceland. After one year of cultivation, the seedlings were planted at the selected eleven sites during the summer of 2014. After twelve growing seasons in the field, the trial sites were assessed in 2025 for tree survival, height, stem straightness, and browning. Data analysis was performed using the R Project for Statistical Computing.



Map of the eleven Trial Sites in Iceland

Results

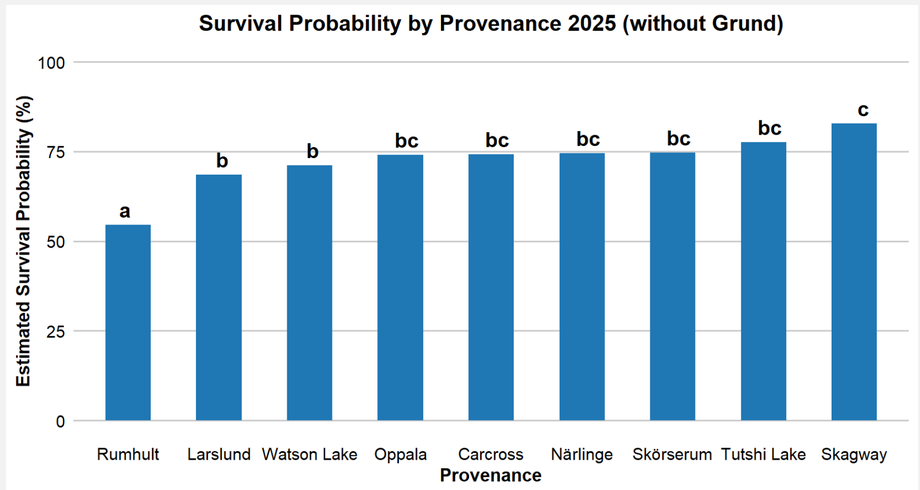
After twelve growing seasons in the field, the trial is old enough to provide reliable results for survival, height, stem straightness, and browning. Based on these data, future planting strategies can be planned. The results are summarized in the following text and shown in the bar charts.

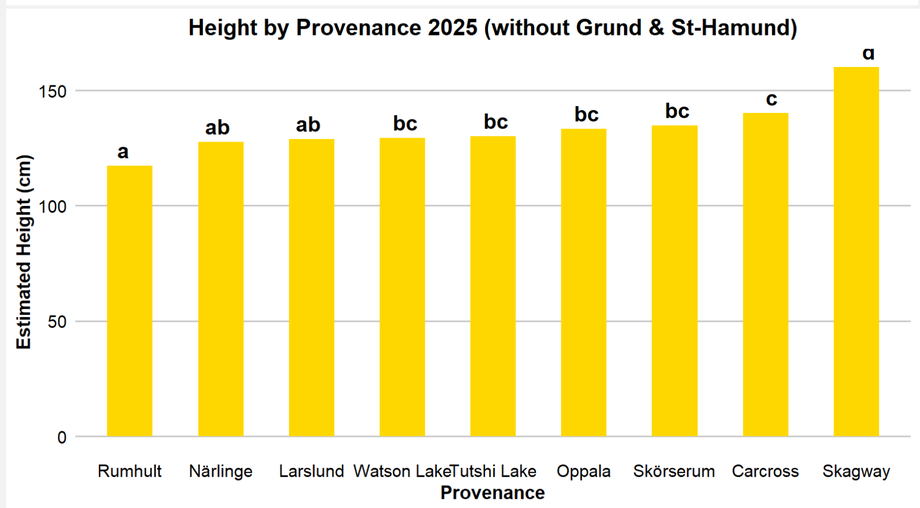
Significant differences were observed among the provenances for survival, height, and stem straightness.

