Transgenic Lignin Easier to Break Down for Biofuel

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WARF: P100281US02

View U.S. Patent No. 9,441,235 in PDF format.

The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a method for modifying plants to contain a transferase gene that makes lignin easier to process.

OVERVIEW

Lignocellulosic biomass is a very desirable feedstock for biofuel production. If the fermentation process could be optimized, conversion of this biomass could yield 25 to 50 billion gallons of ethanol or other biofuels per year.

Yet lignocellulose is composed of tough lignin, cellulose and hemicelluloses that resist breakdown. This limits the conversion of biomass into fermentable sugars. Pretreatment steps require high heat, harsh chemicals and large amounts of water.

Lignin can be modified by introducing weaker structure chemicals like coniferyl ferulate (CAFA). Decoding the enzymes responsible for these chemicals could lead to new transgenic plants.

THE INVENTION

UW–Madison researchers and others have developed methods to genetically alter the structure of plant lignin to be less resistant to chemical (mostly alkaline) degradation.

They have identified and isolated nucleic acids from the *Angelica sinensis* plant that encode feruloyl-CoA:monolignol transferase. This enzyme produces lignin rich in CAFA and similar chemicals, and thus contains ester bonds that cleave under relatively mild conditions.

Plant cells can be modified to contain the enzyme gene sequence using standard genetic techniques. Whole plants (and their seeds) then can be generated from these cells.

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 lignocellulosic biomass to biofuels and industrially important chemicals
- Production of pulp for papermaking
- Production of animal feeds and forages

KEY BENEFITS

- Makes plant material easier to break down
- By reducing the severity of the required pretreatment step, this discovery should lead to savings in both energy costs and water consumption.
- May enable sustainable local processing without massive facility costs
- Processing low-density plant materials locally may decrease transportation costs and reduce greenhouse emissions.
- May make animal feed more digestible
- Applicable to many types of plants

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

WARF reference number P100281US03 describes a transgenic poplar containing the feruloyl-CoA:monolignol transferase gene sequence.

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.