



**LIT**  
DEPARTMENT OF  
APPLIED SCIENCE



**IPSAM '17**

Irish Plant Scientists  
Association Meeting



**LIT** 7<sup>th</sup> - 9<sup>th</sup> June

**Book of Abstracts**

## **Biodiversity & Evolution Theme**

### **Effect of planting density on survival and early growth of potential species for short rotation forestry in South-East Ireland**

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The predicted shortfall in supply of timber for biomass, the uncertain impact of climate change, and the risks of new pests and diseases, have led to increased interest in species with forestry biomass potential. Plantations of fast-growing species on a short rotation period (Short Rotation Forestry, SRF) might play an important role to meet renewable energy demands. The effect of planting density on survival and early growth of four potential SRF species - grand fir (*Abies grandis*), Italian alder (*Alnus cordata*), shining gum (*Eucalyptus nitens*) and Sitka spruce (*Picea sitchensis*) - are being investigated. The results after two growing seasons of one trial established in the South-East Region (Waterford) are described. Planting densities (trees/ha) range from 10000 (1x1 m) to 2500 (2x2 m) for conifer species (*A. grandis* and *P. sitchensis*) and from 5000 (2x1 m) to 1333 (2.5x3 m) for broadleaf species (*A. cordata* and *E. nitens*). Survival rates of *A. grandis* (70.5%) were significantly lower than those of *P. sitchensis* (97.2%), *A. cordata* (96.9%) and *E. nitens* (90.3%). While survival rates were not affected by planting density, growth rates were lower in the 2x1 m spacing (except for *A. grandis*) and were greater in broadleaf than conifer species.

# Effect of planting density on survival and early growth of potential species for Short Rotation Forestry in South-East Ireland



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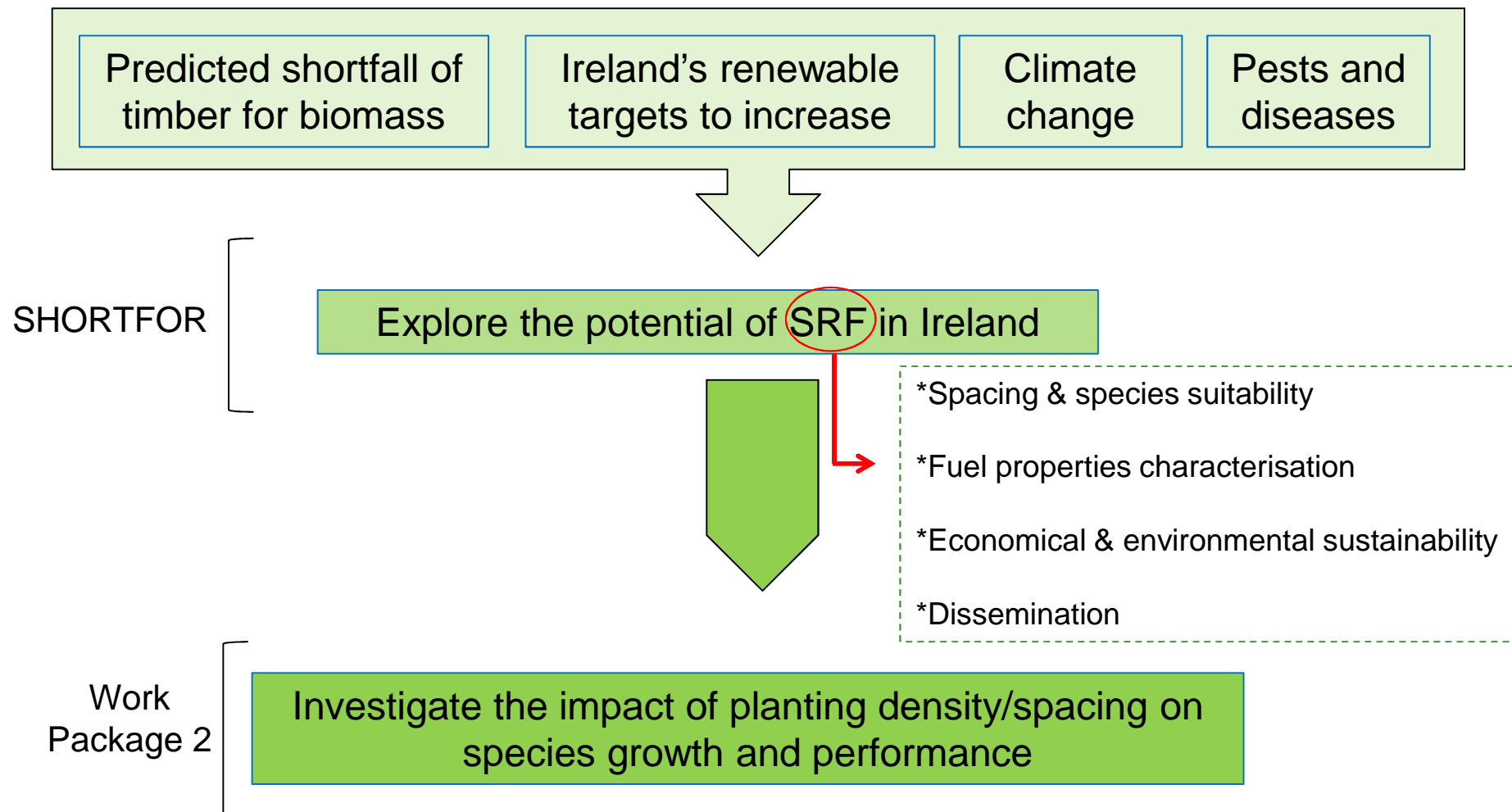