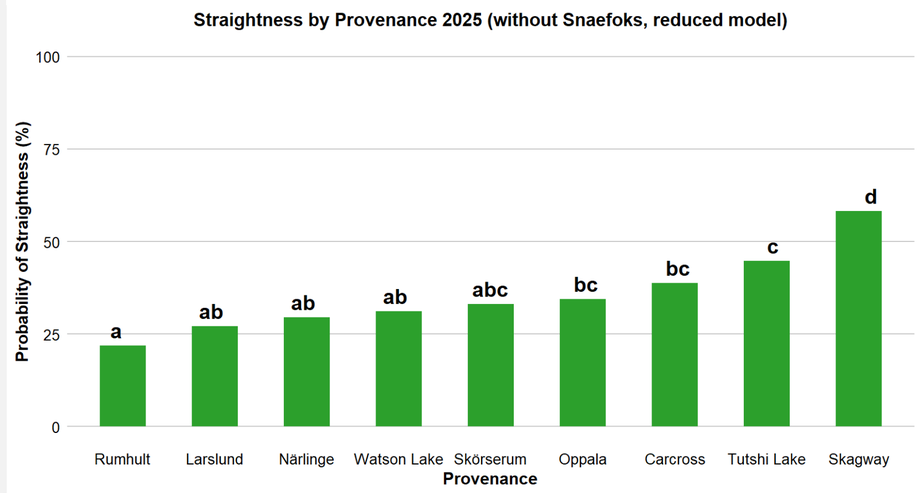
Skagway almost consistently showed the best overall performance across all traits, with the highest survival rate, greatest height, and best stem form.

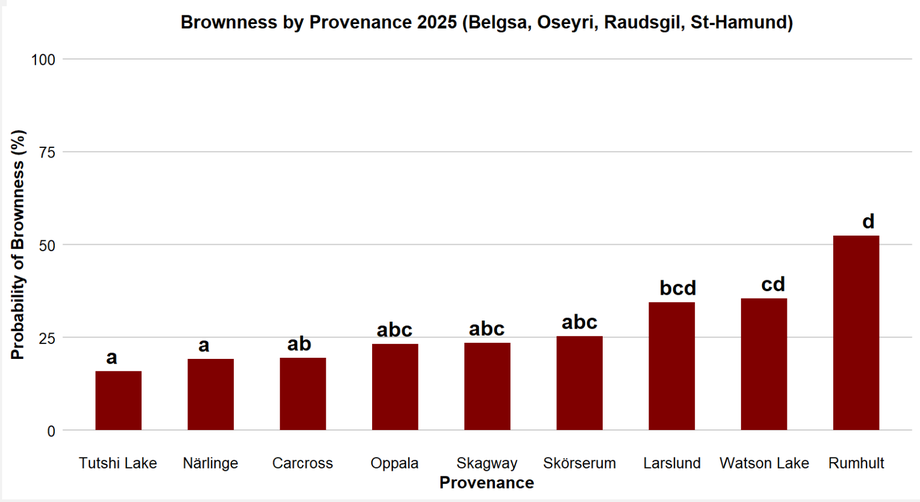
Rumhult performed the weakest across all measured traits followed by Larslund and Watson Lake.

The other provenances Närlinge, Oppala, Skörserum, Tutshi Lake, and Carcross showed intermediate results with no significant differences among them.









Discussion and Recommendation

Lodgepole pine: Provenance Skagway

Rumhult consistently showed the lowest performance across all measured traits, including survival, height, straightness, and needle browning, making it unsuitable for forestry in Iceland. Larslund and Watson Lake can not be recommended either.

Skagway performed best in terms of survival, height, and straightness. That corresponds to previous experience of the provenance. Genetic adaptation of the Skagway material after one generation in Iceland might have resulted in better vigor and general performance. Based on these results, Skagway from well managed forest stands in Iceland should continue to serve as the primary provenance for Lodgepole Pine (*Pinus contorta*) afforestation in Iceland.

Citations:
1) Sigurgeirsson Á (1988) Stafafura á Íslandi: vöxtur, ástand og möguleikar [Lodgepole pine in Iceland: growth, condition, and potential]. Ársrit Skógræktarfélags Íslands: 3–36.
2) Bragason Á (1995) Exotic trees in Iceland. Icelandic Agricultural Sciences 9: 37–45. Available at: https://ias.is/wp-content/uploads/2022/05/IAS-2022-3-O-Eggertsson-DA-Castiglia-M-Carrer-27-32-SC.pdf
3) Lotan JE, Critchfield WB (1990) Lodgepole pine (Pinus contorta Dougl.). In: Burns RM, Honkala BH (eds) Silvics of North America, Vol. 1: Conifers. USDA Forest Service, Washington, D.C., pp 302–315. Available at: https://research.fs.usda.gov/silvics/lodgepole-pine