BC Coastal Hem-Fir Initiative – 2012/13

Project Title	Enhanced Durability of Western Redcedar
Project Number	C.03
Project Leader	Rod Stirling
Project Team	Paul Morris
Total Budget	$100,000

Need(s)

- Emerging and potential new markets for western redcedar (WRC) include areas, such as China and India, which have serious termite hazards. On average WRC is only non-preferred by termites.
- Extractives staining can detract from the value of appearance-grade WRC products such as fencing and siding. Industry needs new, cost-effective designs or treatments that reduce this staining to enhance WRC's competitiveness with non-wood alternatives in markets where appearance is highly valued.
- In the absence of a thorough understanding of WRC's durability in service, the industry is dependent on market perception, which could be severely impacted by a few high profile product failures. It is also difficult to capture new markets without a more sophisticated understanding of how WRC's durability works.
- The viability of BC's future cedar industry is contingent upon growing durable wood. Ensuring the future durability of the planting stock, being developed by BC MoFLNRO, requires knowledge of which extractives most contribute to durability.
- Selection of propagation stock is currently based on extractives analysis, which is laborious and costly. Moreover, as we have recently demonstrated, the correlation between extractives content and wood product durability is not fully understood. A more rapid, cost-effective analysis method that relates directly to durability (decay and termite resistance) is needed.

Objectives & Approach

- Determine the association between WRC extractives and termite resistance, and assess the ability of chromatographic and spectroscopic methods to identify termite resistance wood.
- Further develop and test an NIR screening method for decay and termite resistance.
- Initiate tests to evaluate the efficacy of chemical treatments that reduce extractives stain on sidewall shingles.
- Enhance the market perception of WRC grown in managed forests by presenting recent work in this area at industry meetings, and assisting marketing associations (e.g. WRCLA, WRCEA) in updating their technical literature.
- Characterize and identify an unknown heartwood extractive (compound B) found to be most highly correlated with durability in a ground contract field test.
- Analyze extractives to support Simon Fraser University Prof. Jim Mattsson's research developing genetic markers to select for heartwood rot resistance in WRC. These genetic markers have the potential to enable rapid selection of breeding stock that will produce heartwood with high concentrations of the extractives that we find associated with long-term durability in service.

Benefits

- The value of WRC lumber exports, during more normal market conditions, is $750 million. 90 % of exported WRC is sold for applications where its durability is the primary attribute - $675 million. If WRC were only as durable as D-fir, its value would drop to that of D-fir for uses where appearance and prestige are primary. This would represent a loss in value of $300 million during more normal market conditions. (D-fir 2 x 6 $550/MFBM, WRC 2 x 6 $1000/MFBM).
- Selection of WRC with higher, natural termite resistance would increase margins and open new markets (China and India have severe termite hazard zones).
- The development of treatments that reduce extractives staining will enhance WRC's competitiveness with non-wood alternatives in markets where appearance is highly valued. Prevention of extractives staining would help WRC producers compete in the 2650 MMBF equivalent fencing market.
- Transferring new information that shows second-growth WRC from managed forests is as durable (despite lower thujaplicin concentration) to WRC users and marketers will enhance the reputation and competitiveness of BC WRC products.
- Characterization and identification of unknown compound B will:
    - Enable quantification and eventual incorporation into MoFLNRO's WRC breeding program. This will ensure that the future resource produces durable wood.
    - Provide clues to the mode of action in heartwood protection and facilitate identification of the genes controlling durability.
    - Help maintain the reputation of second growth WRC in the face of data showing low thujaplicin content in second growth.
    - Assist in more accurately determining the value proposition for extracting valuable chemicals from WRC waste streams
    - Facilitate research to determine ways in which durability can be maintained and enhanced in service.
    - Help guide the design of more effective wood preservative formulations by understanding how nature protects wood

Project Tasks and Outputs – Current fiscal year

Tasks / Outputs	Expected Delivery Date
Publish additional data supporting the durability of BC's WRC resource	October 2012
Report on reducing extractives stain in sidewall shingles	December 2012
Identify the extractives associated with termite resistance in WRC, and the ability of NIR to identify termite resistance wood	March 2013
Characterization of unknown compound B	March 2013

Status and Major Accomplishments – Previous year

- Paper on the performance of old-growth and second-growth WRC in field tests published in a peer-reviewed journal (CFS funded)
- Paper on the association between extractives and ground contact durability published in a peer-reviewed journal
- Paper on treatments to reduce extractives staining in WRC submitted to a peer-reviewed journal
- Paper on the detoxification of WRC extractives presented at the Canadian Wood Preservation Association annual meeting

- Further evaluated near infrared models to predict extractives content from scans of increment cores
- Analyzed extractives in WRC samples used in Norwegian field tests to explain the performance of North American-grown WRC relative to Norwegian plantation-grown WRC

Performance Measures

Key Success Factor	Key Performance Indicator	Target	How the outcome of the Project supports the Program objectives
Association between extractives and termite resistance	Extractives associated with termite resistance identified	BC MoFLNRO uses technology to screen breeding stock for durable wood	Facilitates the breeding of termite resistant WRC planting stock.
NIR-based model for predicting termite resistance in WRC	Models capable of identifying termite resistant wood	Higher value, termite resistant WRC exported to markets with termite hazards	Expanded markets for WRC
Cost-effective treatment capable of reducing the incidence of extractives staining	Methods to reduce extractives staining on WRC products	Consideration of the technology by BC industry	Facilitates the expansion and diversification of WRC in outdoor appearance applications
Identification of unknown compound B	Improved understanding of the extractives responsible for durability of western redcedar wood in service	BC MoFLNRO recognition of the importance of undervalued extractives	WRC grown in managed forests in Canada will meet market demands for durability enabling expansion and diversification of markets

Communication Strategy for Information Dissemination

A report on extractives associated with termite resistance and the ability of NIR to scan for termite-resistant WRC will be provided to John Russell (MoFLNRO) and WRC producers. A paper presenting additional data on the extractives and durability of second-growth WRC will be published in a conference proceedings or peer reviewed journal. Recent data indicating that second-growth WRC from managed forests is as durable as old-growth (despite lower thujaplicin content) will be shared with WRC marketing organizations to help update their technical literature. Additional technical advice will be provided as requested. A report on our characterization of compound B will be provided to John Russell (MoFLNRO) and Jim Mattsson (SFU) to assist in their research developing durable planting stock, as well as to WRC producers.

Collaboration – Research Partners

- John Russell, MoFLNRO, Research, Innovation and Knowledge Management Branch
- Professor Jim Mattsson, Simon Fraser University
- Professor Ken Grace, University of Hawaii