Eucalyptus in Great Britain

Species choice, yields and financial returns

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- Potential species
- Records of yields
- *Eucalyptus gunnii* growth curve
- Costs and revenues
- Economic analysis
- Risk

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Potential species

Potential species

Figure 1: Comparison of latitude and area of Europe and Australia (adapted from Turnbull and Eldridge1983. The natural distribution of *E gunnii* (black) and *E, nitens* (grey*)* (Brooker and Kleinig 1990). (Leslie, Mencuccini and Perks 2011)

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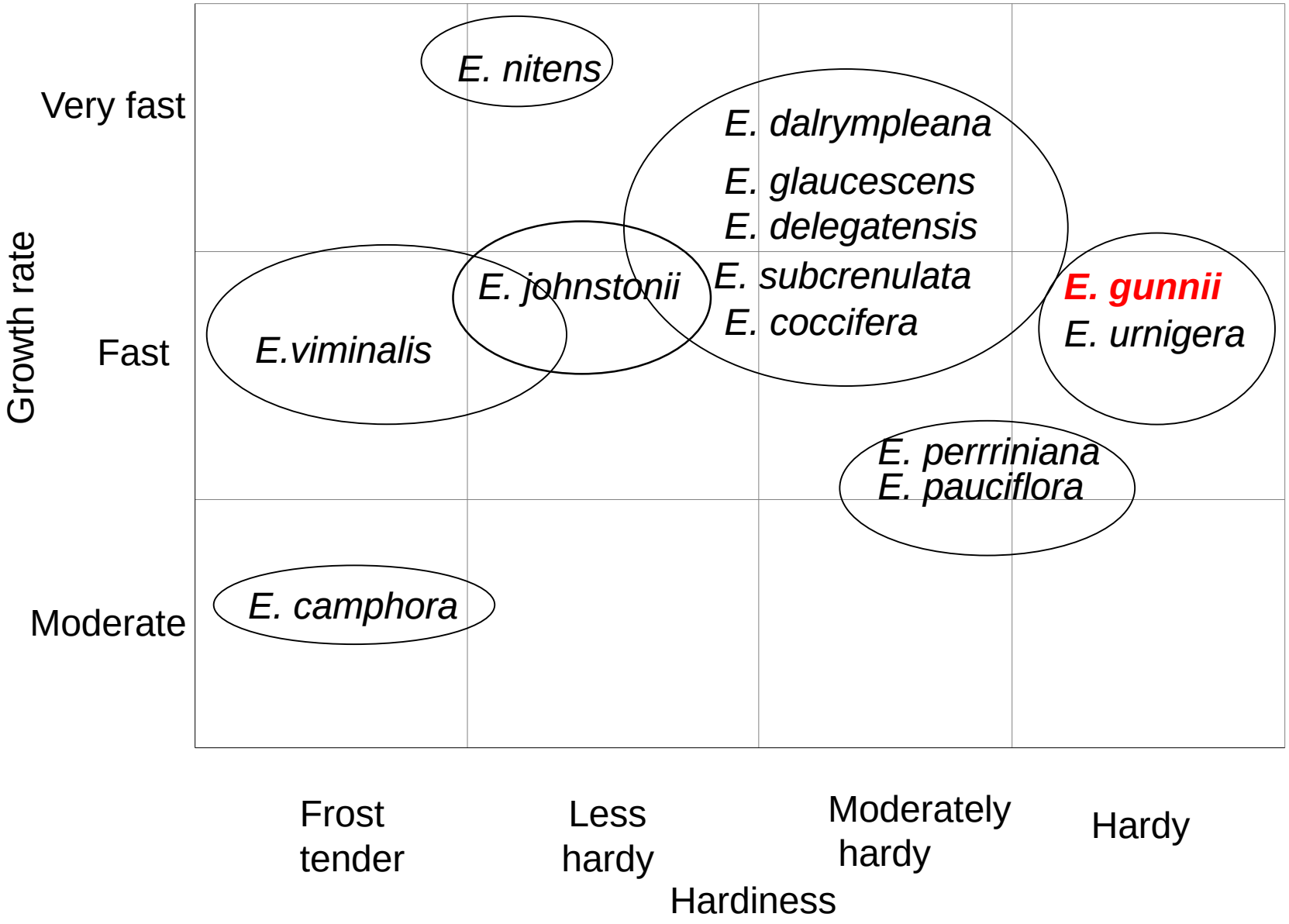

Figure 2: Growth and hardiness of eucalypts in Great Britain (Leslie, Mencuccini and Perks 2011)

Records of yields (mass)

Daneshill – Nottinghamshire

24.2ha of Eucalypts planted in 2005. *E gunnii* and *E nitens*.

