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UNIVERSITY OF THE SUNSHINE COAST, QUEENSLAND, AUSTRALIA | CRICOS PROVIDER NUMBER: 01595D

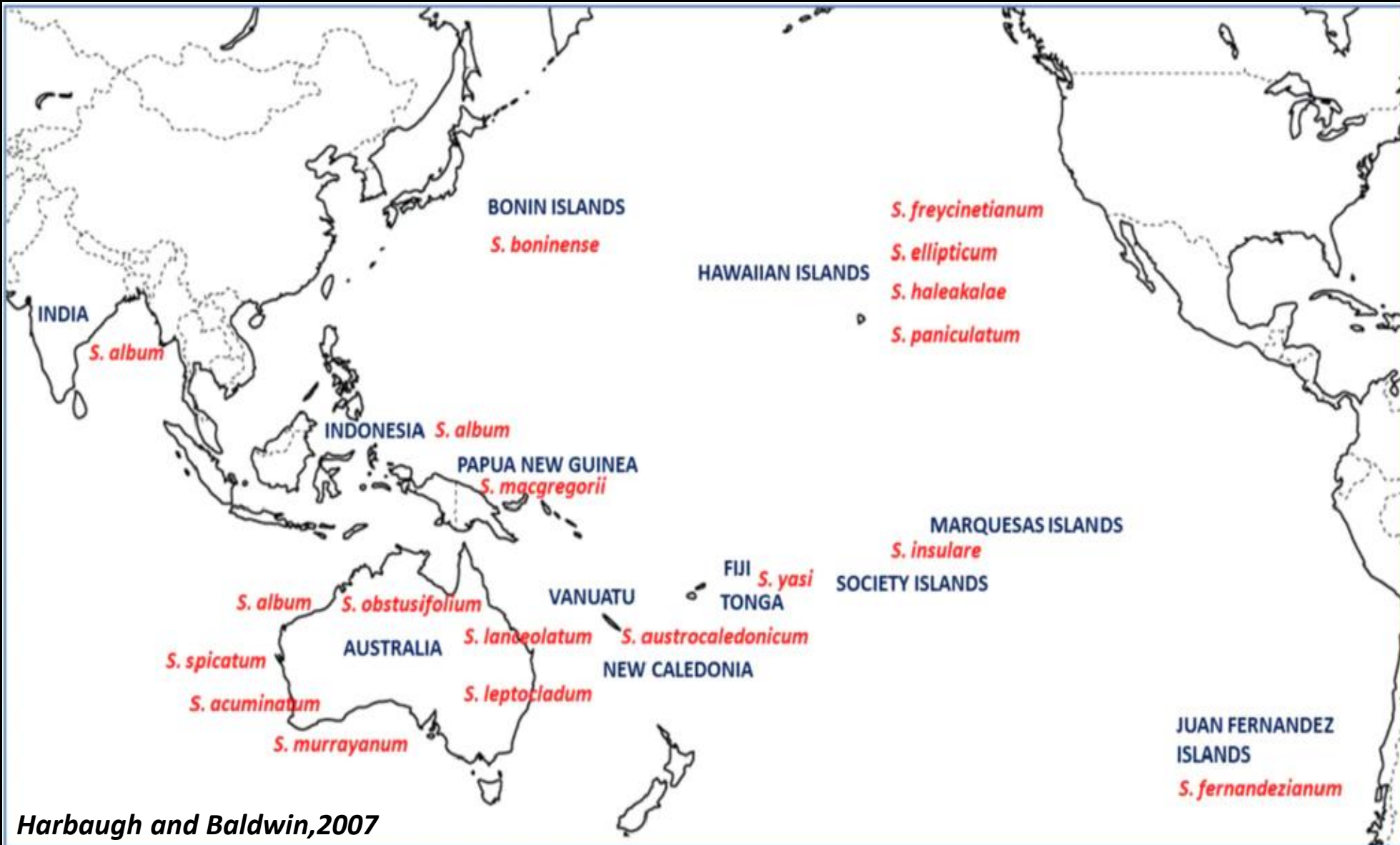
Evaluating the growth and commercial viability of different sandalwood species under mixed-species plantation management

