Veneering of Plantation Grown Subtropical Species from Thinning Experiments

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Drivers for plantation hardwood R&D

• Native hardwood forest logging from Crown lands phased out by 2023

• Plantation to provide substitute resource, around 20-year rotation

• Queensland government are expecting the private sector to establish and manage the plantations

• Limited hardwood plantations established until 2000
Opportunities for small diameter trees

Sawn timber
- Log size and quality make efficient processing difficult
- Low recovery (8-18%)

Power distribution poles
- Limited by available log size and quality
- More suited to final harvest

Veneer based composite products
- High recovery of product
- Opportunities to use thinnings & final harvest
- Veneer: quick and easy to dry
- Existing products and opportunities for new products
Current plantation estate in Queensland

- The subtropical eucalypt estate totals about 116,000 ha with over 54,000 ha of spotted gum (CCV) and *Eucalyptus dunnii*
Material - Thinning trials

- Two species – *Corymbia citriodora* subsp. *variegata* (CCV) and *Eucalyptus dunnii*
- Two regions:
  - Ellangowan in northern New South Wales - wetter more productive site
  - Kingaroy in Queensland - drier site

<table>
<thead>
<tr>
<th>Site</th>
<th>Species</th>
<th>Mean annual rainfall (mm)</th>
<th>Age thinned</th>
<th>Harvest age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ellangowan</td>
<td>CCV</td>
<td>1096</td>
<td>7y 9m</td>
<td>10.5</td>
</tr>
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</tbody>
</table>

- Three thinning treatments:
  - 300 spha
    (5 trees/tmt × 2 heights)
  - 500 spha (not sampled)
  - 900 spha - unthinned
    (5 trees/tmt × 2 heights)
Material and Methods

E. dunnii

Acoustic velocity measurement

Forest inspectors

low % of heartwood

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Billet end splitting

- No splitting issues for CCV
- *E. dunnii* is splitting prone species – adverse effect on veneer quality
Billet dynamic stiffness

- No clear effect of thinning treatments
- *E. dunnii* significantly lower billets stiffness
- Evident site effect on stiffness, lower for drier site
- Top logs o average 10% and 20% stiffer than butt log (CCV and *E. dunnii*)
Peeling using spindleless lathe

Maximizing product recovery from small logs
Overall gross recoveries

- Ranging from 35 to 80% - double or triple recoveries from sawing similar diameter logs
- No clear effect of thinning treatments on recoveries
- Kingaroy (dry site) lower in recoveries – effect of smaller trees
- Splitting did not affect veneer recovery
Grade recovery

- Veneer sheets graded according to AS/NZ 2239: 2008
Veneer grade distribution

- Consistently better grade for butt logs
- Evident effect of site – CCV better grades from wet site
- Indication that thinned plots produced veneers of higher grades
- The majority of D-grade quality is not unexpected given the known presence of knots and other defects that are present in plantation hardwood trees of the size and age processed

![Bar chart showing distribution related to billet volume for butt log and top log from wet and dry sites.](image-url)
Acoustic veneer stiffness assessment

- Veneer assessment samples obtained subsequently after each 1.55 m veneer sheet
- Samples assessed for acoustic stiffness and density
Acoustic veneer stiffness with cambial age

- CCV is stiffer than *E. dunnii*; *dunnii* regarded as pulp species displays high stiffness despite its low density
- Evident effect of site for both species, no clear effect of thinning
- MoE values above average stiffness of radiata pine
Effect of dry period on MOE drop

E. dunnii drier

E. dunnii wetter
Predicting veneer stiffness using standing tree acoustics

Standing tree acoustics can provide reliable estimate of the quality of the veneer stiffness

R² = 0.85

Veneer average MOE (MPa)

Fakopp AV (km.s⁻¹)

E. dunnii

CCV
Concluding remarks

• Veneering is suitable option for processing of small diameter plantation resource, maximizing the recovery

• Thinning treatment not affecting veneer stiffness, there are site differences – less stiff on drier, less productive site

• Both species achieving high values of veneer stiffness – resource suited to structural veneer products rather than appearance products

• Veneers have attributes suited to engineered wood products (plywood, LVL,...) and opportunities for novelty products

• Gluability of veneer sheets needs to be explored further
Acknowledgements

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