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Development & Deployment of Teak Germplasm in PNG



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Outline

- Teak in PNG
- Localized timber shortages & smallholder aspirations
- New Teak Introductions
- Variation, Selection & Domestication
- Utilisation



Teak in Papua New Guinea

Teak, (*Tectona grandis* Linn.) was introduced into the northern parts of PNG by German in the late 1800s and early 1900. Possibly of Burmese origin

Australian administration of the Territory of New Guinea established an improvement program in the 1960s based on germplasm of

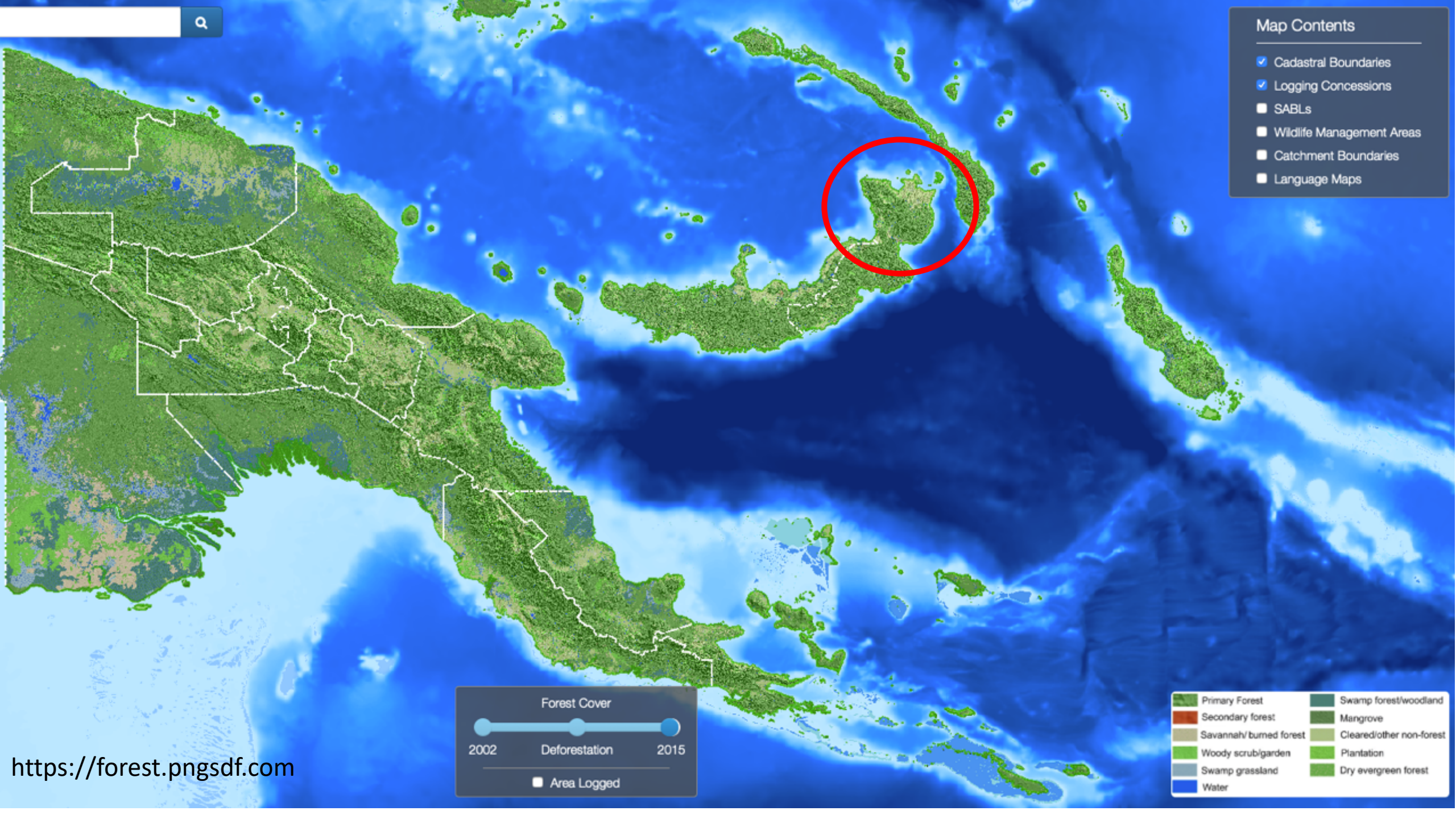
- PNG Origin (Burmese)
- Southern India
- Burma
- Sri Lanka
- Thailand
- FAO sponsored provenance trial comprised "all-asian provenances")

Established two clonal seed orchards (Kerevat & Mt Lawes) using plus trees selected from the provenance trials in the mid 1960s.