Stems killed December 2010.

Woodchip harvested in June 2011 was 2076.4 tonnes or 85.83 tonnes / ha or 17.16 tonnes ha^{-1} $year^{-1}$ (greenish)

(6.95 tonnes $acre^{-1}$ $year^{-1}$)

(Wooddisse 2011)

Records of yields (volumes)

Red Marley – Worcestershire - second rotation coppice measured at 10 years old

Species	Height (m)	Dbh (cm)	Stools ha^{-1}	Stems ha^{-1}	Vol m^3 ha^{-1}	Biomass odt ha^{-1}
E. gunnii	17.19	13.2	2370	3792	248	193
E. dalrympleana	17.08	16.1	530	954	69	49
			2900	4746	317	242

Assuming a dry density ~700 kg m^{-3}

(McKay 2010)

Or 31.7 m^3 ha^{-1} y^{-1}

Or 24.2 odt ha^{-1} y^{-1}

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E. gunnii growth

- 1st rotation: 15 years – 26 m^3 ha^{-1} y^{-1} based on interpolated data from sites from across GB

- 2nd rotation: 10 years - Red Marley – MAI Coppice =30 m^3 ha^{-1} y^{-1} @ 10 years old

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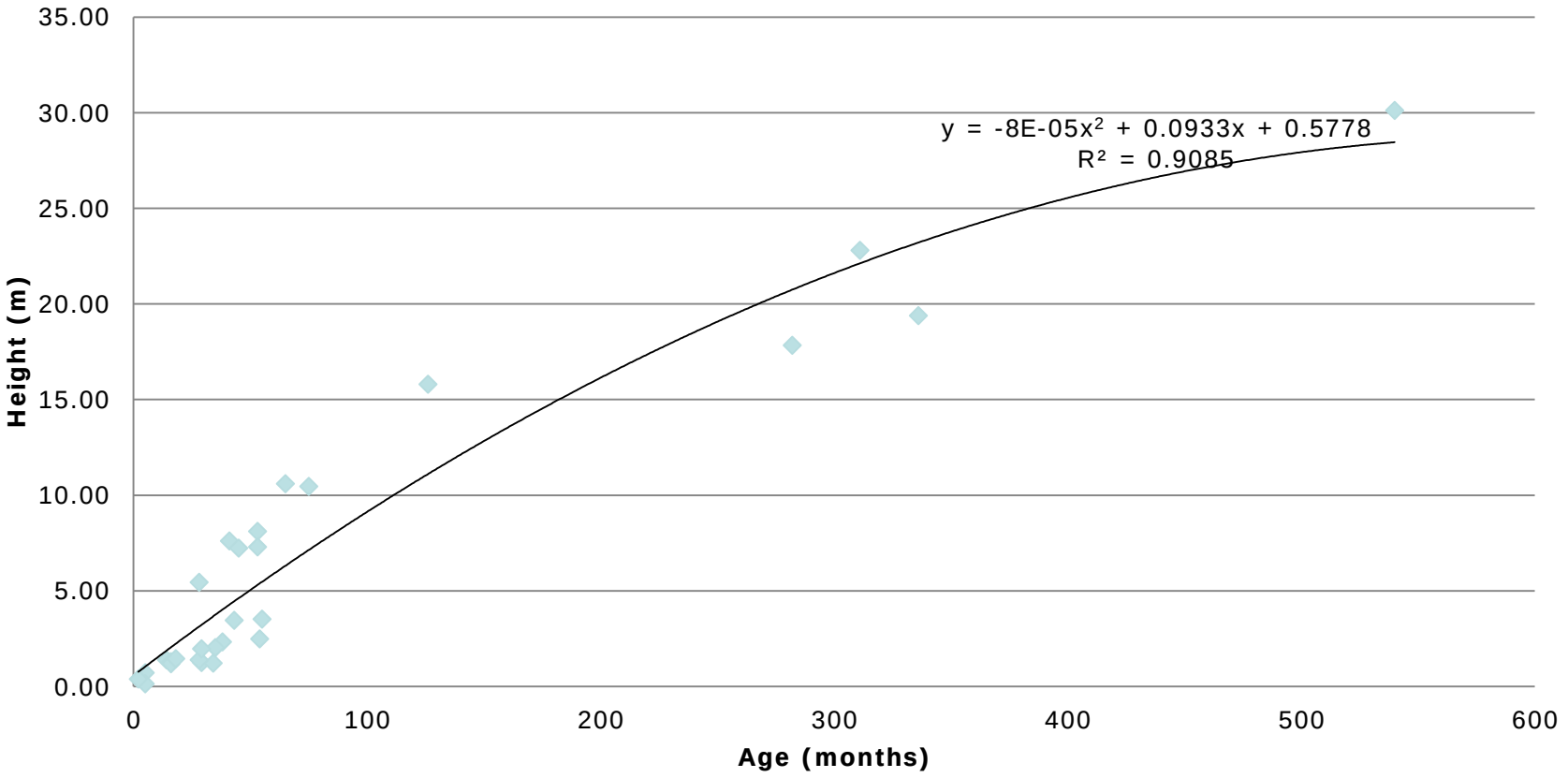
E. gunnii growth



