Environ 2017

Susan Foreman

Effects of planting density on competition, growth and physiological responses of selected short rotation forestry species

Presentation content

Overview of the project
Objectives of study
Results to date
Future plans

Photo courtesy Dr. Ignacio Sevillano

Photo courtesy Oliver Sheridan

Photo courtesy Dr. Ian Short

Under Directive 2009/28/EC

By 2020 at least 16% of all energy consumed in the state is from renewable sources

Biomass is one renewable resource

Photo courtesy of Vattenfall

Short rotation forestry (SRF) has potential to provide some of this biomass

ShortFor Project aims to explore the potential of SRF in Ireland

Short rotation coppice
approx. 2-5 years

www.cropsforenergy.co.uk

One spacing approx. 0.75–0.80m in twin rows 1.5m apart

Short rotation forestry
approx. 8 - 20 years

www.spacecollective.org

A substantial reduction in final tree size, planting spacing could be reduced

Conventional forestry
approx. 30 - 80 years

www.forestry.ie

Conventional spacing for most species is 2x2

<u>But by how much??</u>

SHORT ROTATION FORESTRY

not a system of forestry that has been widely practiced

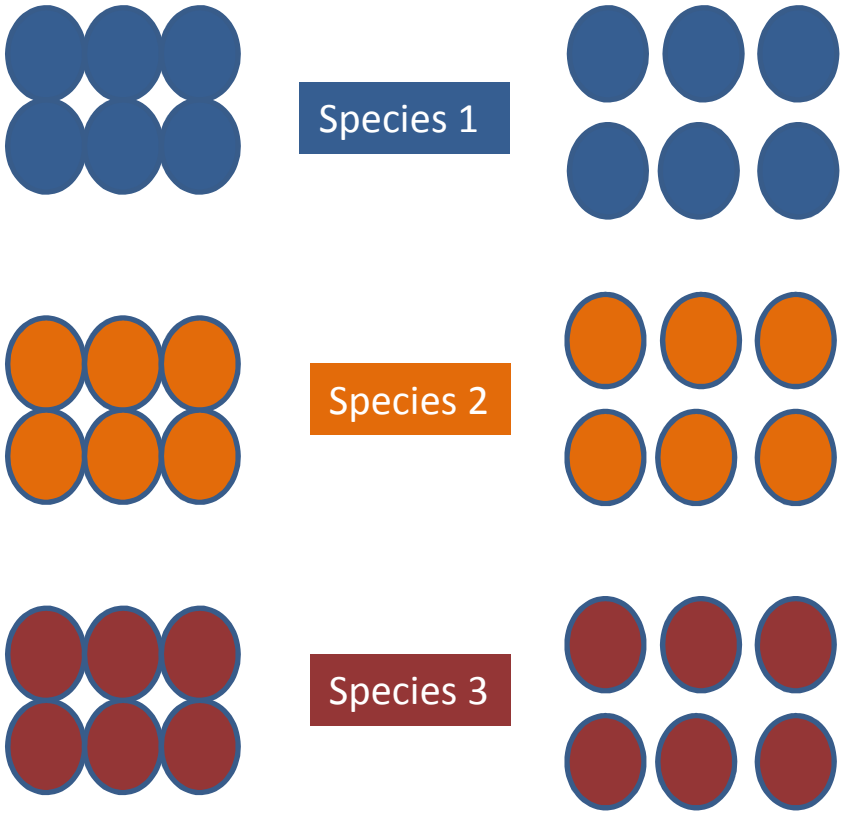
Lack of knowledge on best practice

Growers are not keen to commit land, time, and investment into a new forestry practice

Photo courtesy of Teagasc

Objective: to determine the effects and physiological responses to spacing for selected SRF species

Range of densities and species



Effects of competition on productivity

Establishment of:

Trial at JOHNSTOWN CASTLE

Johnstown castle trial site courtesy of Matt O'Grady

Experiments at KINSEALY RESEARCH CENTRE

Kinsealy research centre polytunnel courtesy of Susan Foreman

JOHNSTOWN CASTLE field trial

Planted with alder, eucalyptus and Sitka in June 2014

Johnstown castle 2015, courtesy of Susan Foreman

Johnstown Castle 2016, courtesy Dr. Ian Short

TEAGASC KINSEALY RESEARCH CENTRE

Kinsealy research centre polytunnel 2016 courtesy of Susan Foreman

Purpose:

maximise measurement and experimentation period

controlled condition

increased replications

inform future plans

Randomised block design
3 species using 3 spacings

Density – per pot

Low	1 plant
Medium	4 plants
High	8 plants

Data acquisition

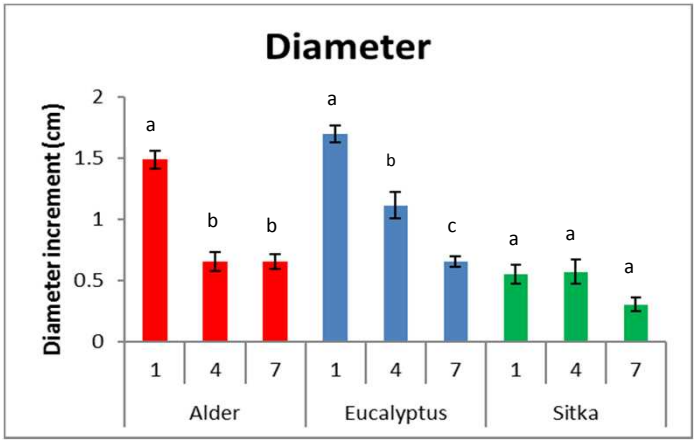
Morphology and Biomass

Physiology

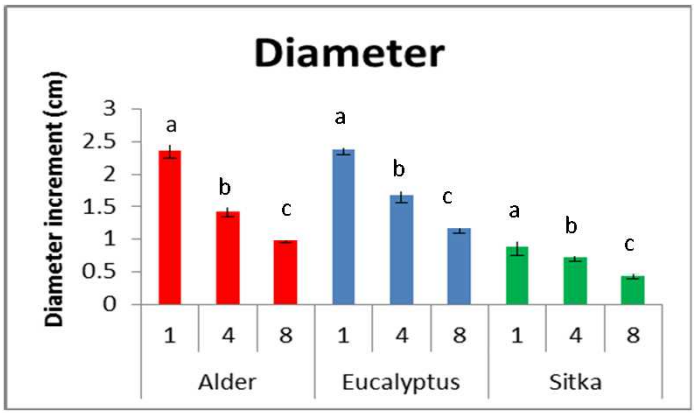
Phenology

Polytunnel courtesy of Susan Foreman

Morphology



Kinsealy 1st experiment



Kinsealy 2nd experiment

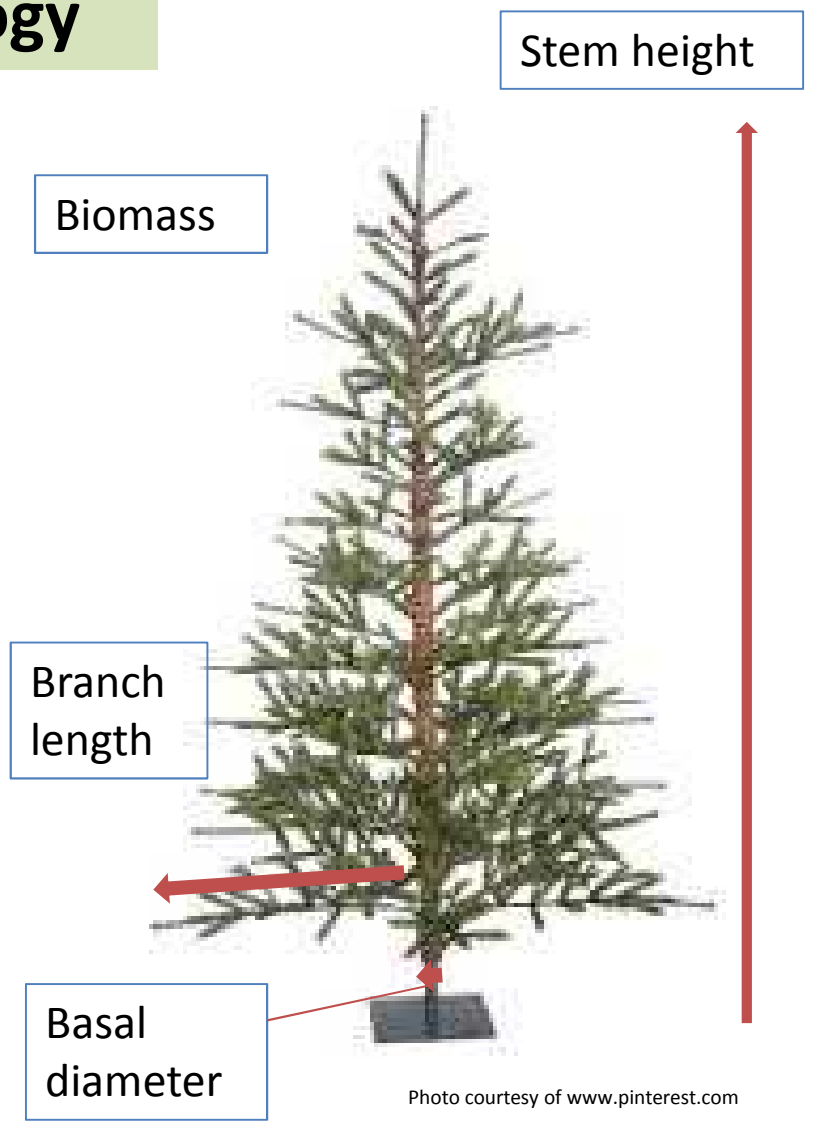
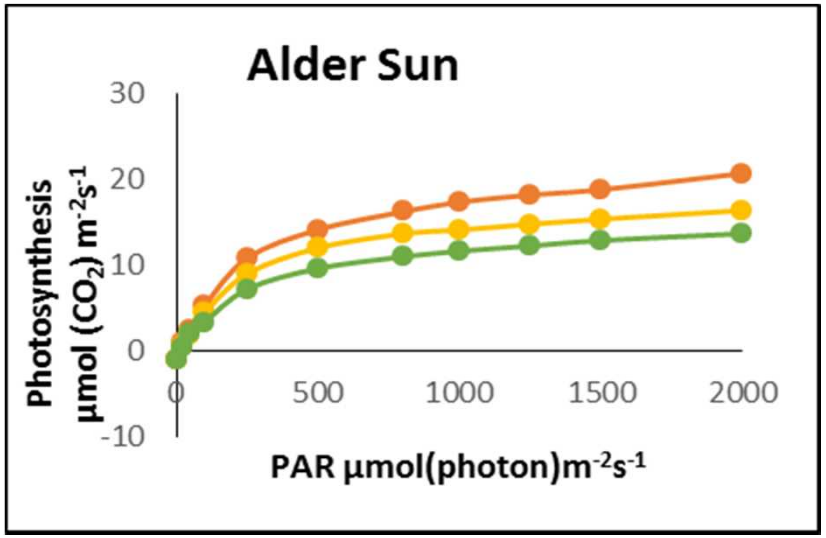
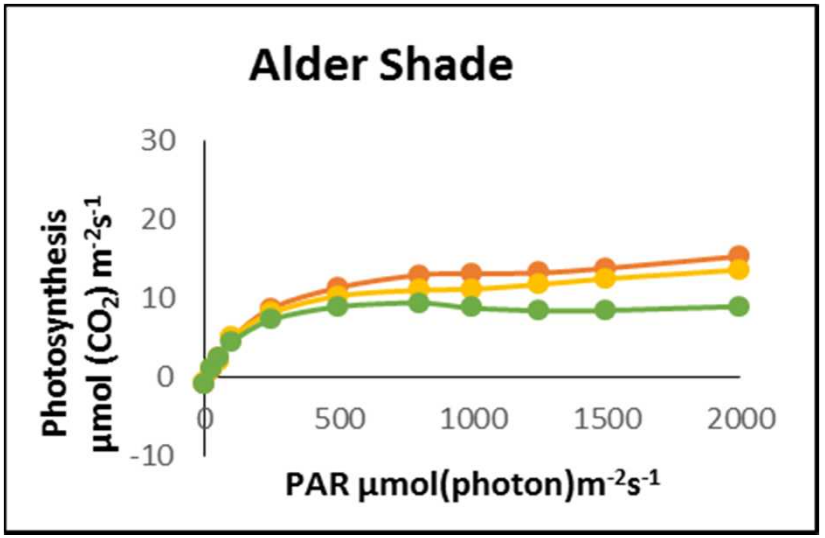


