

Clonal propagation of *Abies lasiocarpa*
for Christmas tree production.
What can be gained ?

Harald Kvaalen¹ & Ola Gram Dæhlen²

1 Skogforsk Ås,

2 Oppland Forestry Society Biri Norway

Plant material

	Number of provenances, families, or clones	Mean number of trees	Min	Max
Trial				
Provenances	13	47	4	99
Full sib families	49	55	3	104
Clones	322	2.8	1	18

Studied traits :

Quality class (1-3)

Height

Branch number

Aphid attack (1-3)

Methods

Estimate Variance comp.

Compute BLUP's

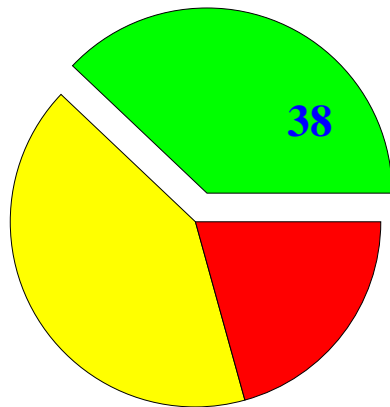
Select the 5% best

Reestimate V_E in the
selected population

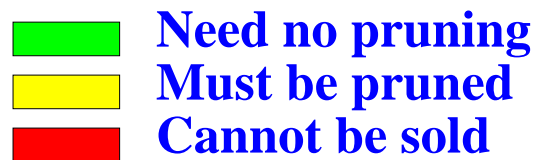
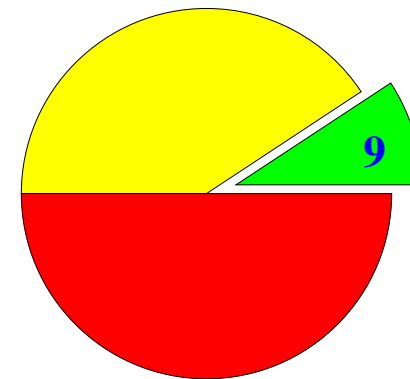
Results:

Christmas tree quality in the best and the worst provenance of *Abies lasiocarpa*

Best at Fluberg



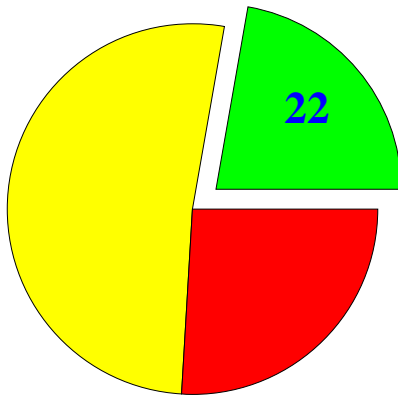
Worst at Fluberg



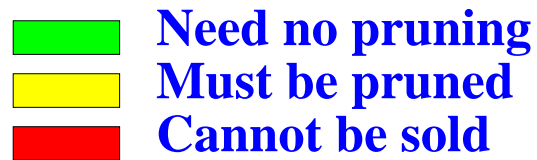
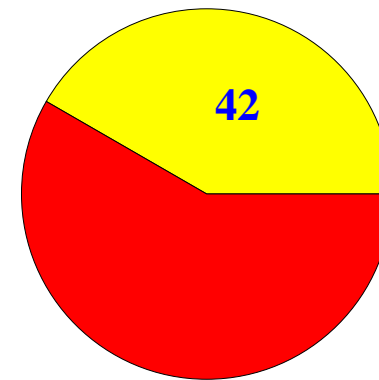
Results:

Christmas tree quality in the best and the worst
provenance of *Abies lasiocarpa*

