

Clean and green

Wood industry, dairy farmers, and consumers to profit from whey-based varnish



UVM researcher Mingruo Guo coats a piece of wood with the whey-based varnish he is developing. Unlike commercial wood finishes that contain chemicals that are volatile and toxic to handle, this water-based finish made from a byproduct of cheese-making will be environmentally benign and safe to humans.

When George Robson was growing up in Morrisville, farmers made their own "milk paint" to cover barns and furniture. "That stuff was indestructible," says Robson, now a natural products specialist with the Vermont Department of Economic Development. "People who bought antique chairs from farmers and tried to strip them found that no chemicals could touch that paint."

Milk paint came to Robson's mind about five years ago, when the only plant in Vermont to process whey, a byproduct of cheesemaking, was closing down. "I thought if we could figure out a way to use whey that would not only benefit the wood industry, but also the farmers, that would be great," he says.

Robson brought his idea of using whey in a wood finish to UVM's Department of Nutrition and Food Sciences, where an edible film was being developed from whey. Today, Mingruo Guo, an associate professor in the department, is working on just such a water-based wood finish.

Guo and two graduate students have almost completed a prototype of a natural oil-based finish, made with beeswax, a byproduct of another Vermont agricultural industry, honey production. But a water-based finish, more difficult to develop, will take two or three years. The task is more complicated because a water-based finish must be soluble in water, yet resist moisture as well.

The finish would be environmentally benign, one important advantage. A varnish must penetrate wood, as well as coat it with a film that resists moisture and other elements. To accomplish that, almost all commercial wood finishes contain several dozen chemicals that are volatile and toxic to handle, Guo says.

Because the wood finishes will fit right into the state's clean-and-green image, they should help sell Vermont wood products, Guo says. "They'll be 100 percent natural and safe to everyone: safe to the environment, the workers, the house, and the kids. They can also be used to stain wood containers for food use. They can be used on toys--they're safe, no matter how much kids chew on them."

A little more than half of the nearly 70 billion pounds of whey produced in the U.S. is put to use; the rest, especially that generated by small cheesemakers, is dumped on fields, Guo says. The dairy industry is searching for more uses for whey protein, now an inexpensive byproduct.

UVM dairy scientists have already shown how protein molecules can be stretched and manipulated into a polymer to form a film that would coat and protect wood. But there are hurdles. Guo must find a way to make the varnish more resistant to scratches and dents, and to make it shiny.

A little more than half of the 69 billion pounds of fluid whey produced annually in the U.S. is put to use; the rest, especially that generated by small cheesemakers, is dumped on fields.

Source: American Dairy Products Institute, 1996

Just as important, he's looking for an ingredient that will repel bacteria. Whey protein offers an attractive food source where microbes can flourish. But Guo thinks he'll be able to infuse a water-based finish with anti-microbial power to give it greater environmental resistance.

His idea is to add either propolis, a natural germ killer found in honey which bees obtain from resinous buds of poplar and pine trees, or an extract from a wood such as cedar.

The development of a whey-based finish will take time, and the money to hire a polymer scientist, Guo says. He hopes to get a \$230,000 grant for the work soon from the USDA, with the help of Vermont's Sen. James Jeffords.

Robson says the wood varnish should be welcomed by everyone. "It's another opportunity for people in the wood products and dairy industries to use a natural organic product that can add value to their commodities," Robson says.

--Susan J. Harlow

For more information about whey-based varnish, contact [Mingruo Guo](#).

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--George Robson, Natural Products Specialist, Vermont Department of Economic Development