Engineering *Saccharomyces cerevisiae* for Increased Utilization of Xylose from Biomass

What is this technology?  
We have developed a *Saccharomyces cerevisiae* strain with improved xylose transport and consumption for conversion of biomass substrates to renewable products.

What problem does it address?  
Biomass feedstocks are composed of hexose and pentose sugars locked into a higher-order structure. The most abundant of these sugars are glucose and xylose. Strains have been engineered to utilize xylose, but these strains do not grow well when xylose is the only sugar available. Xylose uptake into the cell is one of the limitations to efficient xylose utilization. The strain developed here addresses the problem of poor xylose uptake in *S. cerevisiae*.

What is the significance of this solution?  
Increasing the concentration and rate of transport of xylose into the cell allows the enzymes for xylose metabolism to work faster. With our in-house test strains, increasing xylose uptake resulted in increased xylose consumption and ethanol production. Increased productivity and yield directly lower capital costs of a biorefinery by decreasing reactor and distillation equipment sizes and decrease the feedstock cost by increasing the amount of convertible sugar in the feedstock. For biofuel applications, higher ethanol concentrations also decrease the energy required for product recovery by distillation.

Who could use this technology?  
We have tested the modified yeast strains for production of ethanol from xylose and glucose mixtures for use in the biofuel industry. However, any *Saccharomyces*-based process that uses biomass as a feedstock for the production of renewable products may benefit from the use of these strain modifications.

How is this technology unique?  
Strains currently available import xylose poorly through transporters meant for importing glucose into the cell. As such, the currently available strains do not consume significant amounts of xylose when glucose is present. The strain modifications developed here have increased intracellular xylose concentration due to the expression of a non-*Saccharomyces* xylose transporter. These strains also show an increase in the amount of xylose consumed when glucose is present.

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