White (1962) *Australian Forestry*, 26, 90-93

Cameron, A. L. (1966) *Australian Forestry*, 30, 76-87





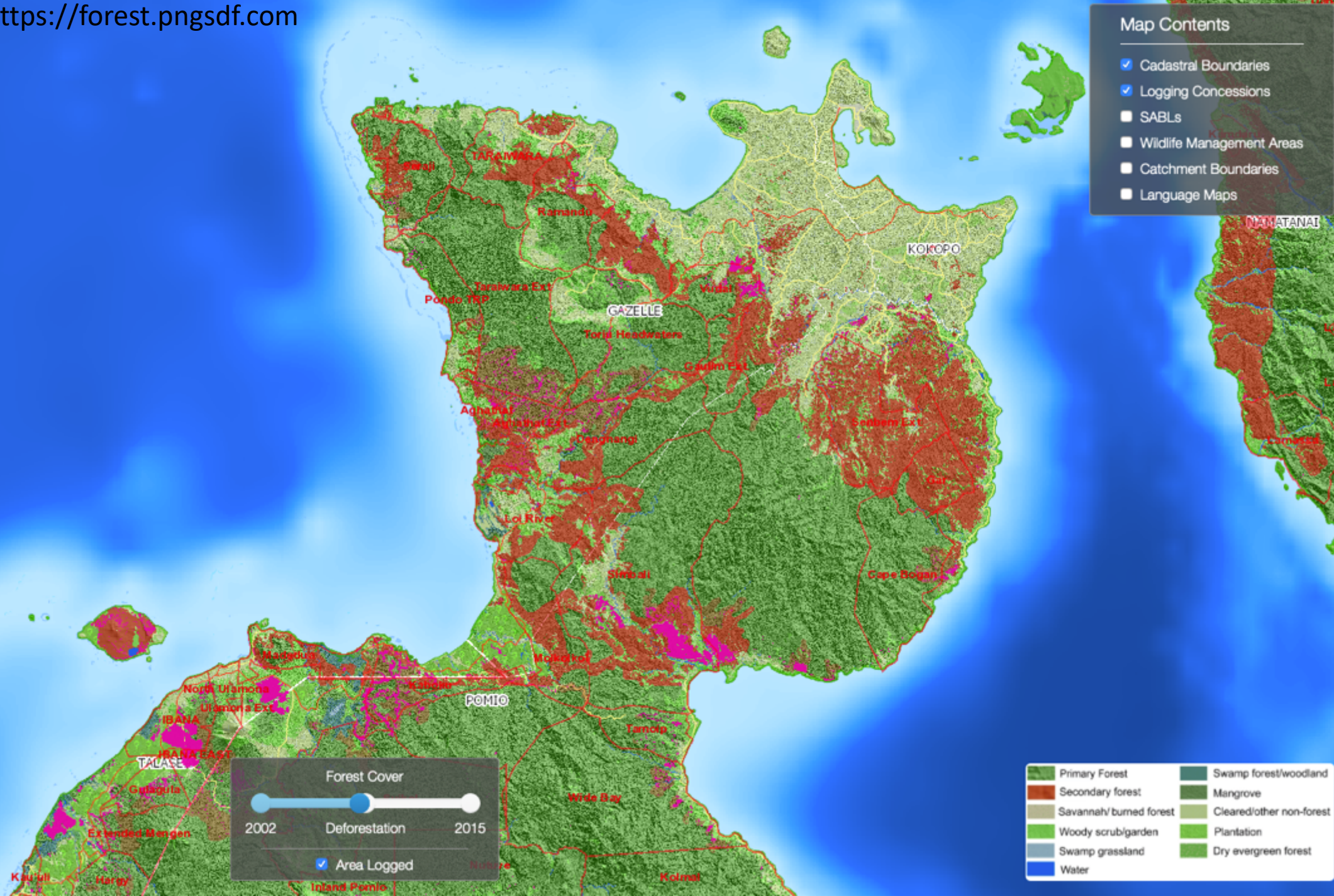
Map Contents

- ☒ Cadastral Boundaries
- ☒ Logging Concessions