Best at Oladalen



Worst at Oladalen,
was the best at Fluberg

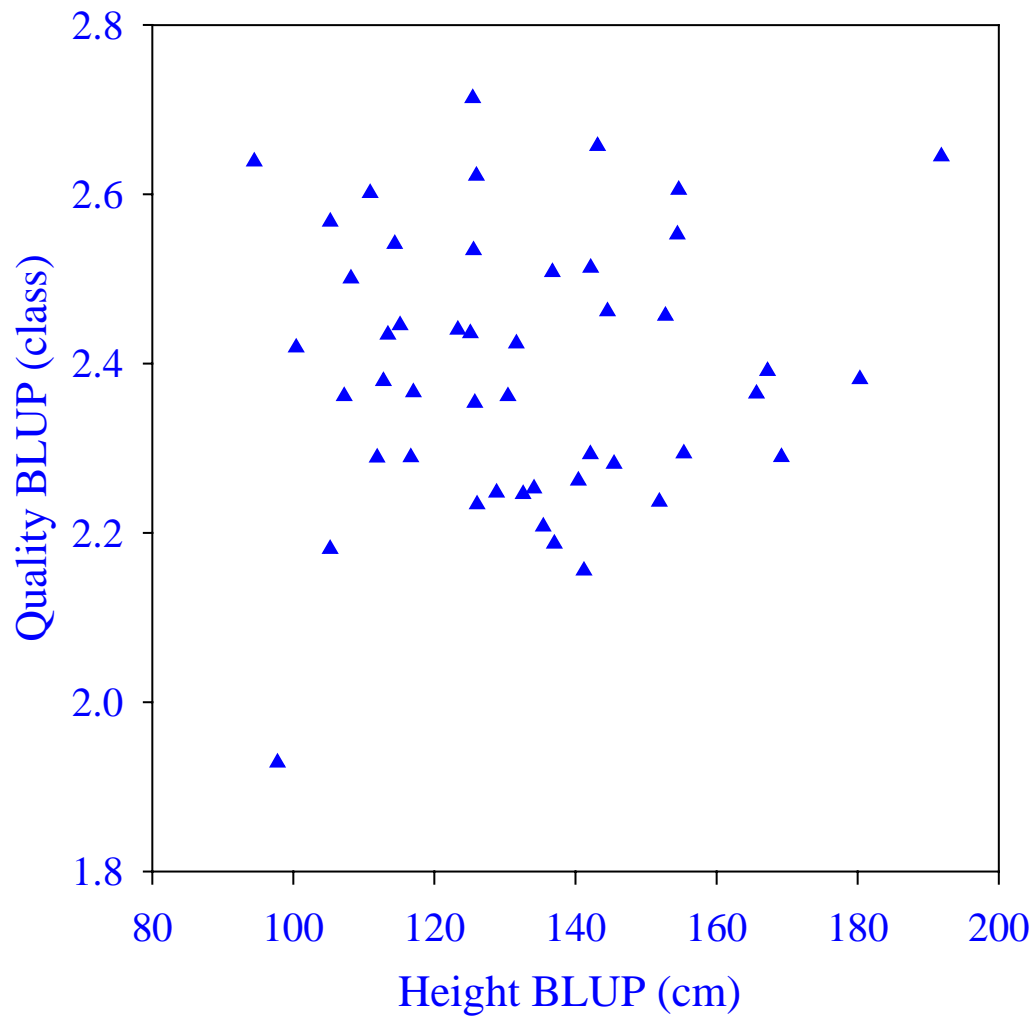


Results:

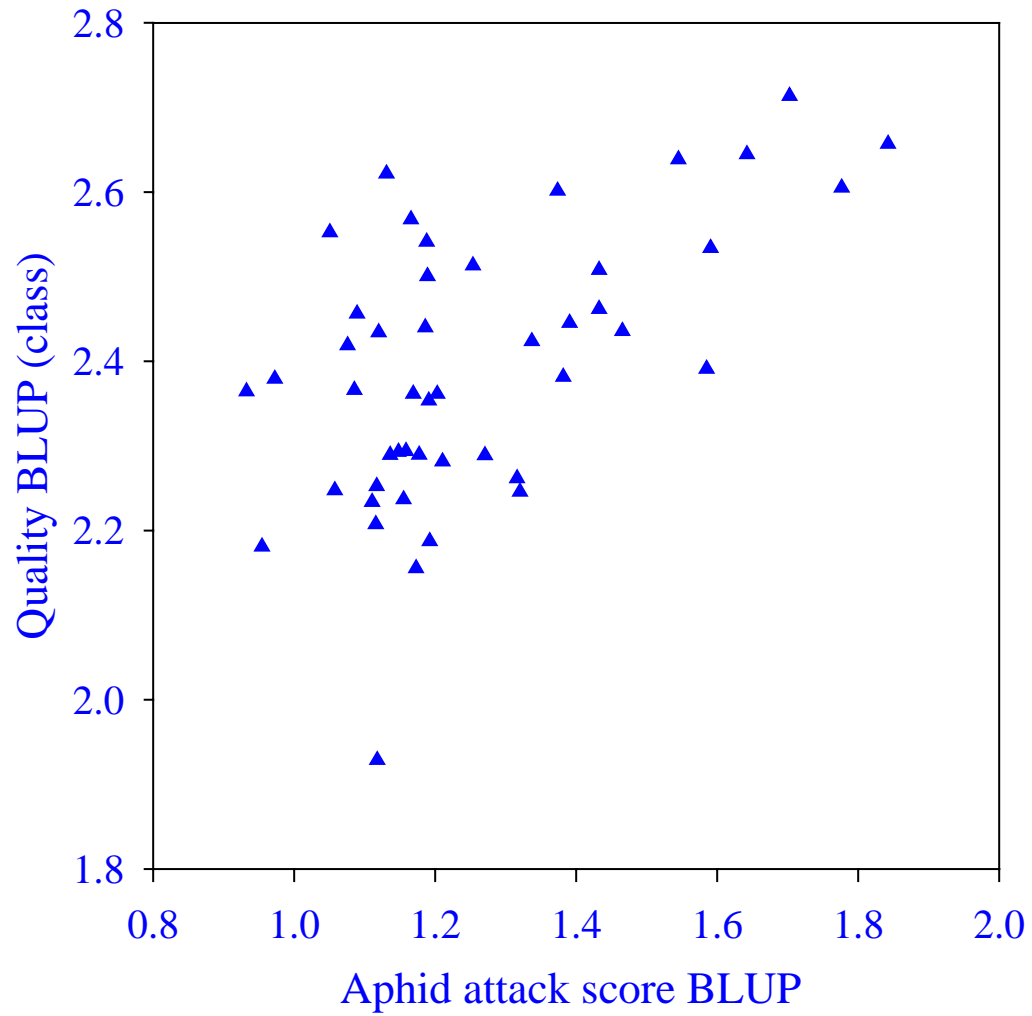
Variance components of various traits in full sib families

Source	Quality		Height		Twigs		Aphid	
	Var	Var%	Var	Var%	Var	Var%	Var	Var%
Father	0.074	13.6	400	14.1	0.00	0.0	0.02	3.1
Mother(father)	0.042	7.7	604	21.3	0.28	16.0	0.06	12.6
Residual	0.428		1829		1.44		0.43	
Total (Vp)	0.544		2833		1.72		0.51	

