ACIAR project

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Development of advanced veneer and other products from coconut wood to enhance livelihoods in South Pacific communities
Content

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• Project structure.
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• Training program.
• The characteristics of coconut
Advanced veneer and other product from coconut wood

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Advanced veneer and other product from coconut wood

Project Objectives

- Identify markets
- Forestry: stem harvesting
- Peeling in S. Pacific
- Peeling trials
- Assemble and test products

By-product utilisation
Objective 1 – Identify markets

Objective 1 – Identify the most promising product options for the veneer from coconut stem

Advanced veneer and other product from coconut wood
Objective 2 - Develop protocols and capacity for sustainable low-impact coconut wood harvesting, plantation rehabilitation, and log grading, handling and transport.
Objective 3 – Establish experimental veneer-peeling capacity in the South Pacific
Spindle-less lathes

• A spindle-less lathe uses periphery drive rollers to pushes the log against the blade for peeling.
• This increases recovery over spindled lathes as small diameter logs can be peeled efficiently down to a small residual core.
Objective 4 – Peeling trials

Objective 4 – Determine the optimum processing parameters & protocols for peeling coconut stems & the properties of the recovered veneer.
Objective 5 – Assemble the product suite and establish its characteristics and in-service performance
Objective 6 - Determine the costs and benefits of using the residual cortex and soft, central cores for bio-char and other agricultural products.
Cocowood.net contains:

- Videos
- Project notes
- Research reports
- and more ...

This research note provides an overview of the physical, mechanical and chemical properties of wood and veneer recovered from the coconut palm (Cocos nucifera L. ssp. nucifera). It is a development of the previous research by the company Cocowood, run by Mr Gordon Roper and Mr Steve Collins. It details the properties of cocowood (Coconut Wood), its diversification into veneer and the physical, mechanical and chemical properties of its veneer. The coconut palm (Cocos nucifera L. ssp. nucifera) is a large tree that can grow to over 25m in height with a conical crown of leaves. It is found in many tropical and subtropical regions worldwide and is particularly abundant in the South Pacific. The coconut palm is one of the most valuable and versatile trees in the world, providing a range of products including oil, copra, nuts, and fibre. The coconut palm is a valuable timber source, with fibres of the inner core being sought after for the production of hardboard and cigarette paper. However, the outer layer of the coconut palm is often discarded after harvest and is used as a source of fuel. High density, dry cocowood is not susceptible to termite attack and has a high natural durability, suggesting it cannot be used in fully exposed conditions. Untreated cocowood is no more durable than any other wood and must be treated with a preservative to prevent attack. Cocowood is a hard, timber-like, wood with a density range of 450 - 800 kg/m³. The density of the recovered veneer reduces with increasing distance from the outer periphery of the stem and is suitable for many applications such as composting, wood chips and insulation. The properties of cocowood have been extensively studied and are well documented in the scientific literature. The physical, mechanical and chemical properties of cocowood and its veneer are described in this research note. The note is intended to provide an overview of the properties of cocowood and its veneer, and to highlight the potential applications of this material. The note is intended to be a valuable resource for students, researchers and practitioners interested in the properties of cocowood and its veneer.
Training is being provided through:

• Participation in university courses.
• Experience in Australian institutions
• Onsite training in equipment in Suva, Fiji.
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The characteristics of coconut
• The coconut palm is a monocot (grass).
  – It is not a true wood.
• The stem’s vascular structure is different to traditional timber.
• Logs are small at ~ < 350 mm diameter with:
  – A high density zone towards the periphery and the base.
  – A low density inner zone.
The wood consists of high density vascular bundles in a matrix of spongy, low-density, parenchyma tissue. There is low radial and tangential connection between bundles. Bundles are clustered at the outside of the stem.
Coconut wood cell structure

Image from QDAF CocoWood project
Density variation in coconut wood

Density decreases with bundle frequency
- From the outside of the stem to the middle.
- Up the stem from the base.

Density range:
- $> 800$ kg m$^3$
- $< 300$ kg m$^3$

Image from QDAF CocoWood project
Coconut applications

• Coconut stems can be used in the round, sawn into board, or peeled into veneer.
• The stem’s vascular structure and small log diameters complicate conversion.
  – Board recovery of dense material is limited to the outside zone.
  – High density vascular material can be difficult to cut cleanly in veneering.
  – Other characteristics are also different to true wood.
This is conclusion of a four-year, collaborative project with six objectives:

1. Identify the most promising product options.
3. Establish experimental veneer-peeling capacity in the South Pacific.
4. Determine the optimum processing parameters.
5. Assemble the product suite and establish its characteristics.
6. Determine the costs and benefits of using coconut residues.
Questions