- ☐ SABLs
- ☐ Wildlife Management Areas
- ☐ Catchment Boundaries
- ☐ Language Maps



Map Contents

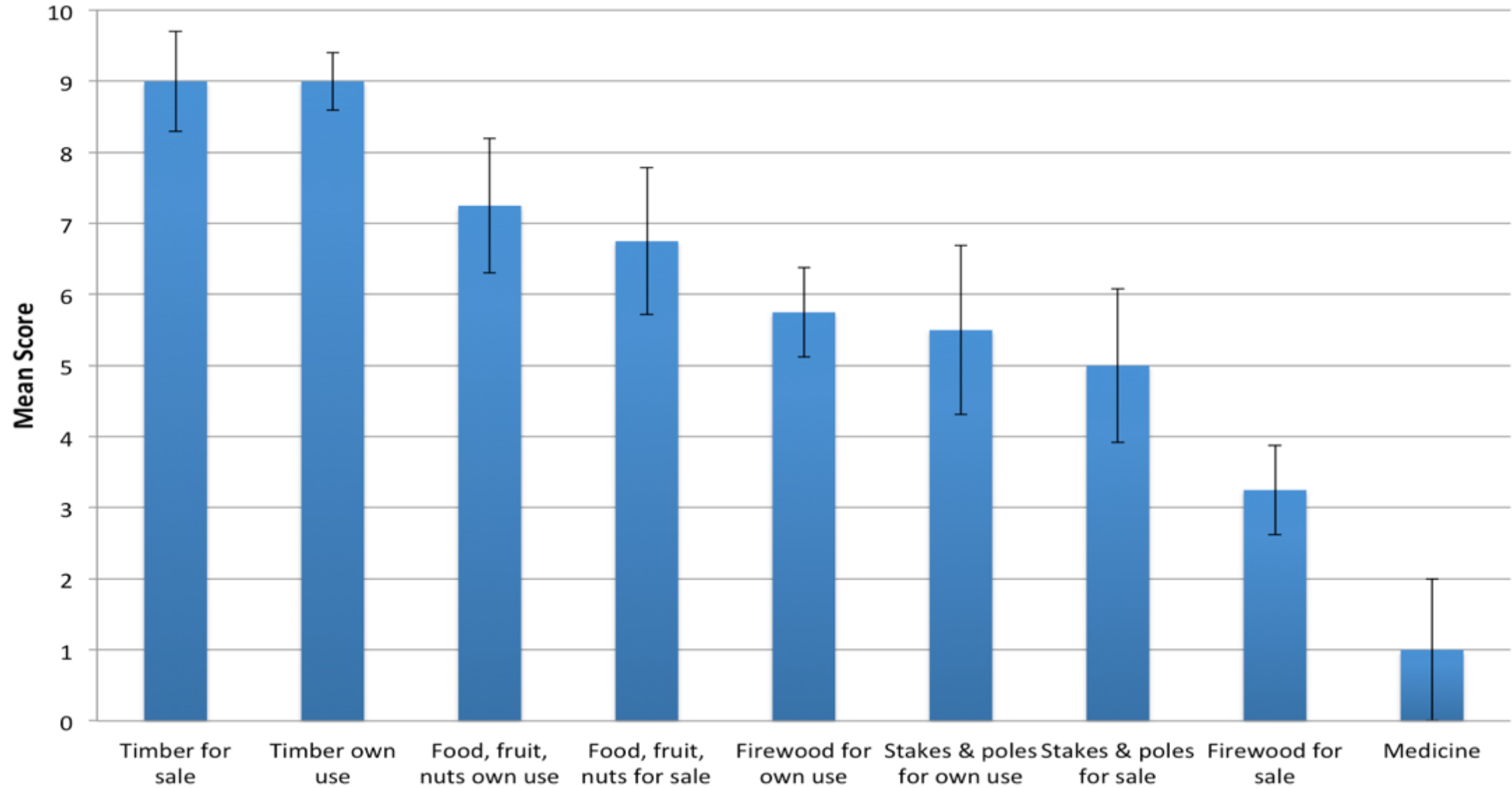
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Housing Quality



