Rapid Assessment of New Zealand Coast Redwood Heartwood Durability using NIR Spectroscopy

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Coast redwood (Sequoia sempervirens) has the potential to be a high value timber species in New Zealand. Both globally and in New Zealand, there is strong market for naturally durable timber which doesn’t require preservation chemicals or paint for outdoor use. However, variability in the extent of heartwood durability is limiting its more widespread adoption by both growers and end-users.

The past decade has seen a rapid improvement in the quality of genetic material being established in New Zealand, a result of various streams of clonal redwood propagation. A close relationship between commercial redwood growers and national research providers has enabled rapid deployment of improvements to growth and form characteristics and some of the more easily measured wood properties. Heartwood durability is difficult to quantify using traditional graveyard tests and it can take decades for results to be realized. Earlier research has indicated that there may be a strong correlation between heartwood spectra measured with near-infrared (NIR) spectroscopy and resistance to fungal decay. If a strong relationship can be established, then NIR technology has the potential to rapidly screen and rank redwood for natural durability for both lumber and standing trees.

The trees selected for this project represent a wide range of ages and productivity in New Zealand. This will allow for robust statistical tests to determine if productivity and age affect NIR heartwood properties and fungal resistance. Approximately 450 trees are being sampled from 14 sites with heartwood samples collected from four height positions from each tree. Up to 14 blocks have been taken from each disk and used to test fungal decay resistance using three types of fungal isolates. Three sets of statistical analyses are being used to determine if NIR technology can robustly predict durability characteristics of heartwood.

The presentation will show the first year’s results and discuss the impact of provenance and growth rate on natural durability.