

Cause or correlation – why do mixed forests grow better?

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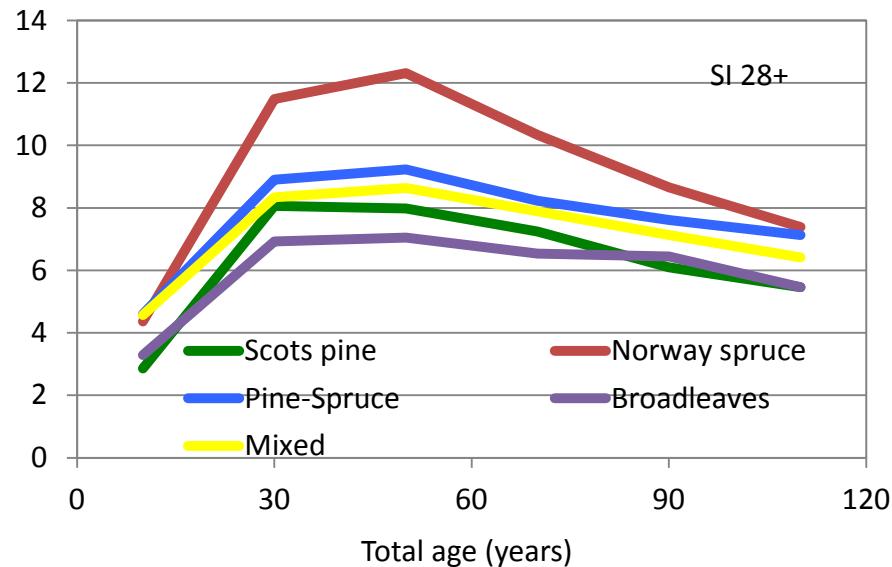
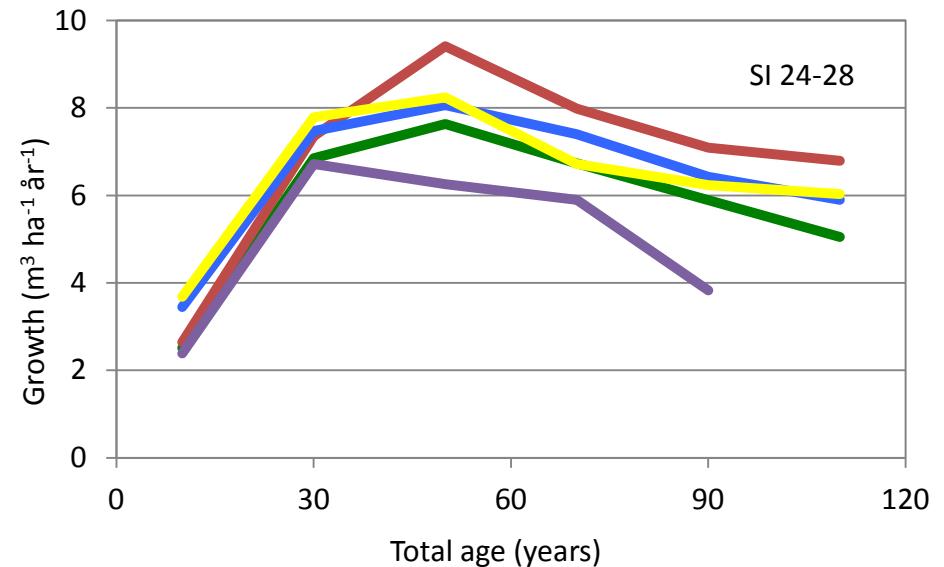
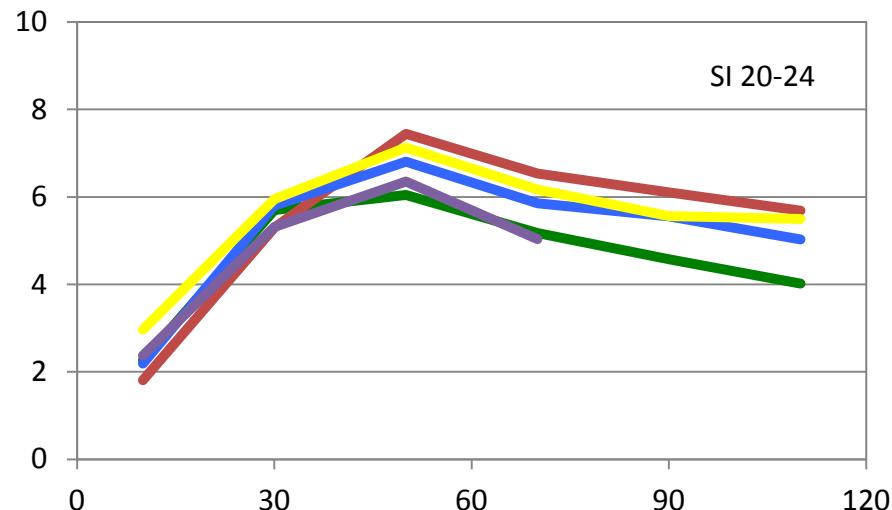
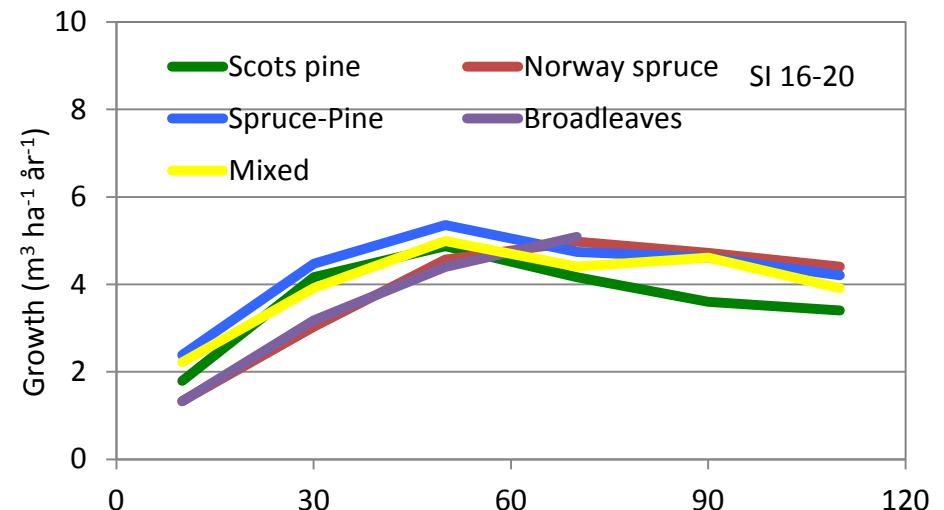
Southern Swedish Forest Research Centre

