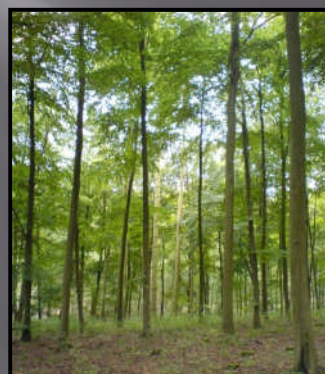


## Introduction

- ❑ 30,000 ha broadleaf
- ❑ Majority is privately owned
- ❑ Mostly planted during the last 15 years



## Broadleaf management

- ▣ €750 ha<sup>-1</sup> thinning grant
- ▣ Emphasis on high quality, vigorous stems
- ▣ Selection is vital
- ▣ Select Potential Crop Trees (PCT)
  - Disease free
  - Good stem form
    - ▣ 6m ⇨ 5m ⇨ 4m ⇨ ...
  - Vigour
  - Distribution



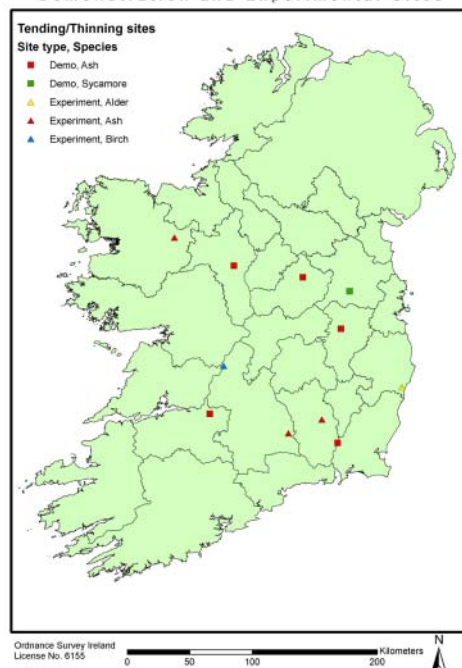
## Broadleaf thinning trials and demos

▣ 6 demonstration sites to date

△ 5 experimental sites

Ash  
Alder  
Sycamore  
Birch

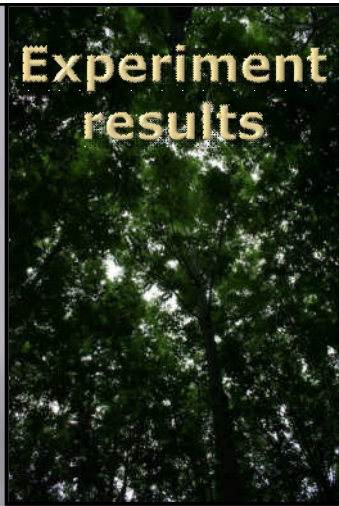
Broadleaf Silviculture Research Programme  
Demonstration and Experimental Sites



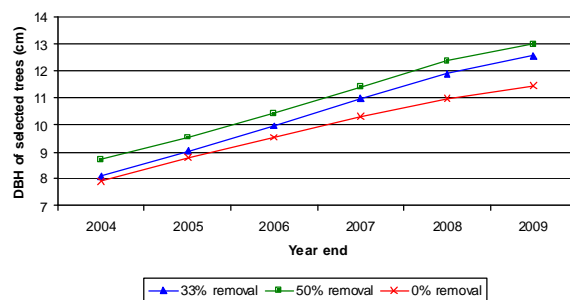
## Ash experiment sites

	Castlefield		Mullinahone	
Planted	1994		1995	
Spacing	2 x 1.5		2 x 2	
Thinning year	2003/2004		2003/2004	
PCT DBH at thinning (cm)	Control:	8.5	Control:	7.9
	33%:	8.2	33%:	8.1
	50%:	8.6	50%:	8.7
PCT DBH 2008/2009	Control:	11.8	Control:	10.9
	33%:	12.4	33%:	11.9
	50%:	13.3	50%:	12.4
PCT DBH increment increase over Control	33%:	28%	33%:	24%
	50%:	40%	50%:	20%

