

Frontiers in Biorefining 2014

<http://www.frontiersinbiorefining.org>

TRANSFORMING AGRICULTURAL WASTE INTO POLYETHYLENE TEREPHTHALATE (PET) MIMICS

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ABSTRACT: U.S. Bioplastics™ (<http://usbioplastics.com>) and the University of Florida are collaborating to convert sugarcane bagasse waste into a bio-based polyester functionally equivalent to water bottle plastic (polyethylene terephthalate, PET, “polyester”). Ferulic acid is extracted from the bagasse and then is polymerized or copolymerized to form Gatoresin™, which eventually water-degrades back into benign ferulic acid, avoids fossil fuel feedstocks, and competes well with a large segment of environmentally unsound packaging plastics. The thermal properties Gatoresin™ are readily modulated; for example, the glass transition temperature (amorphous softening temperature) can be tuned between 70°C and 155°C. Many plant species have been investigated for their ferulic acid content. The typical extraction protocol involves heating and agitating the plant material in 1.0 M aqueous sodium hydroxide (NaOH), which hydrolyzes the ester bonds, thereby releasing it from the lignocellulose. The literature extractable yield of ferulic acid from sugarcane bagasse is reported in the range of 1.36% to 2.58%, making it one of the most abundant sources of any crop species.