Outline

- Site productivity
- What do we compare with?
- Mixed species stands in southern Sweden

Production in pure and mixed species stands.

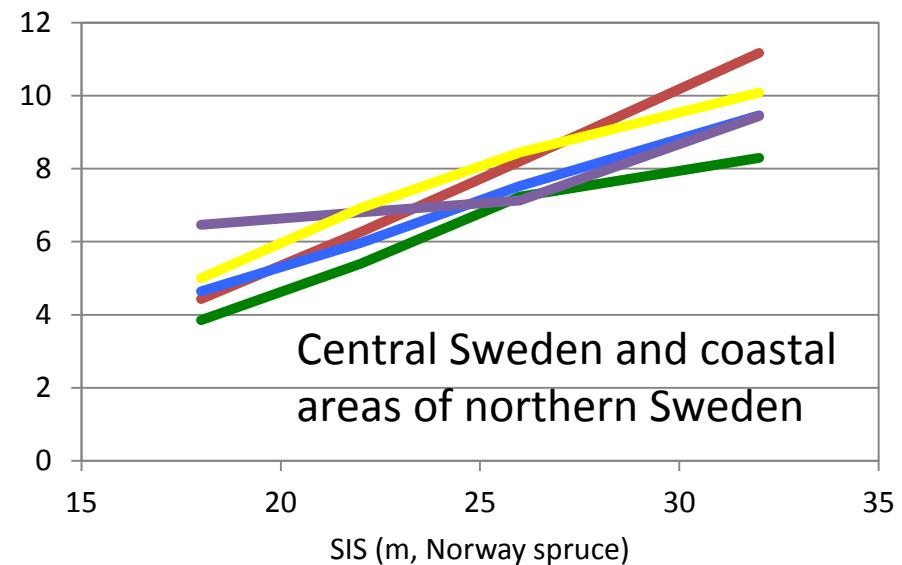
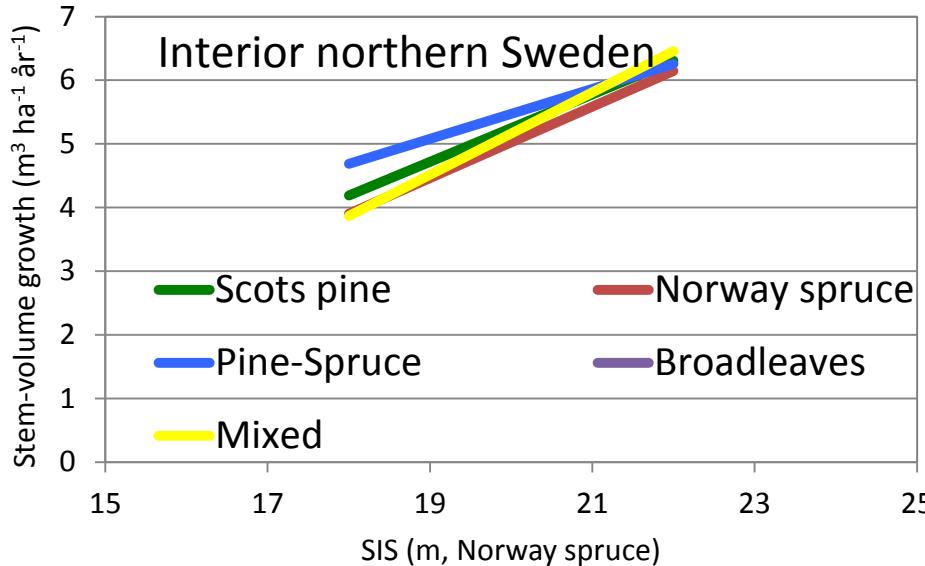
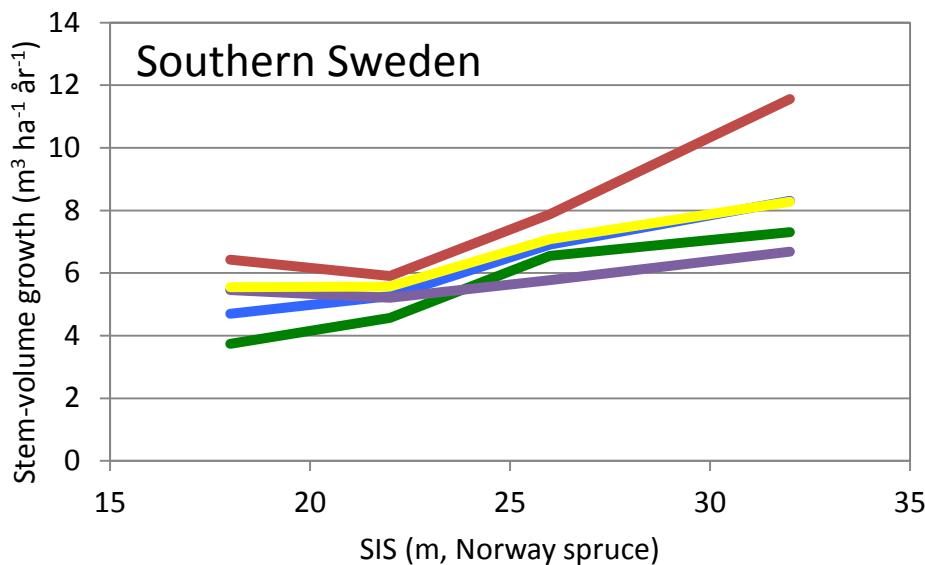
Whole of Sweden (Permanent sample plots 1983-2010)





