



Productive Woodlands:  
A researcher's perspective

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Broadleaf Silviculture Research Officer  
Teagasc



## Acknowledgements

- Teagasc
  - Forestry Advisers
  - Jerry Campion (ret)
  - Derek Gibson
  - Ignacio Sevillano
  - Ted Wilson
- Jerry Hawe
- DAFM
- Woodland Trust
- NUIG Galway
  - Annette Harte
  - Daniel Llana
- UCD
  - Conor O'Reilly
  - Aine Ni Dhubhain
- Coillte
- Private owners

## Introduction

- My background
- My research
  - Broadleaf silviculture
  - Alternative silviculture
    - » Short Rotation Forestry
    - » Continuous Cover Forestry
    - » Remedial silviculture
    - » Ash dieback
  - End-uses

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## Broadleaf silviculture (2010-16)

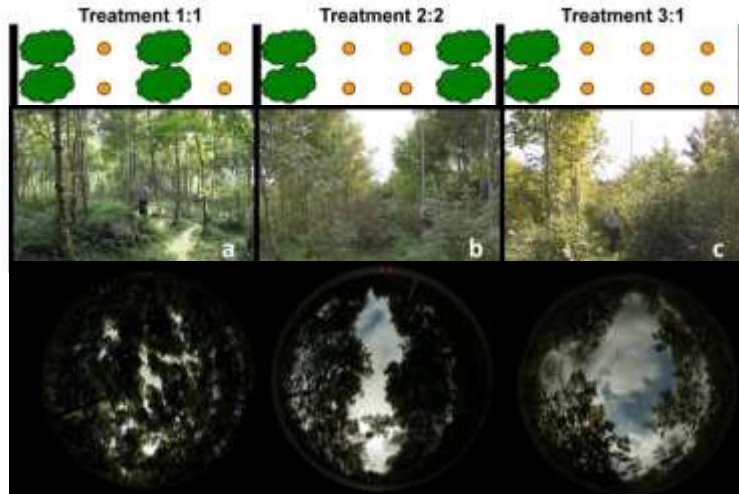
- Establishment
  - Mix configuration
  - Nelder
  - Shelter-in-advance
  - Shade tunnels
- Thinning
- Remedial
  - Coppice-with-standards
  - Free-growth
  - Underplanting



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## Remedial

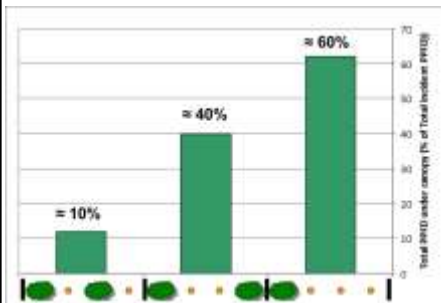


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## Relative illumination (sycamore)



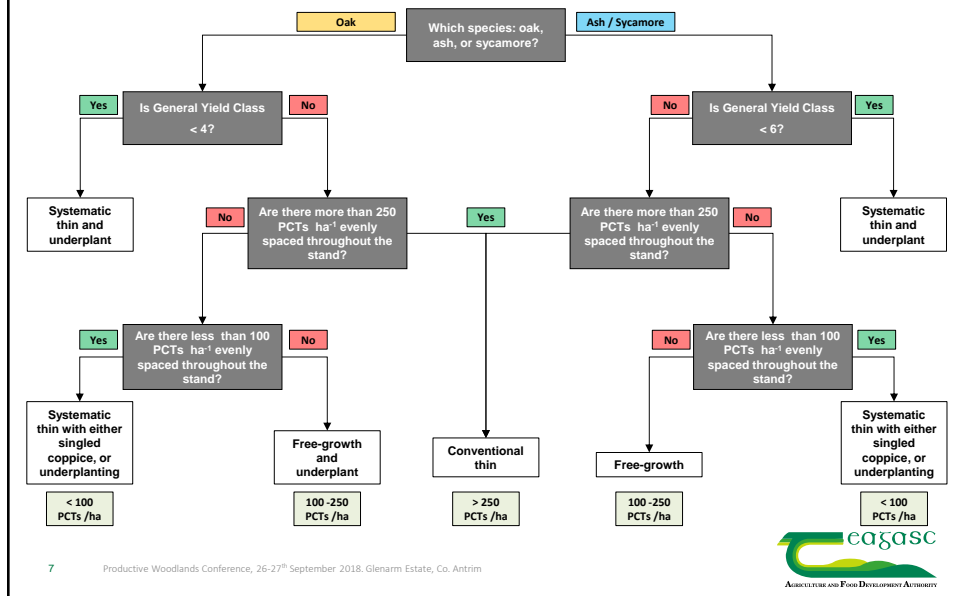
	Treatment		
	1:1	2:2	3:1
No. stools in plot	33	29	59
No. dead stools in plot	4	5	5
No. live stools in plot	29	24	54
% of stools that are alive in plot	<b>88</b>	<b>83</b>	<b>92</b>
Mean no. shoots per live stool	7.4	8.6	<b>11.5</b>
Mean no. shoots >1m tall per live stool	<b>2.8</b>	6.3	8.6
Mean % shoots > 1m tall per live stool	<b>37</b>	74	75
Mean ht of tallest 2 shoots per stool (cm)	<b>139.1</b>	<b>194.8</b>	<b>239.1</b>
Mean dia of tallest 2 shoots per stool (mm)	<b>13.1</b>	20.1	22.4