# Outline

- Objectives
- Short Rotation Forestry (SRF)
- SHORTFOR trials
- Brownswood trial
- Recording
- Results
- Conclusions



# Objectives





# Short Rotation Forestry

- Single stemmed trees of fast-growing species
- Reduced rotation length (< 20 years)
- Niche between short rotation coppice (SRC) and conventional forestry

Rotation length: 2-4 years



SRC (source: <https://www.atb-potsdam.de>)

Rotation length: 8-20 years



SRF (source: <http://www.primabio.co.uk>)

Rotation length: >40 years



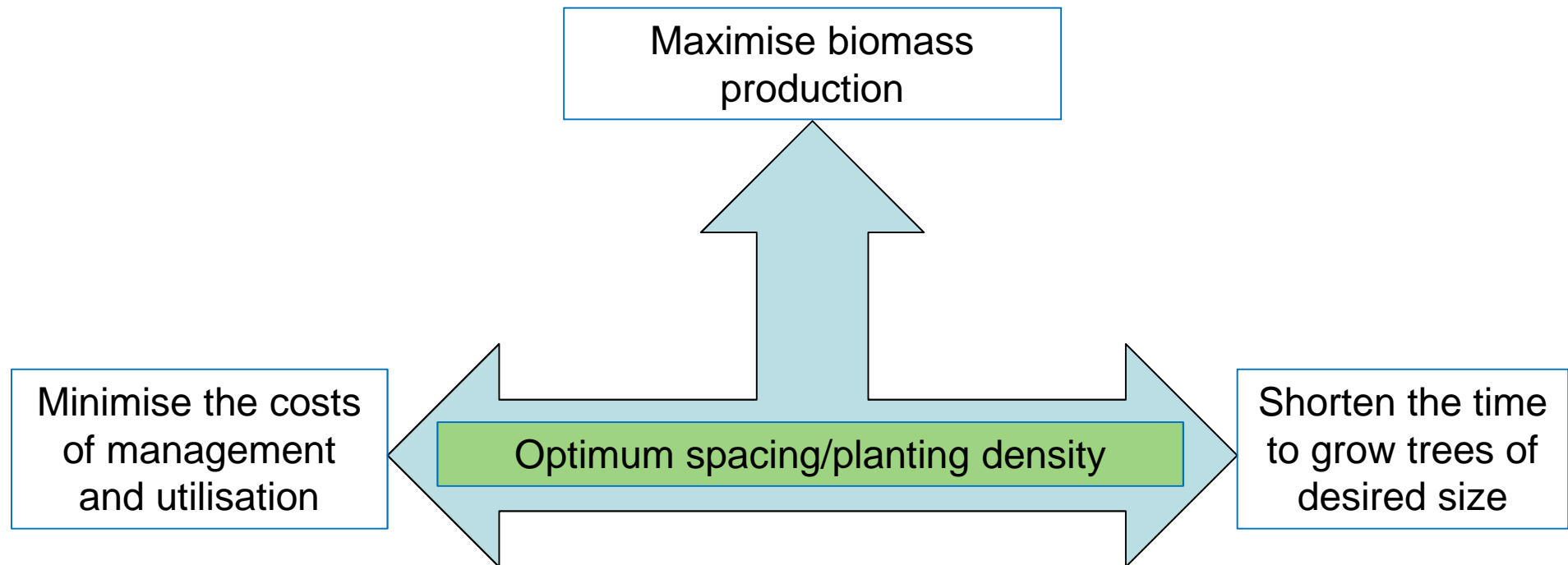
Conventional forestry (source: <http://www.ucd.ie/carbifor>)

# Planting density/spacing

- Effect on
  - ✓ Tree growth
  - ✓ Stand productivity
  - ✓ Management costs
- High planting density/dense spacing
  - ✓ Early capture of the site: maximum productivity earlier
  - ✓ Reduction in juvenile wood: higher wood density
  - ✓ Earlier weed suppression
- ✓ Decrease in individual tree growth rate
  - ✓ Increase in planting and harvesting costs
  - ✓ Possible increase in tree health risks

