

Strength Properties of Hardwood Timber Species Exposed to Decay and Marine Borer Attack in Tidal Zones

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Abstract - The Pinaceae family of timber displays sound strength qualities in underground or dry conditions, with good strength in compression parallel to the grain that make them ideal for use as piles. However, they decay rapidly in marine environments, due to low heartwood rot resistance and large radius of sapwood that is susceptible to attack by marine borers and rot. Therefore, preservative treatment of Pinaceae is the standard practice for producing rot resistant timber marine piles in the U.S. While it has been shown that hardwoods can be marginally treated with preservatives, decay evaluations are primarily based on ground contact and lack inspection of post-decay strength properties.

This paper describes the ongoing research to chemically treat and evaluate the heartwood of four naturally rot-resistant timber families available in the U.S. for use as marine timber: Black locust, white oak, black walnut, and swamp mahogany. Small clear-heartwood samples will be treated with oil-borne preservatives that have already shown better decay protection for red oak over Pinaceae family. The specimens will be sampled annually over the course of a decade in estuary saltwater and tested for decay, marine borer infestation and mechanical properties. Specifically, specimens will be differentiated by exposure in three different zones for comparison to realistic exposure scenarios of a structure: continuous submersion underwater, within the tidal zone for cyclical water and air exposure, and in the splash zone with minimal water exposure. Treated samples will be compared to untreated and preservative treated control specimens of the most common Pinaceae species, loblolly pine, and each hardwood species. This will enable treatment comparison to the industry standard (Pinaceae) and treatment comparison within a species. The objectives of this study are twofold: To establish correlation between rate of decay and strength properties in marine timber, and to determine the viability of treating U.S. hardwoods for use as marine timbers.

Keywords: Marine, timber, hardwood, strength, moisture, rot, resistance, borer.