

## Using Eastern Hardwoods in Wood-Plastic Composites

### Wood and Thermoplastic Polymers Create High-Value Products

#### The Challenge

Wood-plastic composites (WPCs), as the name suggests, are made by combining wood waste and plastic. WPCs are used for dozens of high-value products such as decking lumber, window frames, and interior paneling in automobiles. Pine or maple is generally the low-cost wood filler of choice.

The cost effectiveness of making WPCs is reduced by high moisture content in some wood species, which makes them more susceptible to mold and rot. Wood discoloration during processing and corrosion of metal fasteners and fixtures also reduce the desirability of using some species.

Alternative wood species are needed that will not only lower production costs but increase the overall durability of products made with WPCs. Tree species that grow in the eastern hardwood region could potentially provide the raw materials used in WPCs and open new markets for hardwood producers.

#### The Solution

To promote more widespread use of eastern hardwood species in wood-plastic composites, the U.S. Forest Service, Northeastern Area State and Private Forestry's Wood Education and Resource Center funded a study at the University of Tennessee. Researchers tested the long-term performance and durability of a variety of hardwood species in WPCs and their effects on the composite's properties.

Ten wood species that are native to the Southeastern United States were combined with polypropylene to make WPCs. Researchers studied the effect of these wood species on water sorption and durability of the resulting WPCs.

Of the species tested, eastern red cedar and Osage orange had lower moisture content and were more durable than the other species. Specific species characteristics, such as interesting coloration or natural resistance to fungi, also influenced the properties of the composite during processing and increased the value of the final products. More durable WPCs were produced because of the inherent properties of

*Nontraditional wood species add value to wood-plastic composites.*



*Wood properties influence the color and other characteristics of wood-plastic composites.*

the wood filler material. The findings are being shared to increase awareness among manufacturers of the potential for developing other new and improved products.

#### Resulting Benefits

- Produces high-value products from waste wood material
- Promotes the use of new wood species in the manufacturing of WPCs
- Provides environmental benefits by using recycled materials
- Develops potential new market opportunities for eastern hardwood producers

#### Sharing Success

- A publication, "Wood Plastic Composites – A Primer," was published and distributed. This publication is available online at: <http://www.utextension.utk.edu/publications/pbfiles/PB1779.pdf>
- A series of scientific journal articles was written describing the results
- A presentation was made at the 4th International Conference on Advanced Engineered Wood and Hybrid Composites
- A poster was presented at the 61st Annual Meeting of the Forest Products Society



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