

Project begins in July
Polymer pallets support
Washington exports

By Becky Phillips
Contributing writer



Photo: Jinwen Zhang in the laboratory with the extrusion equipment. (Photo by Becky Phillips)

In a research laboratory, a little like a giant kitchen, **Jinwen Zhang** is cooking up a recipe aimed at supporting Washington's economy ... literally.

As the most trade-dependent state in the union — with twice the per capita exports of any other state — Washington relies heavily on the use of wood pallets in domestic and international trade. With the passage of the United Nations International Plant Protection Convention treaty in 2005, wood pallets must be treated and marked to

assure no insects are inadvertently imported into other countries.

Zhang, assistant professor in the Department of Civil and Environmental Engineering and Wood Materials and Engineering Laboratory, said the chemicals commonly used to treat the wood are toxic to humans and can taint the agricultural products being shipped in them. As an alternative, Zhang and his team hope to develop natural fiber reinforced plastic composites that can be economically molded and assembled into pallets that could replace those made of wood.

Funded by a seed grant from WSU's IMPACT (International Marketing Program for Agricultural Commodities and Trade) Center, Zhang sees a large prospective market for such a product.

"There are about 450 million pallets manufactured in North America every year. Of those, about 90 percent are made from wood. And since wood pallets are cheap, shippers do not want to spend time and money repairing or reusing them. Most pallets are good for only one trip and then disposed of," he said.

"This causes a serious environmental effect, with about 150 million wood pallets going into the landfill each year — accounting for more than 4 percent of all solid waste in landfills."

Though plastic pallets — with their long service life and low maintenance and disposal costs — are becoming more popular in the marketplace, the high cost of resin to produce them is a problem. Plastic also tends to "creep" or deform when bearing weight. By adding wood fibers to the plastic, the resulting composite is not only stronger, but more durable, energy efficient and less expensive than either wood or plastic alone — not to mention insect-free.

The composites will be made of 30-40 percent polymer plastics such as recycled milk and soda bottles — and 60-70 percent wood fibers from recycled pulp or forest thinnings. The fibers will be mixed with thermoplastic resins, such as polypropylene, in large machines called extruders. These force out specially shaped components — called profiles — like a cookie press. These parts are later assembled into pallets.

By increasing the strength and life of the pallets, it will decrease impact on landfills. However, the low biodegradability of polymer plastics is still a challenge that's being worked on.

"This type of material is already being used for Trex decking and has great potential to be extended into many other areas," said Zhang.

The project is set to begin in July and the multidisciplinary team will include **Holly Wang**, associate professor in the School of Economic Sciences. Collaborator, Keith Adkins, president and CEO of All Service All Packaging, Inc., in Spokane Valley, has agreed to produce the prototype pallets in his manufacturing plant.