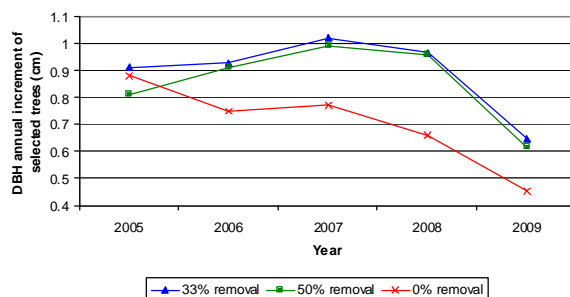
## Experiment results



Mullinahone ash response to thinning



Mullinahone ash response to thinning



## Ash demo sites

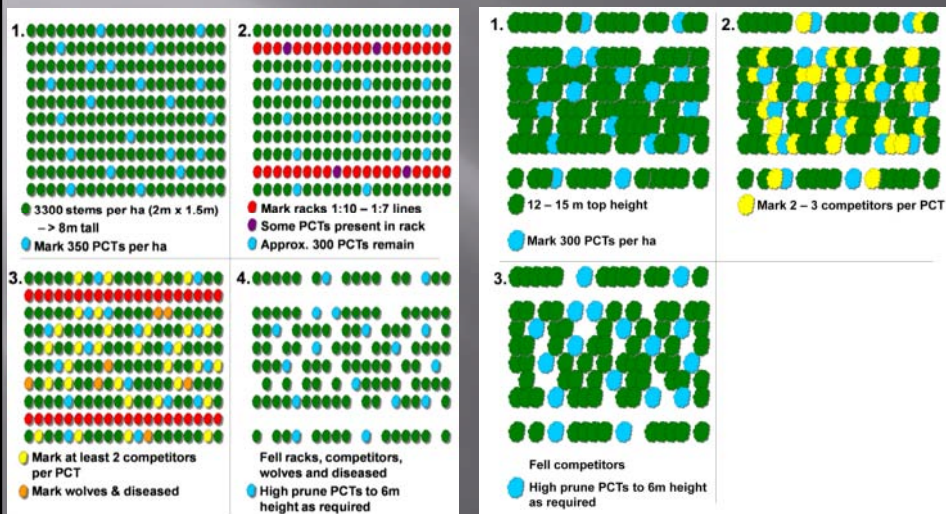
	Kilmeague		Crookedwood	
Planted	1995		1995	
Spacing	2 x 1.5		2 x 2	
Thinned	June 2007		April 2008	
PCT DBH at thinning	Control:	12.6	Control:	11.6
	Thinned:	10.9	Thinned:	10.4
PCT DBH end 2009 (increment)	Control: 14.8	(0.94)	Control: 13.6	(0.78)
	Thinned: 13.6	(1.16)	Thinned: 12.7	(1.15)
Thinned PCT DBH increase over Control	23%		47%	



## Thinning of ash

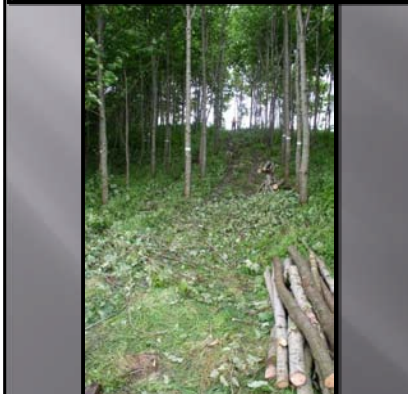
- Thinning should have commenced by the time stand top height has reached 10m (Evans, 1984)
- **Insufficient thinning is a common mistake** in *F. excelsior* management (Selby, 1842; FRAXIGEN, 2005)
- Thinnings should be heavy and frequent (Savill, 1991; FRAXIGEN, 2005)
- Select and mark potential crop trees (Schlich, 1910; Bolton, 1956; Evans, 1984; Mutch, 1998; Horgan *et al.*, 2003)

## Ash, sycamore, maple, alder



## Hurley butts

- ▣ Select and mark hurley butts
- ▣ Remove competitors
- ▣ Sawlog takes precedence over hurley butts