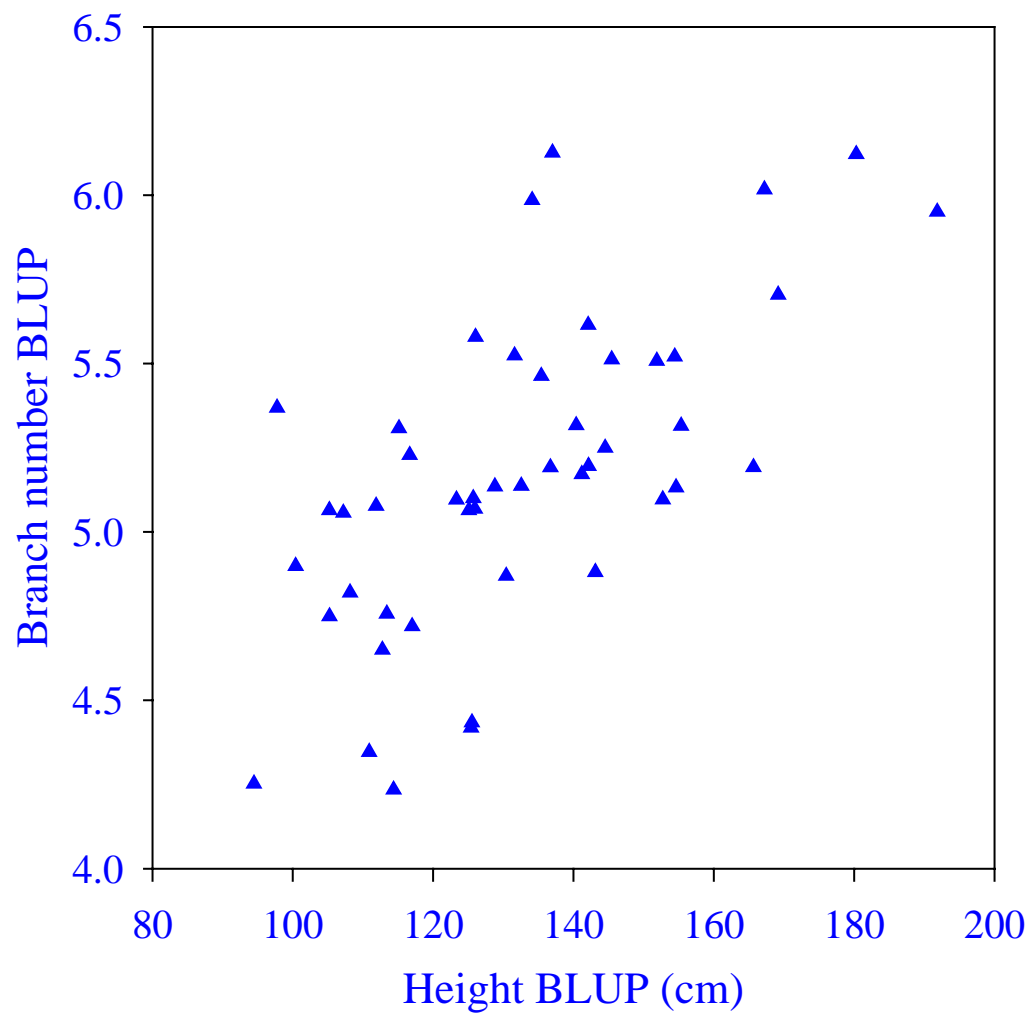
No correlation between height and quality class
in full sib families.



Correlation between little aphid attack
and quality class in full sib families.



Correlation between height and number of branches in the whorl in full sib families