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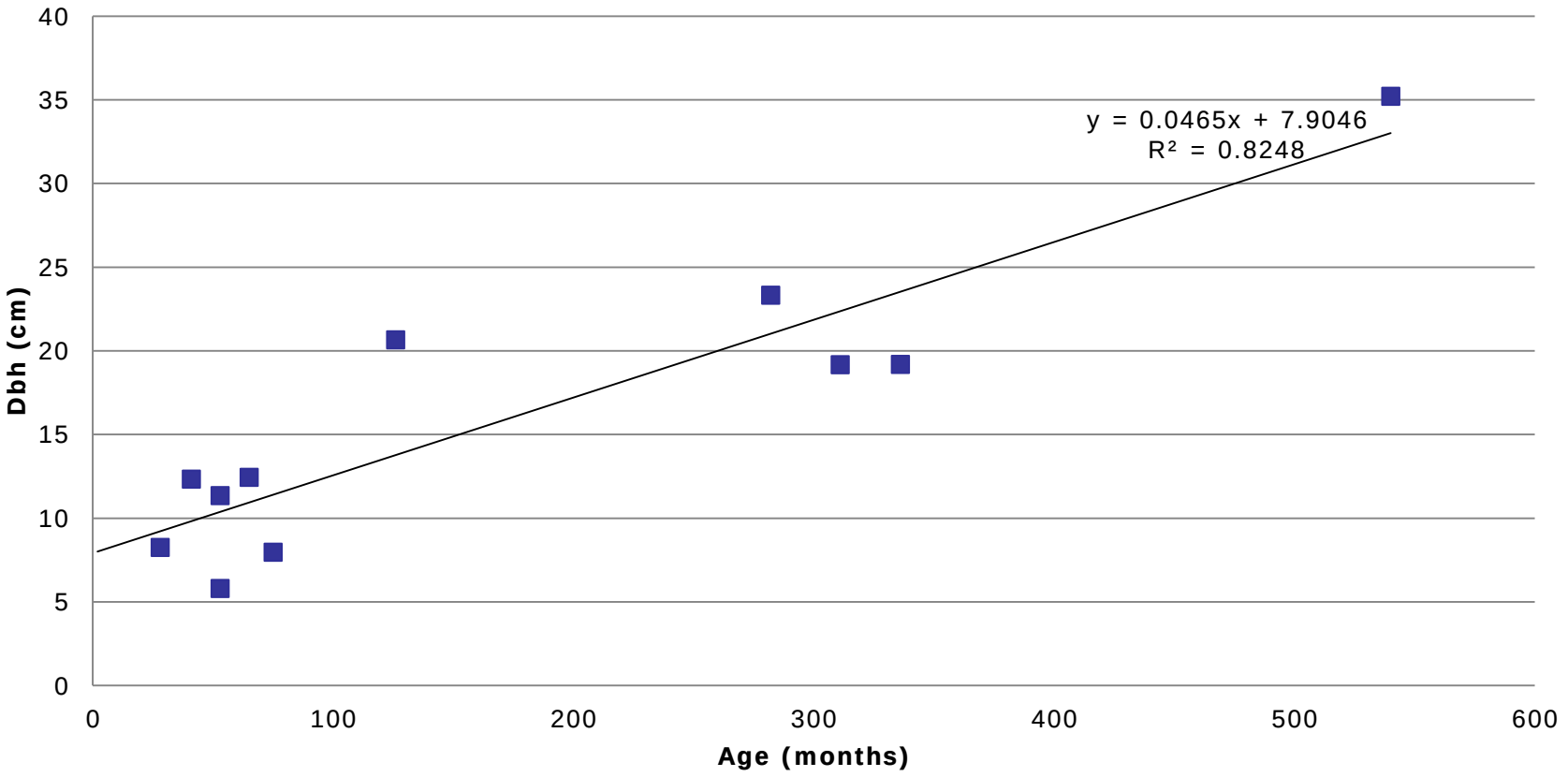
E. gunnii growth