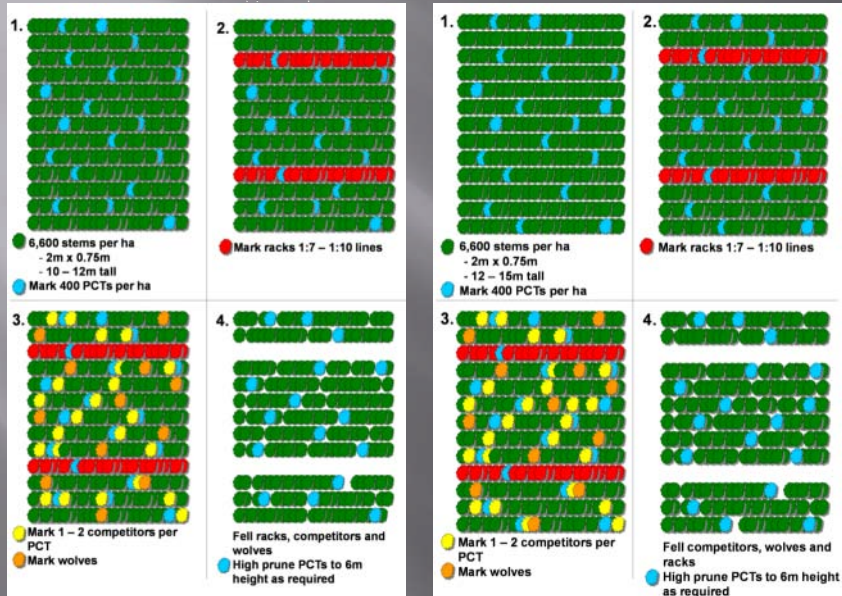
## Tending pure oak / beech

Species	Height (m)	PCTs required
Oak	8 – 10	600
Beech	7 – 8	600

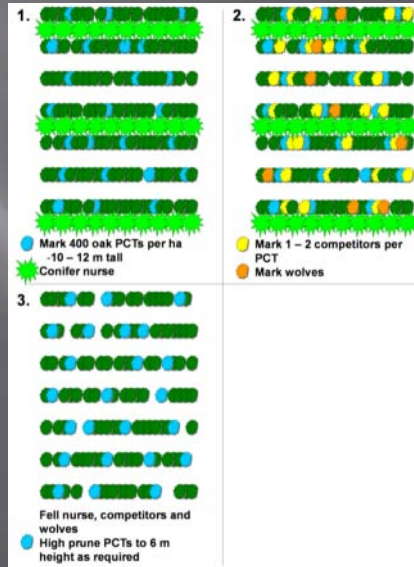
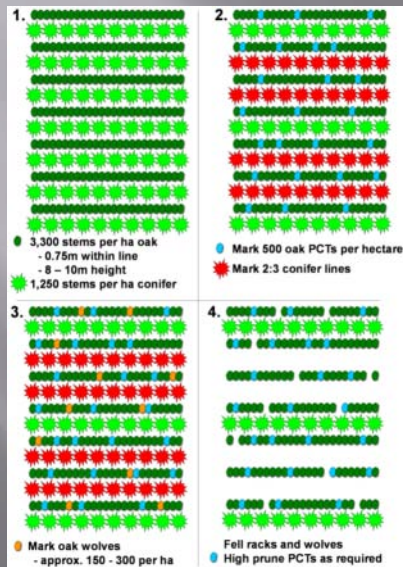
- No removals required
  - Wolves?
- Select, mark and high prune PCTs as required



