



**Genetic improvement of Sycamore
(*Acer pseudoplatanus*) and
ash (*Fraxinus excelsior*) in Ireland**

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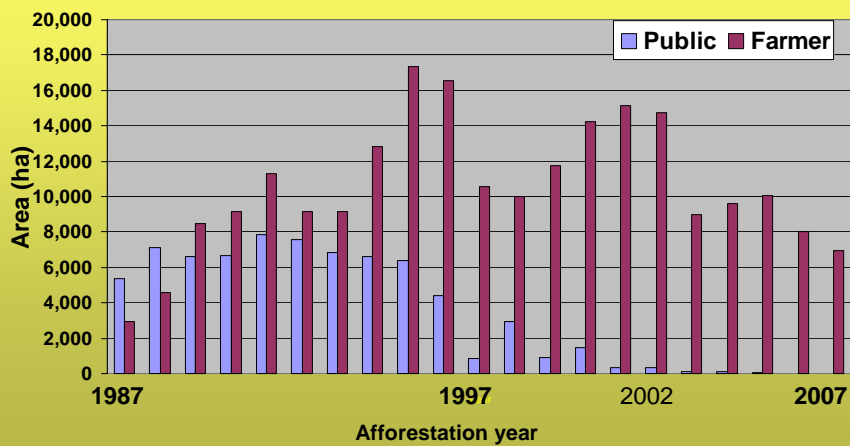
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Context for genetic improvement of broadleaves

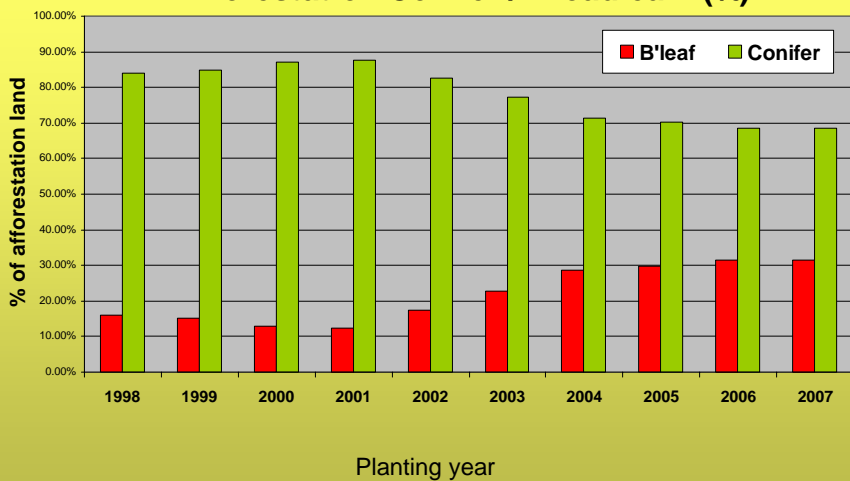
- **Afforestation-- importance**
- **Genetic resources available**
- **Genetic improvement -- Sycamore and Ash
(Partners: Coillte & the UK)**
- **Development of clonal lines / varieties of Ash**

Importance of afforestation in Ireland

Afforestation areas 1987-2007



Afforestation Conifer / Broadleaf (%)



Afforestation environment in Ireland

- *Generous financial supports*

Grants & annual Premia (Euros)

Species	<i>Establishment Grant / ha</i>	<i>Annual Premium ha /p.a. > 6ha (20 yrs)</i>
Oak	6920	559
Ash & Syc	5199	522
**Conifer	3573	464

Relative importance of broadleaves & conifers in Ireland

	% by species	Annual plant needs (x 10 ⁶)
Broadleaves		
Ash	46	4.0
Oak	21	3.0
Alder	20	5.5
Sycamore	4	0.5
Beech	2	1.5
Other	7	3.0
Conifers		
Sitka Spruce	65	35
Others	35	18

3. Genetic improvement -- Sycamore and Ash

Teagasc collaboration with:

- Coillte our largest forestry semi- state company
- British and Irish Hardwood improvement programme (BIHIP)
<http://www.bihip.org/> species groups
 ash, sycamore, birch, oak chestnut, cherry

Aim :

provide genetically improved forest reproductive material for the nursery sector

Operational basis:

Ground –up approach– participation of landowners

Establishing:

- Operational seed stands
- Conservation collections of selected material (primary grafts)
- Clonal seed orchards (regions of provenance based)
- Breeding seedling orchards (regions of provenance based)
- Testing viability of clonal material

** Genetic resources available in Ireland

Species	Seed stands (ha)	Seed Orchards (ha)	Seed Orchard estimated need (ha)
Broadleaves			
Ash	154	2.0	10
Sycamore	7	0.6	2

Conifers			
<i>Picea sitchensis</i>	589	5.0	35
<i>Picea abies</i>	438	0	20
<i>Larix kaempferi</i>	49	0	15
<i>Larix x eurolepis</i>	3	0.7	15
<i>Pinus contorta</i>	13	5.6	6
<i>Pinus sylvestris</i>	131	2.5	4

** COFORD 'Sustaining and developing Ireland's forest genetic resources'

3. Genetic improvement – Sycamore



Bolton Estate, UK

- Age 60
- Thinned 5 times
- Pruned
- Yield Class: 10-12
- Mean dbh: 60 cm
- Value
– approx 45,000 Euro/ha

Problem:-- Grey squirrel

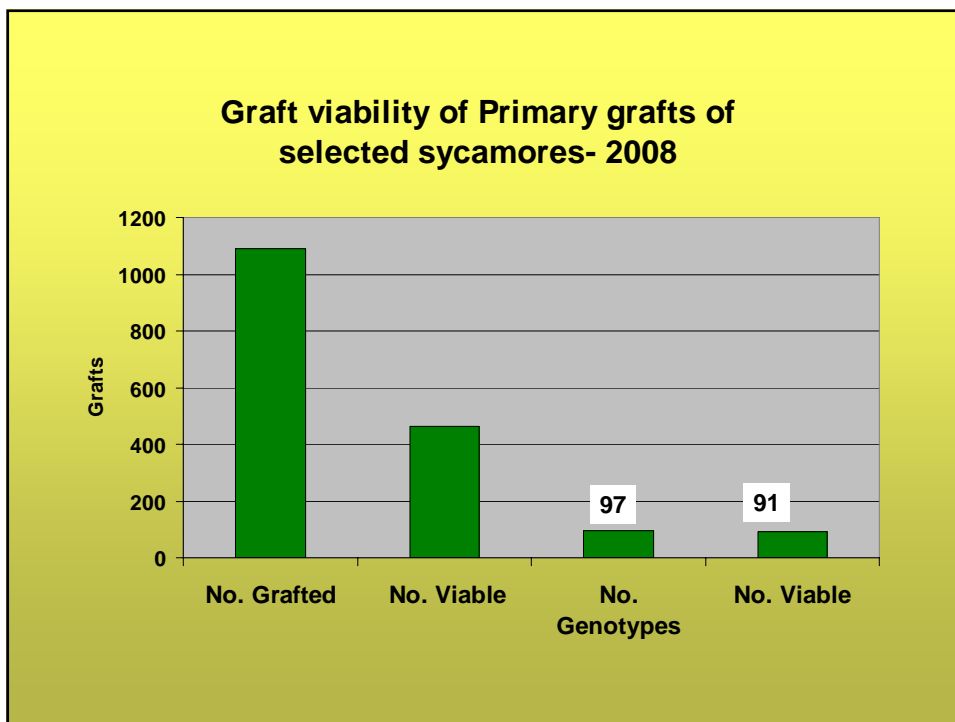
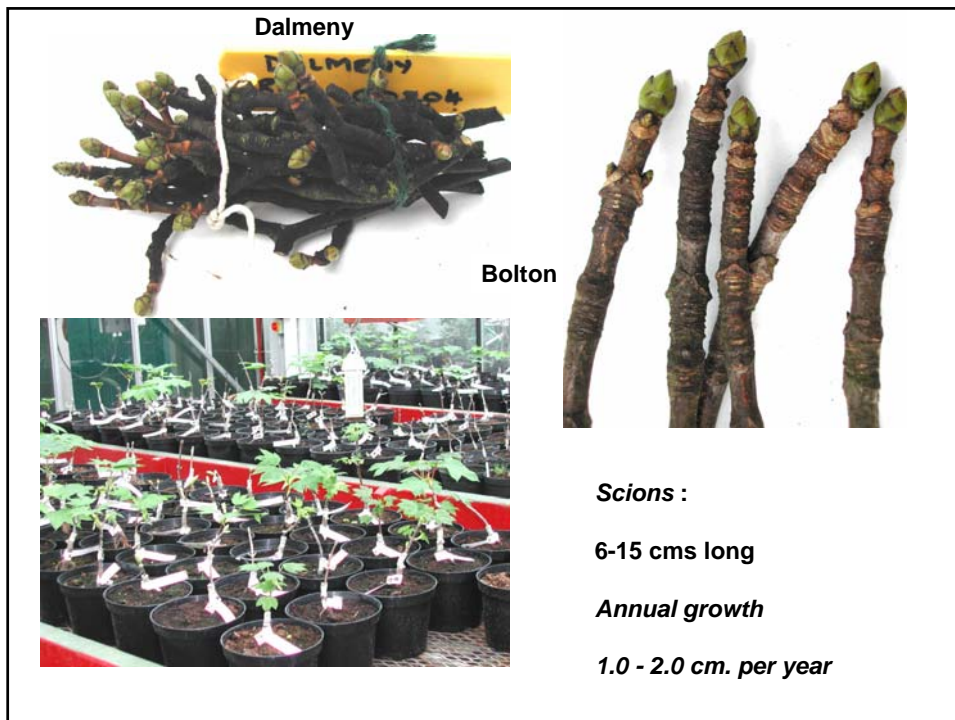
3. Genetic improvement – Sycamore