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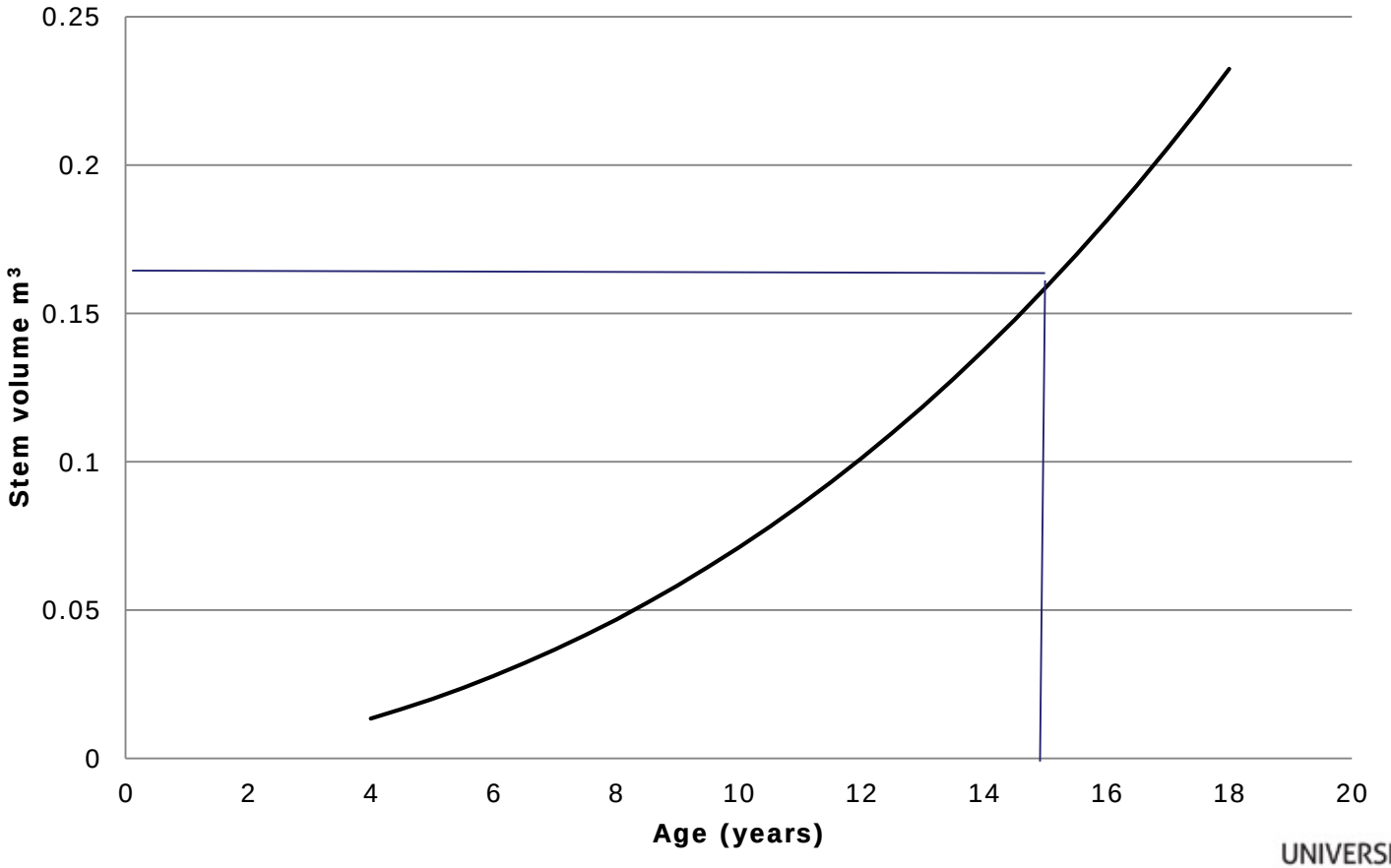
E. gunnii growth