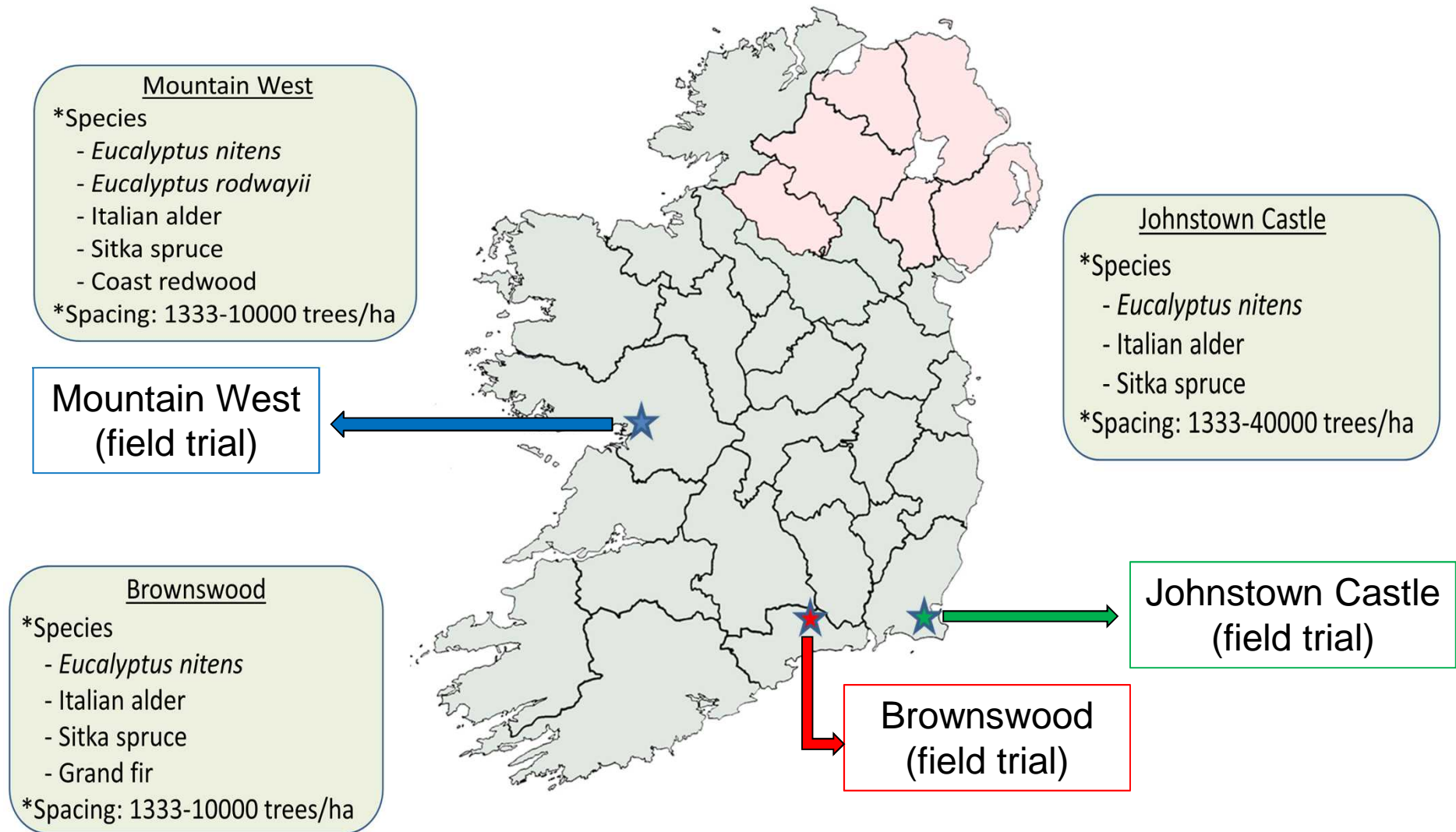


# Planting density/spacing



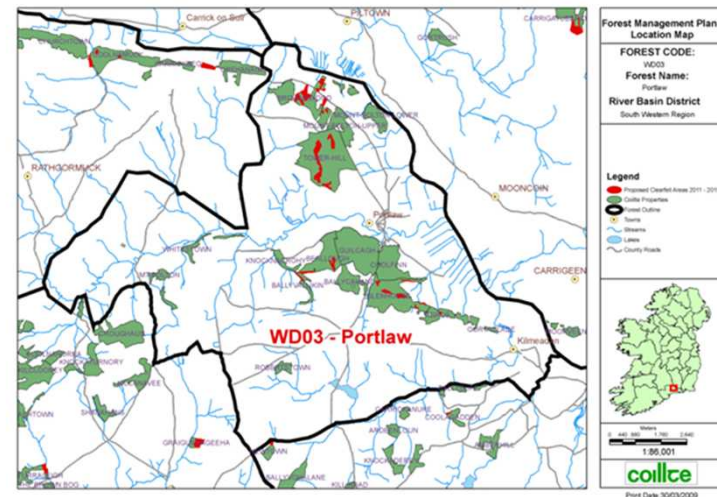


# SHORTFOR trials









# Brownswood-Trial site

- Location: Portlaw forest (Co. Waterford)
- Year established: 2015
- Coillte reforestation site
- Soil: acid brown earth/brown podzolics (acid deep well drained mineral)
- Altitude: 140m ASL
- Coast distance: 25km
- Annual rainfall: 1037mm
- Mean temperature: 10.6°C



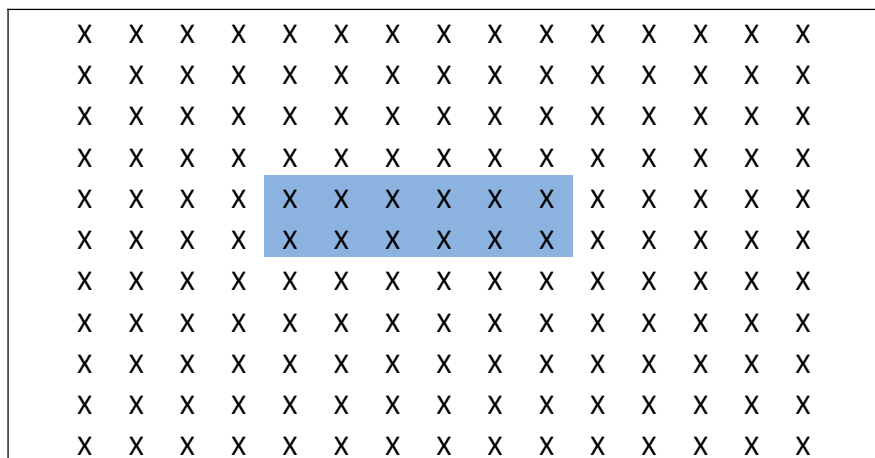
Source: Coillte

