

***Eucalyptus* for short rotation forestry in the British Isles – a long history of trials**

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Prima Bio



Objectives

- Old specimens and trials (1850-2000)
 - What do they tell us?
- Why were trials not developed on a larger scale? (1987-2007)
- What has changed? (2007- 20??)
 - Recent developments
 - Prospects

Very old eucalyptus specimens

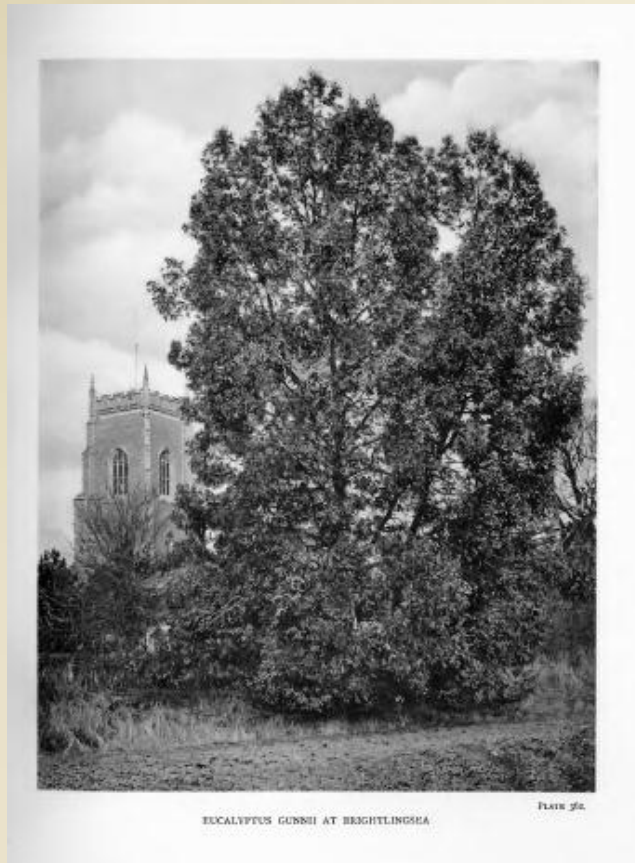


Eucalyptus urnigera p1881,
Stonefield Castle, Argyll, W. Scotland
Height 27m, dbh 137cm
Oldest living *Eucalyptus* in UK)



Eucalyptus urnigera, Crarae, Argyll
(progeny of Stonefield Castle tree)

A population of long-lived *E. gunnii*: Brightlingsea, Essex (SE England)



Specimen in Brightlingsea churchyard :
Photo from Elwes and Henry Vol 6 (1912)



The same specimen in 2010.
Totally defoliated by severe cold in 1963

A younger *Eucalyptus* specimen, and its progeny in trial



E. Glaucescens planted ca.1960,
Bovey Tracey, Devon, SW England.
Dbh 150cm.
First planting of species in Britain



E. glaucescens, progeny of Bovey Tracey
specimens, SRF trial p1980, New Forest,
S. England (Height ca. 35m, dbh to 76cm)

Survivors in *Eucalyptus* trials



E. nitida p1953, Cornwall, SW England
Badly damaged by -18°C in 1978/79
Recovered from stem epicormic buds
(*Tsuga heterophylla* is same age)



E. subcrenulata p1981, Haldon Forest, Devon, SW England
Best-surviving and retained part of trial
Other species cold-damaged in 1981-87
and subsequently removed

Fast growth of *Eucalyptus nitens*



Bovey Tracey, Devon, p1980
Height ca 22m, dbh 116cm
(shaped/pruned by arboriculture students)

