Eucalyptus trees with abundant heartwood and good quality

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Natural durability ratings of NZDFI species AS5604 (old-growth)

Species	Lyctid susceptibility of sapwood	Termite resistance of heartwood	In-ground life expectancy (years)	Above- ground life expectancy (years)	Life expectancy in southern waters (years)	Colour
Eucalyptus bosistoana	Susceptible	Resistant	>25 ^a	>40	21 to 40	Pinkish pale brown
Eucalyptus argophloia	Susceptible ^b	ND	>25 ^d	ND	ND	Orange-brown to deep red- brown ^c
Eucalyptus quadrangulata	Not susceptible	Resistant	15 to 25	15 to 40	ND	Pale yellow
Eucalyptus sideroxylon	Susceptible	Resistant	>25	>40	41 to 60	Dark red
Eucalyptus globoidea	Not susceptible	ND	15 to 25	ND	21 to 40	Pinkish pale brown

^a See (Cookson 2004)

^b See (Cookson, Carr et al. 2009)

^c See (AWPC 2007)

^d See (PR10–5019 Construction timbers in Queensland - Book 2: Properties and specifications 2017)

Variation



4-yr E. bosistoana

10-fold variation in EC



Sampling



Non-destructive

coring - not trivial

- Fast many trees
- High density large forces
- Small trees small hole / core

New coring tool



Heartwood quality - NIR



EC and durability

Decay tests (mass loss) 1 brown-rot; 1 white-rot

>400 E. bosistoana trees (4 sites; age 7)

Known EC (by NIR) – stratified sample



EC and durability

E. bosistoana age 7



- NIR able to select durable trees (at the cost of loosing some good trees)
- Young E. bosistoana generally highly durable (<3% mass loss)
- Influence of site

Heritability

- Martin	Traits	HWD	SWD	DBH	EC
	HWD	0.66 (0.12)			
	SWD		0.66 (0.10)		
	DBH			1.11 (0.12)	
	EC				0.16 (0.05)
Craven's Road	HWD	0.71 (0.11)			
	SWD		0.53 (0.10)		
	DBH			0.69 (0.11)	
	EC				0.25 (0.08)

EC heritability comparable to literature

• E. cladocalyx, E. grandis and E. urophylla

Li et al. (2018) Forest ecology and management

Sites

E. bosistoana age 7



R_g²: Genetic correlations

Note: only 2 sites

Stable rankings across sites

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Phenotypic and genetic correlation

Martin	Traits	HWD	SWD	DBH	EC
	HWD	0.66 (0.12)	-0.08 (0.06)	0.59 (0.04)	0.37 (0.04)
	SWD	0.47 (0.16)	0.66 (0.10)	0.43 (0.05)	-0.22 (0.04)
	DBH	0.89 (0.04)	0.76 (0.08)	1.11 (0.12)	0.15 (0.04)
	EC	0.13 (0.23)	-0.52 (0.18)	-0.18 (0.13)	0.16 (0.05)
Craven's Road	HWD	0.71 (0.11)	0.17 (0.08)	0.78 (0.03)	0.03 (0.07)
	SWD	0.97 (0.07)	0.53 (0.10)	0.58 (0.04)	-0.29 (0.06)
	DBH	0.98 (0.01)	0.88 (0.05)	0.69 (0.11)	-0.14 (0.06)
	EC	-0.86 (0.18)	-0.89 (0.11)	-0.86 (0.14)	0.25 (0.08)

No or negative genetic correlations between EC and growth traits

- Need to search for 'correlation breakers'
- Better to select for HWD than DBH

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Vineyard posts

Range of decay in *E. bosistoana* and *E. globoidea* posts after 10 years



< 2mm 2-5 mm 10 -20 mm > 30mm

Vineyard posts



E. globoidea



No decay after 10 years in *E. bosistoana* Performance of *E. globoidea* posts site dependent

Summary

- Young *E. bosistoana* has generally good natural durability
- Posts from old NZ-grown *E. bosistoana* perform well
- Improving EC (durability) and growth is possible but challenging

Future work

- Investigate site influences
- Heartwood quality and quantity of *E. globoidea*
- Test timber according to building standards of (export) markets

Thank you