Presenter: Duc Bui

Supervision team
A. Prof. David J. Lee
Dr. David Bush



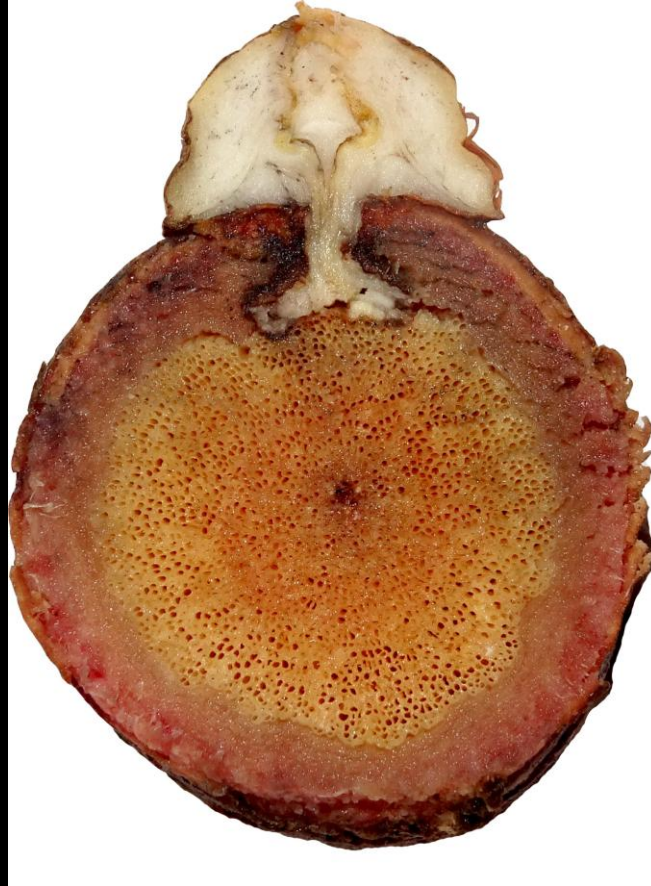
Sandalwood distribution



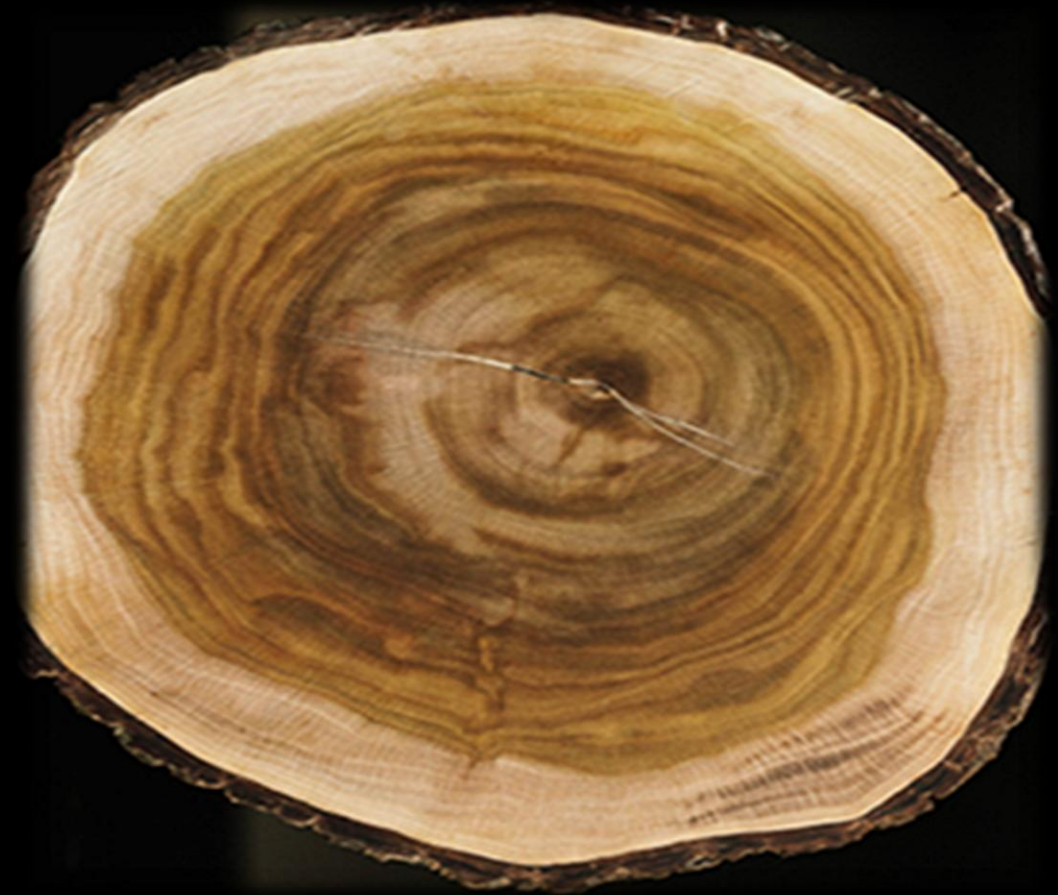
Harbaugh and Baldwin, 2007

Sandalwood and their HIGHLIGHT characteristics

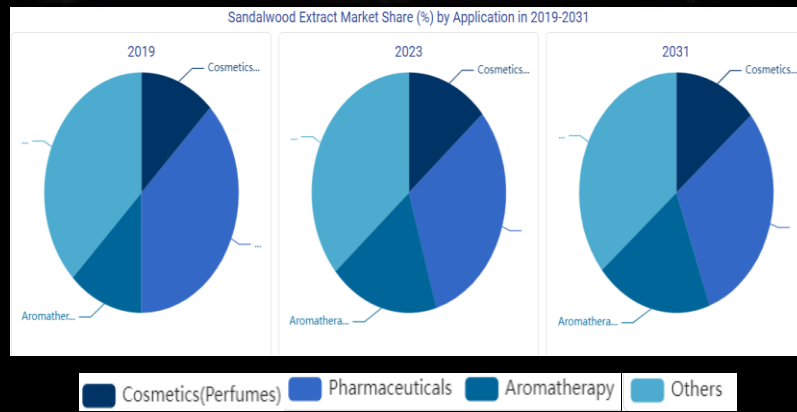
- Root hemi-parasitic plants



- Fragrant heartwood



Main sandalwood species in global trade



Species	IUCN Red book categories
<u><i>S. album</i> L.</u>	Vulnerable
<i>S. austrocaledonicum</i> Vieill.	Near threatened
<i>S. insulare</i> Bertero ex A.DC.	Endangered
<i>S. lanceolatum</i> R.Br.	Least concern
<i>S. macgregorii</i> F.Muell.	Critically endangered
<i>S. paniculatum</i> Hook. & Arn.	Vulnerable
<u><i>S. spicatum</i> (R.Br.) A.DC.</u>	Vulnerable
<i>S. yasi</i> Seem.	Endangered