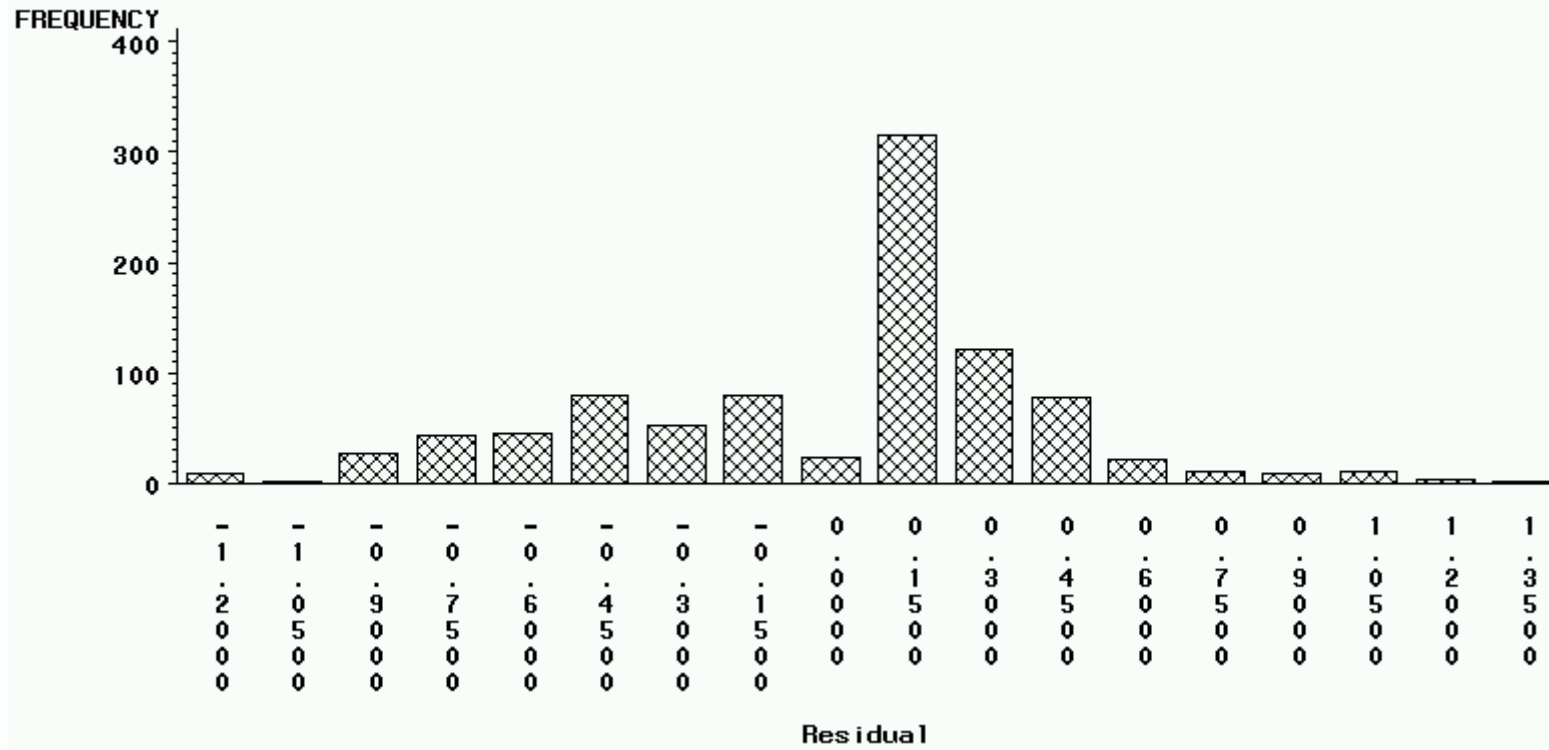




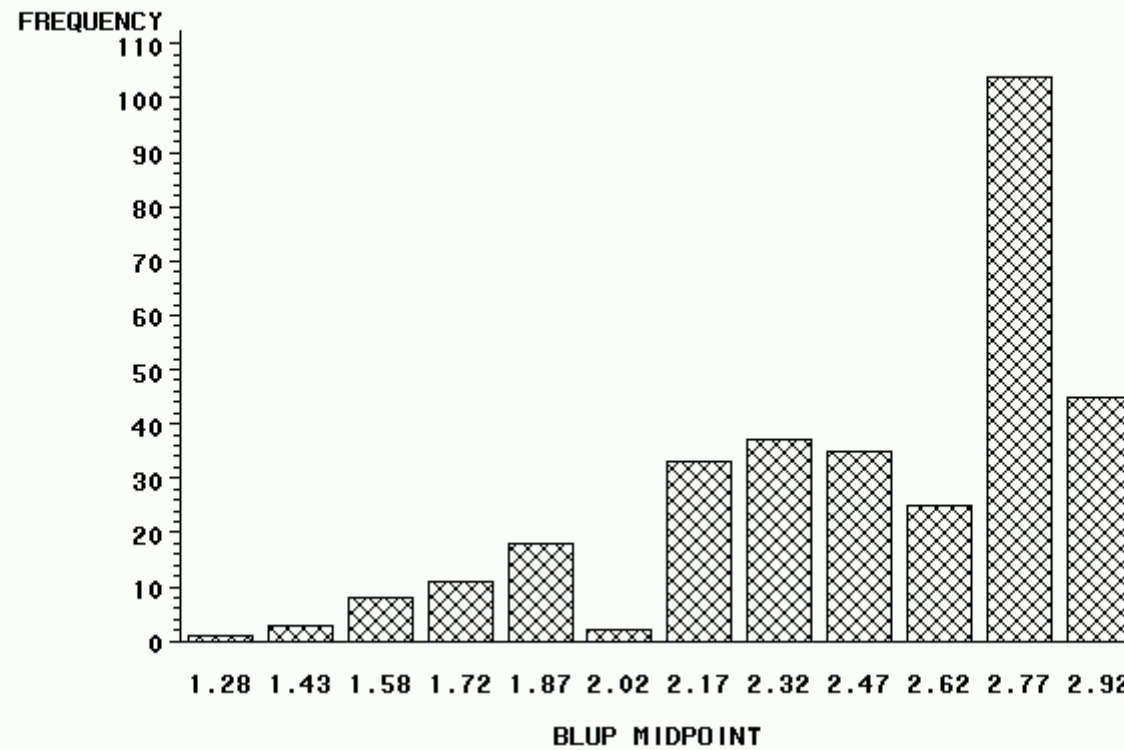
Results:

Variance components for various traits in clones								
	Quality		Height		Twigs		Aphid	
Source	Var	Var%	Var	Var%	Var	Var%	Var	Var%
Clone	0.214	47.5	1007	42.7	0.50	36.7	0.04	46.6
Residual	0.237		1353		0.86		0.05	
Total (Vp)	0.451		2361		1.37		0.09	

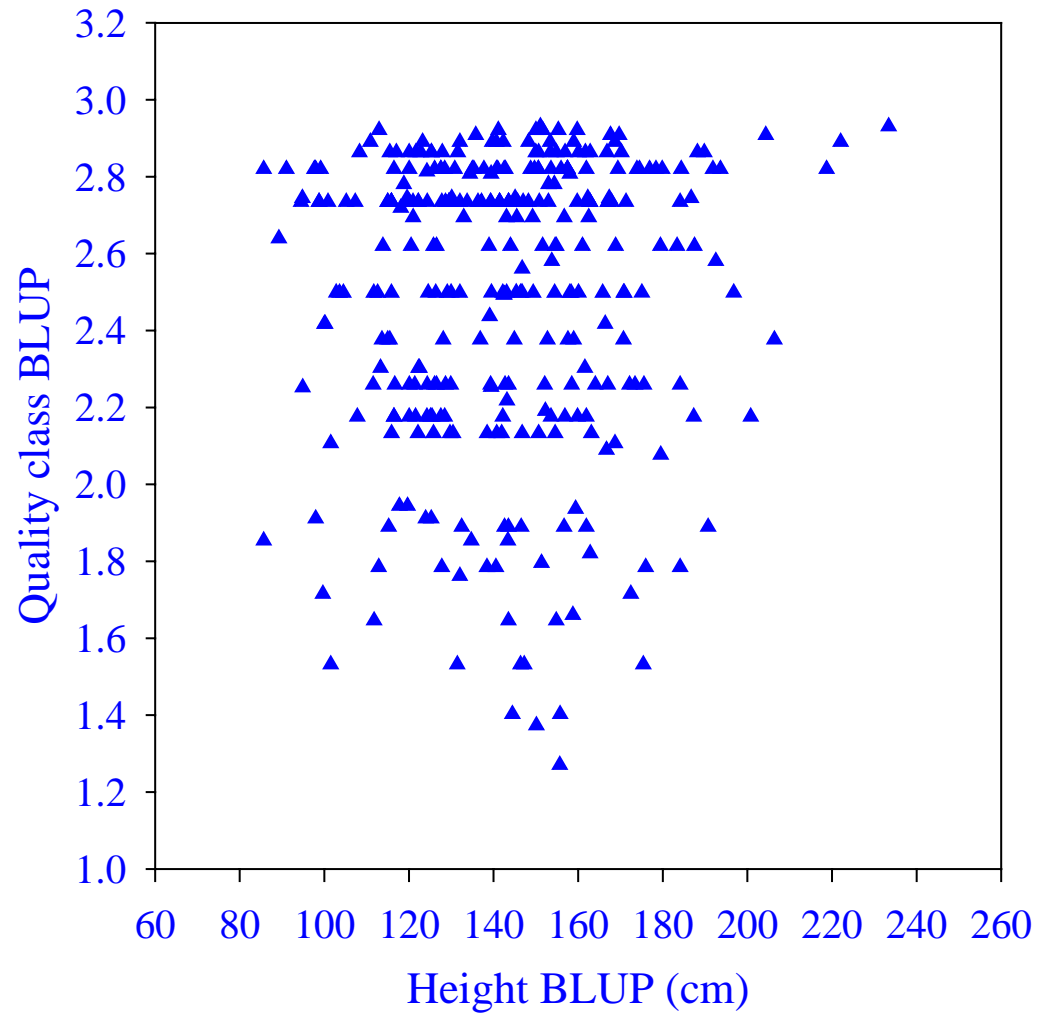
Distribution of residuals of quality class



