

COST ACTION E42
Growing Valuable Broadleaved Tree Species
Resources and Research in Flanders, Belgium

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1. Valuable broadleaves in Flanders

Forest area in Flanders covers a little less than 147,000 ha representing 10.8 % of the total surface. About three quarters of the forest land is privately owned.

Since 1990 forest area decreased with 6,100 ha. Most of the deforestation is located in residential areas (27 %), agricultural areas (18 %), industrial areas (17 %), nature reserves (11 %) and recreational areas (10 %).

Forest policy strongly promotes the conversion of homogeneous conifer stands into mixed hardwood stands. Consequently, the actual share of coniferous forest (5.5 %) is decreasing annually.

In comparison to the most common tree species in Flanders, viz. inland oak and beech, the area of the tree species targeted by COST E42 is rather important and accounts for about half of the total forest area (Table 1).

Tree species	Area (ha)	Tree species	Area (ha)
<i>Quercus robur</i>	50,214	<i>Betula</i> spp.	7,197
<i>Quercus petraea</i>	15,512	<i>Tilia cordata</i>	5,816
<i>Fagus sylvatica</i>	14,970	<i>Acer pseudoplatanus</i>	5,376
<i>Fraxinus excelsior</i>	10,843	<i>Castanea sativa</i>	5,243
<i>Prunus avium</i>	8,686	Other	7,193
<i>Alnus glutinosa</i>	7,222	Totaal	138,272

Table 1. Area of the most important hardwoods species in Flanders

Moreover, valuable broadleaved tree species are expected to become more important in Flanders as they are increasingly used for re- and afforestation and for stand conversion. This trend results from the acknowledgement of their high silvicultural, ecological and economical importance. Furthermore, species such as wild cherry and common ash are promoted as potential alternatives for poplar in view of the forestation of abandoned farmland.

2. Research

The above-mentioned line of policy generates a strong demand for high quality forest reproductive material (FRM), which can not be met by the currently available basic material. The potential for selecting seed stands is limited and the existing seed orchards are marked by a largely insufficient productive capacity, mainly due to their restricted surface area (Table 2)

Tree species	Plus trees	Seed stands		Seed orchards	
		Nbr.	Total Surface (ha)	Nbr.	Total Surface (ha)
<i>Acer pseudoplatanus</i>	19	1	0.60	1	0.52
<i>Alnus glutinosa</i>		5	4.19		
<i>Betula pendula</i>		1	1.40		
<i>Fraxinus excelsior</i>	37	1	1.30		
<i>Prunus avium</i>	158	2	0.63	1	0.85

Table 2. Forest basic material of valuable broadleaves in Flanders

The research on valuable broadleaves as it is pursued at the Research Institute for Nature and Forest mainly focuses on selection and breeding of wild cherry and common ash in an attempt to remedy the discrepancy between supply and demand of FRM.

Wild cherry

The main objective is the establishment of a new generation of clonal seed orchards which are to be characterized by a high yield and by a high genetic quality and diversity of their offspring.

The basis consists of a collection of 158 phenotypically superior plus trees, distributed over 27 different populations throughout Belgium and resulting from a scouting campaign which has been going on since the early 80's. Vegetative copies of these plus trees, obtained by grafting or budding, were planted in 7 experimental plots. These multiclonal plantations do not only allow for the evaluation of the genetic background of the superior traits observed on the original mother trees, but also serve as a gene pool from which the constituents of the new seed orchards can be selected.

The adopted research strategy pursues a fourfold aim:

- i. Identification of the very best clones within the above-mentioned collection, based on:

- their general combining ability for a number of adaptive traits such as vigour, morphology, phenology and disease resistance;
- the narrow sense heritability h^2_A for these traits.

In order to ensure a sufficient genetic diversity within the seed orchard, the genetic distance between all genotypes in the basic collection has been assessed using 10 polymorphic microsatellites.

- ii. Designing the layout of the seed orchard and establishment of the minimum isolation standards with regard to surrounding natural populations of wild cherry and sweet cherry cultivars. Tracing the optimal spatial arrangement of the clones within the orchard will result from the linking of the understanding of the occurring mating patterns to the identification of the incompatibility alleles of the clones selected.
- iii. Assessment of the genetic diversity of the offspring of the seed orchards, compared to the diversity of the progeny of naturally regenerated forest stands of wild cherry

Common ash

Research efforts focus on the follow-up of a pan-European provenance trial, established in 2003 within the scope of the EU FP5 project “Realizing Ash’s Potential” (acronym RAP).

The trial includes 51 provenance from 10 countries and has been installed on two different sites in Flanders in order to trace a possible site/provenance interaction. The major outcome of this research project will be:

- i. The drawing up of a List of Recommended Provenances of common ash for Flanders
- ii. Assessment of the European diversity through observation of adaptive traits and through molecular research.

The establishment of identical trials in seven other participating countries will allow the identification of the provenances marked by a high stability (i.e. low provenance/site interaction) on an European level. These provenances are highly valuable in view of the expected climate change.

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