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E. gunnii growth

Dbh @ 15 years = 16.3 cm

Height @ 15 years = 17.4 m

AFOCEL (2003) volume equation:

Stem volume =

$-5.04+(0.03556*(dbh^2)*height))/1000$

Tree volume @ 15 years =0.16 m^3

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Income – 1st Rotation

- Stem volume @ 15 years = 0.16 m^3
- Standing volume @ 2,500 stems/ha =396 m^3 ha^{-1}
- MAI = 26 m^3 ha^{-1} y^{-1}
- Standing sales prices for material of stem volume of 0.16 m^3 for GB is approx £11 m^{-3} ($5 ft^{-3})
- So standing value = £4365 ha^{-1} ($2587 $acre^{-1}$)

- Delivered biomass prices for the UK electricity sector are £30-60 odt^{-1} (ex VAT) for UK feedstocks and a price range of £105-135 odt^{-1} for imports (DECC 2010)

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Income – subsequent rotations

- Coppice volume @ 10 years = 300 m^3
- MAI = 30 m^3 ha^{-1} y^{-1}
- 300 m^3 @ 1.05 t m^{-3} = 315 tonnes wet weight or 150 tonnes dry weight (based on AFOCEL 2003)
- Standing sales prices for material of stem volume of less than 0.124 m^3 for GB is approx £11 m^{-3} ($5 ft^{-3})
- So standing value =£3,300 ha^{-1} ($2,138 $acre^{-1}$)

- In 55 years get 5 rotations

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Establishment costs

NDR @ 5% discount rate

Year	Operation	Cost / Revenue (£)	Disc Cost / Revenue (£)
0	Establishment	-1850	-1850
1	Herbicide	-200	-191
2	Herbicide	-200	-181
15	Harvesting single stems	+4365	+2100
25	Harvesting coppice	+3300	+975
35	Harvesting coppice	+3300	+598
45	Harvesting coppice	+3300	+367
55	Harvesting coppice	+3300	+225
	TOTAL	+15315	+2043

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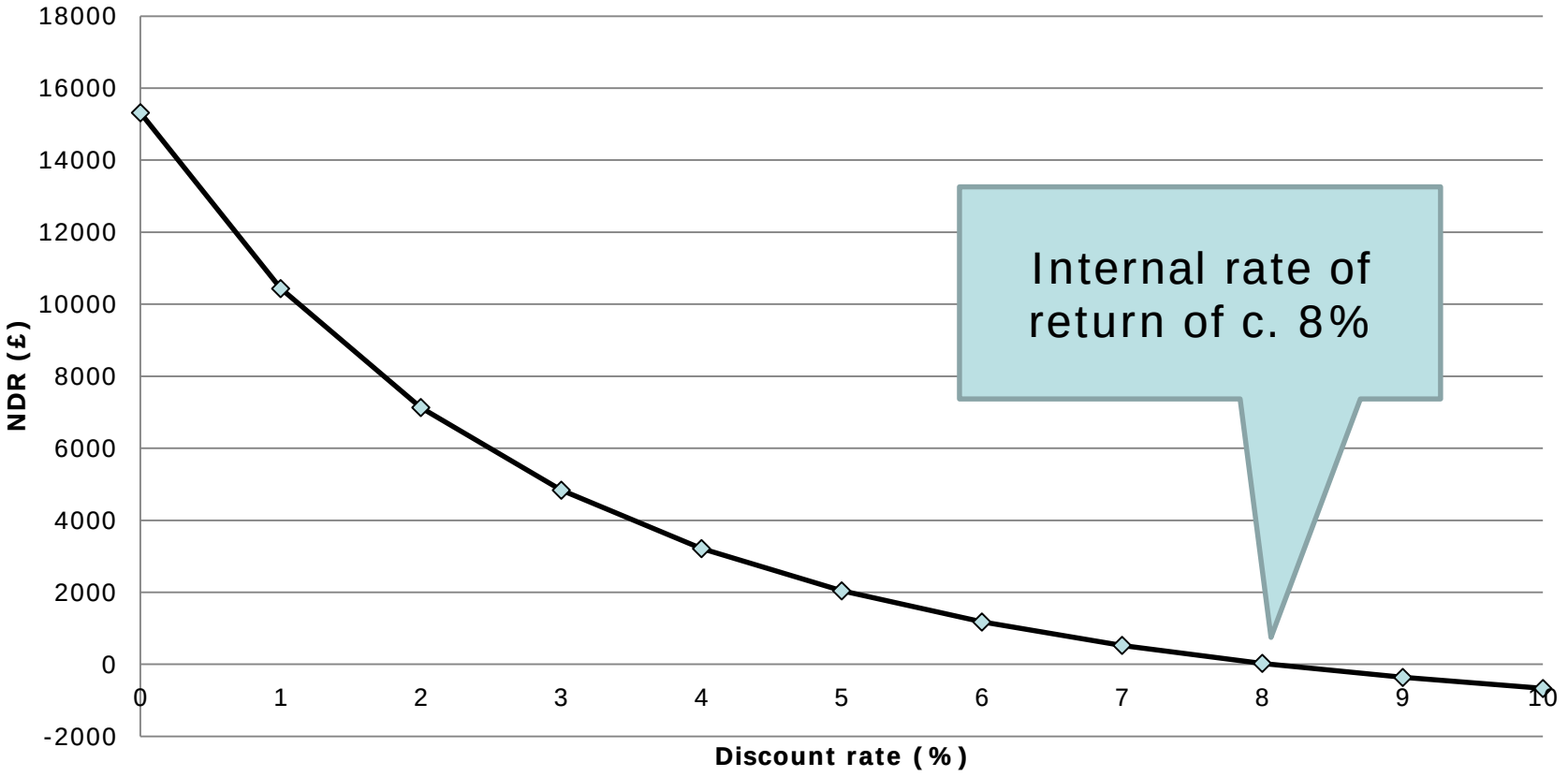
NDR & IRR