# Brownswood-Trial design

Species	Planting density (trees/ha)	Spacing (m)	Growing area per tree (m <sup>2</sup> )	Replications
Sitka spruce Oregon ( <i>Picea sitchensis</i> )	10000	1x1 	1	3
	5000	1x2 	2	3
Grand fir ( <i>Abies grandis</i> )	2500	2x2 	4	3
Shining gum ( <i>Eucalyptus nitens</i> )	5000	1x2 	2	3
	2500	2x2 	4	3
Italian alder ( <i>Alnus cordata</i> )	1333	2.5x3 	7.5	3

# Brownswood-Spacing

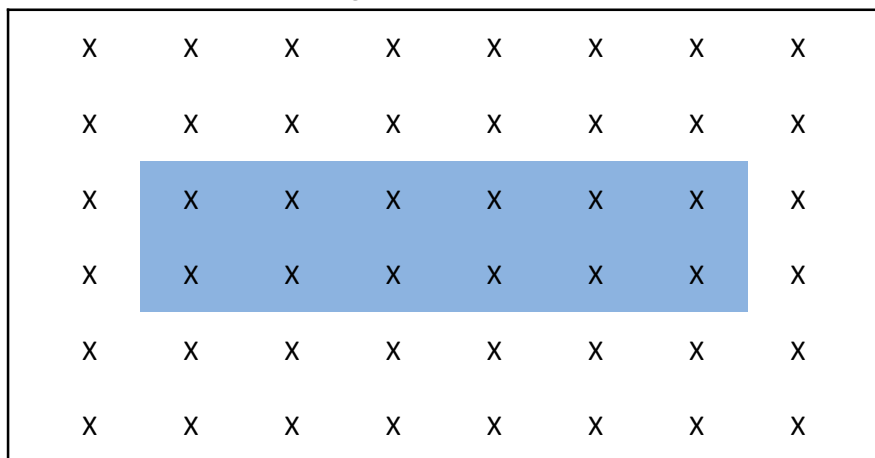
Spacing: 1x1 m (10000 trees/ha)