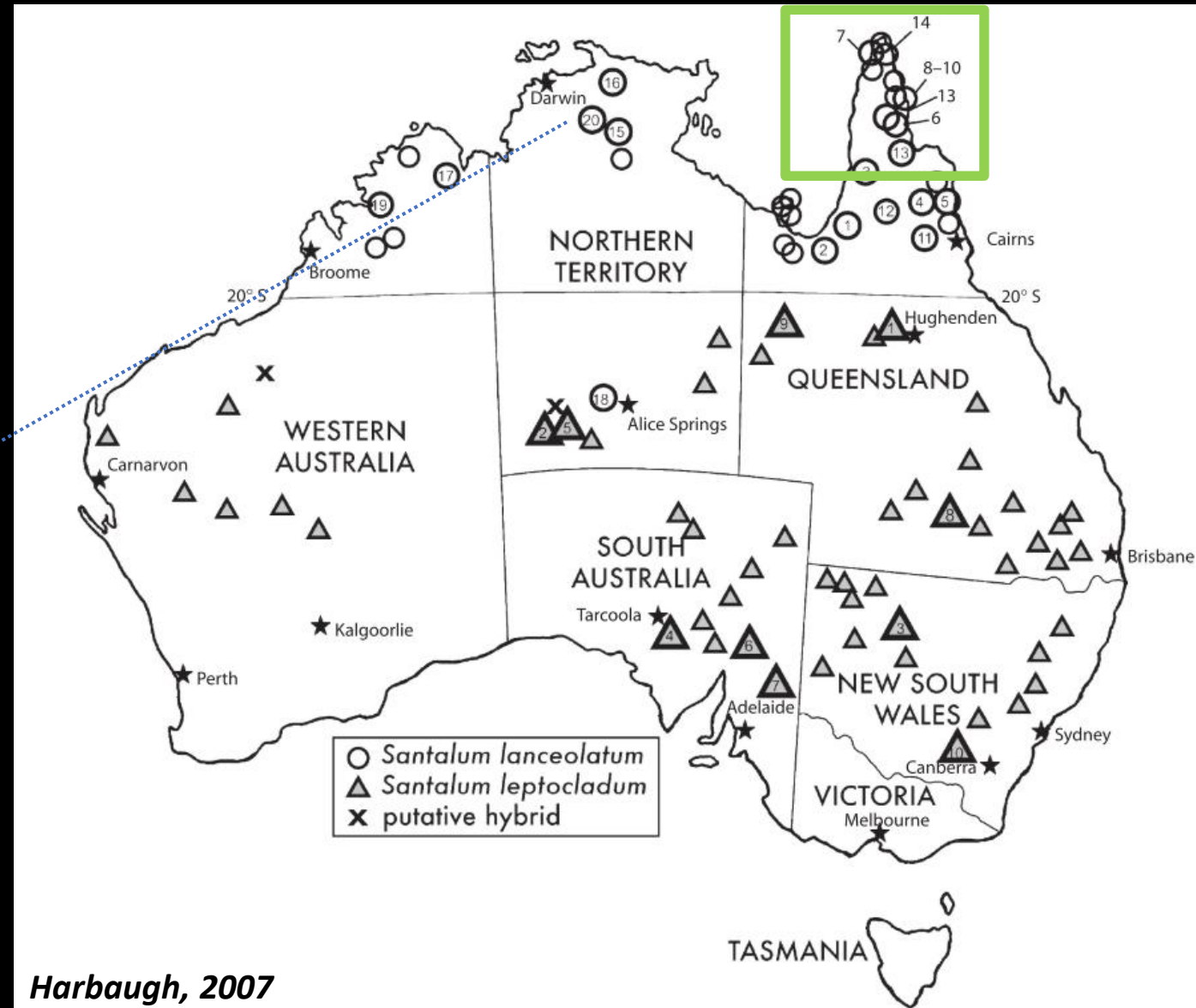
S. album: for HW: ~\$30,000 and ~\$85,000 per tonne; for SW ~\$1,000–2,500/tonne

Santalum lanceolatum

- ✓ Wild harvesting for over century
- ✓ Low oil quality (α -santalol 0.6–2.6%; β -santalol 2.0–4.3%)
- ✓ Supplies are now dwindling