Photo courtesy of www.pinterest.com

Physiology

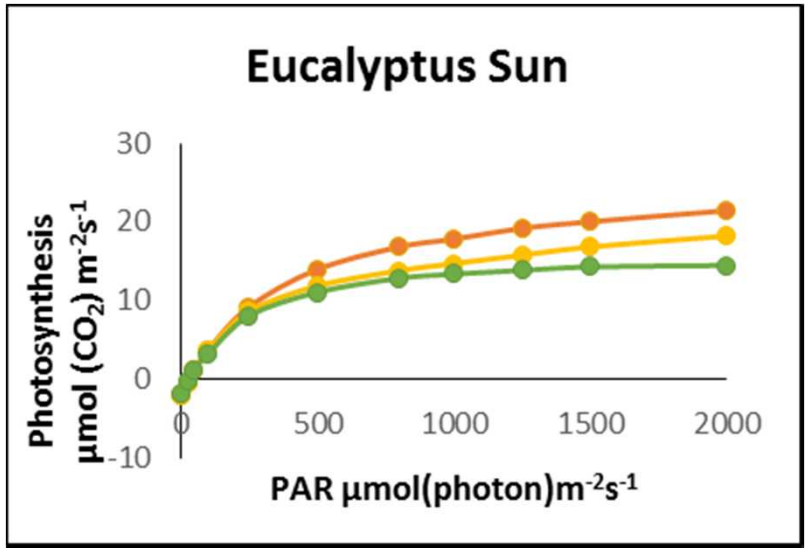
Light response curves at three planting densities