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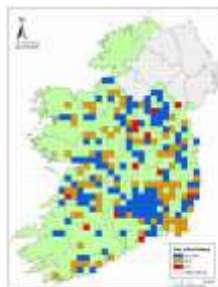


## Provisional protocols



## Ash dieback

- 2012
- Eradication policy
- Wider environment
- 2018 - Change in focus
  - Living with ash dieback



"It is clear from the latest scientific advice that eradication here is no longer considered feasible. Given this updated advice, our policy response must also change. The Reconstitution Ash Dieback scheme will be reviewed to ensure its continued relevance and value for money, and to ensure that **the forest owner is provided with a broader range of silvicultural and management options**,"

Minister of State for Agriculture Andrew Doyle. April 2018

## Clearfell & replant

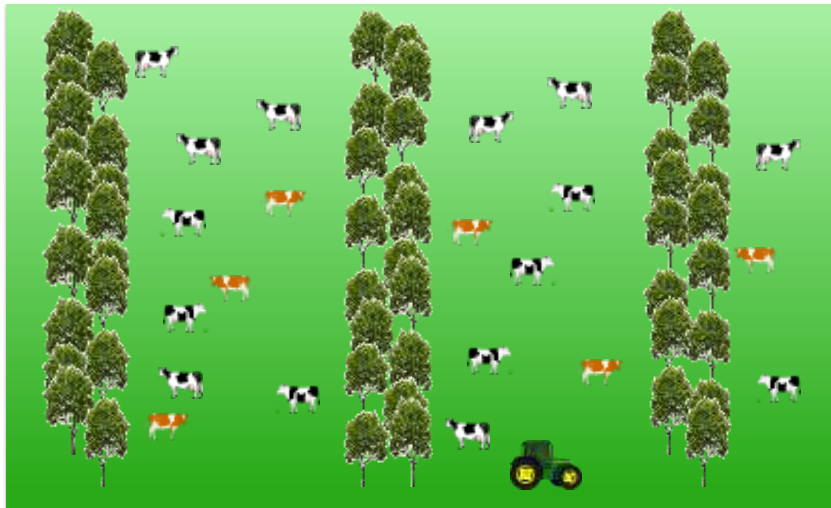


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## Agroforestry



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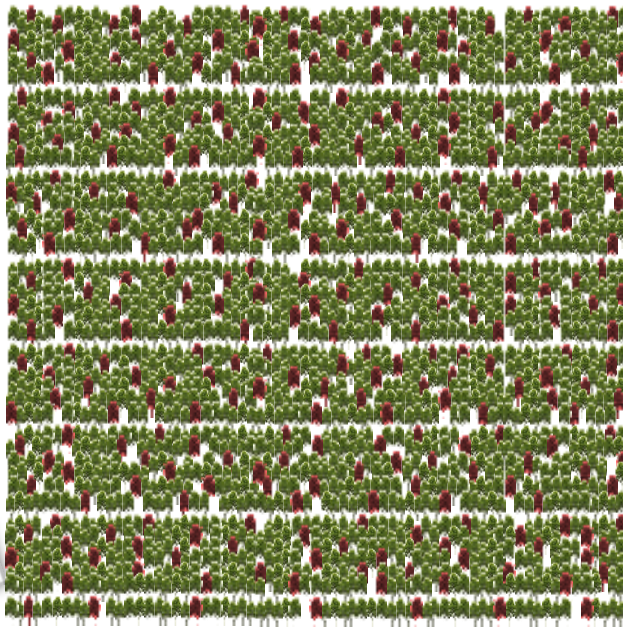
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## Selection thinning