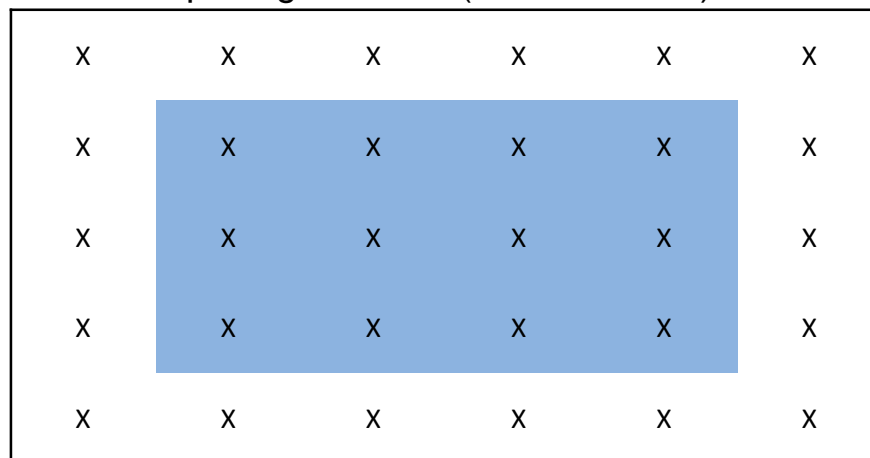
Spacing: 1x2 m (5000 trees/ha)



Spacing: 2x2 m (2500 trees/ha)

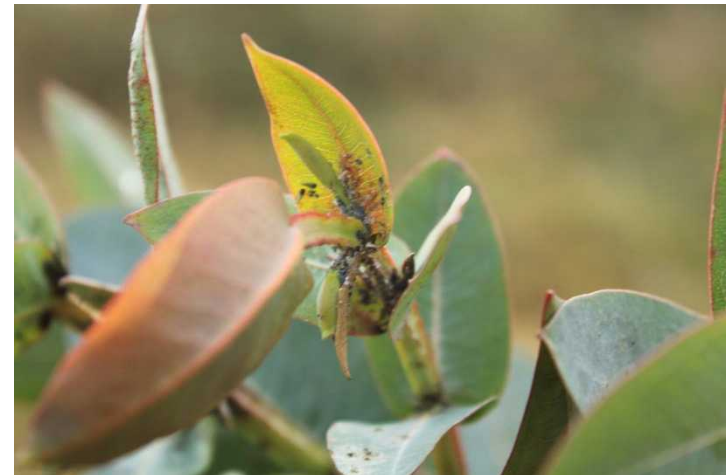


Spacing: 2.5x3 m (1333 trees/ha)