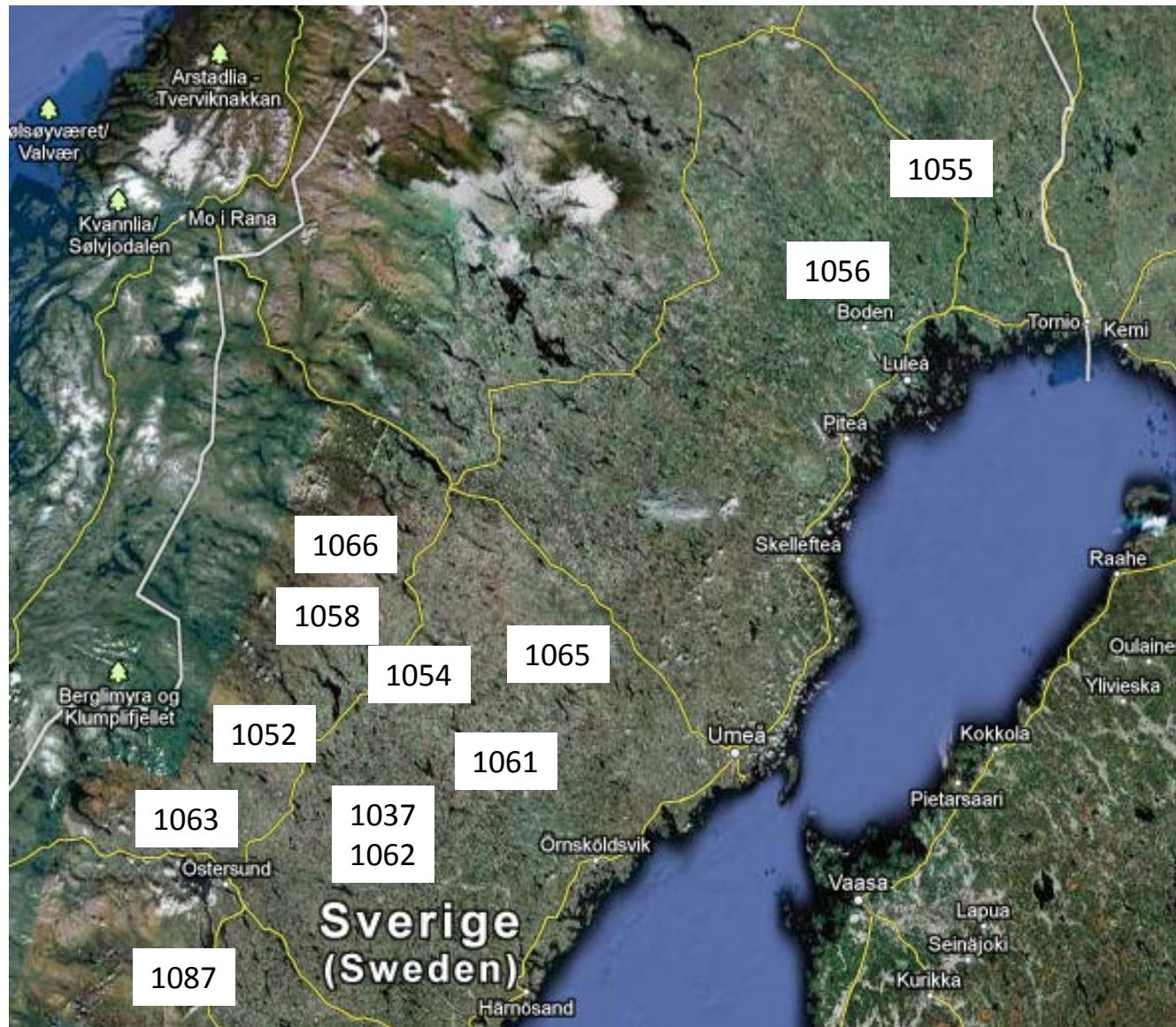
Stem-volume production in pure and mixed stands at different site-indices in different regions in Sweden.