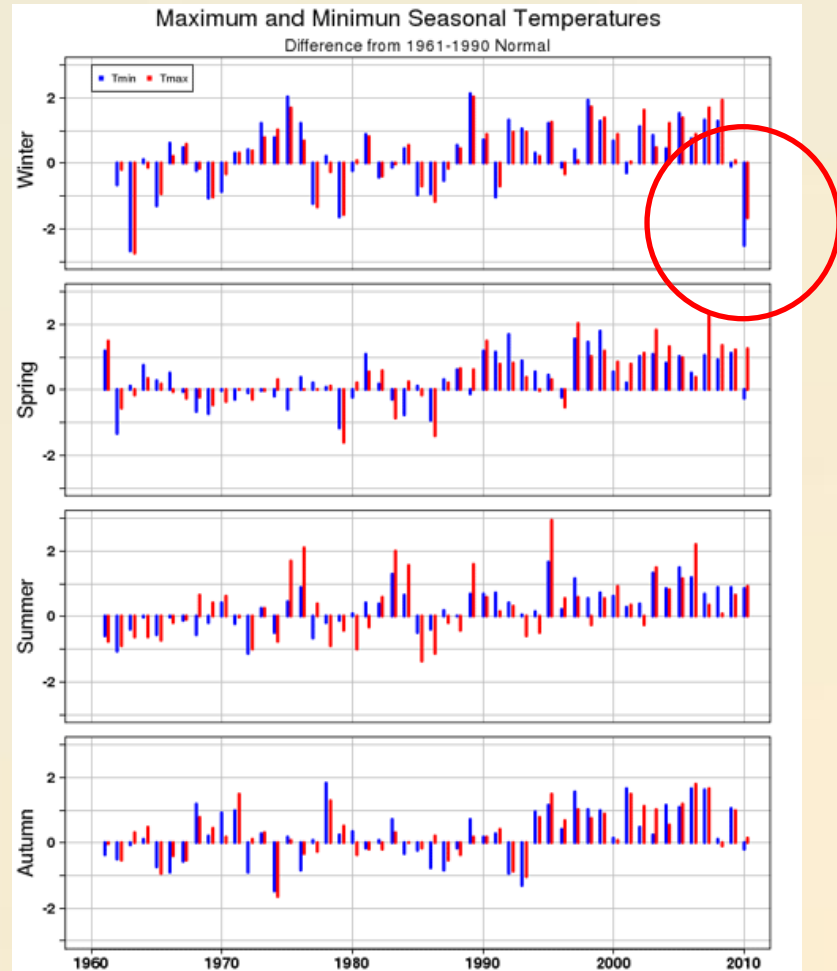
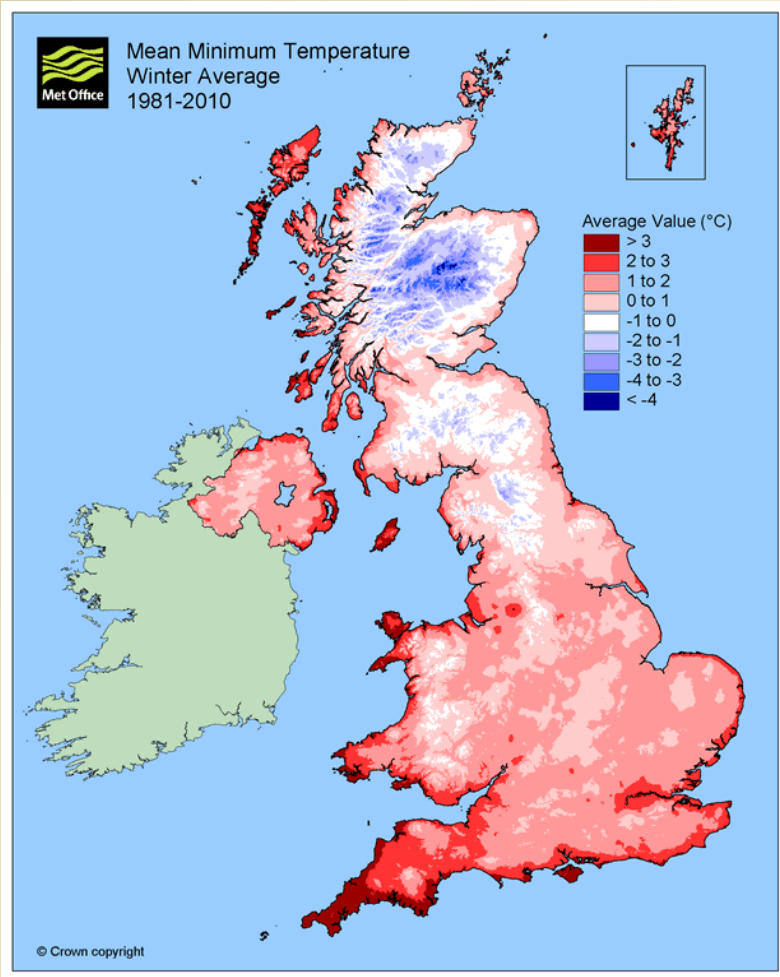


Sittingbourne, Kent, SE England, p1988
Hardwood coppice is re-growth from 1988!

