Forest & Wood Products Australia

Executive Summary

ASSESSING & MANAGING MID-ROTATION WOOD QUALITY IN AUSTRALIAN SOFTWOOD PLANTATIONS TO PRODUCE FIT-FOR-PURPOSE LOGS

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Assessing and managing mid-rotation wood quality in Australian softwood plantations to produce fit-for-purpose logs

This project has underpinned a transformation in the easy access of information about the wood quality for softwood growers and processors. The Resi technology, refers to a resistance drilling method used to assess wood properties, particularly in softwood plantations. It rapidly measures the resistance encountered when a drill bit penetrates the wood, which correlates with the wood's density and stiffness of trees, logs and forest plots. The Resi tool is noted for its efficiency, being three times faster than other methods like the ST300 acoustic velocity measures, and it has been standardised for operational use across the industry to improve the accuracy and reliability of wood quality assessments.

Project objectives:

- Investigate if Resi data measured in mid rotation stands could predict harvest age quality (density and stiffness) in radiata and southern pines
- Quantify the sources of variance in Resi measurements as they affect the accuracy and precision of commercially important wood properties of basic density and wood stiffness (MoE)
- Investigate the radial variability of Resi-derived wood properties to better interpret effects of stand management and harvest age log quality
- Link Resi data to yield models to deliver yield and value tables for wood quality

Project activities:

1. **Supporting the use of Resi:** exploring and quantifying the relationship between drilling resistance and basic density estimation, plus standardising use of the Resi across the industry.

2. **Linking Resi assessment to structural sawmill output:** Assessing current and previous mill trial data to determine Resi data, green and dry mill wood quality (stiffness) and determining how well mid-rotation Resi data could predict harvest age log and board properties.

3. **Connecting mid-rotation Resi sampling to yield and value at harvest:** exploring the variation in Resi data at the tree, plot and forest level. Developing yield (log volume) and wood density estimates in plantations within the YTGen software.

4. **Resi-based early selection for harvest-age density and MoE:** exploring how wood volume and properties from young (<10 years) to mid-rotation predicted harvest age volumes and quality, including when Resi measurements could be incorporated in breeding for improved wood properties and models to predict pith-to-bark properties in plantation-grown softwoods.

5. **Resi, rCambium and the environment:** Reviewing if an existing physiological model could predict the growth and wood properties of softwood plantations; and investigating the factors associated with wood properties variation in southern pine.

Benefits to the forest and wood products industry :

1. Resi data has **predicted mill site-mean board stiffness** in sawing studies across multiple sites and mills in Australia with operationally useful data to facilitate plantation estate information sharing between growers and processors, allowing for improved wood flows as well as potentially inform log pricing structures that benefit both partners.
2. Resi **predicts harvest age wood properties in young and mid-rotation plantations** allowing informed decisions to be made regarding rotation length, stocking, breeding objectives and wood quality optimisation.
3. Over thirty Resi instruments have been purchased by growers and processors for routine forest inventory and log supply management.
4. YTGen software now includes predictions of wood quality values along with yield and the Resi Processor software has improved models to predict stiffness and density of softwood plantations.