Beating the fuel prices: Using yeast for economic production of bioethanol

July 17 2012

Finding renewable and economic sources of energy are one of the most important concerns for the continuation of the human species. New research, published in BioMed Central's open access journal *Biotechnology for Biofuels*, has produced a novel strain of yeast with improved xylose tolerance and metabolism, and consequently improved ethanol production.

Bioethanol is considered one of cleanest renewable replacements for fossil fuel. However using glucose from crops, such as sugar cane or starch crops, uses up resources which could otherwise be used to produce food. Xylose is the second most abundant sugar in plants (after glucose) and is plentiful in agricultural and wood waste. However the yeast which are most efficient at producing ethanol cannot ferment pentose sugars, such as xylose, and yeast which can ferment xylose are not very good at producing ethanol.

Researchers from Ngee Ann Polytechnic, Singapore, used the process of gene shuffling to integrate the genomes of xylose tolerant *P. stipitis* and the glucose loving, ethanol tolerant (but xylose intolerant) *S. cerevisiae*. In the first round of shuffling the *P. stipitis* genome was transferred into *S. cerevisiae*. Recombinant strains were selected for their ability to grow on xylose and then for their ability to produce ethanol. In a second round of gene shuffling the *S. cerevisiae* genome was transferred into the best of these strains and the resulting strains tested for ethanol tolerance.

Anli Geng who led this study explained, "We produced a hybrid yeast,

capable of producing bioethanol from xylose, which was also able to survive in high concentrations of ethanol. The main by-product of xylose fermentation was xylitol and by measuring this, along with ethanol production, we found that our hybrid was more efficient at using xylose and in producing ethanol than either of the parent strains. This yeast is only a prototype and further improvement is possible before scale up. However our results show that there is a future in recycling waste vegetation into bioethanol."

More information: Improved ethanol production by a xylose-fermenting recombinant yeast strain constructed through a modified genome shuffling method, Wei Zhang and Anli Geng, *Biotechnology for Biofuels* (in press)

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