Technical Session 1:
Education and Student Fellowship Presentations

The Secret to Creating a Healthier Future—For the Next Generation, Our Industry, and Planet

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ABSTRACT

The skills gap is widening, seriously affecting the success and longevity of the lumber and forest products industry. The solution is ensuring the next generation is #exTREEmelysmart—inspiring and equipping them to value sustainable forestry, choose wood products, and embark on a career path in an industry they can feel proud of.

North American Forest Foundation Executive Director, Allison DeFord, will show you how they're turning up the volume, dispelling the myths, and spreading the truth about trees to keep this industry thriving for generations.

Educating 1 million kids by 2030 is the goal and they're on track to make this happen with their free signature Truth About Trees kit, traveling Forever Forest exhibit with the Omaha Children's Museum, and a new Truth About Trees App for junior high students that's in development. (The app alone will potentially reach 5 million kids and encourage a career path, following in your footsteps.)

Expanding the Market for Timber Industrial Mats Manufactured from Hardwood Cross-Laminated Timber

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ABSTRACT

Hardwood species are abundantly available, but there is a higher demand for softwood whose availability is limited compared to hardwood. Timber industrial made from cross-laminated timber (CLT) also known as temporary roads or access mats has also contributed to the demand for hardwood. The research aims to expand the market for timber industrial mats manufactured from hardwood CLT, using two low-valued and underutilized hardwood species.

The aim will be achieved by assessing the durability of the species against biological agents; termites, assessing the strength by testing for the mechanical properties of the species and comparing the life span with CLT made from softwood which is generally available in the market. The study will involve conducting a non-destructive test on all the lumbers after collecting all the materials needed, the CLT panels will be made in the Department of sustainable bioproduct after which they will be installed on a naturally termite invasive field in the MSU and USDA three experiment sites within Mississippi State.

The study is expected to provide a viable alternative to the use of softwood in the manufacturing of industrial mats from CLT with the use of hardwood with a possibility of prolonged lifespan, increasing the use of the low-valued hardwood species thereby improving the economic value and supporting forest management, sustaining and creating new jobs for local and rural communities.

Antifungal Properties and Fire Resistance of Phytic Acid Treated Wood

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ABSTRACT

The antifungal properties and fire performance of Phytic acid (PA)-treated wood were studied in this research. Southern pine (softwood) and yellow poplar (hardwood) were used as the test samples. Two white rot fungi (*Trametes versicolor* (T.v.) and *Irpex lacteus* (I.l.)) and two brown rot fungi (*Gloeophyllum trabeum* (G.t.) and *Rhodonia placenta* (R.p.)) were used for the in vivo and durability test. The results showed that PA can significantly inhibit the growth of all the tested fungi. The thermal degradation behavior of the samples was analyzed by thermogravimetric analysis (TGA) under nitrogen conditions. A higher residue rate of the PA-treated samples was observed, indicating the increased thermal stability of PA-treated wood samples.

Development of Preservative-Treated Cross-Laminated Timber: Effects of Panel Layup and Thickness on Bonding Performance

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ABSTRACT

Cross-laminated timber (CLT) is an engineered wood product manufactured from softwood dimension lumber stacked in layers at 90° to the previous layer. CLT has proven to be a promising construction material because of its mechanical properties, low carbon footprint and a sustainable alternative to steel and concrete. The susceptibility of CLT to biodeterioration limits it use to interior applications. To expand the use of CLT to exterior applications, the use of preservative treatment has proven to be an effective method of increasing the durability of wood products. Studies on the use of preservative treated in CLT is limited. In this study, we prepared preservative-treated CLT from prefabricated CLT panels that was impregnated with Cu-based preservatives through a conventional vacuum process. The effects of panel layup (longitudinal and crosswise), thickness (3- and 5-layer), and preservative treatment (CA-C and MCA) on bonding performance were investigated.

The bonding performance of post treated CLT panels were evaluated using block shear and delamination tests by referencing ASTM D905 and ASTM D2559 Standards, respectively. One-way analysis of variance and Kruskal-Wallis H tests were conducted to evaluate the effect of panel layup, thickness, and preservative treatment on the block shear strength (BSS) and wood failure percentage (WFP). There was not much of an influence of the panel layup, thickness, and preservative treatment on

the BSs and WFP of the treated panels. Approximately 60% of the block shear specimens passed the minimum WFP requirement of 75% specified in ASTM D2559. Less than 10% of the delamination specimens passed the allowable delamination rate of 1% specified in ASTM D2559. The low percentage of wood failure and the low percentage of specimens passing the allowable delamination rate could have been influenced by the air drying of the CLT panels from approximately 85% MC to 20% MC. Some of the control specimens showed cohesive failure of the adhesive. This also could have been a factor in influencing the results.