



## Grass Modified for Easier Bioprocessing

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**WARF: P120040US02**

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**The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a method to make grass lignin easier to process by knocking down a gene called *PMT*.**

### Overview

Manufacturing paper and producing biofuels is difficult because the lignin in plant cell walls is tough to degrade. Current techniques are energy intensive and use harsh chemicals. In the case of biofuels, costly pretreatments are required to alter the lignin and help enzymes produce sugars for fermentation. Grass lignins contain large amounts of *p*-coumarate that interfere with this process.

UW–Madison researchers previously identified a transferase gene in the *Angelica sinensis* plant that makes lignin less resistant to chemical breakdown (see WARF reference number P100281US02). They continue to build on their work to create so-called ‘zip lignin’ that is easier to process.

### The Invention

The researchers have identified another gene of interest in rice, corn/maize and other grasses, called *p*-coumarate monolignol transferase (*PMT*). This is the first gene reportedly involved in the acylation of lignin monomers. In essence, interfering with this gene could make plants more amenable to biorefining.

### Applications

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

### Key Benefits

- *PMT* downregulation reduces the *p*-coumarate levels in grasses, reducing the level of components toxic to fermentation microorganisms.
- Alternatively, *PMT* upregulation allows grasses to produce more *p*-coumarate if the easily clipped *p*-coumaric acid (or derivatives) are being produced as chemical byproducts.
- Makes plant material easier to break down when used in conjunction with the ‘zip-lignin’ gene (*FMT*)
- 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 grasses (e.g., corn, switchgrass, sugarcane, wheat, millet and sorghum)

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## Stage of Development

The researchers identified the gene in rice, along with its homologs in Brachypodium and corn/maize.

## Additional Information

### For More Information About the Inventors

- [John Ralph](#)

### Related Technologies

- [WARF reference number P100281US02 describes the \*Angelica sinensis\* gene that makes lignin easier to process.](#)
- [WARF reference number P100281US03 describes a transgenic poplar containing that gene sequence.](#)

### Tech Fields

- [Clean Technology : Biobased & renewable chemicals & fuels](#)

For current licensing status, please contact Jennifer Gottwald at [jennifer@warf.org](mailto:jennifer@warf.org) or 608-960-9854

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