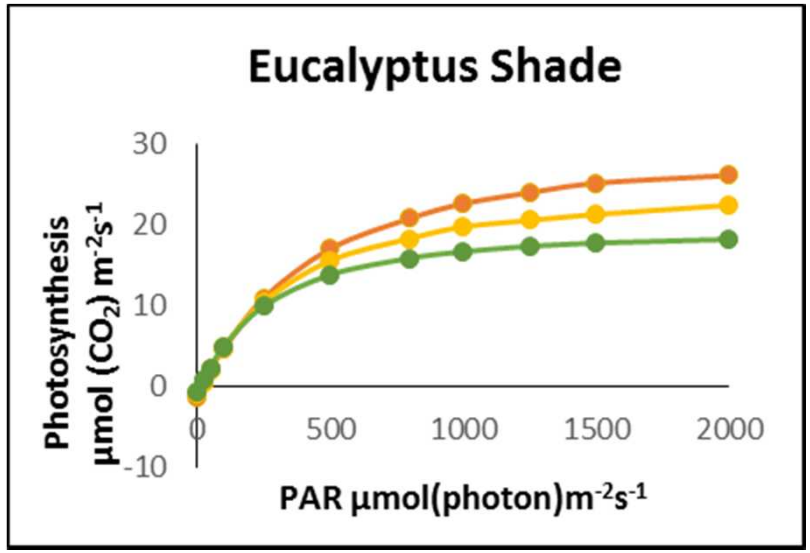




Low density
Medium density
High density

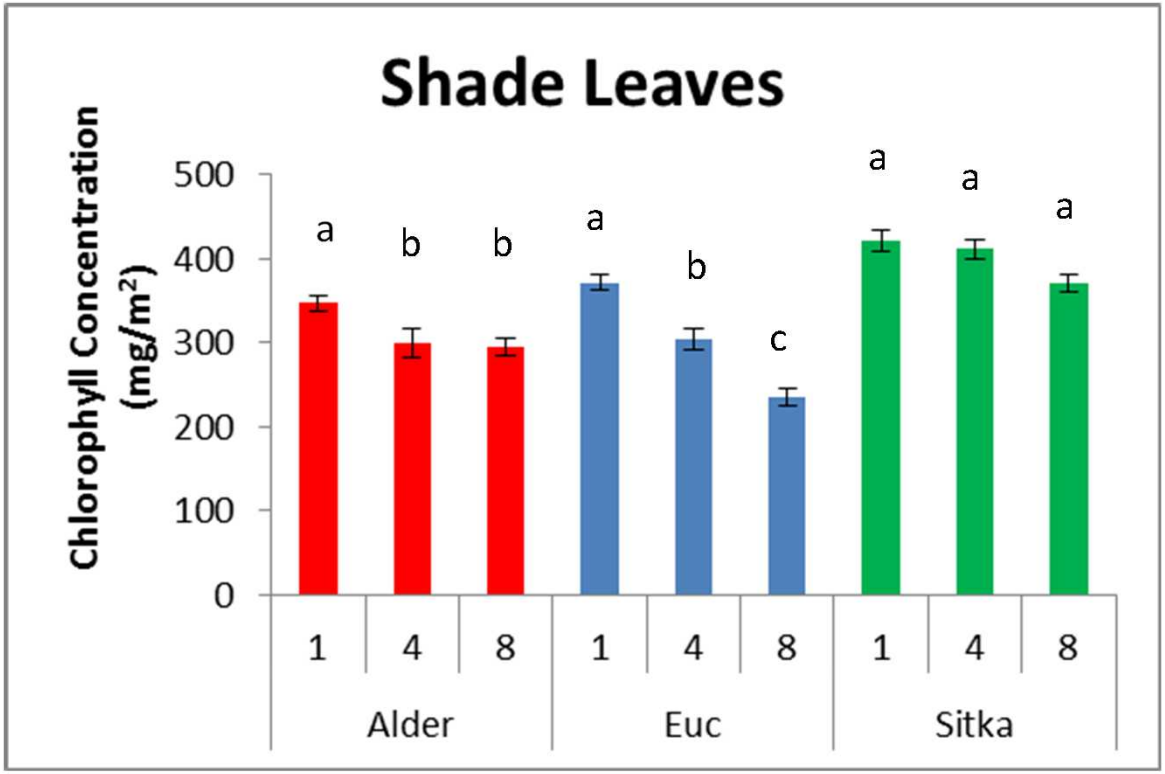
Light response curves at three planting densities





Low density
Medium density
High density

Chlorophyll concentration



Conclusions

- Competition detected using gas analysis of photosynthesis
- Significant differences detected in morphological results
- Significantly different levels of chlorophyll content across treatments

‘Putting the Eco in the Economy’

Biomass vs fossil fuels

Kyoto Protocol on Climate Change

Density and yield

EU Targets

Carbon footprint

www.eco-fuels.eu

Thank You

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