Permanent NFI-plots 1983-2010, mean height 12-25 m)



- Scots pine
- Norway spruce
- Pine-Spruce
- Broadleaves
- Mixed

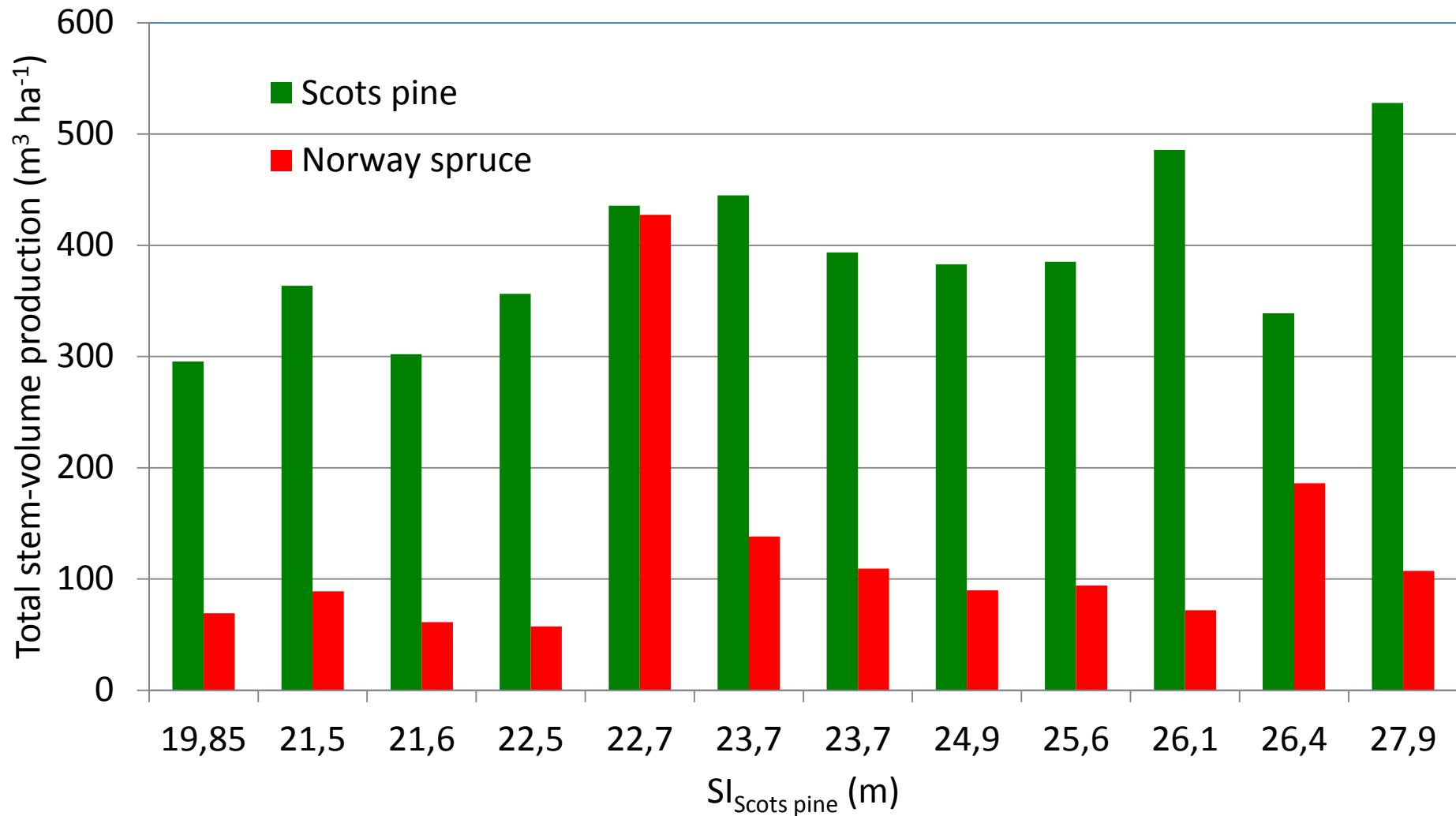
Tiréns comparison between Norway spruce and Scots pine





Total stem-volume production

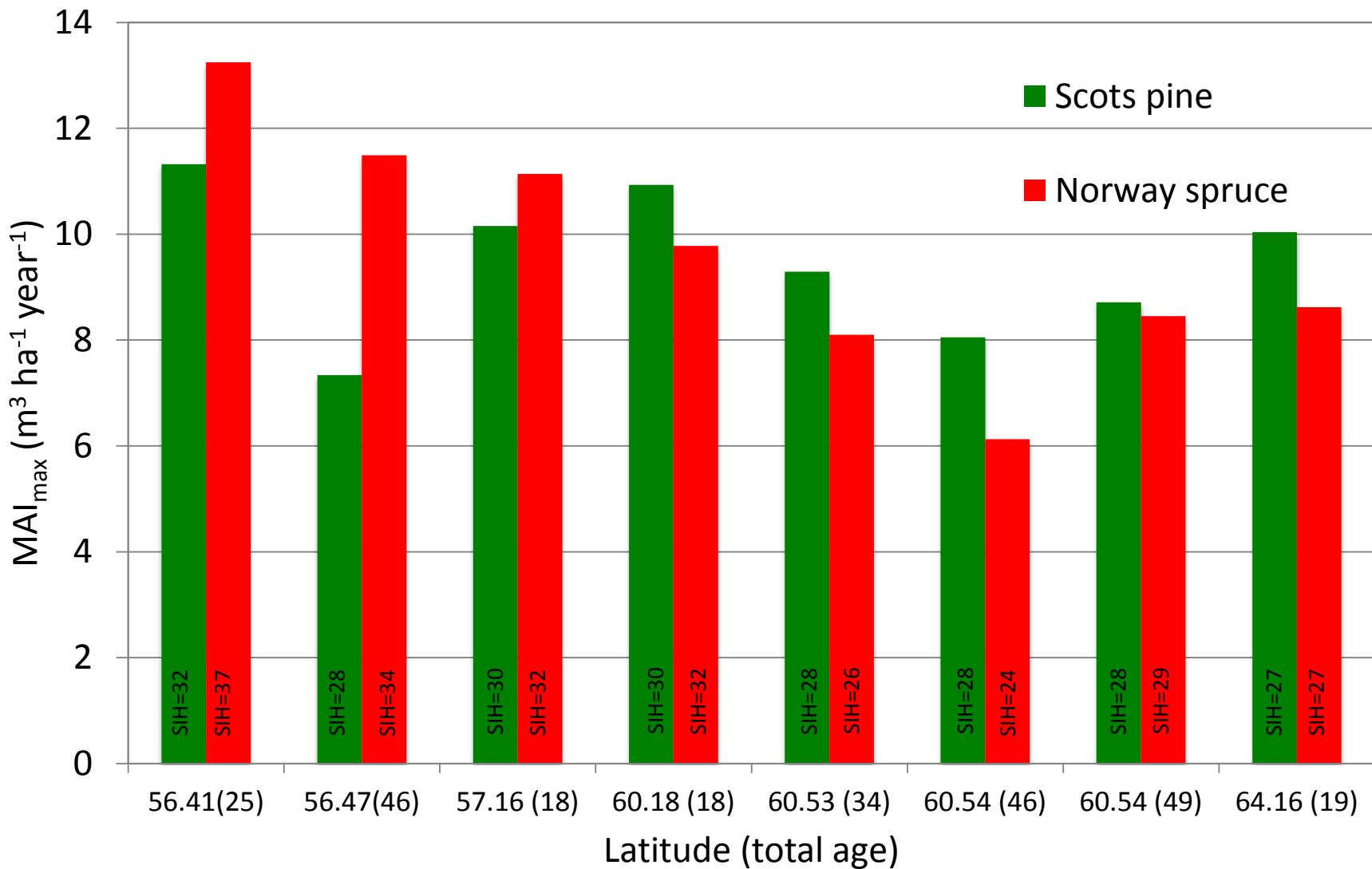
Tiréns Scots pine-Norway spruce experiments



