

# A review of the Irish Birch and Alder Improvement Projects

Teagasc and UCC collaboration

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Teagasc.



Funded by:



## Ireland: Forestry land cover

1999 = 9 %

2004 = 10 % (680,000 ha.)

National forestry strategy 2035 = 17 %

- Of which 20% will be broadleaves Financial incentives to promote planting and the range of species planted
- A 10 % minimum commercial broadleaf requirement advised for each planting - role for birch

EU average = 35%.

‘In Northern Europe birch is commercially the most important broadleaved species’

J. Hynynen et al. Forestry 2010 83: 103-119

Unable to put birch on the recommended species list as had not seen any evidence of good form in Ireland -

Dr Niall OCarroll Chief Inspector of the Forest Service

- Potential 10% min. broadleaf requirement on poor quality soil;
- *B. pendula* and *B. pubescens* are native species;
- Increased diversity of Irish forestry species;
- Can produce high quality timber;
- Shorter rotation than most other broadleaved trees (Barrett 2000).
- It can be used as a nurse tree for other timber species.
- Other European *Betula* improvement programmes have shown this genus to be amenable to form and vigour improvement.

# Summary of performance of two trials of foreign birch in Ireland assessed in 1998. (O' Dowd, 2004)

Site	Species	Age (years)	Origin	Tallest individual (m)	DBH (cm)	Survival (%)
Comeragh Forest	<i>B. pendula</i>	32	Sweden A	12.5	8.1 ± 0.9*	53
	<i>B. pendula</i>	32	Sweden B	17.0	9.2 ± 1.4	53
Kilmacurragh **	<i>B. pubescens</i>	14	Ireland	10.5	10.3	100
	<i>B. pubescens</i>	14	Finland	10.3	10.2	69
	<i>B. pendula</i>	14	Finland3	12.0	10.0	22
	<i>B. pendula</i>	14	Finland6	8.0	7.9	6

\* standard error \*\* data supplied by Coillte, standard error not available

The development of a sustainable supply of improved, adapted and healthy seed within the framework of the EU Forest Reproductive Material (FRM) regulations.

- Locating the best examples of mature trees (plus-trees) of these species on which to base the improvement programme;
- Collecting scion wood from plus-trees i.e clones;
- Establishing clone banks to preserve the clones;
- Establishing seed orchards;
- Establishing progeny trials to assess the value of the trees as parents.

# Birch:

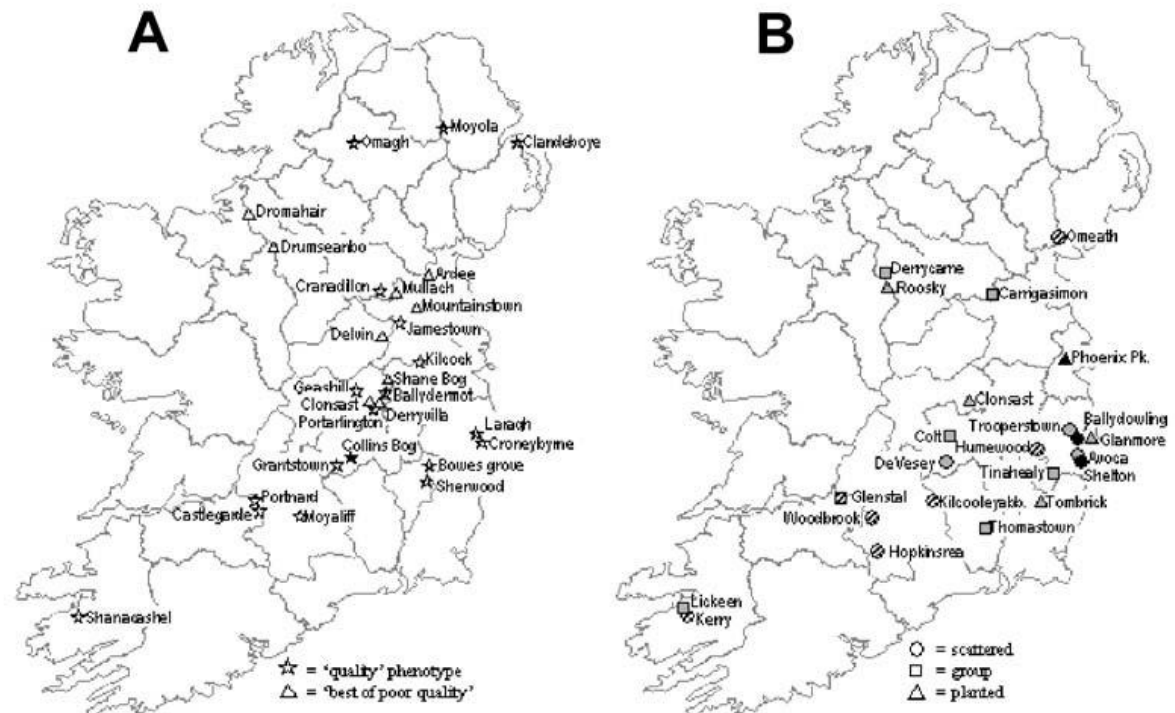
- 'Pilot project for the genetic improvement of Irish Birch' (1998 – 2000).
- 'Irish Birch Improvement Project' (2001– 2004).