1 ha  
 1.5 x 2 m spacing  
 Racks 14 m  
 300 PCT ha<sup>-1</sup>  
 Crown thinning



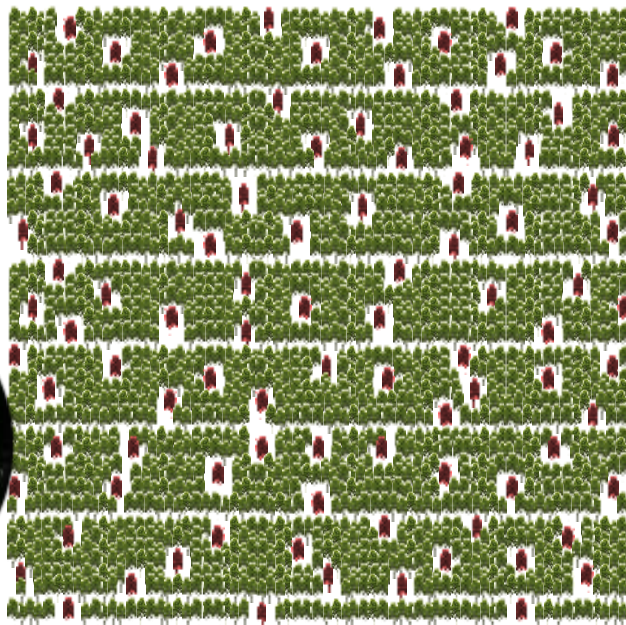
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## Free-growth

1 ha  
 1.5 x 2 m spacing  
 Racks 14 m  
 100 PCTs  
 Intensive crown thinning



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# Free-growth

1 ha  
 1.5 x 2 m spacing  
 Racks 14 m  
 100 PCTs  
 Intensive crown thinning



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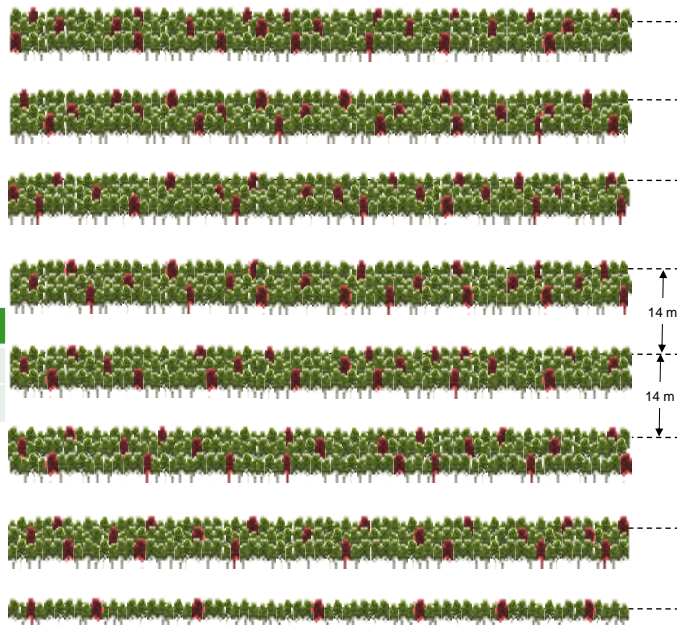
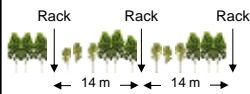
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# Bands – 3 line

1 ha  
 1.5 x 2 m spacing  
 Racks 14 m  
 Replant 43 %

Fell 4	Remain 3
Replant 3	
Rack 1	



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# Systematic thinning 6:2

1 ha  
1.5 x 2 m spacing  
Racks 16 m  
63 % replanted

Fell	6	Remain	2
Replant	5		
Rack	1		

Rack Rack Rack  
16 m 16 m

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# Systematic thinning 6:2

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Replant	5		
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Rack Rack Rack  
16 m 16 m

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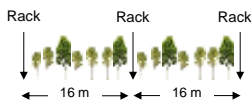
# Systematic thinning

## 6:2

1 ha  
 1.5 x 2 m spacing  
 Racks 16 m  
 63 % replanted



Fell 6	Remain 2
Replant 5	
Rack 1	



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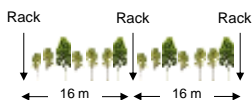
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Fell 6	Remain 2
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Rack 1	