Tree species experiments



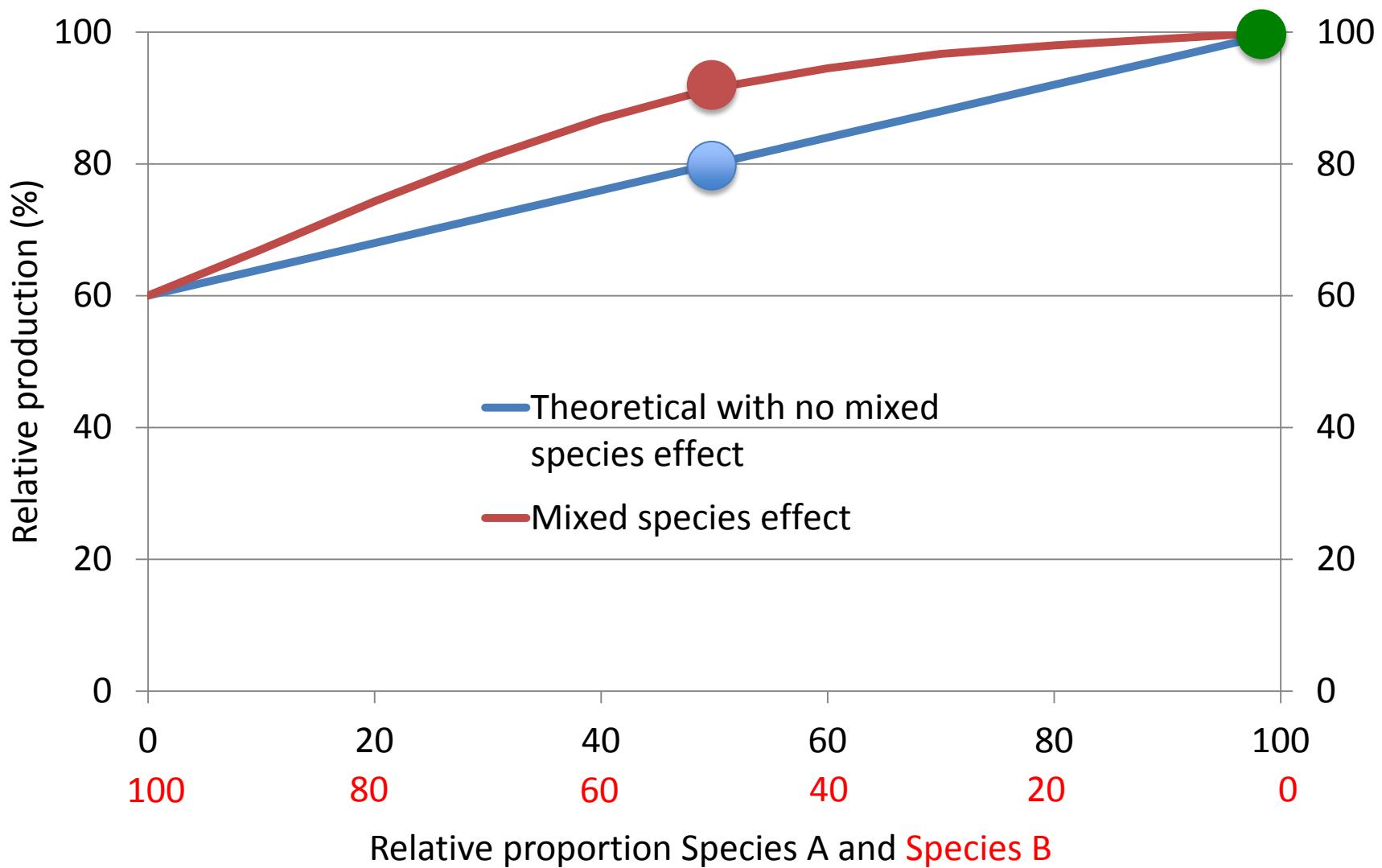
Simulated MAI_{max}. Tree-species experiments from Tönnersjöheden in the south to Vindeln in the north