Landowner reasons for planting trees in ENB



Teak Seed Sources

1. Rajamundry (India, CSO)
2. Kaengben (Laos, CSO)
3. Chantaburi (Thailand, CSO)
4. China (Burmese Origin)
5. Sayaboury (Laos)
6. Champasack (Laos)
7. Donglan CSO (Thailand)
8. Honduras
9. Santa Alicia (Costa Rica)
10. Jicaro (Costa Rica)
11. Nambi (Costa Rica)
12. Mansion (Costa Rica)
13. Penas Blancas (Costa Rica)
14. Santa Cruz (Costa Rica)
15. Nellicutha (India)
16. Maukal Karnataka (India)
17. Nellicutha (India)
18. Kokokendero (Ivory Coast)
19. Morogoro (Tanzania)
20. Perlis (Malaysia)
21. Segama (Malaysia)
22. Taliwas (Malaysia)
23. Malaysia Bulk
24. Solomon Is.
25. Mt Lawes (PNG)
26. Vunapalading (PNG)



Germplasm destinations

UNRE

Provenance trial
Clonal Selection
Clonal Test
Clonal Archive

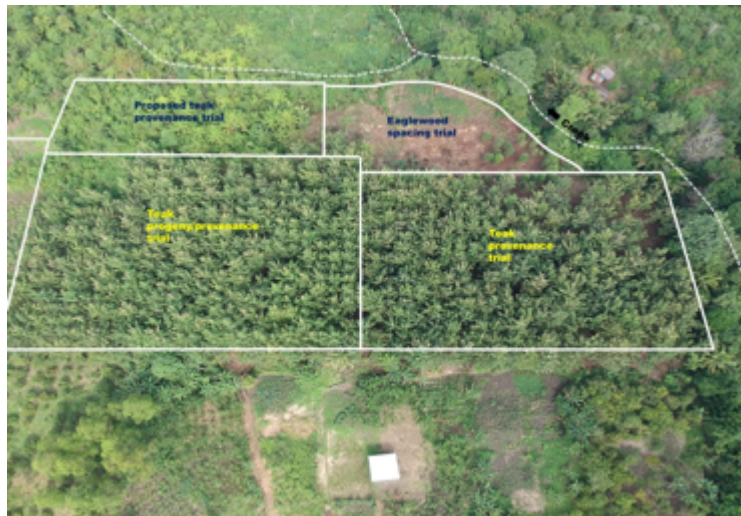


OISCA

Provenance plots
Clonal Test
Clonal Archive

FRI

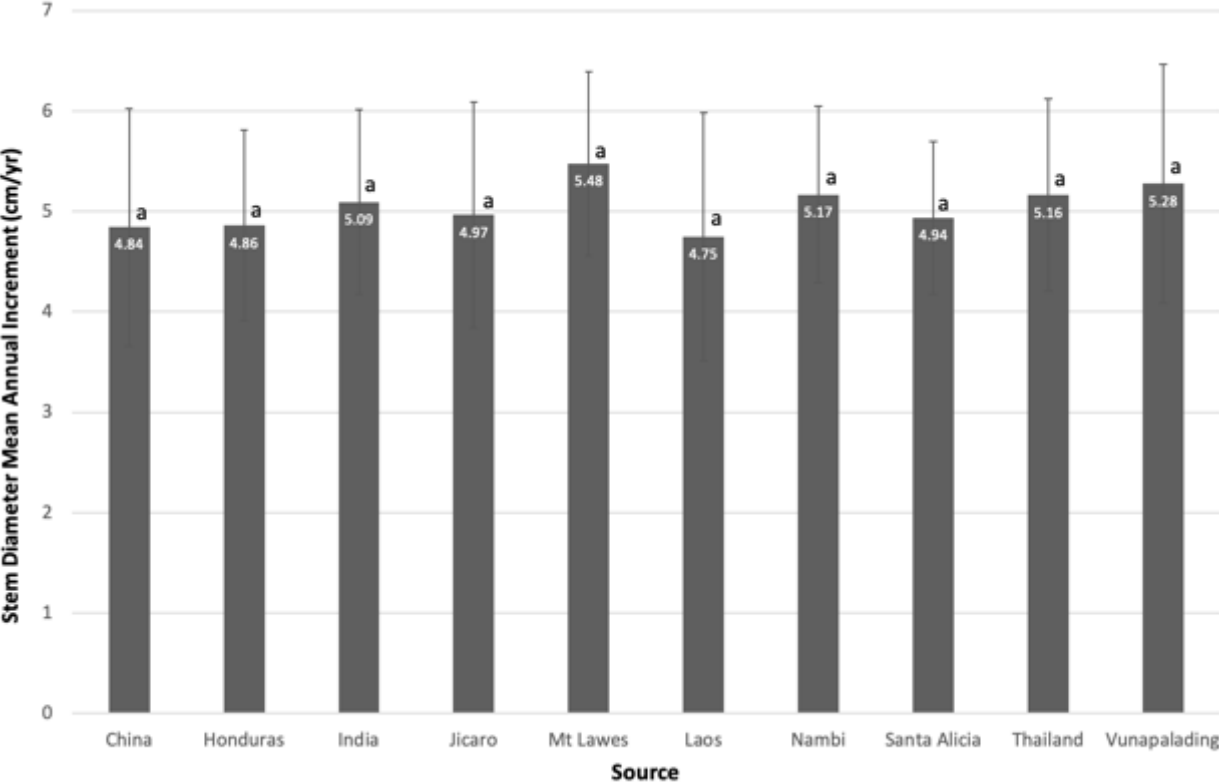
Provenance trial
Prov / Progeny Trial
Clonal Archive