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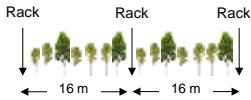


# Systematic thinning 6:2

1 ha  
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 Racks 16 m  
 63 % replanted



Fell 6	Remain 2
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Rack 1	



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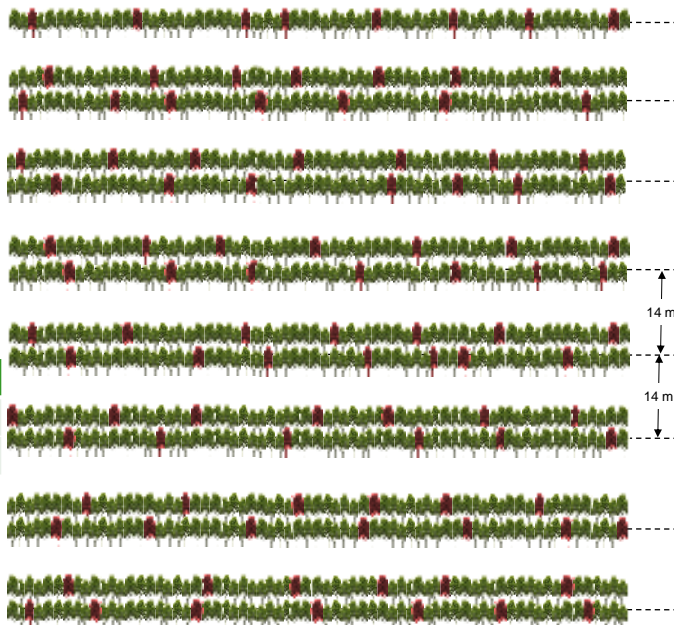
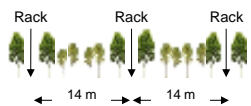
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# Systematic thinning 5:2

1 ha  
 1.5 x 2 m spacing  
 Racks 14 m  
 57 % replanted

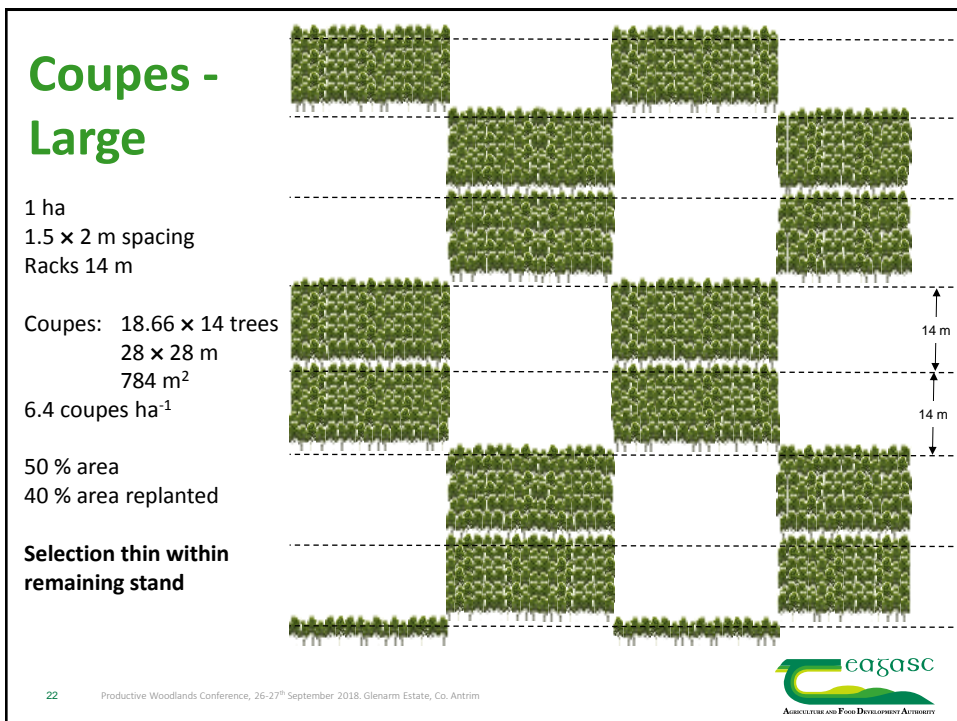
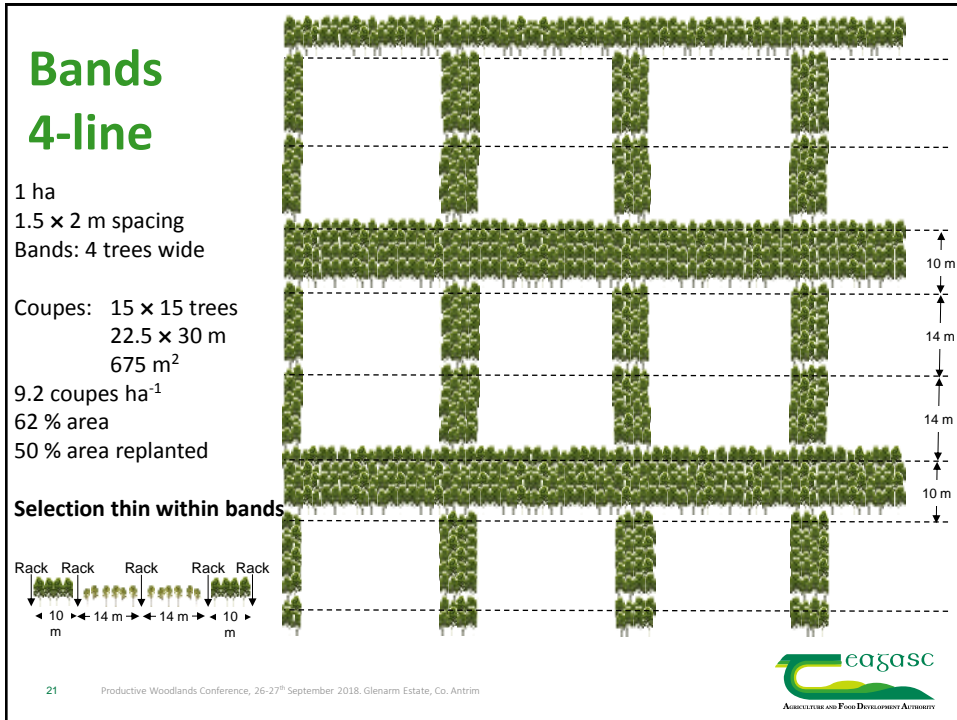
Fell 5	Remain 2
Replant 4	
Rack 1	



