Sham-Sensitive Terminal Oxidase Gene
From Xylose-Fermenting Yeast

INVENTORS • Thomas Jeffries, Nian-Qing Shi

WARF: P00076US
View U.S. Patent No. 6,391,599 in PDF format.

The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a xylose-fermenting, mutant yeast strain capable of increased ethanol production.

OVERVIEW

To meet the future increased demand for ethanol, sugars from biomass like corn hulls and corncobs will need to be fermented. This biomass has a high concentration of xylose, ranging from 25 to 30 percent by weight. The current focus of this field is to develop efficient and economical processes to convert xylose into ethanol. A yeast-based process is sought because yeast are relatively resistant to contamination, fairly insensitive to low pH and ethanol, and are easier to handle in large-scale processing. *Pichia stipitis* is one of the few yeast strains that can use xylose fermentatively.

To increase the efficiency of fermentation, UW-Madison researchers focused on disrupting respiration, which essentially wastes carbon and energy from a fermentation standpoint. They developed a cytochrome c deletion mutant of the yeast species *Pichia stipitis* (see WARF reference number P98142US). This mutant has many benefits over existing yeast strains, including an increased ethanol production rate from xylose.

THE INVENTION

UW-Madison researchers have developed an additional xylose-fermenting, mutant yeast strain capable of increased ethanol production, which may be used to convert xylose in xylose-containing media into ethanol. This mutant also disrupts respiration in *Pichia stipitis*, but through an alternate pathway called the SHAM-sensitive respiratory pathway. The researchers created the mutant by removing or replacing at least part of the functional SHAM-sensitive terminal oxidase gene natively present in the parent strain with nonfunctional DNA.
APPLICATIONS

- Ethanol production

KEY BENEFITS

- The mutant *P. stipitis* shows an improved rate of xylose fermentation.
- The mutant can be used as a parent for additional fermentation improvement.
- The mutant is not highly growth impaired.
- This method provides a cost-effective means of producing ethanol by fermentation of xylose.

ADDITIONAL INFORMATION

Related Technologies

Please refer to P98142US for additional information on converting xylose into ethanol.

Tech Fields

Clean Technology - Biofuels & renewable fuels
Research Tools - Fermentation

CONTACT INFORMATION

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