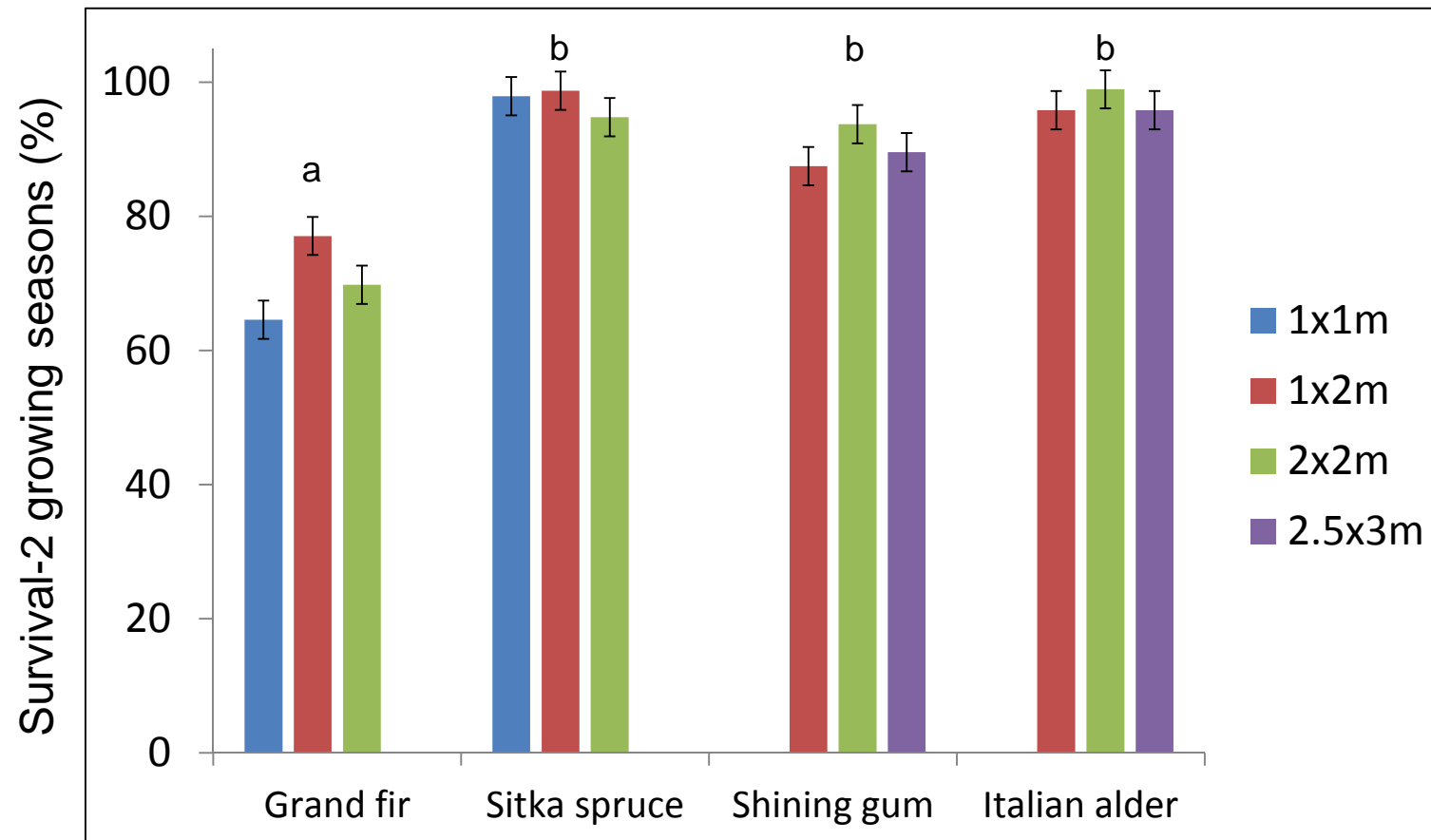


# Recording

- Survival
- Height
- Stem diameter at 5 cm above ground
- Tree damage
  - ✓ Shoot/branch dieback