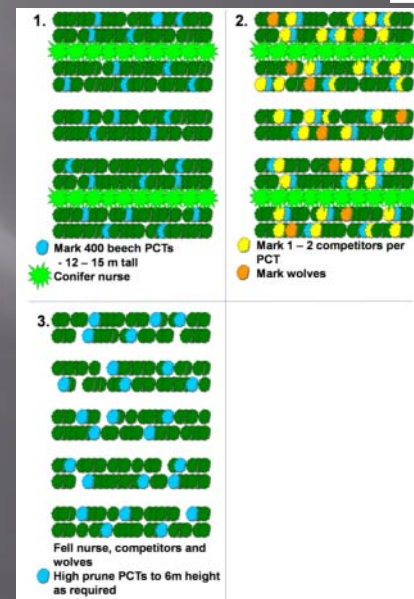
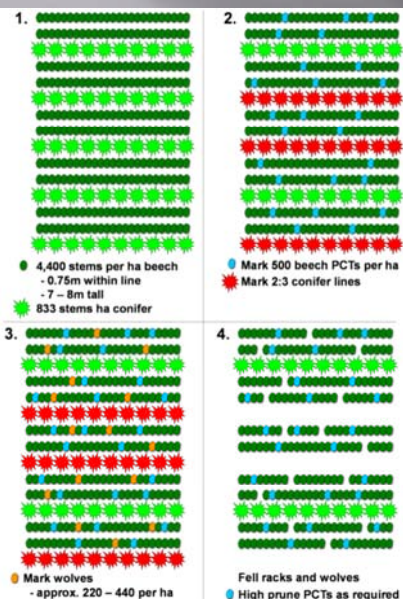
## Thinning pure oak / beech



# Oak / conifer mixture



# Beech / conifer mixture



## The 2-stick method

### Ash/Sycamore/Maple/Alder 3,300 – Tending

- 1 Place 1<sup>st</sup> stick at start, count 20 planting positions in one row, place 2<sup>nd</sup> stick
  - 2 Identify & mark 4 – 5 PCTs between the two sticks ( $\approx 350$  per ha)
  - 3 Identify and mark 2 competitor trees to be thinned per PCT
- Approx. 30 m

### Oak mixture – Tending

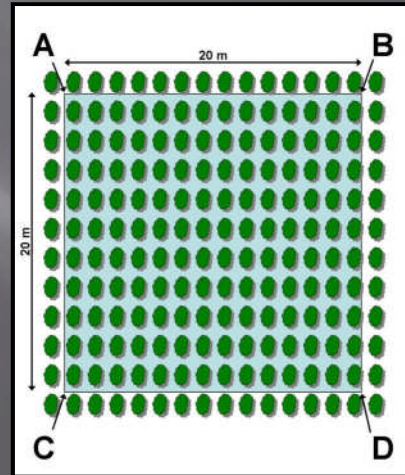
- 1 Place 1<sup>st</sup> stick at start, count 20 planting positions in one oak row, place 2<sup>nd</sup> stick
  - 2 Identify & mark 3 PCTs between the two sticks (500 per ha)
  - 3 Identify and mark 1-2 wolves between the two sticks to be felled
- Approx. 15 m

## The 2-stick method

Species	Spacing	Operation	No. PCTs	PCTs /ha
Ash/Syc/Map/Ald	2,500	Tending	5 – 6	$\approx 350$
	3,300	Thinning	4 – 5	$\approx 300$
Pure Oak / Beech	2,500	Tending	9 – 10	$\approx 600$
	6,600	Thinning	6 – 7	$\approx 400$
Beech/Conifer	3,300	Tending	3 – 4	$\approx 600$
	4,400	Thinning	2 – 3	$\approx 400$
Oak/Conifer	4,400	Tending	4 – 5	$\approx 500$
	3,300	Thinning	4	$\approx 400$
Oak/Conifer	3,300	Tending	3	$\approx 500$
	3,300	Thinning	2 – 3	$\approx 400$

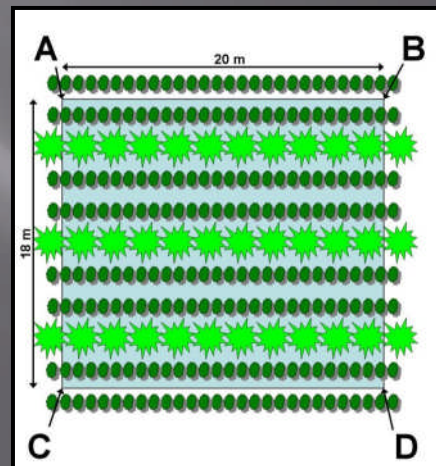
## Thinning control plots

- ▣ 20 x 20m plot (20 x 18m for beech/conifer mixture)
- ▣ Install using permanent posts after trees are selected but prior to cutting
- ▣ Can check quantity of marked trees
- ▣ Can estimate harvest volume