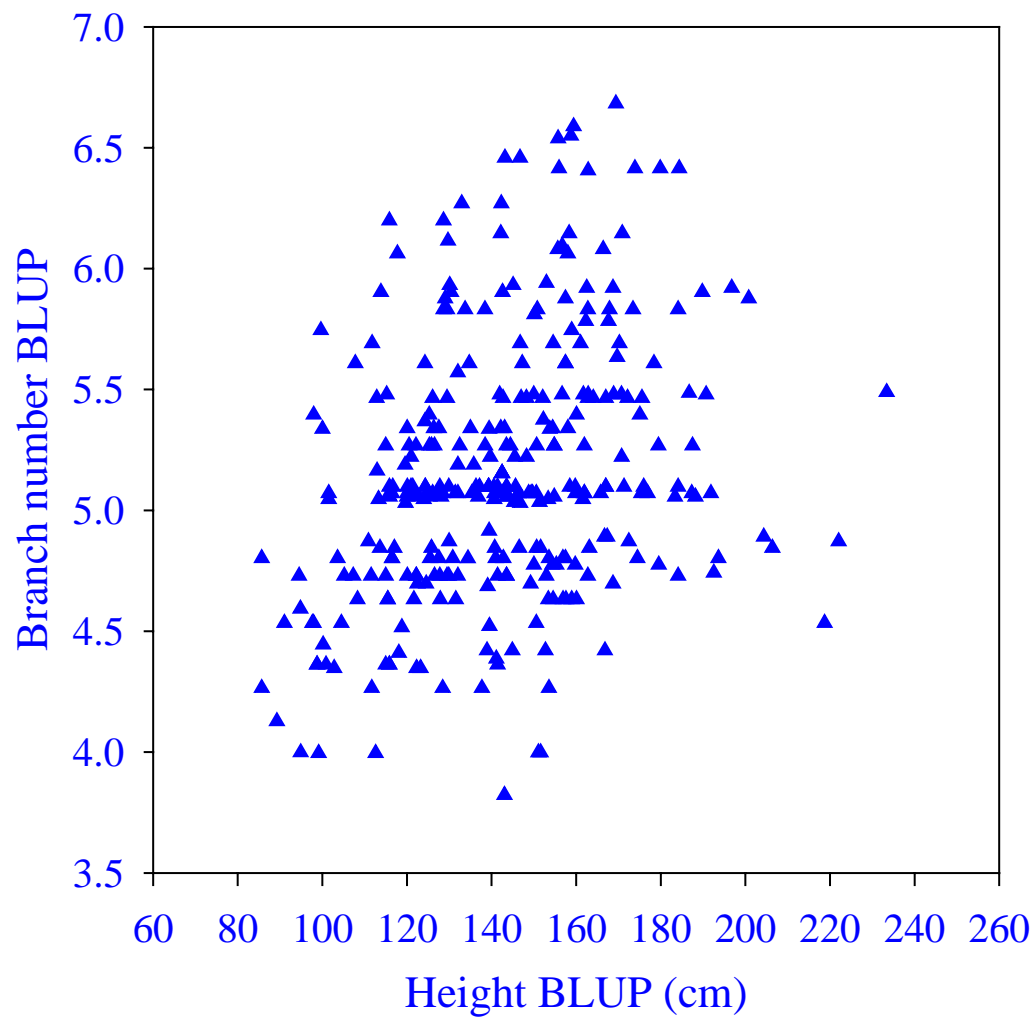
Distribution of BLUP values of quality class



