CocoVeneer

Research Note: Why try and peel coconut stems?

Large areas of mature coconut palms across the Pacific region are now considered senile and unproductive when compared to younger palms and newer varieties. To generate an economic driver for replacing senile stems, ACIAR has funded two research projects. The Cocowood Project (2007-10) analysed the properties of coconut wood and processing technologies to investigate whether the harvest of this product could provide one solution to waning global timber resources. This project was successful providing knowledge on the coconut stems properties, identifying appropriate solid wood processing protocols and developing a range of products. However, there were limitations in the production process of cocowood with an average recovery of 30-35% of log volume in viable wood product. Due to the low return, a new use for the coconut stems was proposed – coconut veneer and veneer-based products. These products would be produced through the rotary peeling of the coconut stems rather than saw milling, with a significant increase in recovery of 60-65% of log volume. The current CocoVeneer project (2012-16) aims to develop the technologies, processes and expertise to produce veneer and veneer-based products from senile coconut stems. The use of residues for by-products such as soil conditioning products will also be investigated.

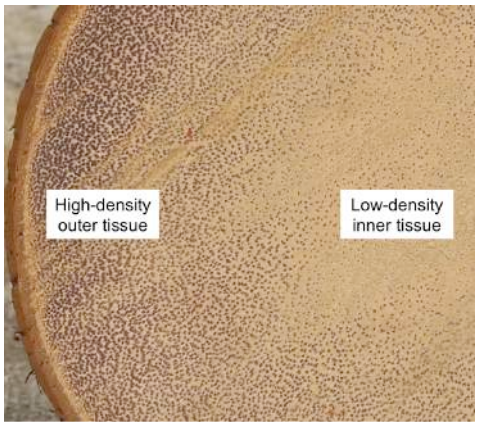

Figure 1. Mature coconut stem illustrating the reduction in vascular bundle density towards the inner 'woody tissue'

Figure 2. Inspection of the peeled coconut stem

Introduction

This research note discusses the practical considerations for rotary peeling senile coconut stems rather than sawing. Sawing is the traditional processing method for the production of timber and timber products. The research on peeling is being conducted as part of an ACIAR-funded project for research and extension activities developing means to sustainably convert senile coconut stems into veneer and veneer-based products and complementary agricultural products for export and use in Pacific Island economies. The project supports economic development in Fiji, Samoa and the Solomon Islands.

Senile coconut palms are potentially a valuable resource for wood production in Fiji, Samoa and the Solomon Islands. However, the use of coconut stems as a 'wood' product is unconventional due to the palm's properties. The coconut palm (*Cocos nucifera*) is not a true wood. As a monocot (grass) the vascular structure of the stem is largely different to that found in traditional timber products. The coconut stem has a high density zone towards the stem periphery while the inner zone is much lower in density due to a significant reduction in vascular bundles and an increase in parenchyma. This is shown in Figure 1. Parenchyma is a spongy, low-density tissue that is foam-like in texture. With such a soft inner core and large radial variation of properties, most of the coconut stem could not be utilised in the traditional production of sawn timber boards.

The peeling of coconut stems for the production of veneer and veneer-based products presented a potentially more efficient method of processing and utilisation.

This research note is a general introduction to processing coconut stems. For more detail refer to Bailleres *et al*. (2015) 'Experimental investigation on rotary peeling parameters of high density coconut wood' in *BioResources*.

Sawing vs. Peeling of Coconut Stems

Traditional methods of sawing a log can provide a low return of viable product, especially from small logs with variable physical properties. Milling harvested coconut stems give an average recovery of 30-35% of log volume. However, during sawing, the log is 'squared up' to produce traditional sawn

boards. This leads to significant losses, especially of the more dense 'hard' wood-like outer material that is most attractive for timber products. Also, a significant proportion of recovered boards can include a mixture of hard and soft material in the piece, decreasing the board quality and value.

The peeling of harvested logs allows for a greater utilisation of the coconut stem. The log is rotary peeled in a long continuous ribbon down to a core of <60mm in diameter. The peeling process gives a significantly larger recovery of 60-65% of log volume into product with the remaining wood available for various by-products. The resulting veneer can then be glued together to make valuable products such as plywood.

Figure 3. Harvested coconut stems being peeled using a spindle-less lathe

Figure 4. Peeled coconut veneer displays significant diversity in colour from dark to light/pale brown

Method to Peel Coconut Stems

Traditionally, logs were peeled into veneer using a spindle lathe. This means that the log is suspended and spun on two spindles and then pushed up against a knife to peel a continuous ribbon of thin veneer from the log periphery. However, traditional spindles are unable to grip the soft inner core of the coconut stem to enable peeling of the hard outer material. A spindle lathe is efficient with large logs from traditional forest resources however it is not highly efficient with small logs. A spindle-less lathe is an alternative to a spindle lathe. The technology for a spindle-less lathe has been around for many years, however their use was limited until roughly 10 years ago. These lathes do not use a spindle to hold the log against the knife but instead use a periphery drive system that pushes the log up against the blade for peeling. This in turn increases recovery as the log can be peeled down to a small residual core.

Contact for further information

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This research note is part of the ACIAR-funded CocoVeneer project FST/2009/062: Development of advanced veneer and other product from coconut wood to enhance livelihoods in South Pacific communities.

The project team includes researchers and collaborators from the University of Tasmania, the Queensland Department of Agriculture and Fisheries (DAF), the Secretariat of the Pacific Community (SPC), the Fiji Department of Forests; Forest Research and Development Section, Forestry Division, Ministry of Natural Resources and Environment, Samoa; Ministry of Forestry, the Solomon Islands, and industry in Australia and Pacific Islands. The project supports economic development in Fiji, Samoa and the Solomon Islands and includes activity in market and value-chain assessment, log harvesting, veneer production and product manufacture, and the development of viable uses for coconut residues at the harvest site or the production facility. More information about the project is available at www.cocowood.net.

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