Discrepancies between NFI and experiments

- NFI-data show higher growth for Norway spruce than for Scots pine in almost all regions and all site-index classes
- Experiments show higher growth for Scots pine in Central and Northern Sweden on almost all site-index classes
- Possible reasons for discrepancies:
 - Difficulties to represent productivity in the NFI-data
 - Possible differences in management – lower basal area in Scots pine
 - Difficulties to determine total age
 - Genetics
- Comparison between NFI-plots are difficult to do until we have a good measure of site-productivity
- However, both NFI-data and experiments indicates little or no decrease in production in mixed forest stands as compared to monocultures (except for the most productive sites in southern Sweden).

Theoretical production in a two-species mixture



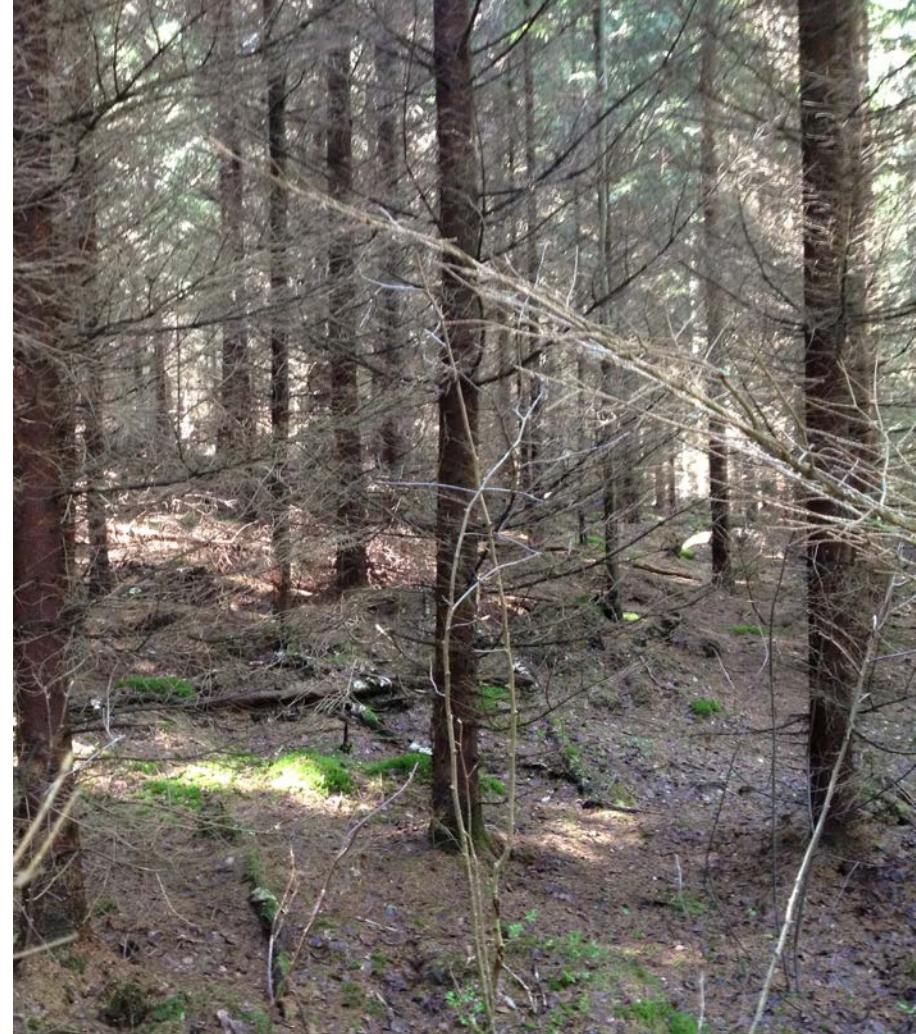
Conclusion mixed species stands

- Little or no effect on production if good producers have a large share of the mixture
- Several other ecosystem services are enhanced by mixed species stands:
 - Biodiversity
 - Recreation
 - Landscape
 - Risk for damage/Risk diversification
 - Etc...
- A “win-only loose a little” situation