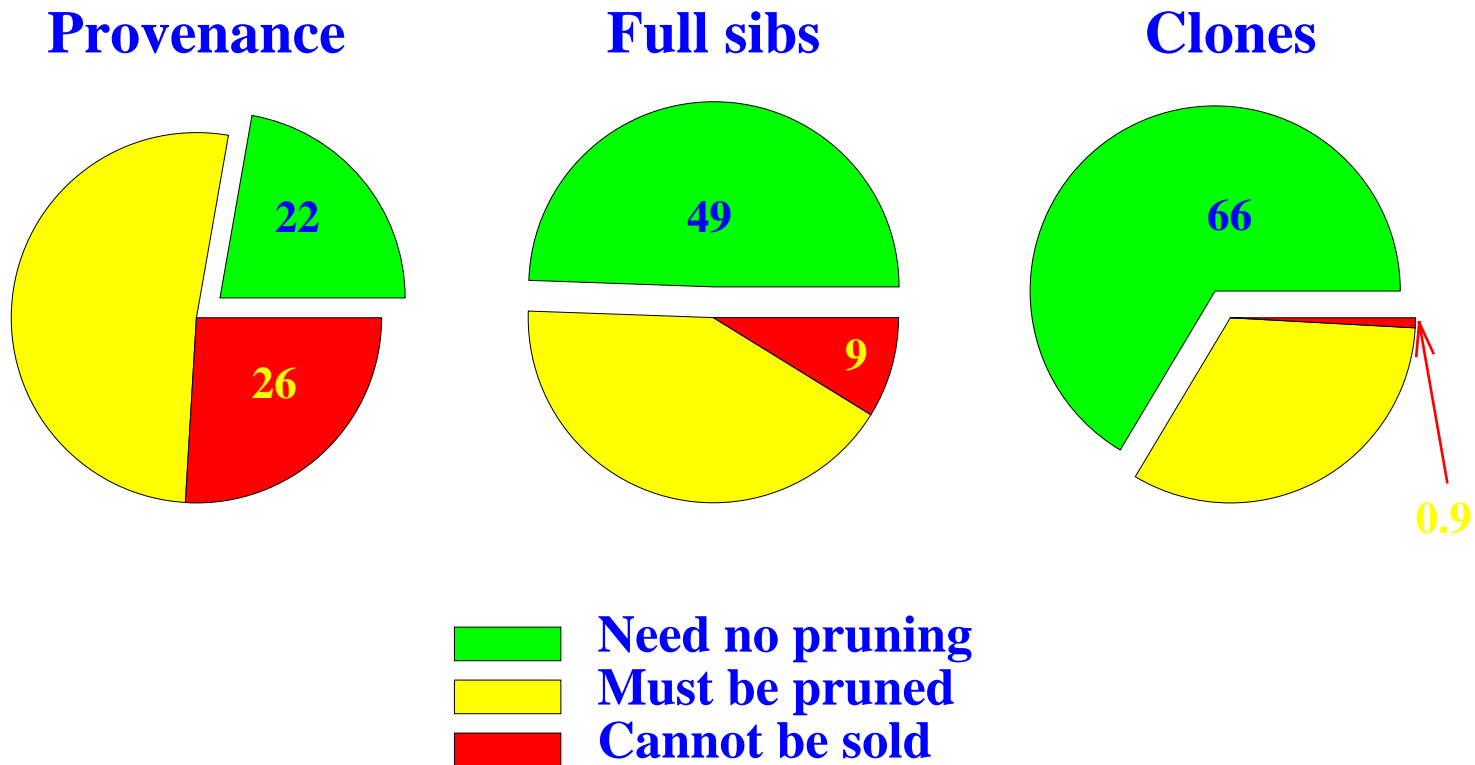
No correlation between height
and quality in clones



Weak correlation between height and branch number in clones



Christmas tree quality in selected groups of *Abies lasiocarpa* at the "Oladalen" site



Conclusions

- Testing and selection always needed
- Limited effect of provenance selection only
- Full sib families gives larger gains
- Clones gives the largest gains
- Best clones within the best families would give even better results

Thanks to:

- Oppland Forestry Society
- Norwegian Research Council
- Gunnar Haug
- Anne Tove Rognstad & Borgny Grønstad