## Plus-tree locations

A = birch woods

B = scattered or individual trees

(O' Dowd, 2004)



## Birch to date

- **Establishment of provenance/progeny trials**

- Three sites, 9 ha.
- 27 *B. pubescens*
  - 94 *B. pubescens* families
- 16 *B. pendula* provenances
  - 27 *B. pendula* families,
- 37 controlled crosses of plus-trees (*B. pubescens*)
- Overseas *B. pendula*
  - 7 Scottish provenances,
  - 2 German breeding populations
  - 1 French family.
- Now 10 years-old

- **Clone banks established**

- **Untested seed orchard**

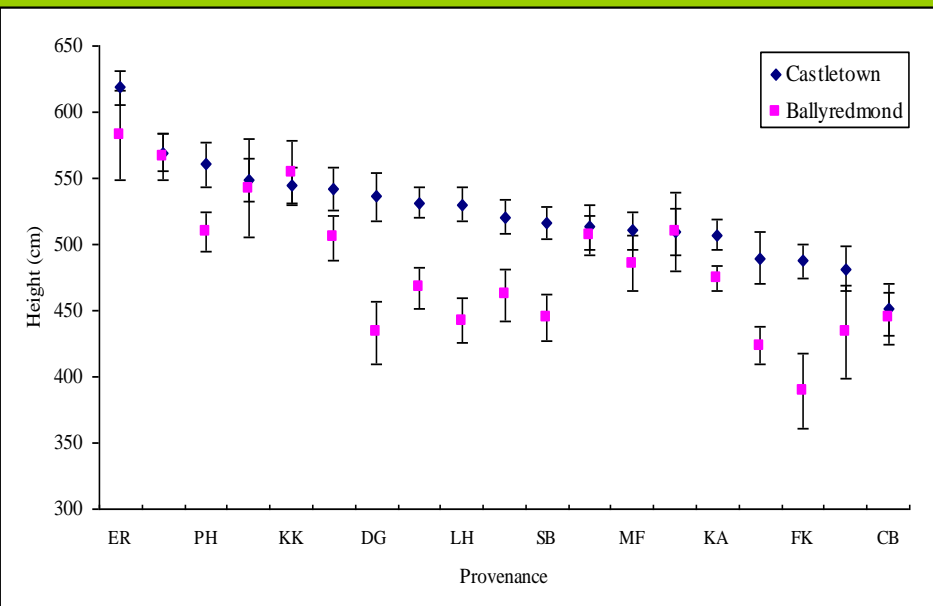
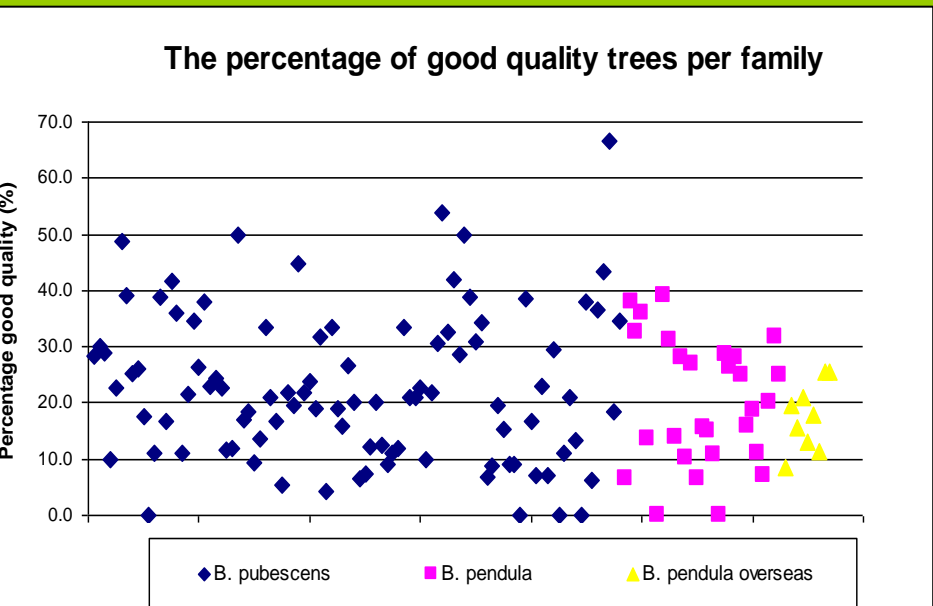
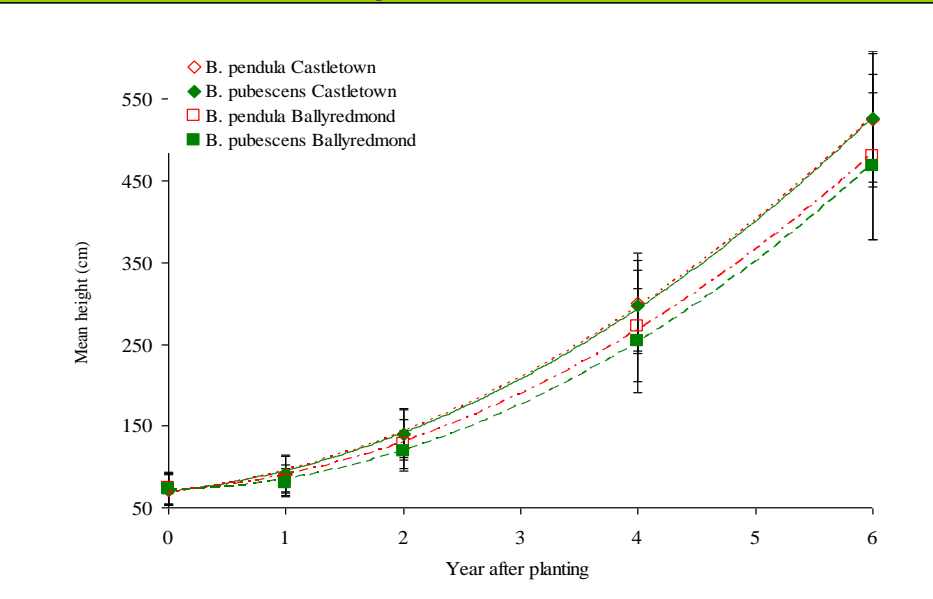
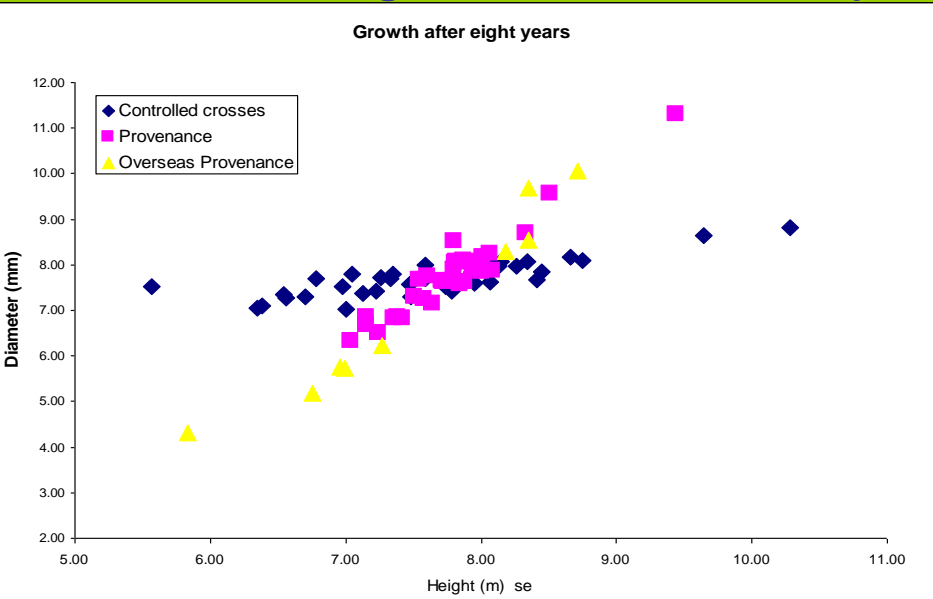