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Comparison alternative

Sitka Spruce, YC20, 2500 stems ha^{-1}, intermediate thin

Year	Operation	Cost / Revenue (£)	Disc Cost / Revenue (£)
0	Establishment	-1850	-1850
1	Herbicide	-200	-191
2	Herbicide	-200	-181
20	Thinning	+287	+108
25	Thinning	+559	+165
30	Thinning	+1102	+255
35	Thinning	+1055	+191
40	Thinning	+739	+105
45	Thinning	+1129	+126
50	Thinning	+959	+84
55	Clear fell	+9125	+754
	TOTAL	+12705	-434

Risk

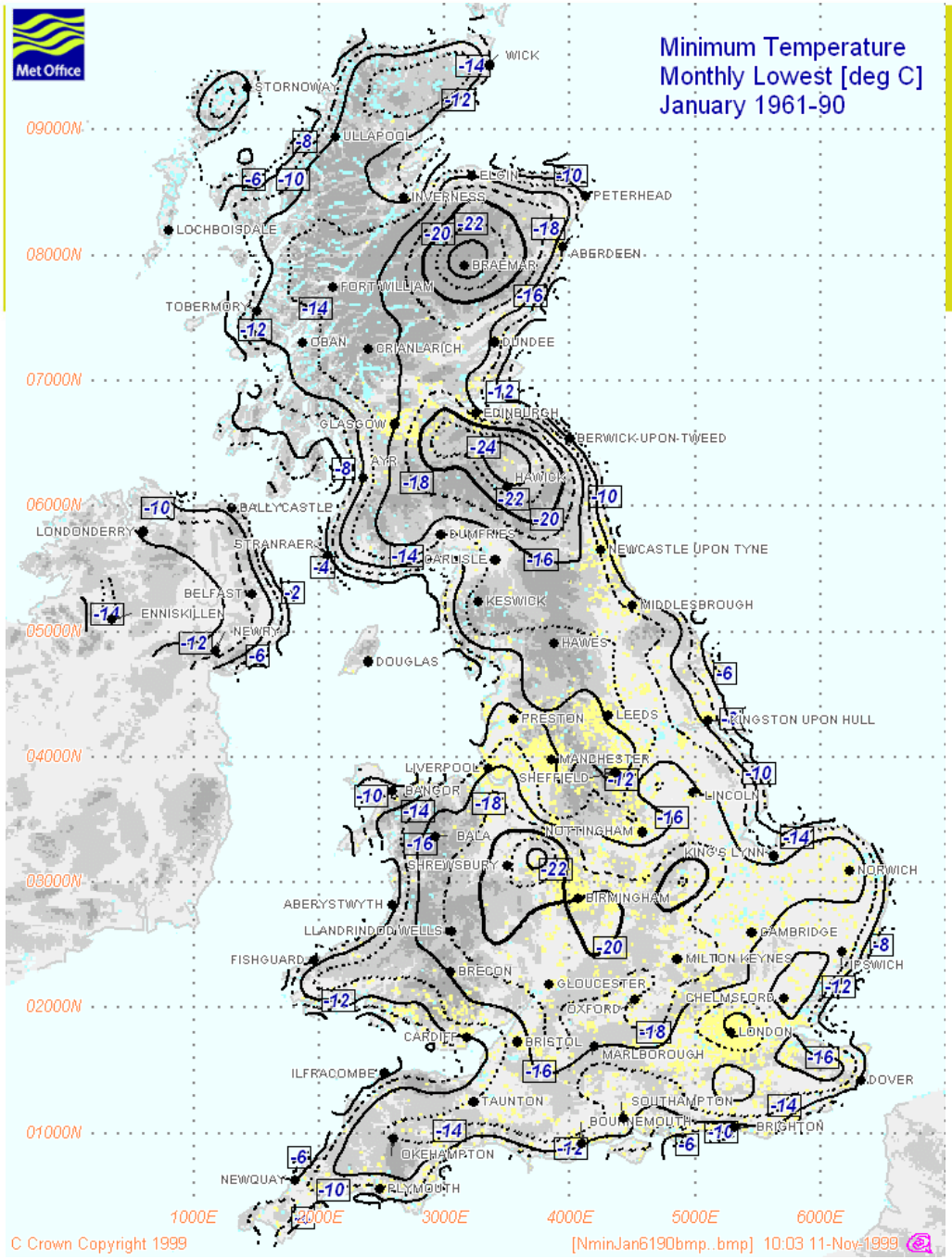

Figure 3: Minimum temperature for January (1961-1990). (Met Office undated)

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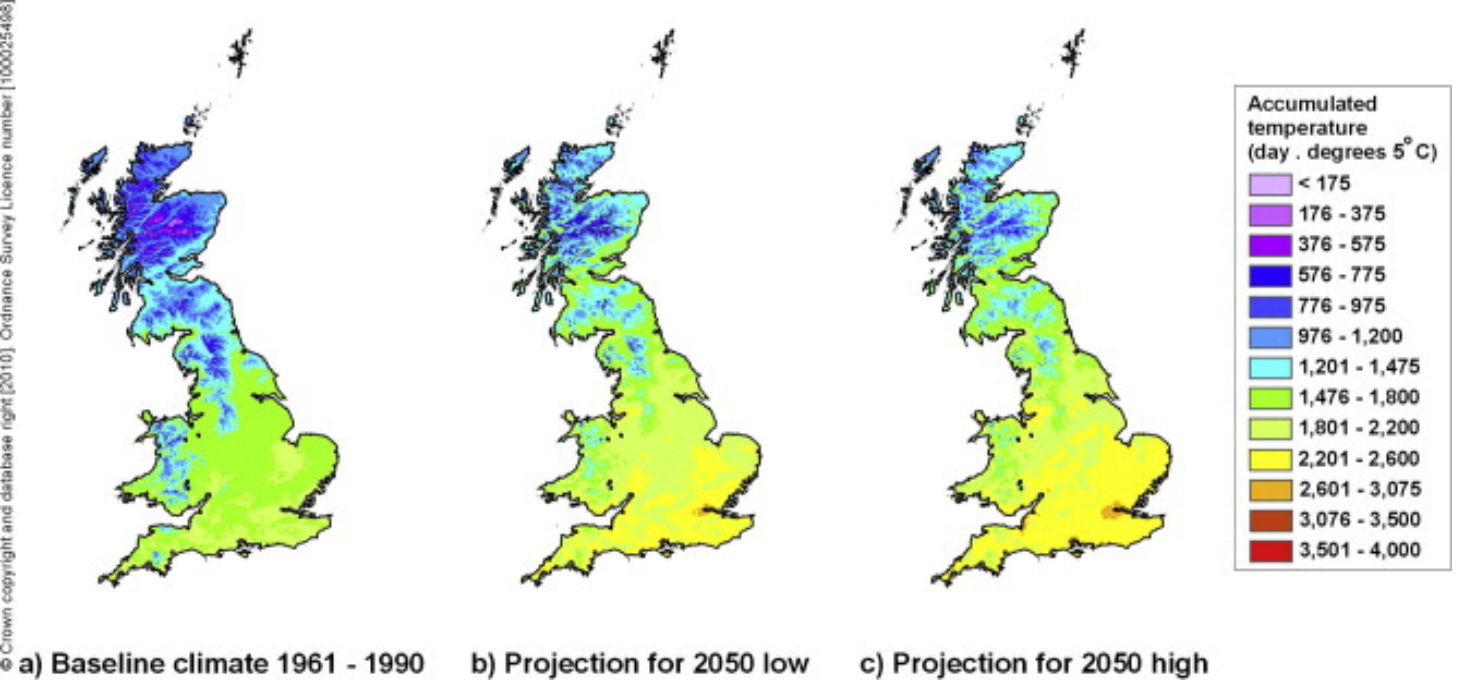

