Forest&Wood Products Australia
Knowledge for a sustainable Australia

How much pulp will that tree produce?

Foresters can now precisely predict Kraft pulp yield from standing trees in eucalypt plantations with hand-held devices that use near-infrared radiation (NIR) and provide immediate results.

The new technology will help foresters to fast-track genetic development and help them ensure that their wood chips meet the customer's specifications for pulp yield. It replaces a process of destructive testing that usually required ten trees and laboratory processing.

"This work is very important to our business as a supplier of wood chip for pulp and paper manufacture, especially for our main breeding population of *Eucalyptus globulus*," says Nigel England from ITC Limited in Albany, WA.

"As a result of our involvement in this FWPA project, NIR is now our method of choice for pulp yield determination. We plan to spend around $20,000 a year for the next two to three years using NIR to screen *E. globulus*. After this 'catching up' phase we expect to spend less but still on a regular basis every year."

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Dr Geoff Downes and colleagues from CSIRO conducted extensive tests using two portable, commercially-available NIR devices, with assistance from industry partners Gunns, FEA, Midway Plantations, ITC and WAPRES.

Non-destructive NIR techniques are routinely used to analyse agricultural commodities, providing information on properties such as ripeness and protein content. Previous FWPA studies found that NIR could predict Kraft pulp yield (KPY) from green wood chips on a moving conveyor belt.

NIR output was correlated with standard laboratory test results to develop calibrations that predict KPY, basic density and dry matter content using field instruments.

The result of the work is a single calibration model that gives commercially-useful predictions for *E. globulus* and *E. nitens* species across 40 test sites in southern Australia.

The project team also investigated acoustic wave velocity, but found that this technique did not yield commercially-useful predictions of pulp properties.

Green chainsaw frit samples gave the most accurate NIR predictions of basic density and KPY. NIR instruments can also predict KPY from increment cores (green and dry).

Overall accuracy and precision can be increased by combining individual tree predictions. This allows foresters to compare site average values, or to use results from related individuals to improve selection and breeding programs.

A further advantage is that NIR can utilise much smaller samples than those needed for KPY laboratory tests, allowing non-destructive testing.

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Of the instruments tested, the project team preferred the Polychromix Phazir, which they found to be practical, robust and user-friendly. Calibration models generated by CSIRO can be uploaded to the device and used for real-time predictions. The Phazir can also store spectra for later use.

"We're encouraging forest growers to contact us to arrange for a demonstration," Downes says. "They can then see for themselves that the technology is robust and commercially useful before they purchase equipment or start developing in-house capabilities. We can provide ongoing assistance with calibrations."

More information:

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