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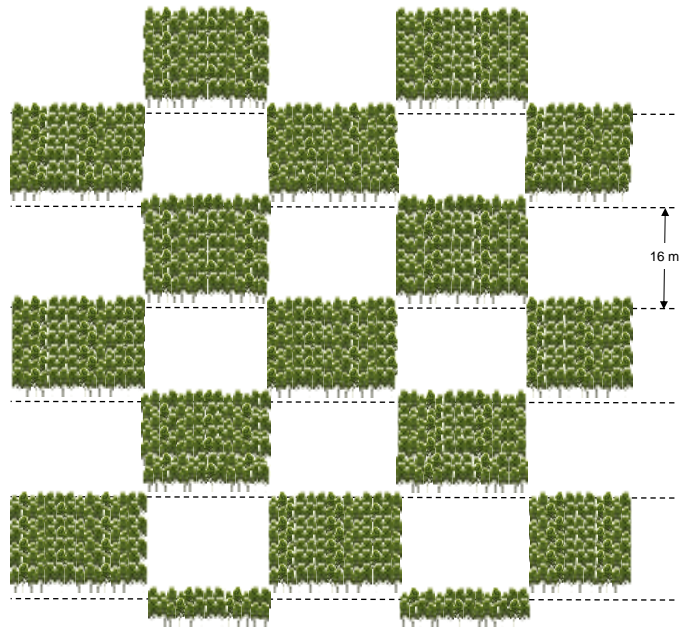
## Coupes - Small