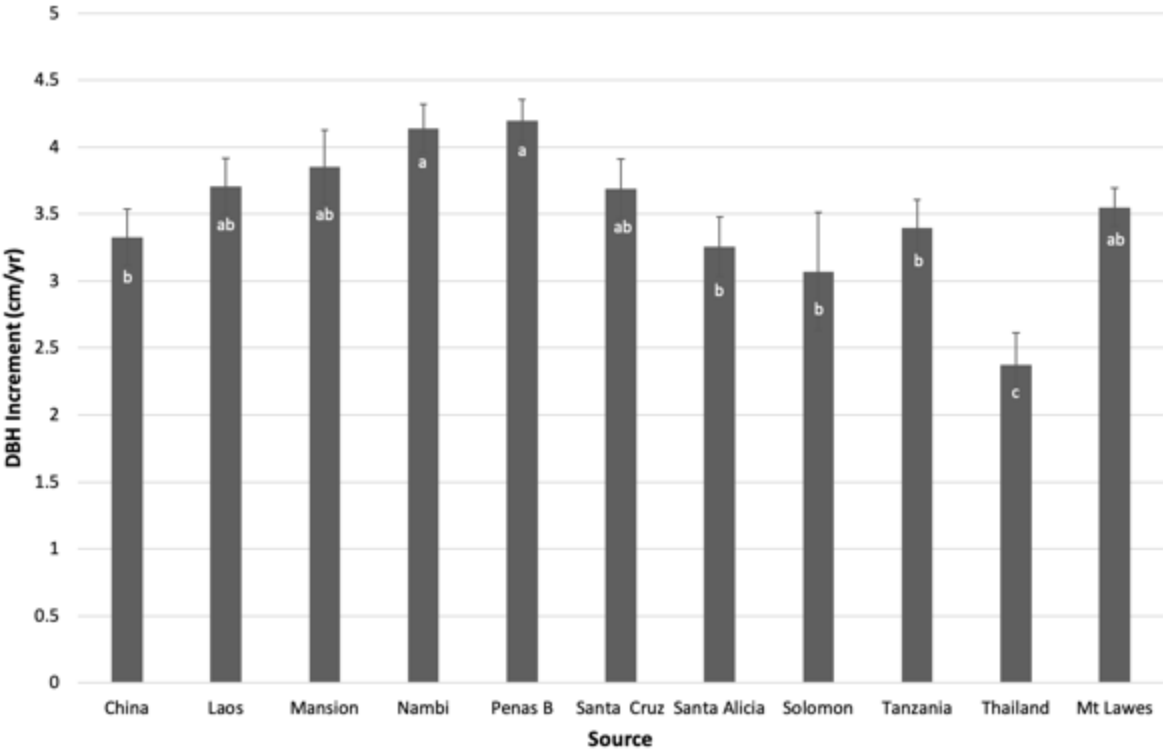
Woodlots

Provenance identified
teak woodlots
280 plantings
representing 22,000
trees

Provenance Variation



UNRE



OISCA

Phenotypic Selection & Clonal Propagation

- Annual measurements
- Diameter and height increments
- Tree form using method of Keiding et al (1986)
- Volumetric equation

68 trees selected and propagated as clones

- 1.Mt Lawes teak CSO, Central Province (29 clones)