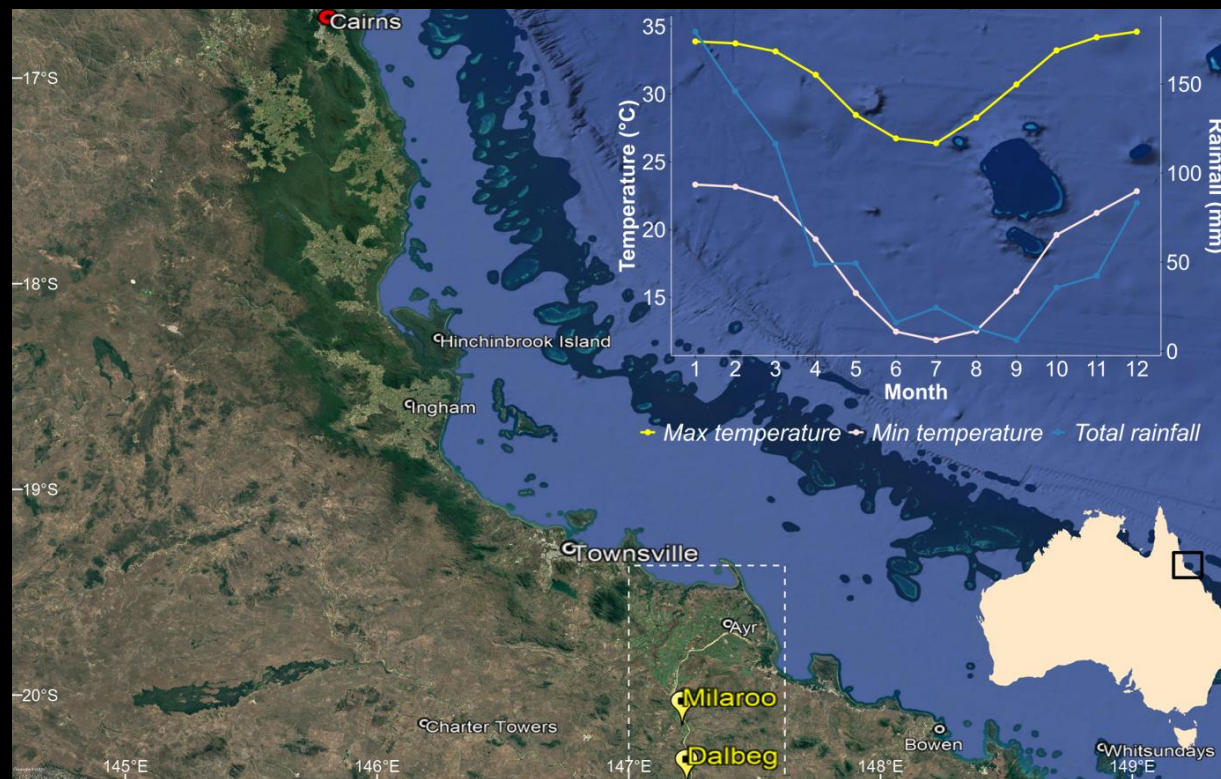


Some populations (NPA) meet The ISO 3518:2025 standard for sandalwood oil: α -santalol: 41%; β -santalol: 16%.
Need to manage as the **genetically** and **geographically unique** races.

