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Energy Efficiency and Renewable Energy
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Biomass Program

Bioproducts R&D

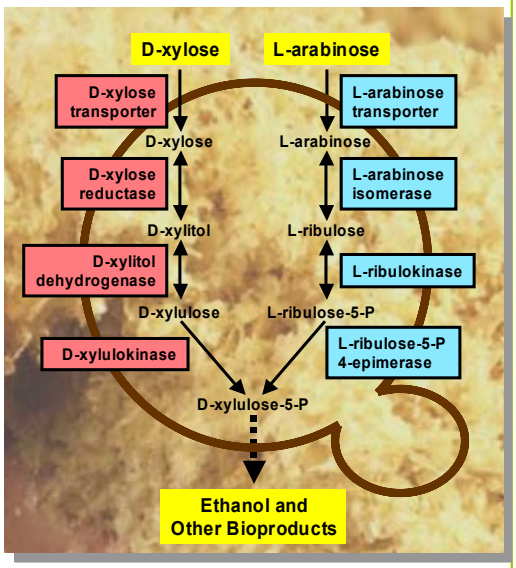
Arabinose Yeast Cooperative Research and Development

Much of the existing bioproducts industry is founded on fermenting starch-derived glucose, a 6-carbon sugar, to chemicals such as citric acid, lactic acid, and ethanol. The biocatalysts used in these processes are unable to utilize 5-carbon sugars such as xylose and arabinose present in the starch feedstocks (e.g., corn and other grains, sugarbeets, tubers) and the 5-carbon sugars exit the process in the low-value, co-product stream(s). To better utilize all of the sugars in corn grain, the National Corn Growers Association is sponsoring work at the National Renewable Energy Laboratory (NREL) to develop yeast that can co-ferment glucose and arabinose from hydrolysates of distillers' dried grains (DDGs), a co-product of the ethanol dry mill process, or from corn fiber.

DDGs and corn fiber are primarily composed of sugars (glucose, arabinose, xylose) and protein. They are sold as animal feed and their value is based on the concentration of protein. By hydrolyzing DDGs (or corn fiber) and converting the glucose and arabinose that is released into more ethanol or other bioproducts, the corn processor will increase the overall yield of ethanol or other bioproducts while increasing the protein concentration and value of the remaining DDGs (or corn fiber). It is anticipated that the advances from this strain development effort will be combined with separate R&D efforts to develop a glucose, arabinose, *and* xylose fermenting yeast.

R&D Pathway

Researchers have devised strategies for improving L-arabinose transport in the organism *Saccharomyces cerevisiae*, have identified appropriate organisms as a source for an efficient transporter, and have refined several genetic tools and transformation methods for the organism. Work continues to improve transport using these tools, methods, and organisms.



Metabolic pathway of improved *S. cerevisiae*.

Benefits

- **Enables more complete utilization of corn grain**
- **Increases value of corn milling co-product**

Applications

Arabinose fermentation will allow cost-effective utilization of hydrolysates of distiller's dried grains, corn fiber and other arabinose-rich lignocellulosic biomass.

Project Partners

National Corn Growers Association
National Renewable Energy Laboratory

Project Period

FY 2003 – FY 2005

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Visit the Web site for the Office of the Biomass Program (OBP) at www.eere.energy.gov/biomass.html

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