- 2.Kuriva Plantation, Central Province (6 selected)
- 3.Kerevat-Vunapaladig Plantation, ENB (6 selected)
- 4.Oomsis woodlot, Morobe Province (6 selected)
- 5.UNRE Provenance Trial (21 selected)



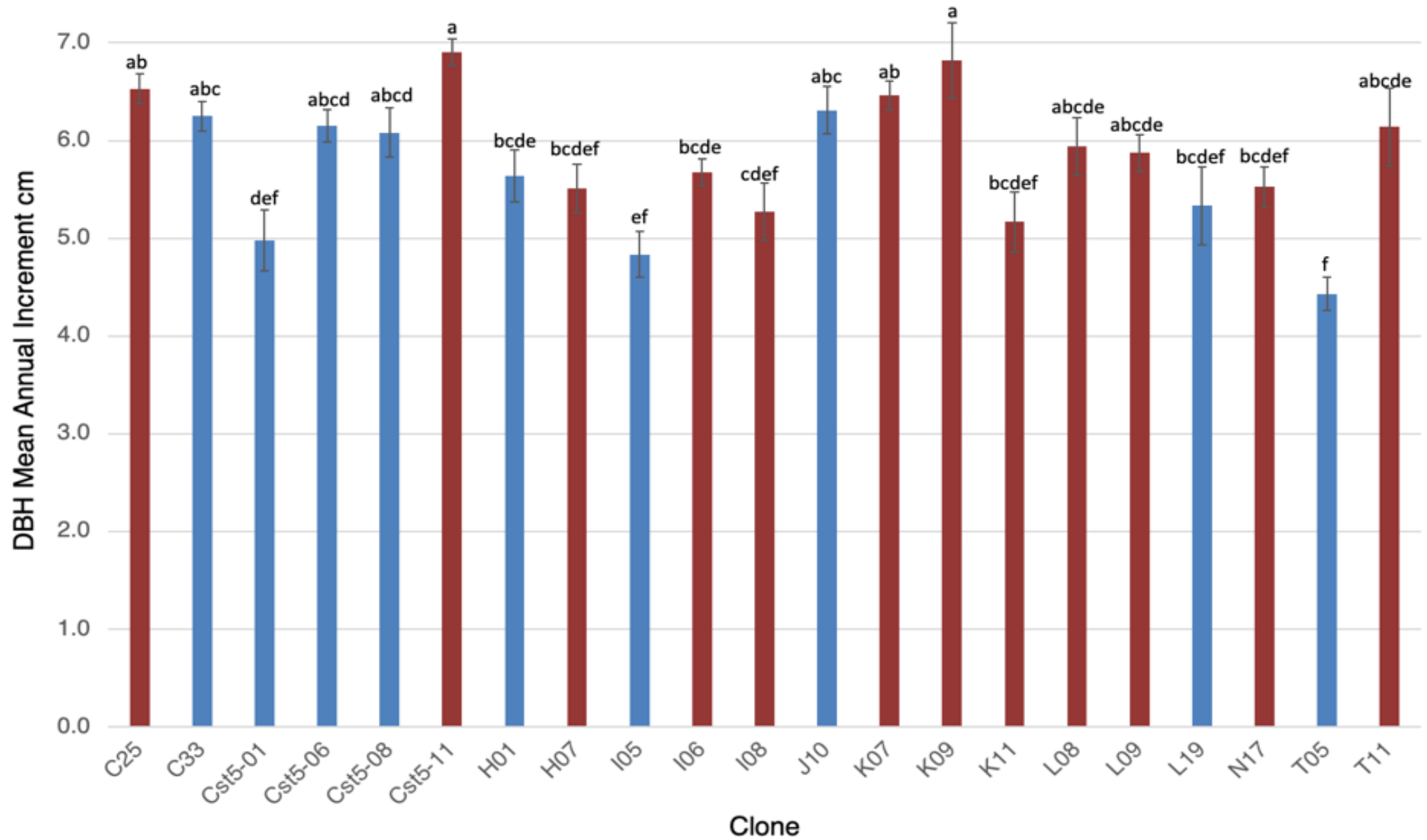
Keiding H, Wellendorf H, Lauridsen EB (1986) Evaluation of an International Series of Teak Provenance Trials. Copenhagen, Forskningscentret for Skov & Landskab