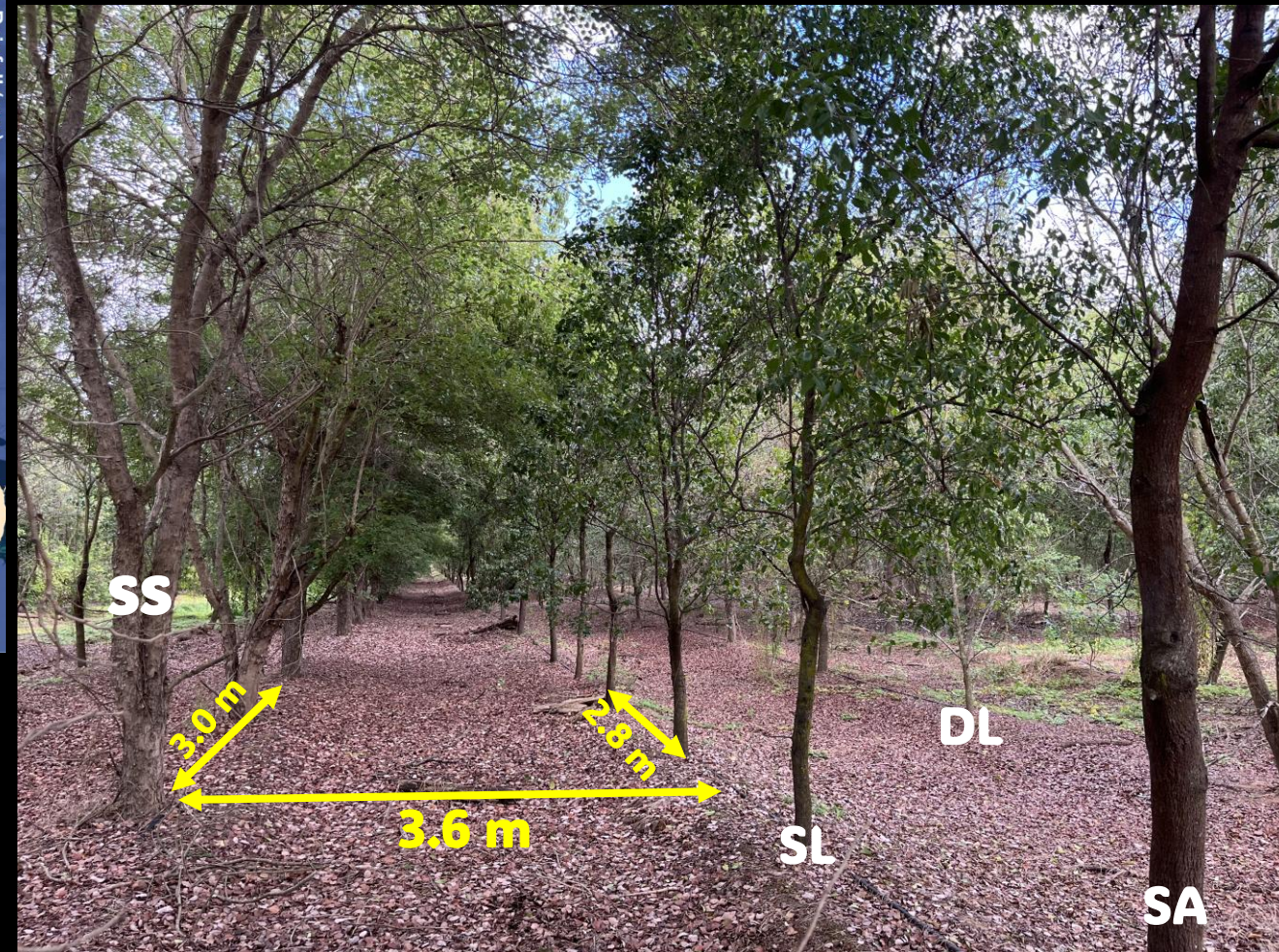


Harbaugh, 2007

Cultivation remains underexplored



Site designs



Study sites (Burdekin area): established in 2017

- Millaroo (20°07'10" S, 147°15'53" E): six blocks of 24 sandalwood trees
- Dalbeg (20°18'12" S, 147°17'29" E): four blocks of 22 sandalwood trees