  - ✓ Multiple leaders
  - ✓ Animal/insect damage

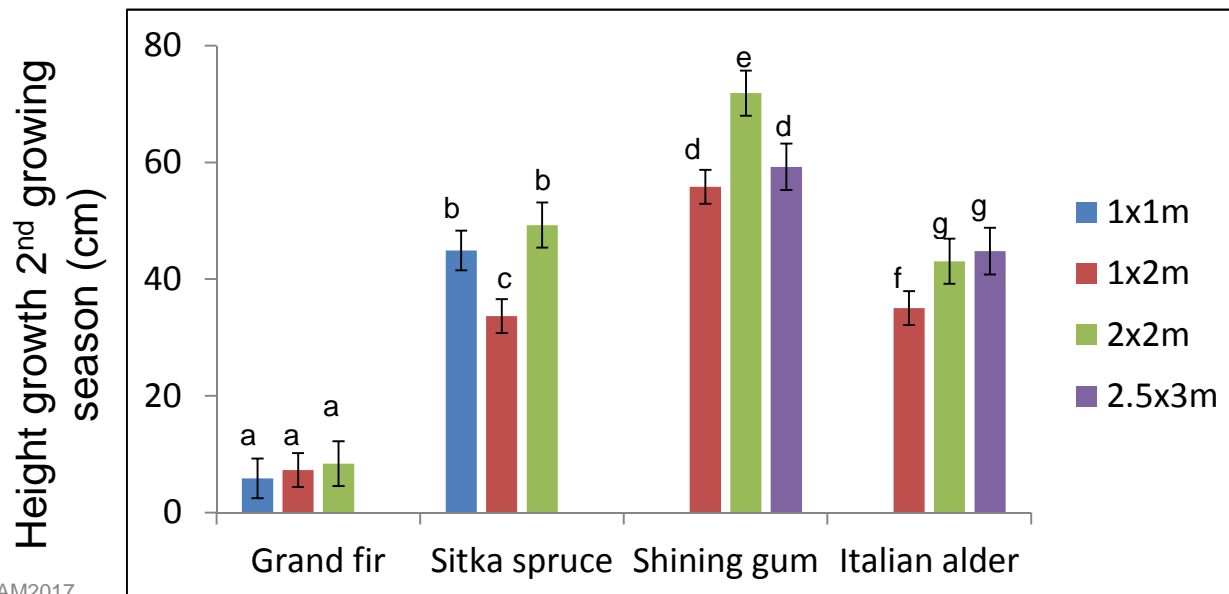
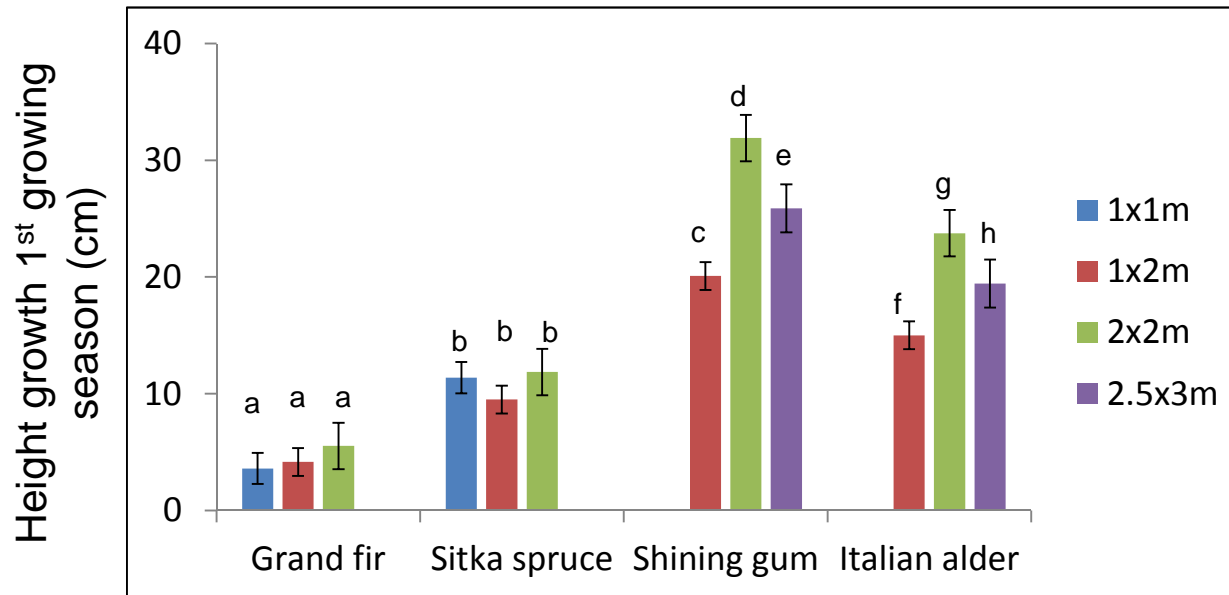