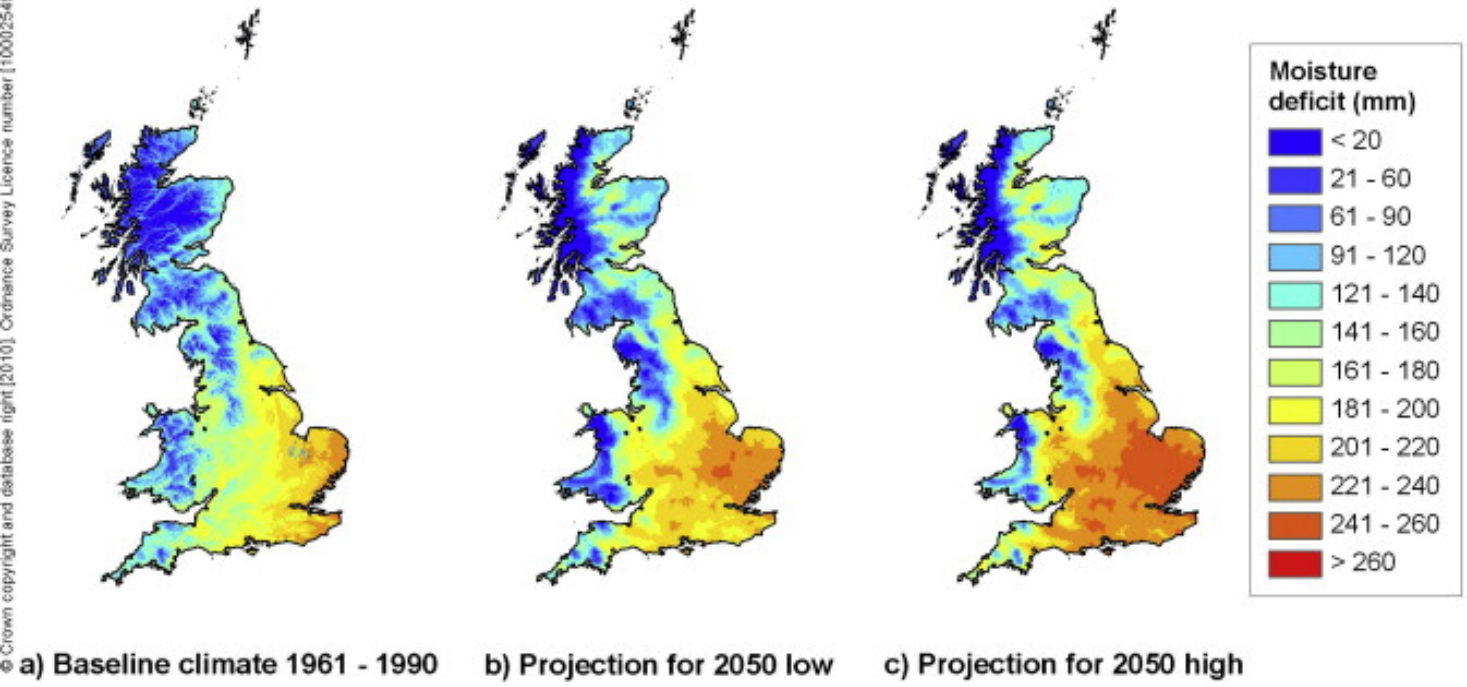

Figure 4: Projections for Accumulated Temperature and Moisture Deficit for Great Britain (Broadmeadow, Webber, Ray and Berry 2009)

Conclusions

- Cold tolerant eucalypts possible crop
- Highly productive
- Higher returns than other trees
- But...Risk of cold damage
- Future risk not predictable

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