## Thinning control plots

- ▣ 20 x 18m plot for beech/conifer mixture
  - 20m along the line
  - 18m perpendicular to the line



## Extraction

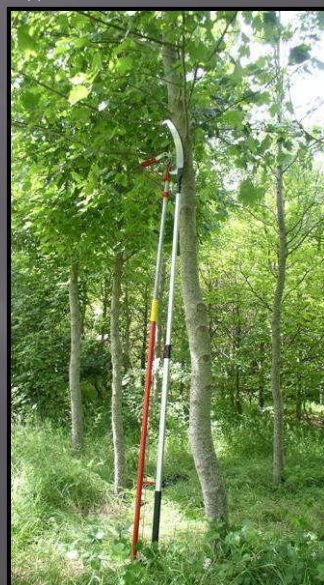
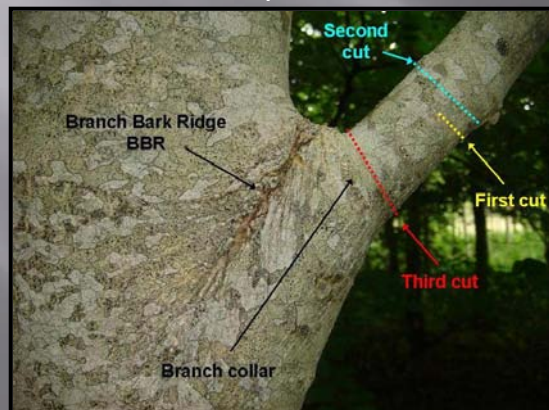


- ▣ Quad and trailer / skidder
- ▣ Tractor and trailer / buck rake
- ▣ Forwarder
- ▣ Horse
- ▣ Demo days



## High pruning

- ▣ High prune PCTs as required to improve timber length
- ▣ Never flush prune



## Health and Safety

- ▣ Never work alone when using chainsaw
- ▣ Use appropriate PPE



## Future work

- ▣ New 5-year project beginning 1<sup>st</sup> July
  - ≈ € 1 million COFORD funding
- ▣ Teagasc/UCD
- ▣ New Teagasc Broadleaf Silviculture contract researcher begins 1<sup>st</sup> July
- ▣ Teagasc Walsh Fellowship approved for Ph.D. student

Broadleaf Silviculture Research Programme				
WP1 Programme Management and Quality Control				
WP2 Establishment of Optimum Species Mixtures	WP3 Remedial Action	Thinning		
WP2a State-of-the-art		WP4 Conifer/Broadleaf	WP5 Pure Broadleaf	
WP2b Nelder plots incorporating 2 species		WP4a State-of-the-art	WP5a State-of-the-art	
WP2c Mixture configuration Alternate Lines / Bands / Shelterbelts / Intimate		WP4b How to thin Timing of thinning (all nurse/alternate lines of nurse/select nurse?)	WP5b Intensity	
WP2d Establish shelter in advance		WP4c Products from thinnings	WP5c Products from thinnings	
WP2e How trees in mixtures respond to environmental factors		WP4d Thinning protocols	WP5d Thinning protocols	
		WP3c Protocols		
WP6 Dissemination				
Publications		Demonstration sites		Demonstration days

## FDU Technology Transfer

- 9 Forestry Development Officers
- 1 Forestry Specialist
- 1 College Lecturer
- Researchers also involved
  
- Free independent advice
- Demonstration days / Farm forest walks
- Courses
  - Short training courses
  - Advanced Certificate in Forestry
- Website – [www.teagasc.ie/forestry](http://www.teagasc.ie/forestry)
- Publications
- Newsletters
- Today's Farm
- Brochures / Leaflets / Booklets



## Research Interactions





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