Aims:

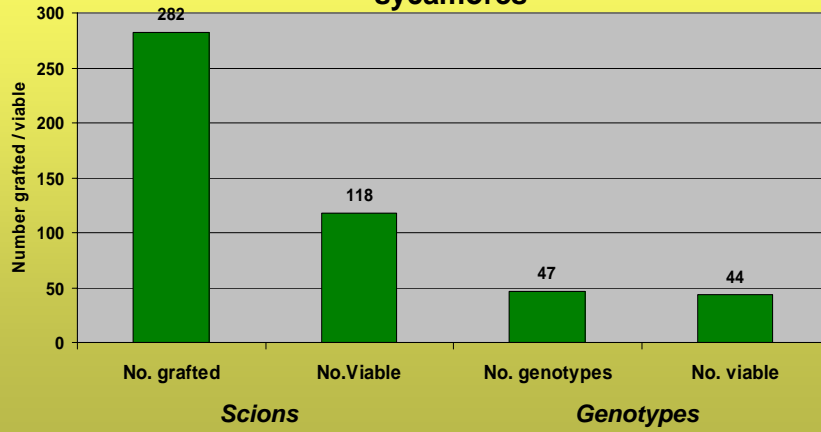
- 10 seed stands (3-active)
- 150 selected trees
- Conservation collection
- 3 clonal Seed orchards

Scion collection
for
clonal seed orchards
by
shooting





Graft viability of Secondary grafts of selected sycamores



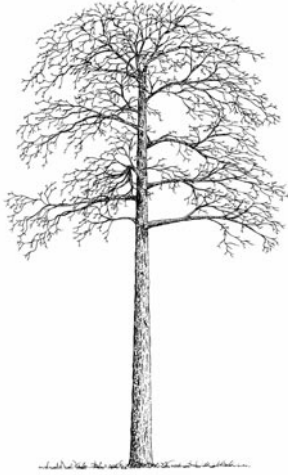
One year old grafted plants



Conservation collection

Material is being bulked up to generate Seed Orchards

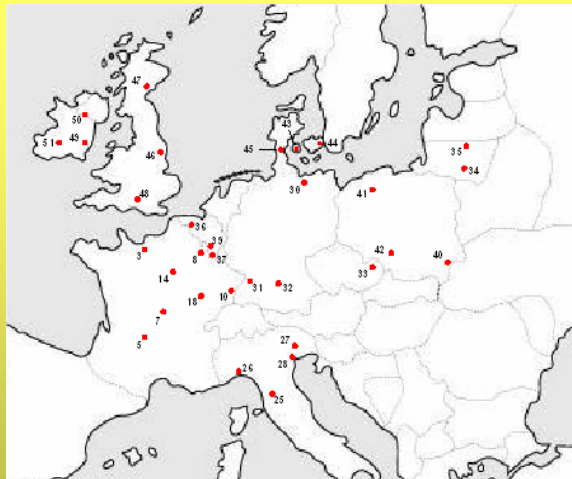
3. Genetic improvement – Ash



Aims:

- Testing European provenances
- Establishment of sufficient Seed Orchards (10 ha)
- Development of vegetative propagation methods produce material for testing and development of polyclonal varieties

Ash- --Testing European provenances



- Material grown from 36 European regions (provenances)
- sites in Ireland (replicated in UK, Germany, France, Belgium, Italy)
- Identify good & bad provenances
- influences of environmental / climate effects



- 36 European ash provenances (core of 30 provenances)
- Roottrainer grown plants
 - Planted May 2005 & 2007 (2 sites)
 - 108 plants / provenance (36 trees/ plot) of 3 replications
 - Height & stem diameter taken after planting
 - Trees are well established

**Ash -- Development of vegetative propagation methods – large scale
-- material for testing and
-- ash variety development**

Initiation of cultures 2008:

No. Clones initiated	No. viable at first culture	No viable at 2nd culture	No.clones micropropagating
44	44	26	12



**** buds collected from grafted plants for micropropagation**



Viable



Non- Viable



Viable ash shoot cultures

Medium: (mg/L)
M9 = MS : BA 5.5; TDZ 0.55, IBA 0.2
QRC = WPM with 3.0 g/L charcoal.



Micropropagation cycle



Spontaneous Rooting
-- indicates rejuvenation



Weaning of micropropagated ash