# Results from birch progeny trials;

## Survival and growth

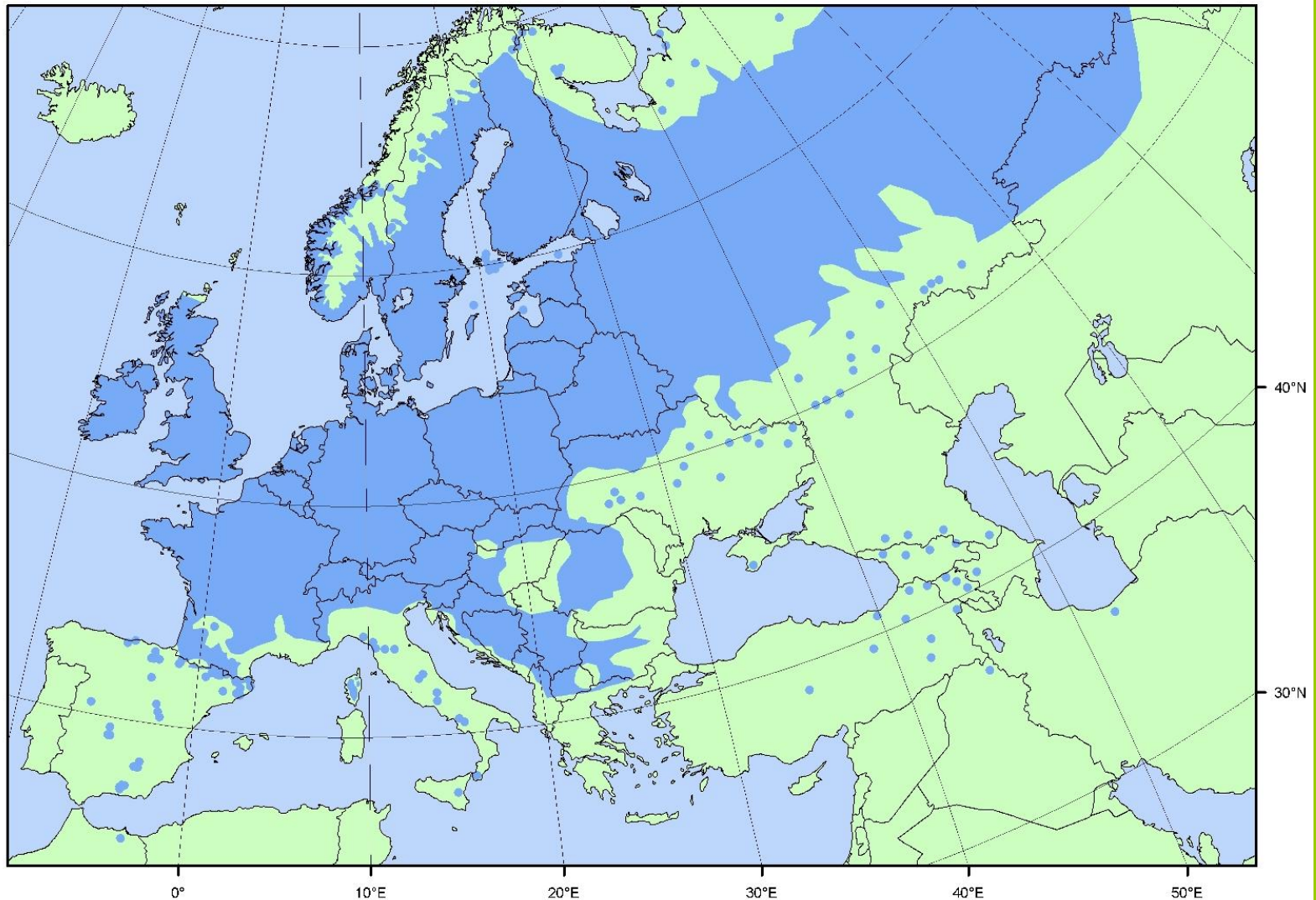
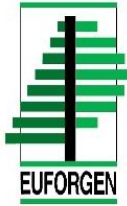
## Quality trees

