***Caryocar villosum* (Aubl.) Pers. as a bioresource: evaluation of particleboard technological properties.** Surdi, P., Junior, G. B., Castro, V., Ribeiro, V. (*University of Saõ Paolo-ESALQ, Brazil; paulasurdi@usp.br; gbjunior@usp.br; vresende@gmail.com; vcrribeiro@usp.br*), Filho, M.T. (*University of Saõ Paolo, Brazil; mtomazel@usp.br*).

The purpose of this research is to evaluate the potential use of residues from mechanical processing of *Caryocar villosum* (Aubl.) Pers. wood in particleboard production. Three panels were produced from this tropical species, with adhesive based on phenol formaldehyde, nominal density of 850 kg/m^3, and dimensions of 400 mm × 400 mm × 15.7 mm (width, length, and thickness, respectively). The panels were then put in a climate-controlled room at the Wood and Derivatives Mechanical Assay Laboratory at University of Saõ Paolo-ESALQ, at a temperature of 295.15 ± 8 K and 65% ± 5% relative moisture. The basic density and chemical properties of the wood were determined. Specimens from the particleboards will be prepared and conditioned to then evaluate their physical (water absorption and thickness swelling) and mechanical (internal bond, modulus of elasticity and modulus of rupture) properties. Resistance to decay fungi will be evaluated. The density profiles of the panels will be characterized by X-ray attenuation. Results are expected to show an economic utilization of residues from mechanical processing of tropical species explored sustainably as well as to generate options for consumers looking for products different from those generally marketed.

Reinforcement of plant fiber-based ultra low density material with sodium silicate. Xie, Y. (*Fujian Agriculture and Forestry University, China; fjxieyq@hotmail.com*).

This presentation will show that inorganic materials such as sodium silicate and aluminum sulfate can be used as additives to improve mechanical and fire-resistance performances of plant fiber-based ultra low density material (ULDM) during the production process with the liquid frothing approach. The following process was used to make sample mats. After fibers were pulped in a refiner, resin and a surface-active agent were added to the pulp solution. Then sodium silicate and aluminum sulfate were added and thoroughly mixed into the solution. After solution frothing, the mat was formed and dried, producing a plant fiber-based ultra low density mat. The reinforced ULDM had an internal bonding strength of 1.0 MPa, compared to 0. 1 MPa in material without the inorganic additives. In reinforced ULDM as compared to unreinforced material, the modulus of elasticity was 87.3 MPa and 12.4 MPa, modulus of rupture was 7.3 mPa and 0.2 MPa, and compressive strength (at 10% strain) was 3.7 MPa and 0.2 MPa, respectively. Reinforcement with sodium silicate can also increase fire resistance, and the oxygen index can reach a higher level, 42%. No significant weight loss and exothermic decomposition could be observed below 700 °C.

F-17 Recovery, reuse, and recycling of wood products for a greener future

Organizers: Phil Araman (U.S. Forest Service), Robert Bush & Robert Smith (Virginia Tech, USA)

Wood pallet production, disposal, recovery, reuse, and recycling in the United States. Araman, P. (*U.S. Forest Service, USA; paraman@vt.edu*), Bush, R. (*Virginia Polytechnic Institute and State University, USA; rbush@vt.edu*).

In the United States, large volumes of wood in the form of pallets are used to move, store, and ship products. For example, the authors estimate that 7.26 billion board feet (approximately 441 million pallets) of new solid wood were utilized by the U.S. wood container and pallet manufacturing industry (North American Industry Classification System 321920). They also estimate that 7.57 billion board feet (approx. 460 million pallets) were recovered for reuse and recycling. Of the total pallets recovered, 309 million were sold to pallet users. The remaining pallets and material from repaired pallets were recycled into other products after grinding and further processing. Nevertheless, many pallets still end up at landfills, and ways to divert those pallets to recyclers will be presented. The audience will get a slide tour of a typical pallet recovery operation pursuing zero wood waste. The tour will include ways to collect the waste pallets, separation of incoming pallets, repair techniques, pallet disassembly, and pallet grinding and the various fiber products produced.

Home construction waste and potential recycling options. Araman, P. (*U.S. Forest Service, USA; paraman@vt.edu*), Hindman, D. (*Virginia Polytechnic Institute and State University, USA; dhindman@vt.edu*).

Construction waste represents a significant portion of landfill waste, estimated as 17% of the total waste stream. Estimates on the amount of wood construction waste for a typical 2 000-ft^2 single family home is more than 5 000 pounds, including 3 000 pounds of solid-sawn wood, and 1 500 pounds of engineered wood products (EWP). Most of the solid-sawn lumber and EWPs can be recycled. Through a partnership with Green Valley Builders (Blacksburg, Virginia, USA), an EarthCraft House certified builder, the authors have studied their wood construction waste and recycling options. Wood products studied included solid-sawn lumber, oriented strand board, particleboard, laminated veneer lumber (LVL), and preservative-treated wood. Wood waste was collected for each house during the construction process. The waste was measured, weighed, and sorted according to material type and size. Potential uses included finger-jointing to produce non-structural stud material or sill plates, web material in open web floor trusses, temporary stair treads and risers, shelving, pallet parts, and finger-jointed panels for sheathing. Grinding would be used to convert smaller pieces to mulch and fuel. Zero wood waste is possible. Data for 15 homes will be presented.

Green building: dimensional stability of block produced from sawdust and sand. Badejo, S., Adejoba, O. (*Forestry Research Institute of Nigeria; solomonbadejo@yahoo.com; jatsod2009@gmail.com*), Adelusi, E. (*Federal College of Forestry, Ibadan, Nigeria; adelusi_ade@yahoo.com*).

The present study investigates the potential utilization of wood waste in the production of building blocks. Sawdust, sand, and cement were mixed together at three different mixing ratios of 1:1:3.5, 1:1:4, and 1:1:5. The blocks were subjected to water absorption, thickness swelling, and compression tests. The effects of this production variable (mixing ratios) on dimensional movement and compressive strength were determined. After a period of 120 hr of cold water immersion, the mean water absorption values of the wood waste block were 40%, 39%, and 25% for a mixing ratio of 1:1:3.5, 1:1:4, and 1:1:5, respectively. Ratio 1:1:5 produced a more dimensionally stable block with the lowest water absorption percentage. The mean compressive strength examined was 11.63 N/m^2, 11.68 N/mm^2, and 12.80 N/mm^2 for a mixing ratio of 1:1:3.5, 1:1:4 and 1:1:5, respectively. In conclusion the use of sawdust in construction block making is possible.