1 ha  
1.5 × 2 m spacing  
Racks 16 m

Coupes: 14 × 8 trees  
21 × 16 m  
336 m<sup>2</sup>  
15 coupes ha<sup>-1</sup>

50 % area  
44 % area replanted

**Selection thin within remaining stand**



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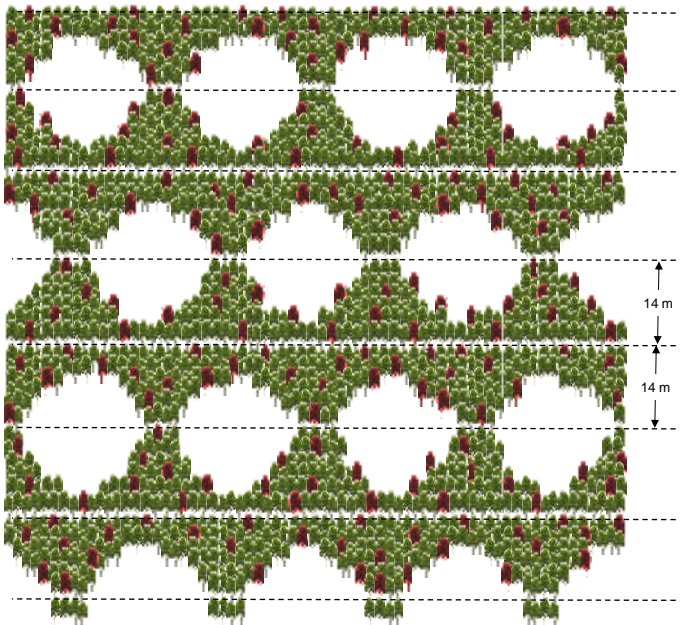
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## Circular coupes

1 ha  
1.5 × 2 m spacing  
Racks 14 m  
300 PCTs ha<sup>-1</sup>

Circular coupes 20 m dia  
0.031 ha  
50% area

**Selection thin within remaining stand**



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## Drumnaph

- 32 ha reserve (15 ha ancient woodland)
- 12 ha planted “Woods on Your Doorstep” millennium project
  - 4 ha ash dominated
- Thinned 2017/18
- Coupes
- Diversify spp structure



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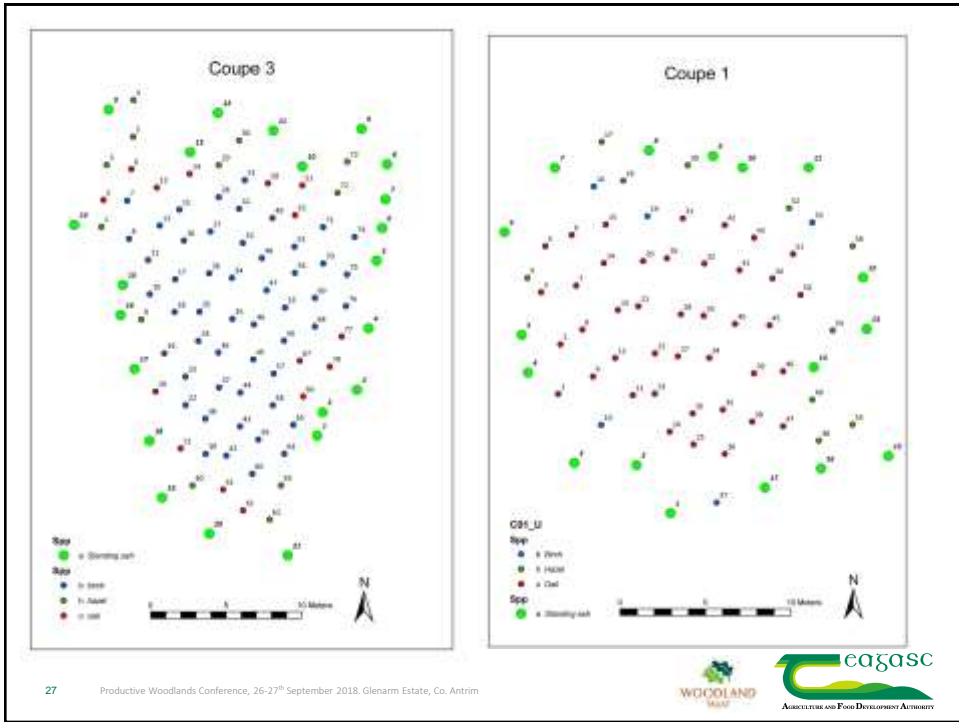
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Coupe replanted with oak, birch and hazel.  
Inset: mulching head

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The composite image consists of three main parts. On the left is a site plan map showing a central vertical axis with yellow stars, and a radial pattern of colored dots (green, blue, red) representing different tree species or planting points. A legend below the map identifies the colors: green for 'Planting area', blue for 'Water', red for 'Road', and yellow for 'Star'. A scale bar and a north arrow are also present. In the center is a photograph of a pond with a reflection of the surrounding trees. On the right is a photograph of a surveying instrument (theodolite) mounted on a tripod in a grassy field.

