SPECIALTY WOOD PRODUCTS PROGRAMME UPDATE

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Summary

Highlights – Ongoing performance of the thermally modified Cypress and Douglas-fir samples. The Cypress boards are performing very well in terms of durability in the fungal cellar tests. This technology opens up more products options for these species.

The annual nursery survey is complete with an estimation of over 15,000 Ha of our species of interest having been planted since the start of the programme.

Densification of eucalypt boards has shown variability in the response to exposure to moisture with many samples regaining their original uncompressed dimensions. The full cross-section treated *Eucalyptus nitens* did retain the highest percentage of their original compression. Stability performance in response to moisture exposure is critical in products such as flooring.

Durability performance of young durable eucalypts over 6 years of testing has shown that all euc samples have either failed or have well established to deep and severe decay. These trees were 15 years-old so would not be representative of sawn timber that would likely come for these species in the future, but we should work to understand the anticipated increase in durability with age.

RESEARCH PROGRESS: Q4 Year 7

Non-durable eucalypts

Scion undertook wood densification testing on *E. nitens* and *E. fastigata*. The *E. nitens* samples were able to be compressed to a higher degree than the *E. fastigata* without sustaining damage, and consequently the increase in surface hardness of the *E. nitens* boards was significantly higher. Subsequent stability testing (following exposure to high humidity or liquid water) found that for both *E. fastigata* and *E. nitens*, the surface densified boards regained most of their original thickness when soaked in water. In the samples that were densified throughout the cross section, the E. nitens boards were found to perform better than the *E. fastigata* boards. The figure below shows *E. nitens* boards following densification. From left to right: undensified controls; surface densification; full cross-section densification.

For an in-service application (e.g., flooring), reducing the tendency of the wood to swell when it gets wet would be a key performance requirement.

Naturally durable eucalypts

A UoC project aiming to understand *Paropsisterna cloelia* phenology in NZ was undertaken. This contributed to the understanding of the potential risks posed by *Pst. cloelia* compared to *P. charybdis*. *Pst. cloelia* clearly dominated *P. charybdis* on *E. bosistoana* and accounted for 96% of all immature stages and 88% of all adult beetles counted throughout the sampling

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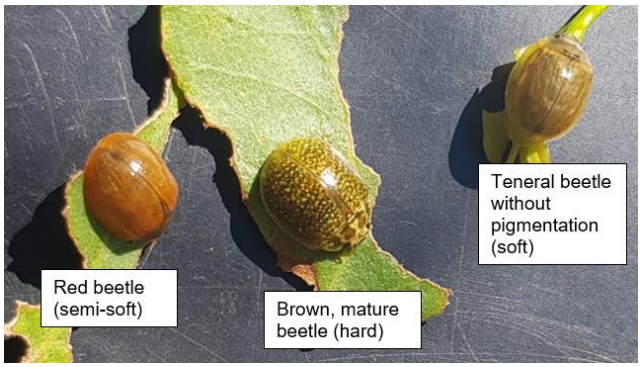
season. Both species showed the start of a third generation with egg batches again being found in March.

Image below shows the different colouration of Pst. cloelia beetles.

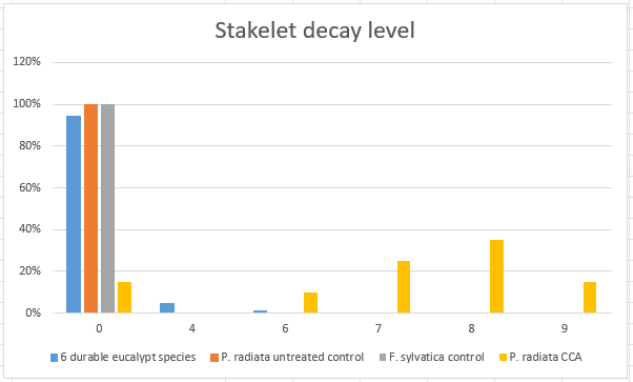


Since its first discovery in the South Island in Nelson/Marlborough in 2019, Pst. cloelia has spread by at least 120 km in a direct line southward to North Canterbury. Pst. cloelia will establish throughout NZ where preferred eucalypts occur and will dominate or potentially even outcompete P. charybdis.

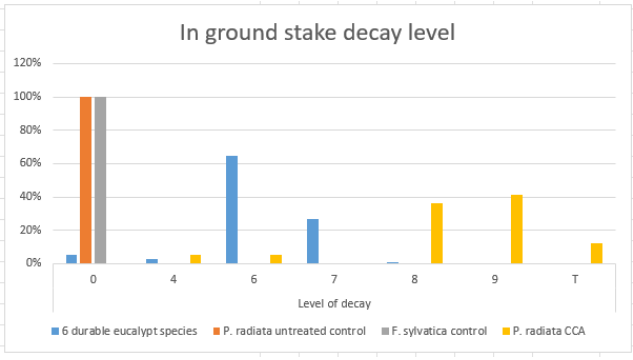
Durability

Durability stakes and stakelets were prepared from six different durable Eucalyptus species, (*E. bosistoana, E. quadrangulata, E. pilularis, E. sphaerocarpa, E. globoidea., E. muelleriana*). These trees were 15 years-old and grew in Northland. These Eucalyptus species had been selected as they are considered to have high natural durability. For each species, timber had been selected from four different trees with samples taken from both inner and outer heartwoods. Control stake and stakelet samples from Pinus radiata sapwood, *Fagus sylvatica* (European beech), and H3.2 and H4 CCA treated Pinus radiata sapwood were also included in the test. The stakes were exposed outdoor at Scion's Whakarewarewa Graveyard, and the stakelets were installed in the Scion's Accelerated Decay House. After 6 years of testing the following results were observed.