-

Traits measured:

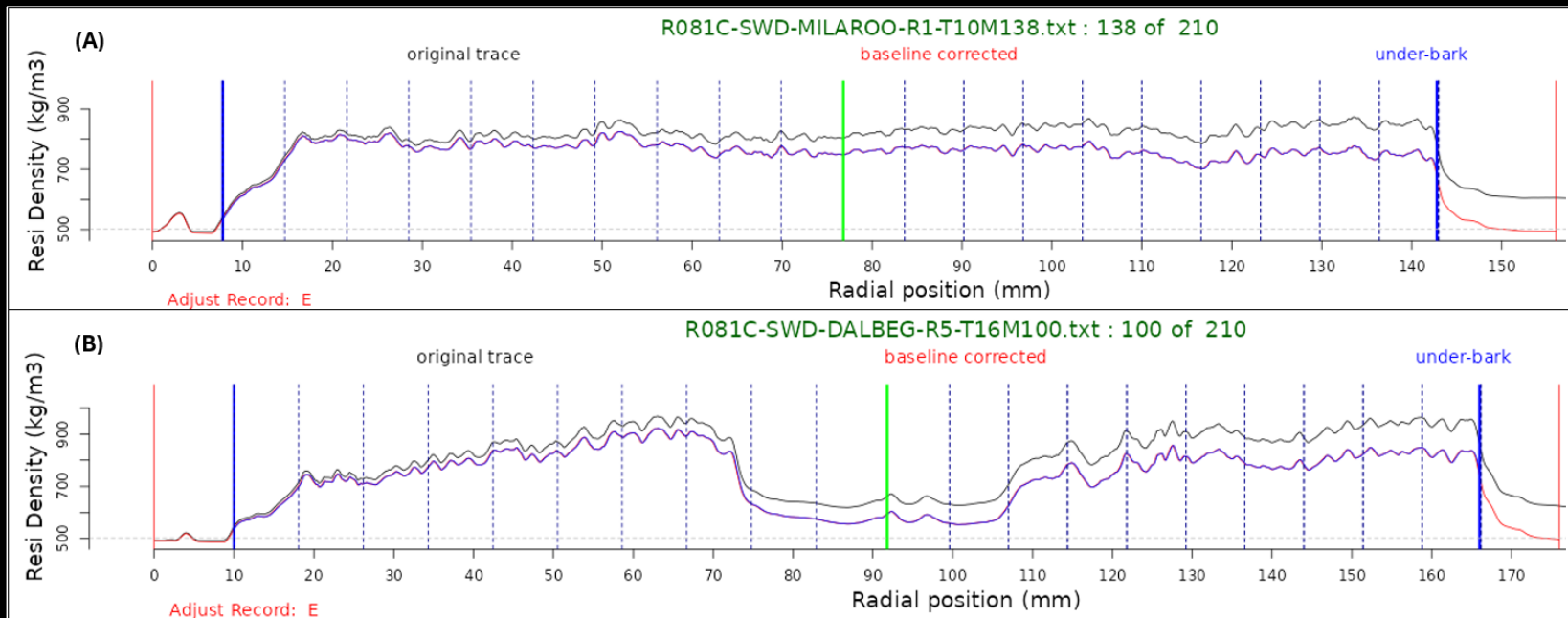
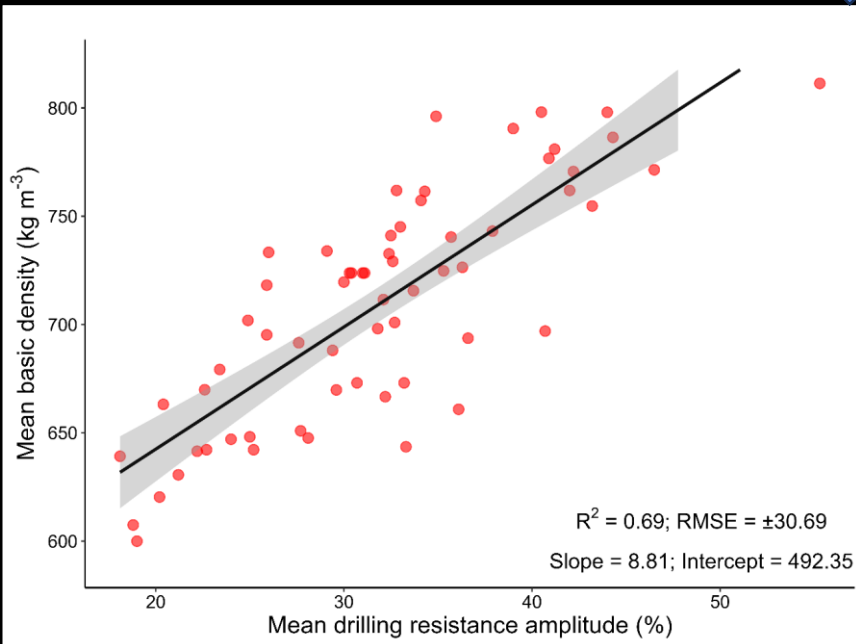
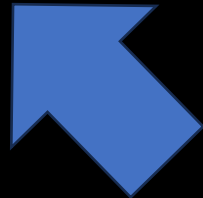
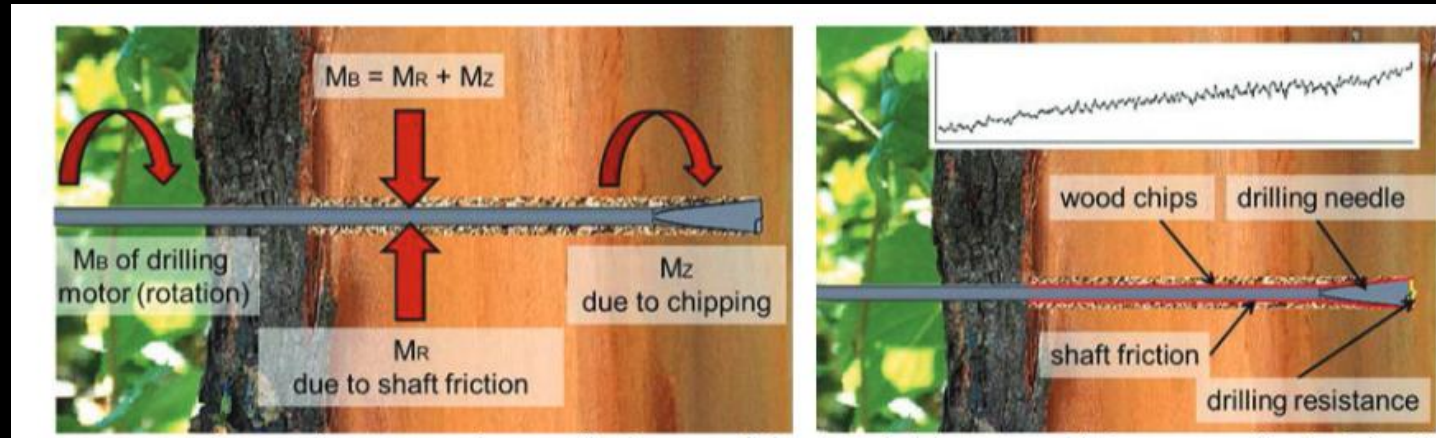
1. Survival, H: 1,3 and 7 (2024) years since planting
2. DOB, MAI at 3 and 7 years since planting