# Survival-After 2 growing seasons

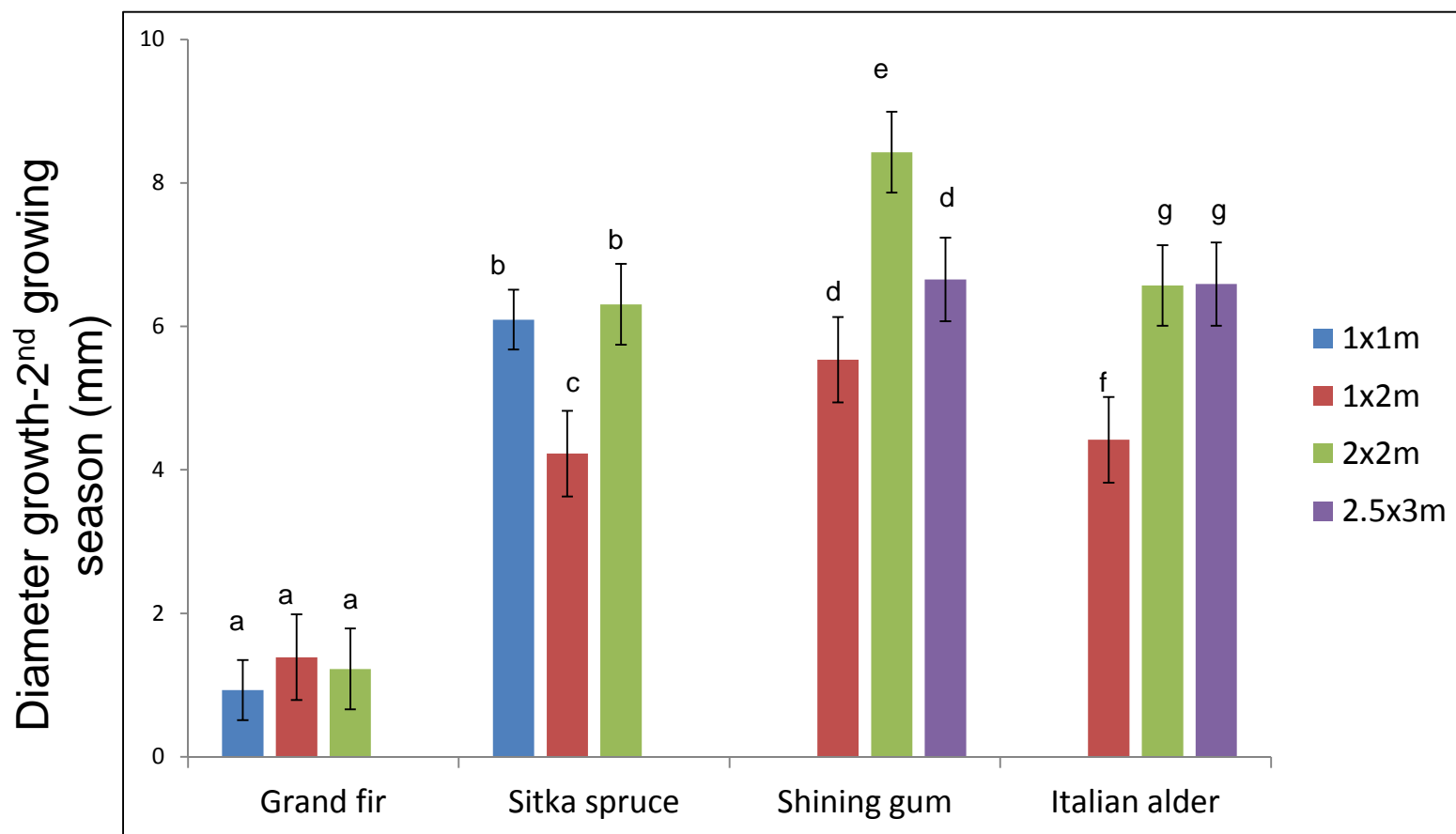




# Height growth



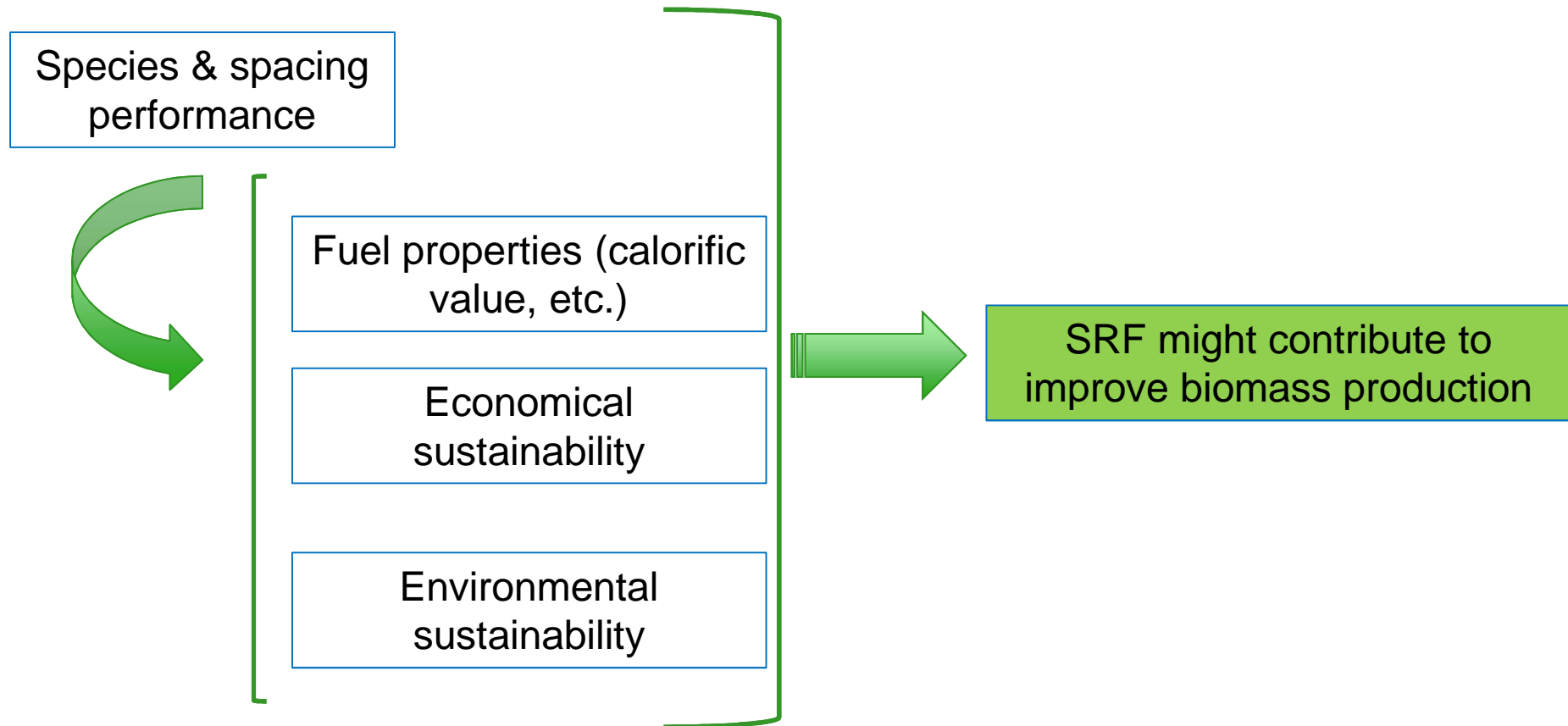
# Diameter growth



# Conclusions

- Survival
  - ✓ Grand fir < Shining gum  $\approx$  Italian alder  $\approx$  Sitka spruce
  - ✓ No spacing effect
- Growth rates
  - ✓ Shining gum: highest growth
  - ✓ Greatest growth in broadleaf than conifers
  - ✓ Spacing effect (except for grand fir): lower growth in 2x1 spacing
- Continuous monitoring of SRF trials
  - ✓ Silvicultural practices (spacing and rotation length) that optimise returns

# Conclusions



# Thank you

