

Clonal forestry with *Populus trichocarpa* and breeding for
poplar rust resistance

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Black cottonwood in Iceland

- First imported from Alaska in 1944
- Planted as garden and park trees from 1950
- First “large scale” plantation – 1979
- “Discovery” as potential forest tree ~ 1990
- Production of multipot stock since ~ 1990
- First clonal trials – 1992
- First cutting hedges established - 1992
- Poplar rust (*Melampsora larici-populina*) arrives – 1998.



Black cottonwood in Iceland

- Production of rooted cuttings
 - 1989 - 10,000 cuttings
 - 1992 - 125,000 cuttings (mostly a single clone, 'Iðunn')
 - 2000 - 280,000 cuttings (mostly ~ 10 clones)
- The 5th most planted tree species in Iceland, comprising about 5% of planting.

Black cottonwood in Iceland

- Uses:
 - Planted as a nurse species with Sitka spruce on fertile sites
 - In shelterbelts, mostly along with *Salix alaxensis*
 - Almost never planted as monoculture
- Timber value – unknown
- Is the tallest tree in Iceland (22m)



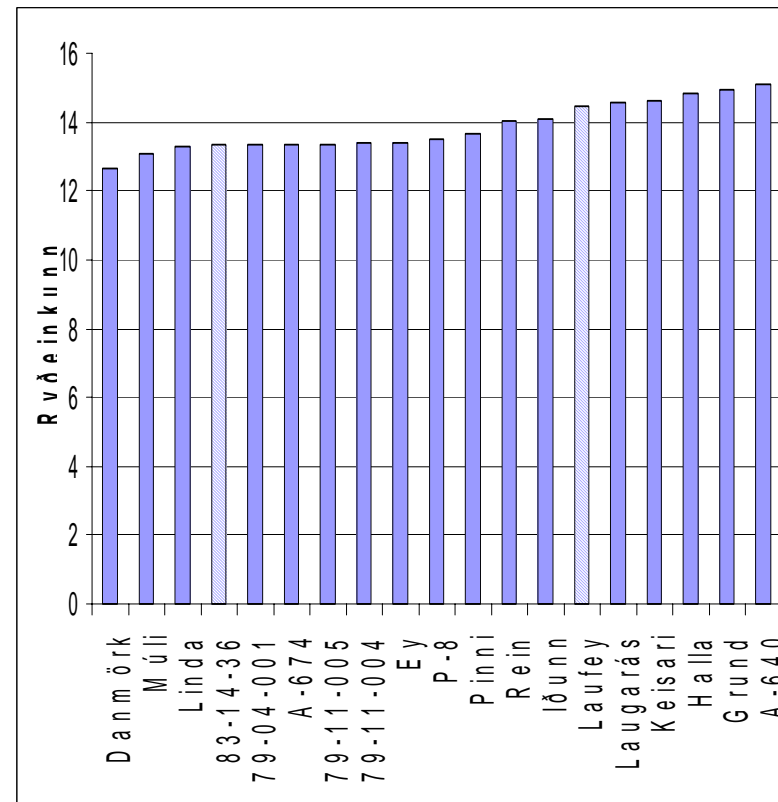
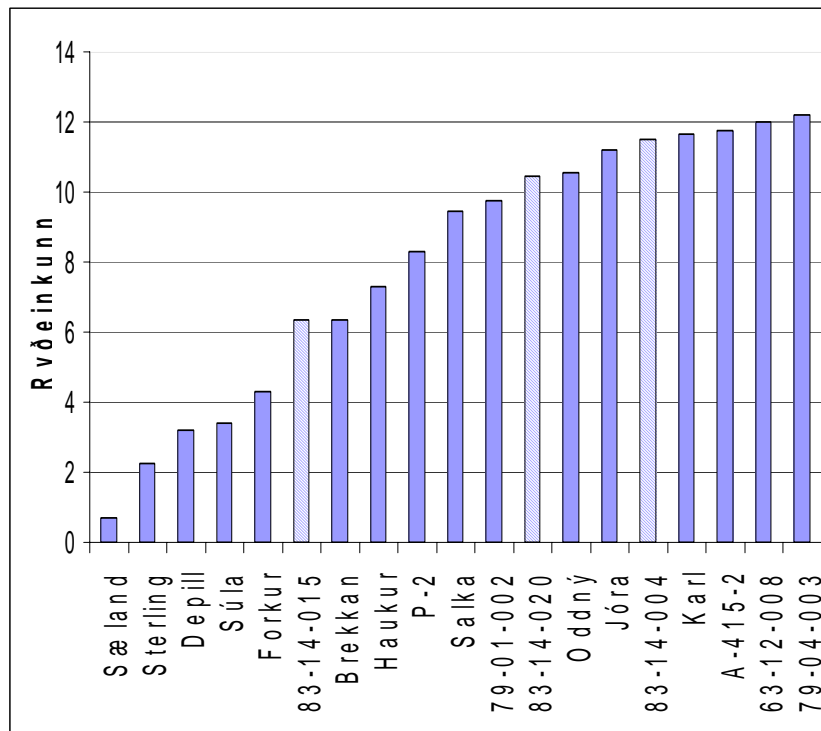
Poplar rust

- Mostly a problem in gardens and parks
- Severe infestation can cause die-back through frost damage.
- Unknown how big a problem this will be in forest plantations



Variable susceptibility

(unpublished data from Guðmundur Halldórsson)



Rust damage assessment in existing clonal trials indicates that:

- A small number of clones had rust damage below the median of the trials.
- Only 3 clones, Súla, Sæland and Haukur, combined good rust resistance with good growth and survival.
- Back to a (too) limited choice of clones?
- A decision was made to broaden our choices through controlled crossing.

Controlled crosses 2002

	☐					
☐	Súla	<i>Guðríður</i>	<i>Salka</i>	Gretta	Bera	Gerða
Sæland	x	x	x	x	x	x
Haukur	x	x		x	x	x
<i>Pinni</i>	x					
<i>Hallormur</i>	x					
<i>Oddi</i>	x					
<i>Keisari</i>	x					
Gunnlaugur	x					
Þengill	x					
Björn	x					
Vigfús	x					
Sæmundur	x					
	Bold - rust resistant, good growth and survival					
	<i>Italics - medium rust resistance, good growth and survival</i>					
	Normal - good growth and survival					

Outcome

- 20 full-sib families, all with at least one rust-resistant parent.
- A total of 11-12,000 seedlings in fall 2002
- Will be planted in progeny trials at 3-5 sites in 2003.
- Selection of new clones in progeny trials beginning in 2010?



Questions still to be answered

- How serious a problem will poplar rust be?
- GxE effects on rust resistance?
- Considering the ease of seed and seedling production of black cottonwood, should we switch to seedlings in afforestation (in part or in whole) in order to increase genetic diversity?