Wood traits assessment using RESI



Cross section sampling at position of DOB

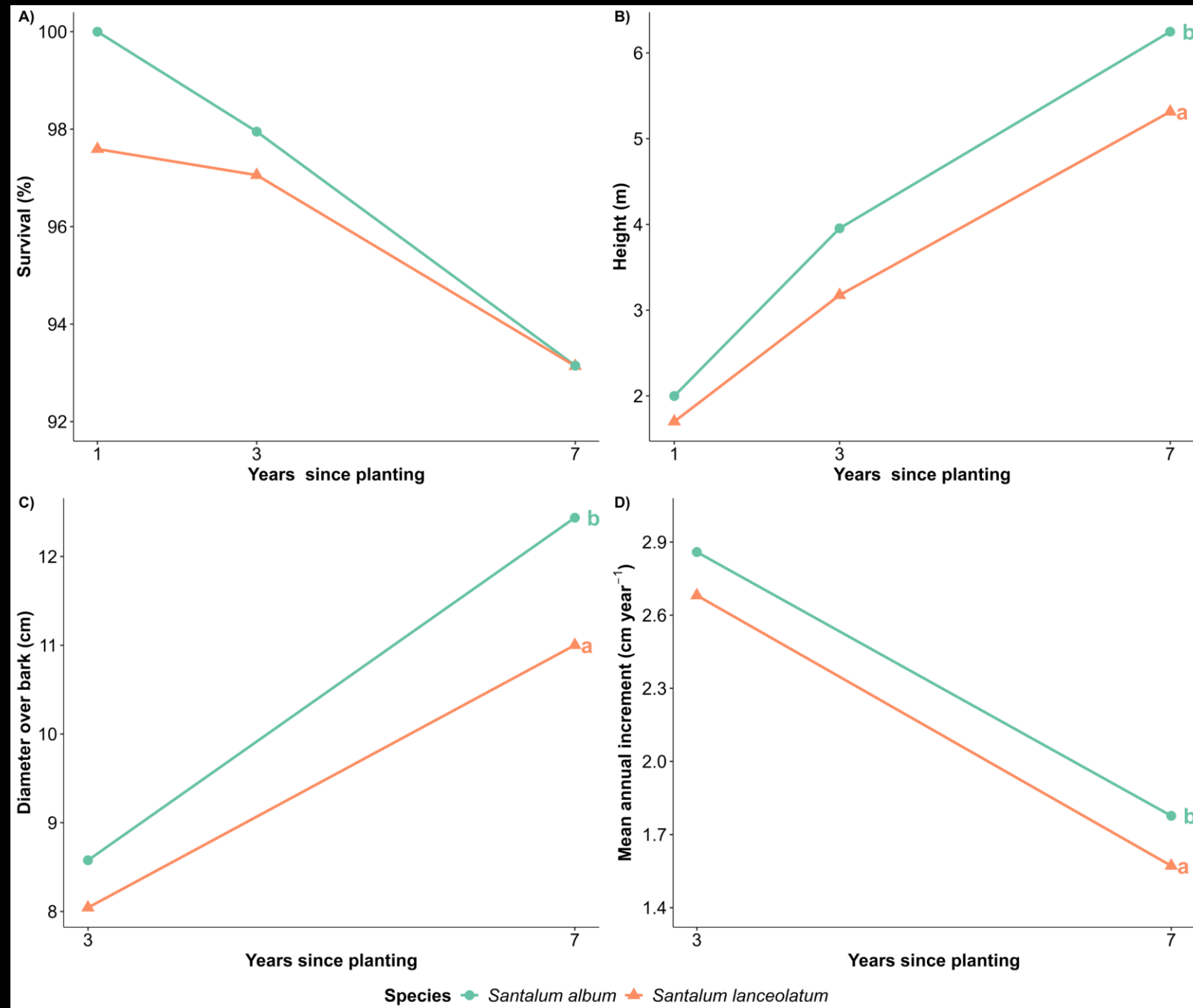
- 1) Wood density
- 2) Bark thickness
- 3) Diameter under bark
- 4) Tree decay