Lessons from old specimens and trials

- Eucalypts can survive and grow in Britain for many decades
 - *E. gunnii* specimens are widespread
- Large trees >30 years old are generally in milder areas
- Severe cold can cause serious damage, not necessarily fatal
 - Distinct responses to cold by leaves, cambium and roots, influenced by hardening and duration of cold, and species
- Many species tried
 - Several have good form, growth and cold tolerance
 - Evidence of great variation at provenance and family level
- Other potentially interesting species overlooked
 - e.g. *E. rodwayi*

Winter temperatures in Britain and Ireland



METéirann data for Ireland

1987 – 2000: Disinterest

- Forestry Commission trials formally closed in 1986
 - Following a succession of severe winters
- Major shift of focus in UK forestry in early 1990s
 - More emphasis on environmental and recreational aspects
 - Removal of exotic species from lowland forestry
 - Production forestry becoming steadily less attractive; replanting dependent on grants – eucalypts ineligible
 - Low fossil fuel prices; little interest in biomass
- Developments in eucalyptus SRF elsewhere not understood
 - No domestic Kraft pulp industry

2000 – 2007: re-awakening of interest

- Further trial plantings by private sector
 - Focussing on better establishment conditions
 - Mixed results, but some excellent and hard to ignore
 - But difficult to source good quality planting stock
- Greater interest in biomass production
 - SRC willow not delivering advertised yields or adequate returns, despite planting grants
- Fossil fuel prices rising

From 2007: many drivers for interest

- High fossil fuel prices (especially natural gas)
- Rapid market growth and strong prices for woodfuel (especially hardwood logs for domestic use)
- Generous subsidies for woodfuel for heating
- Incentives for using biomass for electricity generation
- Now difficult to justify wood production on agricultural land
- New pests and diseases severely constraining planting many traditional forest species
- Predicted effects of climate change require new species and shorter rotations –officially recognised and promoted

Demonstration of eucalyptus SRF in UK (1)

Eucalyptus nitens, Newnham, Kent, p2001



4 months



16 months

Demonstration of eucalyptus SRF in UK (2)

Eucalyptus nitens, Newnham, Kent, p2001



4.5 years



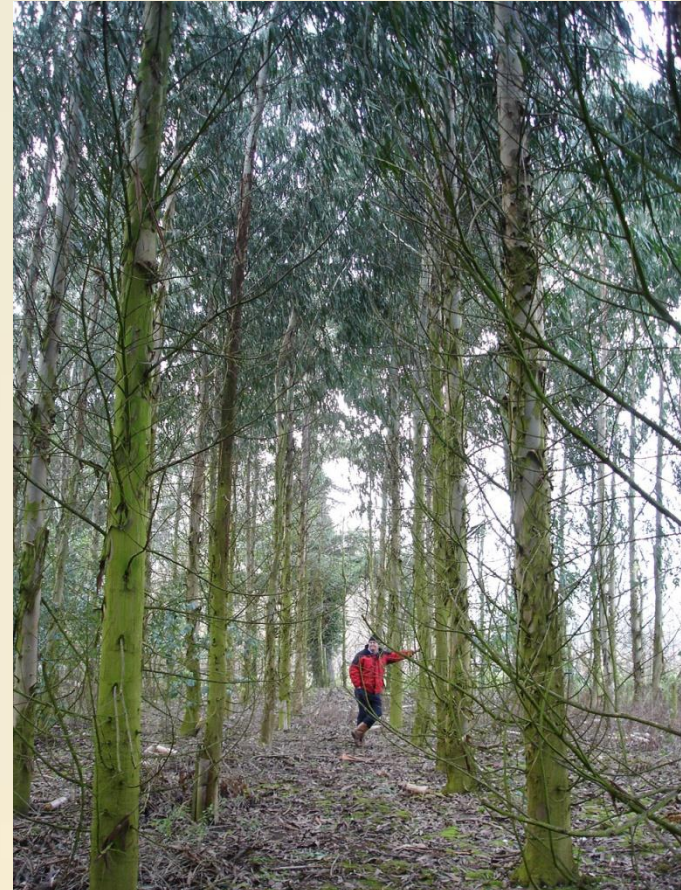
Logs from thinning at 4 years

Demonstration of eucalyptus SRF in UK (3)