Planted as stoolbeds / hedges



Cutting production
in hedges



Hedges of ash clones at Teagasc, Kinsealy



Propagating ash from cuttings from hedges of micropropagated plants



Warm bench 20C°+ plastic

Rooting in cuttings from micropropagated ash

**Rooting
2 -3wks.**

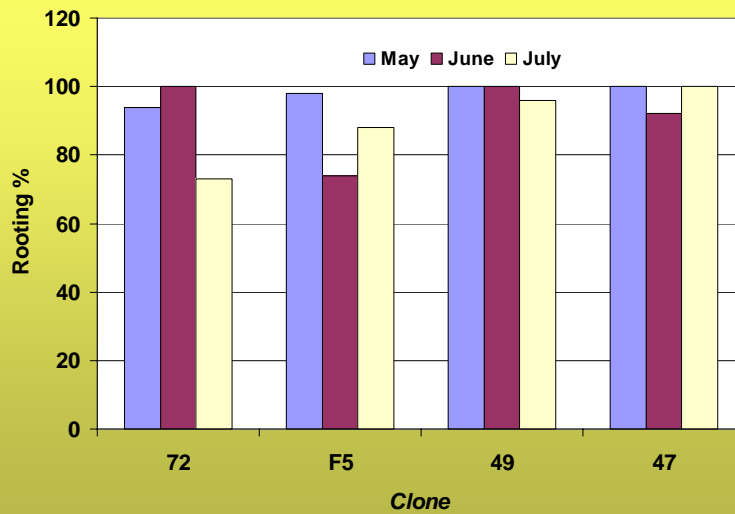


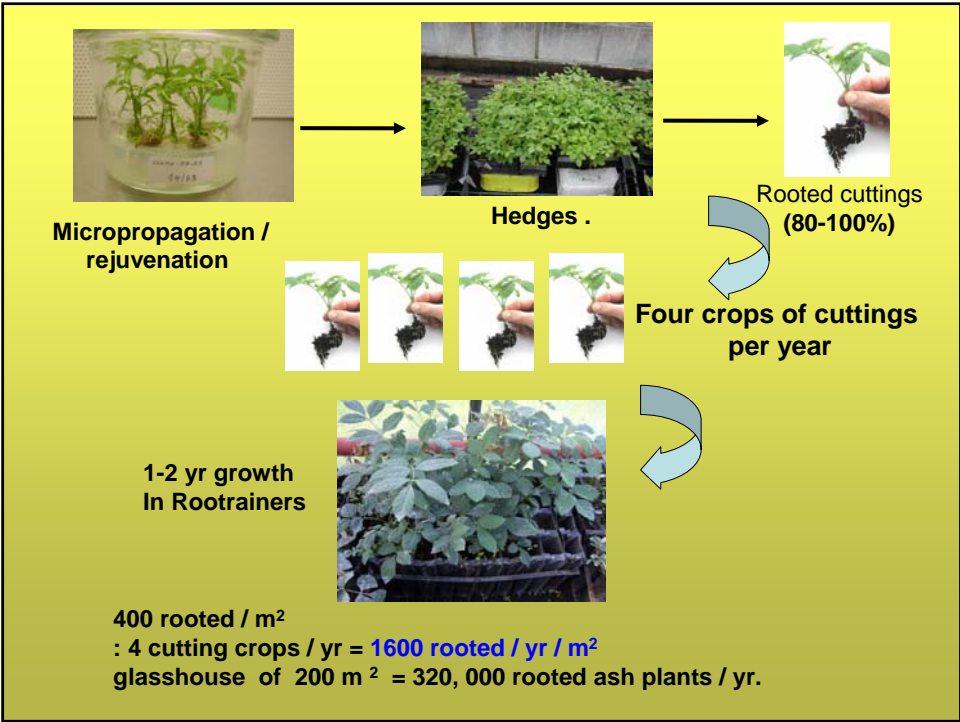
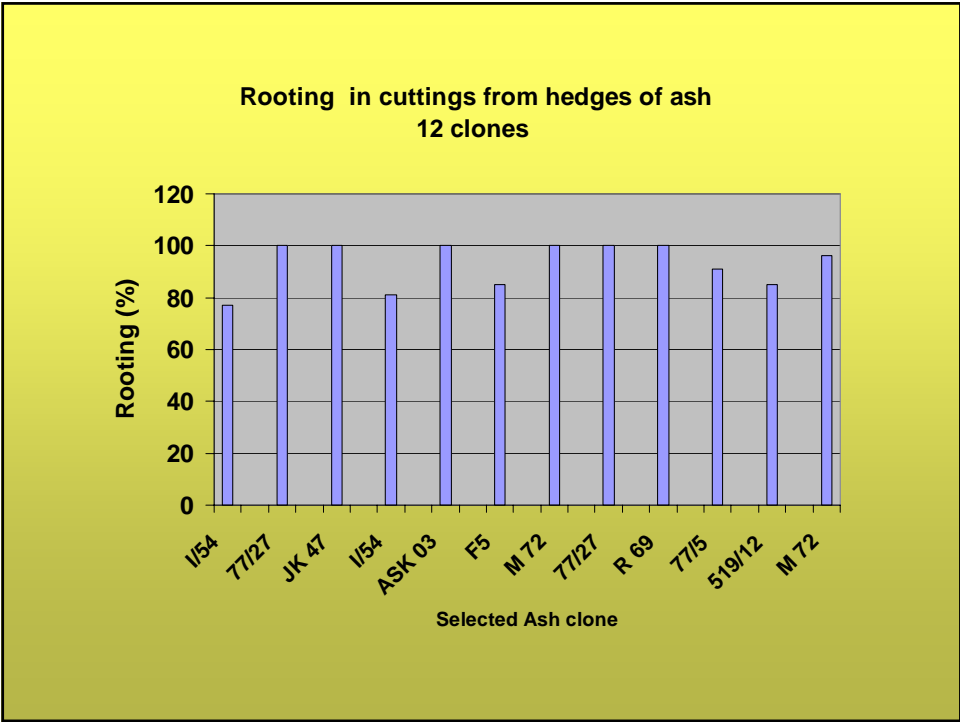
3 months



Plants grown in Rootainers

**Rooting in cuttings from hedges
3 successive crops in May, June & July**







Field demonstration of clonal ash 5- yr old with 5 clones



Conclusions:

- More research needed to improve the culture initiation stage for ash
- Clonal seeds orchards of ash and sycamore are planned
- Vegetative propagation system for ash is viable
- Field testing of ash clones indicates conformity
- Clonal field trials are planned



Thanks to:

Coillte
British & Irish Hardwood Improvement Programme (BIHIP)
European colleagues EC- former projects
COFORD (national funds)

Colleagues:

John Mc Namara
Sean Egan
P. Doody

Improving culture initiation:

- Flushing stage is most responsive
- Summer dormant buds not responsive
- Stimulation of secondary flushing by defoliation



Cutting propagation of ash:

- Stoolbeds
- 3 crops of cuttings / year
- High rooting rates