Results

S. album better than *S. lanceolatum*

1. 15.0% greater tree height
2. 11.4% larger diameter
3. 11.0% faster growth rate

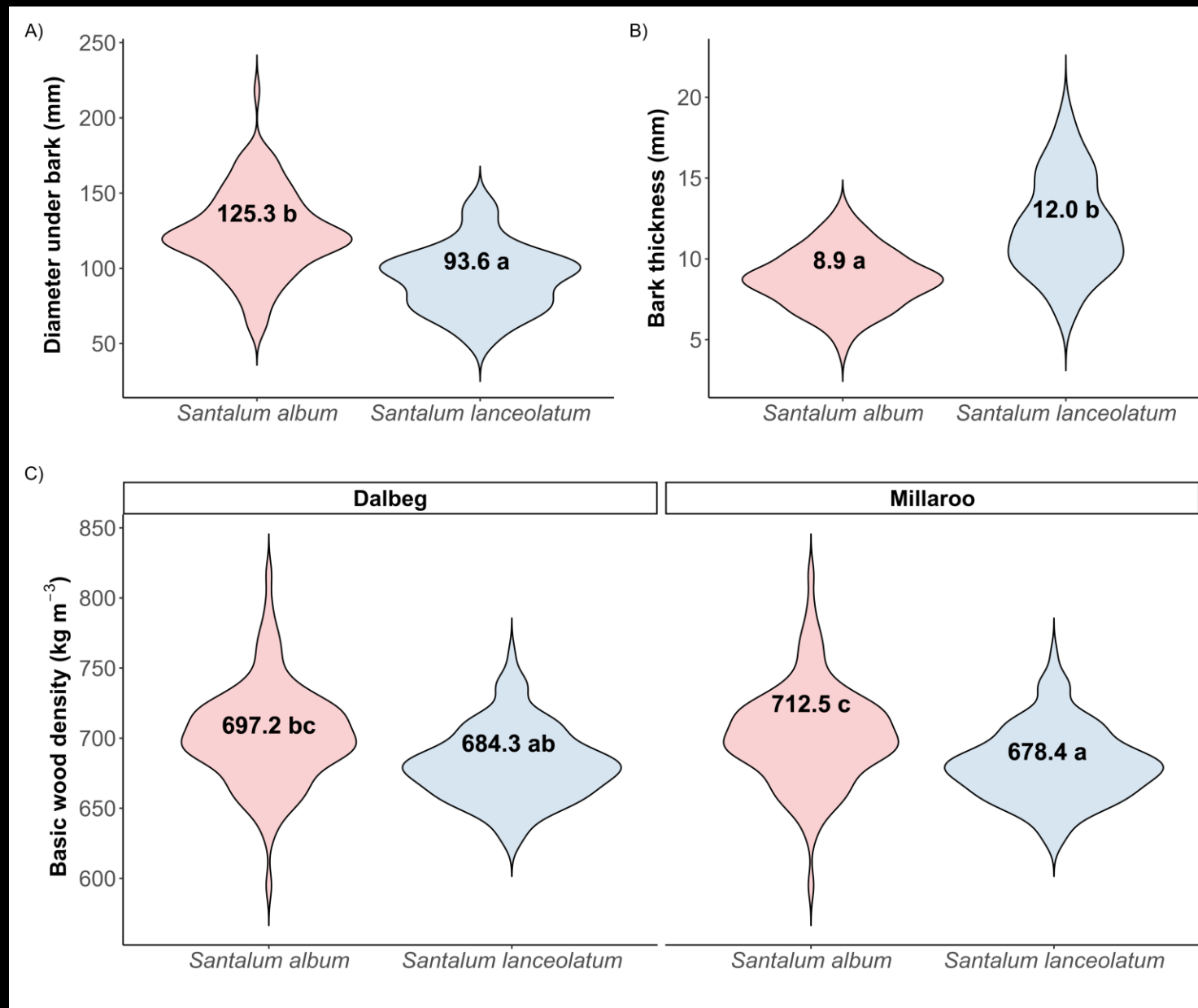


Results



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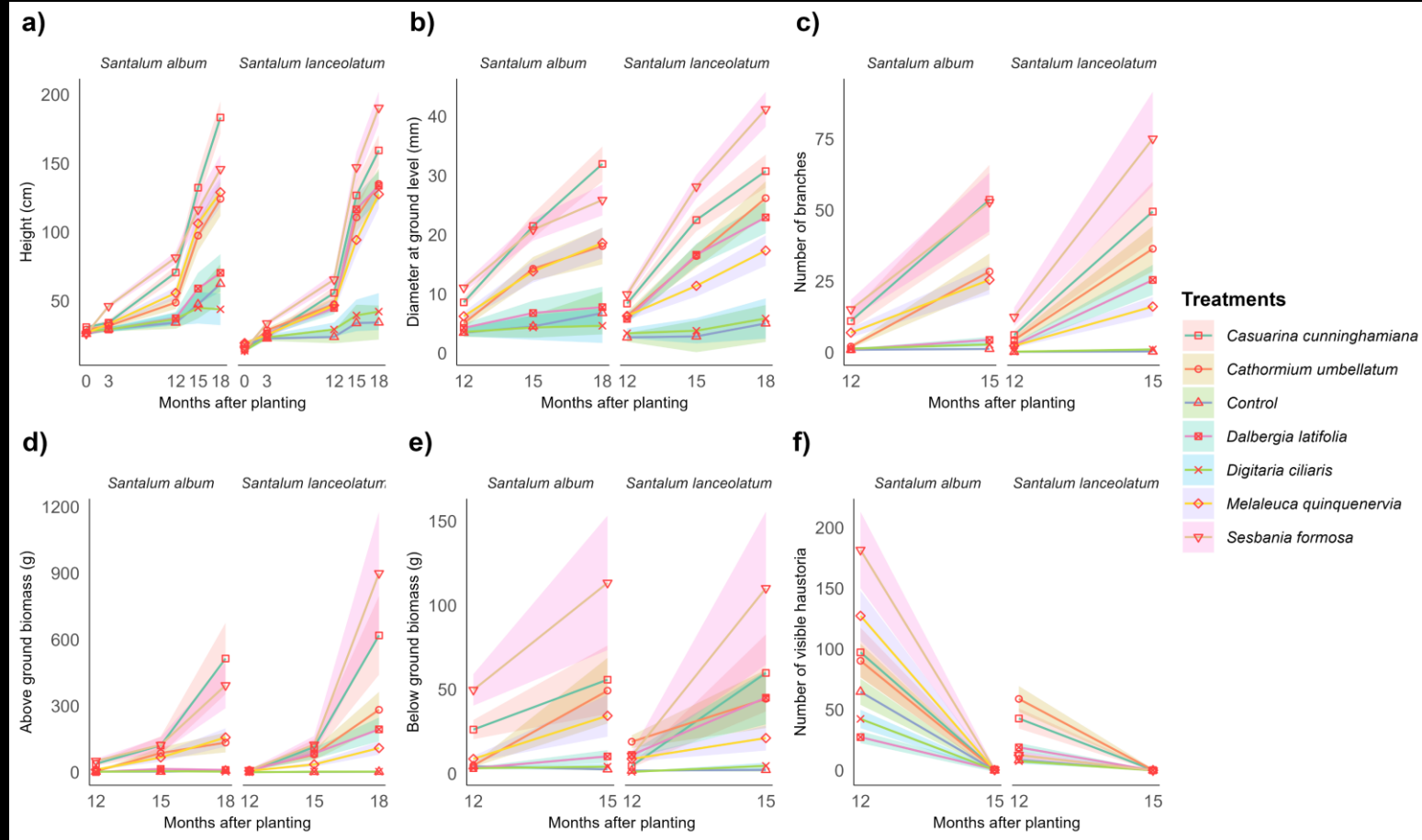
1. 25.0% greater diameter (UB)
2. 25% thinner bark



Two species remain a small proportion of tree decay with max of 3%

However,...

Despite **lacking prior genetic improvement**, *S. lanceolatum* demonstrated **comparable** growth consistency and inherent stability, highlighting its **potential adaptability** across **diverse regions**



Trait	<i>Santalum album</i>		<i>Santalum lanceolatum</i>	
	SD	CV(%)	SD	CV(%)
H (m)	1.43	14.2	1.17	15.8
DGLOB (cm)	2.74	9.9	2.35	9.9
MAI (cm year ⁻¹)	0.39	45.9	0.34	56.0
WD (kg m ⁻³)	33.91	0.8	25.14	0.6
BT (mm)	1.73	9.8	2.88	10.2
DGLUB (mm)	27.52	4.9	21.29	5.3

Future works

1. Growth variation assessment
2. Heartwood and oil assessment
3. Genetic improvement

Acknowledgement



**QUEENSLAND
GOVERNMENT**

Department of Agriculture and
Fisheries



QUINTIS
SANDALWOOD

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