Snogeholm



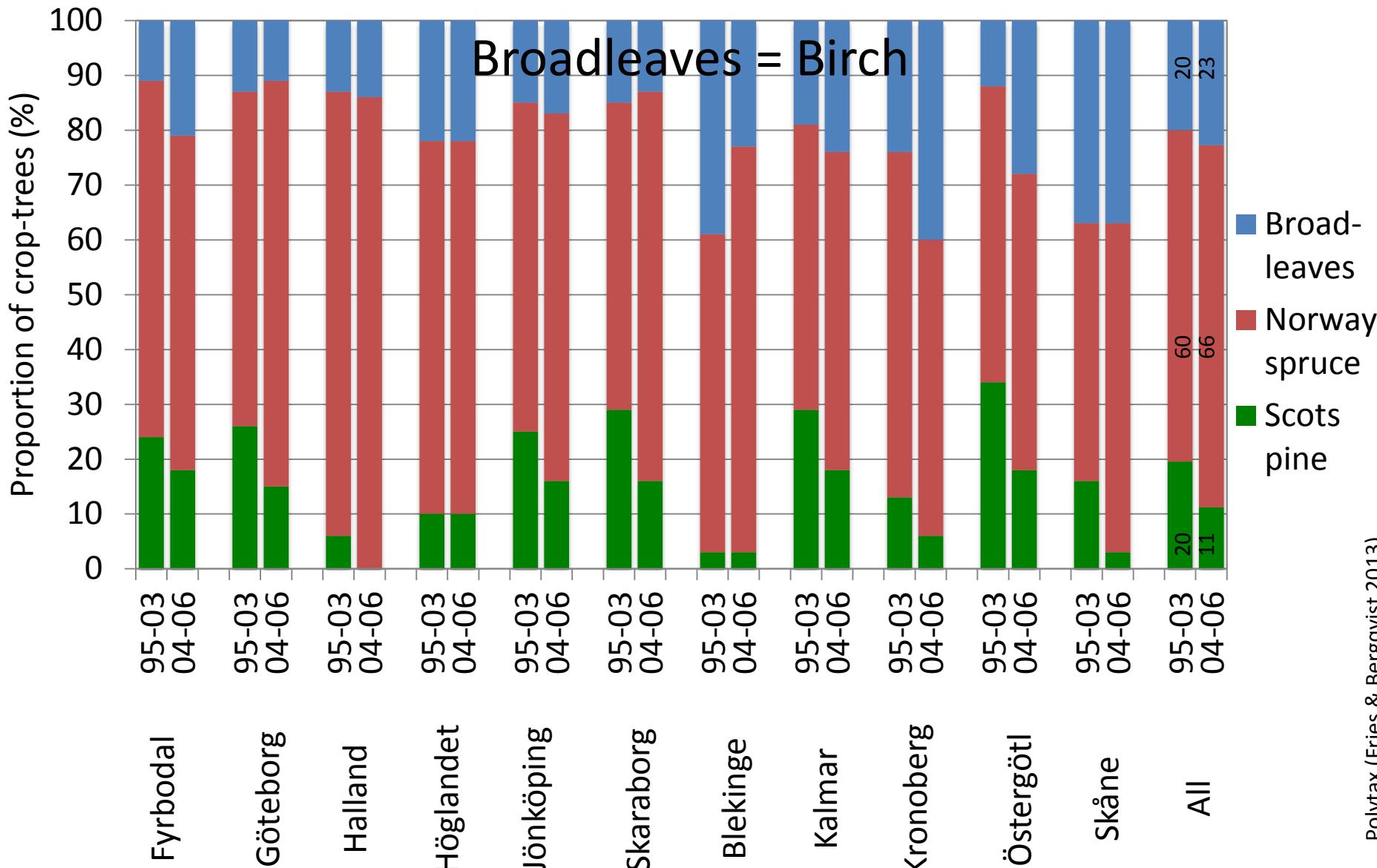
Brudahall



Scots pine – Norway spruce mixtures

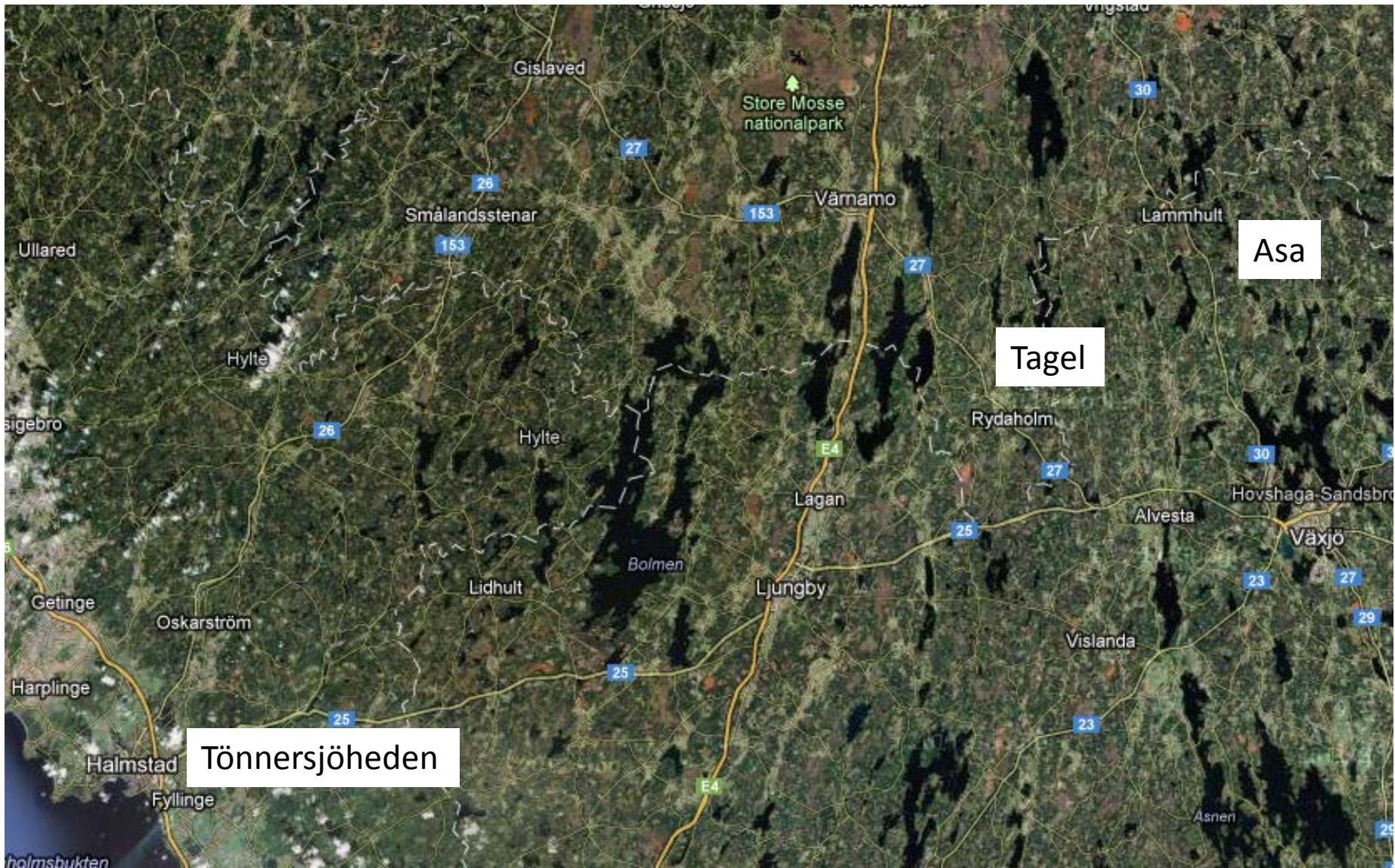


Crop trees in south Swedish regenerations established in 1995-2003 and 2004-2006

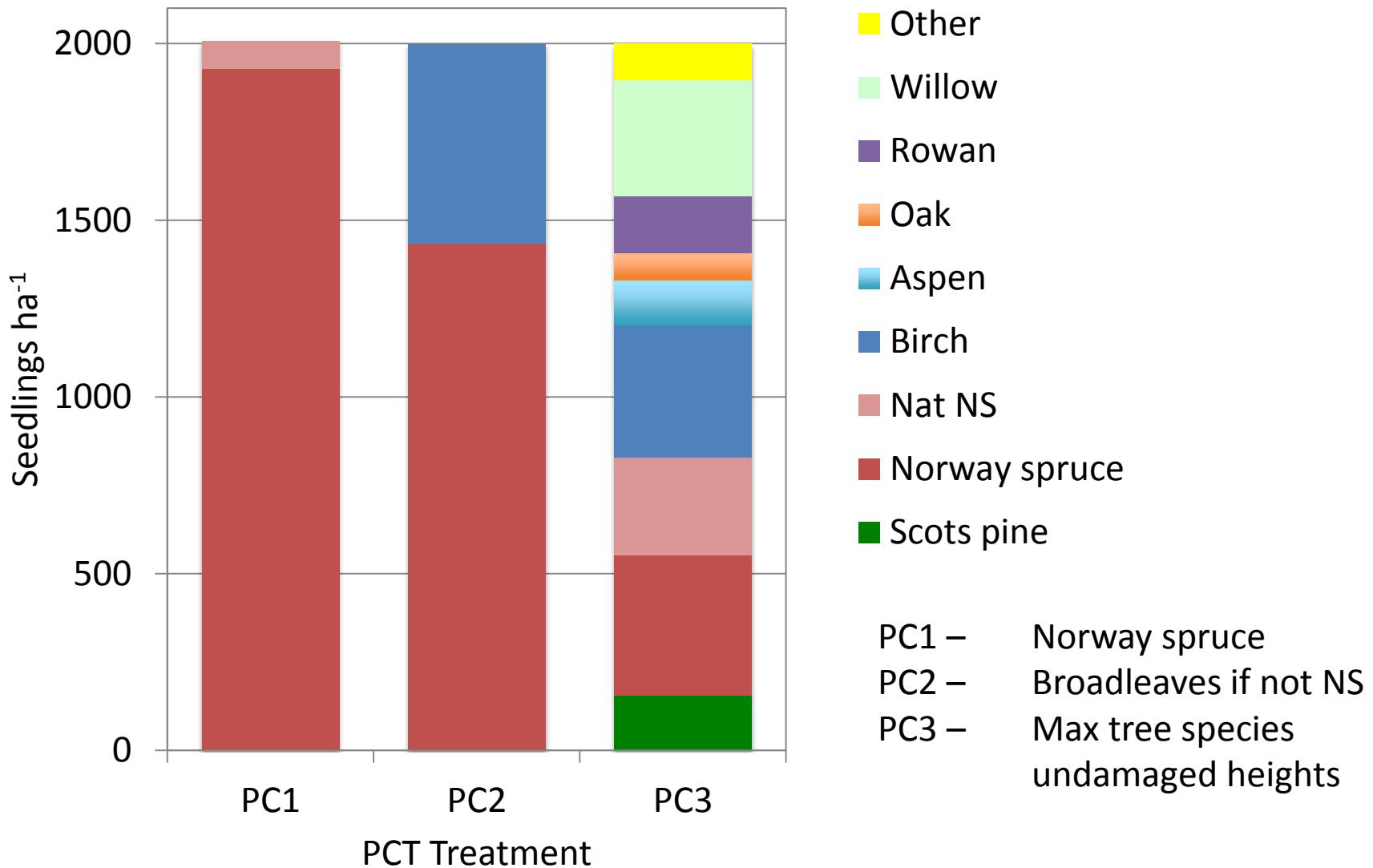




Regeneration and pre-commercial thinning experiment



Tree species composition after simulated pre-commercial thinning.



Conclusion

- Production is probably very little affected by mixed species stands if good producers have a large share of the mixture
- Several other ecosystem services are enhanced by tree species mixtures
- Win-only loose a little situation
- But in southern Sweden it will only be mixtures with Norway spruce and birch due to the current browsing pressure
- In central and northern Sweden, mixtures of Scots pine, Norway spruce and birch are possible but probably nothing else

Gudrun clearcuts