Across the six Eucalyptus species, stakelets from 24 individual trees have failed giving them a group average life between 1.4 to 3.7 years. Only seven stakelets remain from two E. bosistoana trees and the remaining samples have a rating of 6 or 4 (deep to severe decay). Stakelets have failed mainly due to soft rot. See figure below – all the eucalypt data has been combined to one column.



For the stake tests, some euc samples have failed, and the remaining stakes have well established to deep and severe decay. See figure below – all the eucalypt data has been combined to one column.



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Stakes of *Cupressus x ovensii* grown in Rotoehu and Riverhead, and *Cupressus x leylandii* (Leyland cypress) were installed in the Whakarewarewa outdoor test area in April 2021. Untreated radiata pine and CCA H4 treated radiata pine stakes were also included for comparative purposes.

After one year in-ground exposure, the stake Indexes of Condition (IoC) for all the Cypress species tested were very similar (between 8.5 – 8.9). In comparison, CCA H4 treated radiata pine stakes have an IoC of 10.0 and the IoC of the untreated radiata pine stakes was 5.9.

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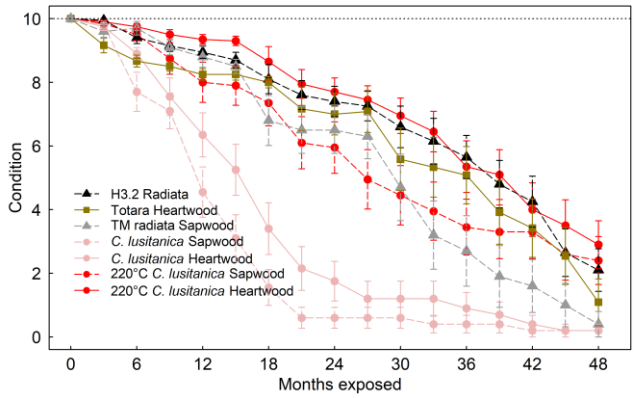
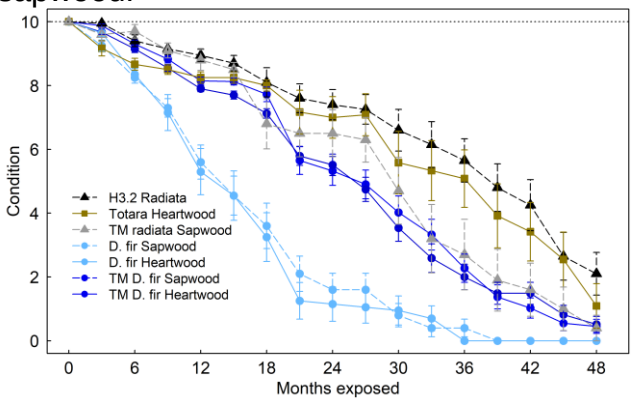
Thermally modified wood has been undergoing fungal cellar/accelerated durability testing for 4 years now. The figure below shows thermally modified cypress as well as untreated cypress and other controls. The modified *C. lusitanica* stakelets are in significantly better condition than the unmodified stakelets, suggesting improved durability of both the heartwood and the sapwood.



The Douglas-fir samples are represented in the figure below. Douglas-fir stakelets are not performing as well as the *C. lusitanica*, but they are still showing improvement over the unmodified controls and are performing similarly to thermally modified radiata pine sapwood.



Because of the promising results for both *C. lusitanica* and Douglas-fir outdoor durability tests (decking and flat panel) were installed in September 2021.

Other

The annual nursery survey has been undertaken and the table below shows the number of seedling produced as well as assumes hectares planted (based on 1,200 trees/ha) for each species/group since the programme began in 2015.

Species/group	2015-2021	ha	%
P.menziesii	8,851,308	7,376	49%
E.nitens	3,456,802	2,881	19%
E.fastigata	1,217,019	1,014	7%
E.regnans	86,012	72	0%
Naturally durable eucalypts*	2,603,869	2,170	14%
Redwoods	1,388,172	1,157	8%
Cypresses**	587,285	489	3%
Total	18,190,467	15,159	

* Naturally durable eucalypts consist of *E. bosistoana, E. globoidea, E. quadrangulata* and some other minor species.

** Cypresses consist of *C. macrocarpa, C. lusitanica, C. nootkatensis* and Ovens/Leyland hybrids.

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It is assumed (but we have no data to confirm) that these plantings will be replanting for the Douglas-fir and ash eucalypts (E. nitens, E. fastigata and E. regnans) and new planting for the naturally durable eucalypts, cypresses and redwoods. There are some reports that new durable eucalypts stands are replacing clear-felled radiata areas.

Reports and other outputs completed

Report No.	Document Title
SWP-T147	Decay rate of Cypress stakes
SWP-T148	Densification of *Eucalyptus nitens* and E. fastigata
SWP-T149	Comparative phenology of *Paropsisterna cloelia* and *Paropsis charybdis* in Marlborough
SWP-T150	The decay resistance of six Eucalyptus species after six years exposure
SWP-FN139	Interim fungus cellar results
SWP-FN140	Nursery survey 2022

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