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WOODLAND MARK

eaGASC  
AGRICULTURE AND FOOD DEVELOPMENT ACTIVITY



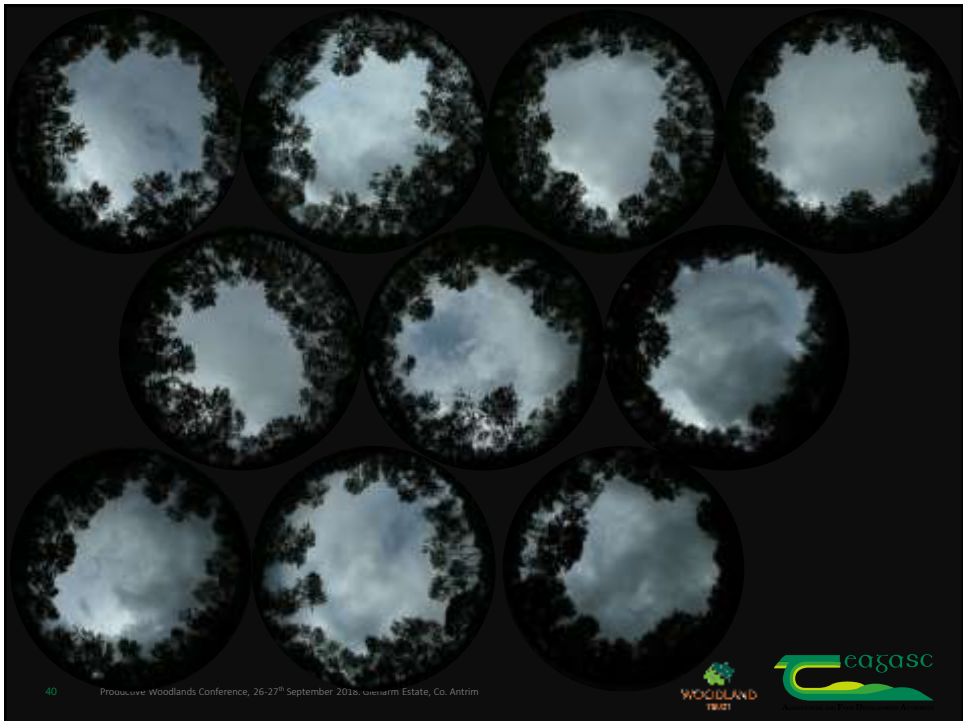








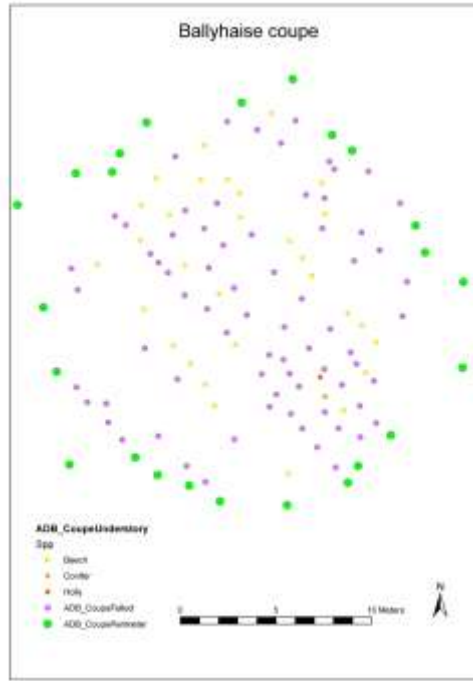




# Ballyhaise demo 23<sup>rd</sup> Oct



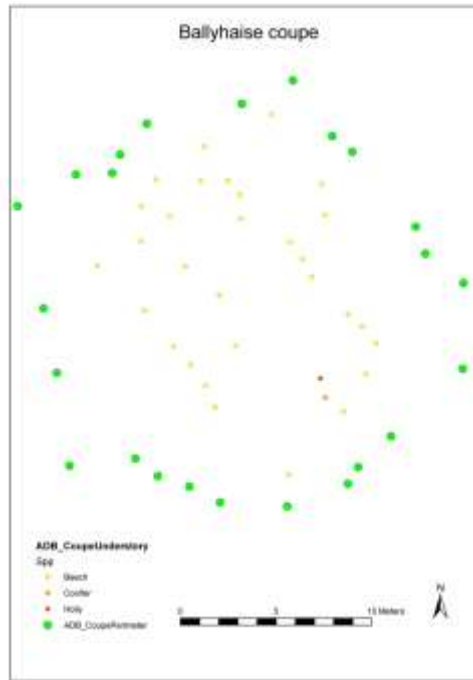
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# Ballyhaise demo 23<sup>rd</sup> Oct



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# Ballyhaise demo – 23<sup>rd</sup> Oct



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## Considerations

- Planting area width
  - Light requirement of spp to be planted
  - Height of adjacent trees
  - Trials required



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## Considerations

- Planting area width
  - Light requirement of spp to be planted
  - Height of adjacent trees
  - Trials required
- Coppice regrowth
  - Control required?
    - » Reduce competition for replacement spp
    - » Reduce spore loading??
  - Herbicide?
    - » Flash-back?
      - Buffer zone?
      - Trials?
  - Manual control
    - » Brush cutter?
  - Mulch stumps



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## Future positives from ash dieback?

