Lignin from Transgenic Poplar Is Easier to Process

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WARF: P100281US03

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a method to modify fertile poplars and other plants to contain feruloyl-CoA:monolignol transferase, making them easier to digest and ferment.

OVERVIEW

Lignin is an important plant cell wall component that provides structural support and vascular functions. It is one of the most abundant organic polymers on Earth, constituting about 30 percent of non-fossil organic carbon. However, the chemical structure of lignin is difficult to break down by chemical and enzymatic means, posing a challenge to bioenergy processing and papermaking.

An enzyme called feruloyl-CoA:monolignol transferase (FMT) has been found and isolated from the *Angelica sinensis* plant. It is known that this enzyme produces chemicals that weaken lignin structures. Genetically engineering other species to contain this enzyme could lead to more easily digested and fermented plant matter.

THE INVENTION

UW–Madison researchers and others have developed genetically modified poplars with lignin that is less resistant to alkaline degradation.

Having previously identified and isolated the gene for FMT, the researchers introduced the nucleic acid sequence into poplar tissue. The enzyme produced lignin rich in monolignol ferulates, including coniferyl ferulate and sinapyl ferulate. The transformed lignin thus contained ester bonds that cleaved under relatively mild ammonia conditions.

The poplar cells were modified using standard genetic techniques.

THE WARF ADVANTAGE

Since its founding in 1925 as the patenting and licensing organization for the University of Wisconsin-Madison, WARF has been working with business and industry to transform university research into products that benefit society. WARF intellectual property managers and licensing staff members are leaders in the field of university-based technology transfer. They are familiar with the intricacies of patenting, have worked with researchers in relevant disciplines, understand industries and markets, and have negotiated innovative licensing strategies to meet the individual needs of business clients.

APPLICATIONS

- Conversion of poplar and lignocellulosic biomass for biofuels and industrially important chemicals
- Production of pulp for papermaking

KEY BENEFITS

- Poplar lignin is easier to break down.
- Plants are fertile and pass FMT gene to next generation.
- Lignin exhibits up to 30 percent increase in monolignol ferulate content.

STAGE OF DEVELOPMENT

The development of this technology was supported by WARF Accelerator. WARF Accelerator selects WARF's most commercially promising technologies and provides expert assistance and funding to enable achievement of commercially significant milestones. WARF believes that these technologies are especially attractive opportunities for licensing.

ADDITIONAL INFORMATION

Related Portfolios

WARF Accelerator Program Technologies

UW–Madison Technologies Developed Through the Great Lakes Bioenergy Research Center

Related Technologies

For more information about FMT transgenic plants for bioenergy and papermaking, see WARF reference number P100281US02.

Tech Fields

Clean Technology - Biofuels & renewable fuels
Clean Technology - Energy & resource efficiencies

CONTACT INFORMATION

For current licensing status, please contact Jennifer Gottwald at jennifer@warf.org or 608-960-9854.