

# SWEDEN

## Introduction

Broad-leaved species constitute 15 % of the total standing volume. Of the total broad-leaved standing volume, Birch is dominant with 67.5 % followed by Aspen 8.8 %, Oak 6.3 %, Black Alder 5.4 %, Beech 4.0 %, Goat Willow 2.4 %, Grey alder 2.3 %, Rowan 1.1 %, Ash 0.8 %, Elm 0.3%, Lime 0.2 %, Norway Maple 0.2 % and a mixture of other species 0.7 %.

The following eight species are defined as “noble” hard-wood trees according to the Forestry Act: Elm (3 sp.), Ash, Hornbeam, Beech, Oak (2 sp.), Wild Cherry, Lime (2 sp.) and Norway Maple.

## Past and ongoing activities

### Production

Yield tables for *Fraxinus excelsior* have been established from 15 plots in southern Sweden. The plots were established between 1917 and 1925 and many of them are still running and measured by SLU.

Provenance trials of *Prunus avium* have been established at several sites in southern Sweden since 1990.

Demonstration plots at former farm land at two sites in southern Sweden were established in 1995 by SLU. They contain all valuable broadleaved tree species plus other tree species (18 species in total) in single species plantations and in mixtures (totally 67 combinations).

Six other demonstration plots at forest land combined with research plots with randomized block designs were established from 2000 to 2002 by SLU in southern Sweden. They contain side by side plantations of *Fraxinus excelsior*, *Tilia cordata*, *Prunus avium*, *Betula pendula*, *Acer pseudoplatanus*, plus beech, oak, larch and Norway spruce.

Nutritional ecology and content in old stands of *Tilia cordata*, *Fraxinus excelsior*, *Betula pendula* were studied at Lund University and presented in a PhD-thesis in 2004.

The results from a number of field experiments in pre-commercial thinning of Birch, Black Alder, Lime and mixtures of mainly Birch and Black alder will be published by Skogforsk in a near future.

### Regeneration

Natural regeneration of *Fraxinus excelsior* in southern Sweden was studied and presented in a PhD-thesis at Stockholm University in 1994.

Natural regeneration of especially *Betula pendula* in southern Sweden was studied and presented in a PhD-thesis at SLU in 2001.

One PhD-student at SLU-southern Sweden is presently working with natural regeneration of mixed stands containing most of the valuable broadleaved tree species.

Skogforsk has recently published results from a rather cost effective and promising method for direct seeding of Birch.

### **Tree improvement**

Results have been published by Skogforsk concerning the effects of transfer of *Betula pendula* provenances within the range of latitude 66° to 56°.

At Skogforsk breeding of *Betula pendula* restarted during the 1980<sup>th</sup>. Indoor seed orchards have during the last decade produced a number of improved varieties. Scientific publications are available describing genetic parameters after 15 years of breeding work.

Skogforsk has an ongoing breeding programme together with Lithuania in *Alnus glutinosa*.

An oak breeding programme for *Quercus robur*, *petraea* and *rubra* has recently restarted at Skogforsk with the aim to establish clonal- and seedling seed orchards.

For most other native broad-leaved species, at least 100 plus trees have been selected by Skogforsk, and clonal seed orchards established. Progeny testing of clones has started.

### **Other activities**

Biodiversity and amount of threatened species in valuable broadleaved forests have been studied and compared with other forest types by SLU-Uppsala from 1990-1994.

The dynamics of forest types and the development of forests in southern Sweden from 3000 BP to present have been analyzed in several PhD-thesis at SLU and Lund University. Historical pollen-data that includes all valuable broadleaved tree species.

Since 2003, SLU is running a research programme together with the forest industry. This is including all valuable broadleaved tree species plus oak and beech. The research programme covers aspects of: 1) Production; 2) Nature Conservation; 3) Social values and 4) Wood utilization.

Skogforsk has recently launched a decision support tool for deployment of broad-leaved stands within an estate, taking wood production, biodiversity, recreation and cultural heritage into account.

A joint project between Skogforsk and the commercial forestry organisations in south Sweden, to promote forestry with broad-leaved trees, and containing most important aspects of the subject, was completed some years ago.

Skogforsk has since several years had a Webb-based decision support tool to support forest owners with silvicultural decisions in Birch, Aspen and Alder stands. The system is now revised and built out with more subjects besides silviculture. In a near future the system will be completed with the “noble” hardwoods in cooperation with SLU.