Eucalyptus nitens, Newnham, Kent, p2001



at 7.5 years
14.6 odt/ha/y
(32.5 m³/ha/y)



at 7.5 years, thinned at 4 years
12.8 odt/ha/y (stand)
15.4 odt/ha/y (cumulative)

Demonstration of eucalyptus SRF in UK (4)

Eucalyptus nitens, Newnham, Kent, p2001

Latest assessment (8.33y):	Unthinned	Thinned @4y
Stocking at assessment (stems/ha)	1975	878
No. trees assessed	117	62
dbh range (cm)	6.5-27.9	14.2 - 33.1
Dominant height (m)	20	22
Vol (m ³ /ha)*	334	311
Biomass yield (odt/ha, assuming BD=0.45)	150.3	140
MAI (m³/ha/y)	40.1	37.4
MAI (odt/ha/y)	18	16.8
Thinning yield @ 4y (m ³ /ha)		42
Biomass yield @ 4y (odt/ha, assuming BD=0.42)		17.6
Cumulative yield @ 8.33y (m ³ /ha)		353
Cumulative biomass yield @ 8.33y (odt/ha)		157.6

* Using volume table for *E. nitens* derived in Lugo province, Galicia, NW Spain (J J Lorenzo and JG Alvarez Gonzalez, 2000)

Demonstration of eucalyptus SRF in UK (5)

Eucalyptus nitens, Newnham, Kent, p2001

General conclusions:

- World-class yields are possible (widely noted)
 - Despite only 500mm (21 inches) annual rainfall!
- Hardier species will have lower yields
- Establishment silviculture for species with lighter canopy will be different
- Establishment practices need to be optimised

Recent developments

- Severe winters in 2009/10 and 2010/11
 - Most young *E. nitens* killed
 - Most established eucalypts in coldest (inland) areas damaged
 - Young SRF *E. glaucescens* and *E. urnigera* undamaged and impressive on cold (not coldest) sites
- Short very cold period in E. England in Feb 2012
 - Damage to weaker young plants and stands (root damage)
- Interest tempered, but still significant in milder areas
- *E. glaucescens* appears extremely unpalatable to deer
- Good quality stock of wide range of species now available

***Eucalyptus glaucescens* in Thetford Forest, p2010 (1)**

(Forestry Commission; inland eastern England)



Above: in Jan 2011, following 6 weeks of severe cold
Right: in Oct 2011. Enthusiasm riding high!!



Eucalyptus glaucescens in Thetford Forest, p2010 (2)



Photographed in May 2012.

The area experienced several days of very cold weather in Feb 2012 (min ca. -17°C).
Symptoms of damage only became apparent in April 2012

***Eucalyptus glaucescens* at Totnes, Devon, p2010
(Normally mild site, SW England; Forest Research trial site)**



Above: In April 2011. Cold-damaged *E. nitens* in foreground
Right: In Sept 2011, showing benefits of weed control



Current activities; prospects

- Many small-scale trial plantings in 2012, and planned for 2013
 - Private landowners, fuel log suppliers, and Forestry Commission
 - In areas with milder climates (esp. SW England and SW Wales)
 - Several species on each site, good establishment conditions at some sites
 - Not grant-aided
- Coillte (Irish FC) planning 150 ha/y
- *E. glaucescens* in greatest demand; doing very well on wide range of sites
- Yields and costs still unclear (both will be species- and site-dependent)
 - Need data, with yields in oven-dry tonnes
- Private landowners regard coppicing ability as very important
- Further take-up will depend on growth of recent trials

Thank you