Cloning

Goh, D., & Monteuiis, O. (2016). Teak. In *Vegetative Propagation of Forest Tree* (pp. 425-440). National Institute of Forest Science. Korea



Clonal Test Performance (2yr)



Base Population

Seed Orchards
Provenance Trials
Progeny Trials
Woodlots



Clonal Archives

FRI
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OISCA



Clonal Tests

Clonal Performance
G x E Interaction



Progeny Trials

Heritability estimates
Genetic selection



Family & Individual Selections

Added to Clonal Archive & Hedges
Recurrent selection



Rogueing of inferior phenotypes

Seed Prod Area



Bulk clones as hedges, based on clonal performance

Clonal Hedges



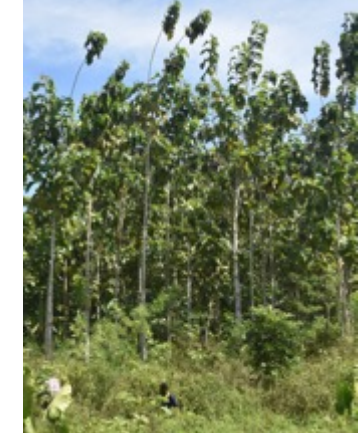
Rogueing of inferior clones

Clonal Seed Orchards

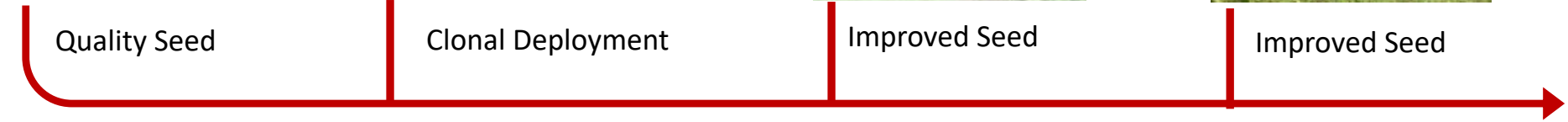


Rogueing of inferior genotypes

Seedling SO



Woodlots



Quality Seed

Clonal Deployment

Improved Seed

Improved Seed

Utilisation of prunings & thinnings



Demand for House construction

- Sawn timber inputs of 10 to 15 m³ per house.
- K5,000 - K22,500 per house.
- 0.7 to 3.3 times average annual per capita income.
- ENB Requires 174 ha to satisfy subsistence use.
- Need to develop domestic & international export market



Jenkin B. 2019 The prospects and markets for PNG timber products and plantation development. Sylva Systems

Benefits of tree domestication





Acknowledgements

- **ACIAR** – Devoe, Bartlett
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- **UNRE** – Howcroft, Essacu, Kulang,
Minimulu, Waldi
- **OISCA** – Perry, Rabbie, Vinarut, Kuariri
- **Sylvasystems** – Jenkin
- **PIP** – Rollinson
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