## Stability on two sites





## *Betula pendula*

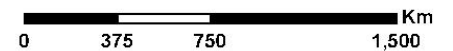


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This distribution map, showing the natural distribution area of *Betula pendula*, was compiled by members of the EUFORGEN Networks

Citation: Distribution map of silver birch (*Betula pendula*) EUFORGEN 2009, [www.euforgen.org](http://www.euforgen.org)

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# Alder:

- Initiated in 2005
- On recommended list
- Inadequate supply for demand
- Imported material used extensively
- Two collections (2007 and 2009)
- Untested seed orchard
- Clone banks established at two locations
- Three progeny trials established (2008 and 2009)



# The future

•Adoption by the Forest Service of birch as a recommended species and a sustainable supply of improved, adapted and healthy seed is the ultimate aim.

**New phase of research;**

To measure and trace genetic diversity in the collections

Assess that the heritability variation

Authenticate pedigree

To test the relatedness of clones

Physiological studies

Reduce field testing

Response to climate change

Maintain genetic diversity in breeding populations and collections

**Challenges;**

Pests e.g. hares, deer and squirrel

Diseases e.g. phytophthora

Long-term security of research sites

**Funding**

# Outputs:

- Bi-annual reports for COFORD
- Project reviews for COFORD Annual report
- O'Dowd, N. 2004. *The improvement of Irish birch. Phase 1: Selection of individuals and populations*. Project Reports COFORD, Dublin.
- O' Connor, E. 2007. *Progress in the selection and improvement of Irish birch*. COFORD Connects, COFORD, Dublin.
- Skovsgaard, J.P., O'connor, E., Graversgaard, H.C., Hochbichler, E., Mohni, C., Nicolescu, N., Niemistö, P., Pelleri, F., Spiecker, H., Stefancik, I., Övergaard, R. (2006) *Procedures for forest experiments and demonstration plots*. <http://www.valbro.uni-freiburg.de/>
- Hemery, G., Clark, J., Aldinger, E., Claessens, H, Malvolti, M., O'Connor, E., Raftoyannis, Y., Savill, P. and Brus, R. (2010) Growing scattered broadleaved tree species in a changing climate – risks and opportunities. *Forestry* 83: 65-81

## Transfer of research into commercial sector:

- Initially, small amounts of seed will be produced by the project.
- Demonstration trials to confirm improvement are in the next phase.
- Long-term, parent material for commercial nurseries to produce their own sources of seed will be available.
- Protocols to manage these indoor seed orchards are being developed.

## Project team

- Dr Ellen O' Connor, University College Cork\*
- Mr. Oliver Sheridan, Teagasc
- Dr Nuala Ni Fhlatharta, Teagasc
- Dr Barbara Doyle-Prestwich, UCC
- Other staff such as Christy Roberts and Jenny O' Callaghan
- Students

## Early birch work

- Dr. Niamh O' Dowd
- Dr. Linda Williams
- Michael Bulfin
- Prof. Martin Steer, UCD

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