- Improved silviculture?
  - Amelioration of poor-performing stands
  - Better soils for tree establishment
  - Shelter present?
- Greater emphasis on thinning
- Greater owner (and public) interest
- Less prescriptive silviculture, more site specific silviculture
- Greater emphasis on establishing mixtures?
- Improved planting stock made available?

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## E.A.R.T.H. project



- Alternative uses of 1<sup>st</sup> and 2<sup>nd</sup> thinnings
  - alder; ash; birch; sycamore
  - Increased income to the forest owner
- 20 x 20 m (0.04 ha)
- Stem diameter
- Height
- Tree selection
  - PCTs
  - Thinnings
- Random sampling of thinnings
- TreeSonic
- Felling and log samples
- MTG



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O'GallimheAgasc  
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## Timber quality assessment



- Non-destructive testing (NDT) measurements:
  - Treesonic (on standing trees) → ToF →  $V=L/ToF$
  - MTG (on green and dry logs) → Natural frequency →  $V=2*f*L$




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## Timber quality assessment



- Mechanical testing
  - Four point bending test (EN 14251)
    - MOE; MOR; Density (from a slice)
- MOE & MOR estimation from NDT
- Drying – Kiln, Air 
- Durability
- Potential end-uses



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## Small diameter alder (20 – 30 cm)

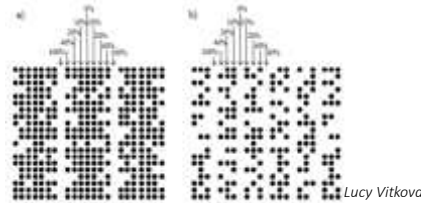
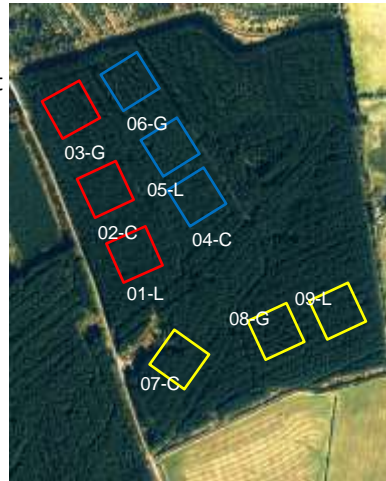
- 2-year project
- Characteristics, properties and utilisation potential
  - Conversion; Drying; Processing; Nailing/Screwing; Bonding; finishing
- Develop product prototypes
- Walsh Fellowship M.Sc. - David Monson

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# CCF

- 5-year project
  - Continuation of 2010-14 LISS project
  - PhD Walsh Fellowship – Ted Wilson
- Transform SS plantation to CCF
- Low; Crown; GDT
- Thinned 2011, 14, 18



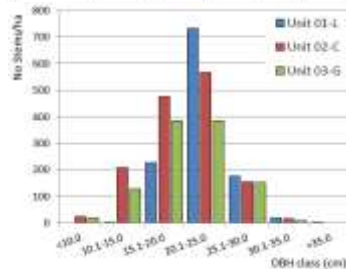
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Ted Wilson



- Clumpiness
- Small sawlog
- Nat. regen.



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## Dissemination

- Researcher
- Advisor
- Owner



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## Publications

- Journals
  - Open Access?
  - T-Stór
    - » [T-stor.teagasc.ie](http://T-stor.teagasc.ie)



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## Publications

- Journals
- Technical



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## Publications

- Journals
- Technical
- Press
- Newsletters



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## Field-days

- Owners
- Industry
- Students
- Training



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## Social media

- Teagasc Forestry Website
- YouTube
  - Teagasc Forestry channel
- Facebook
  - forestry.teagasc
- Twitter
  - @teagascforestry
  - @IanShort\_Forest
- e-Newsletters



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## Feedback

- Always welcome
- Constructive criticism
- Knowledge gaps
- Industry requirements

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## Thank you

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