

# Sugar-hungry yeast to boost biofuel production

March 29 2010

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Engineering yeast to transform sugars more efficiently into alcohols could be an economically and environmentally sound way to replace fossil fuels, say scientists presenting at the Society for General Microbiology's spring meeting in Edinburgh today.

Dr Christian Weber and Professor Eckhard Boles from Frankfurt University, Germany, have worked out how to modify [yeast cells](#) so that they successfully convert a wider range of sugars from plant waste such as wheat and rice straw into alcohol that can be used as [biofuel](#).

Bioalcohols produced by microbial fermentations are an example of second generation biofuels that use raw materials not used in food production. Plant waste is available in large amounts and contains a mixture of complex sugars including hexoses and pentoses that can be fermented to alcohol. "As these feedstocks represent the biggest portion of processing costs, we need rapid and efficient conversion of all sugars present. At the moment there is a lack of microbes that will efficiently convert both hexoses and pentoses into ethanol," explained Dr Weber.

Bakers' yeast [Saccharomyces cerevisiae](#) is already used in the beverage industry to efficiently convert hexose sugars, such as glucose, into ethanol. By transferring genes from bacteria that naturally break down pentose, Dr Weber's team have engineered *S. cerevisiae* to successfully ferment pentose and hexose sugars. "As pentoses represent a substantial part of the feedstock, the engineered yeast gives a much higher yield of ethanol for the same amount of [feedstock](#)," he said.

To enhance their biofuel potential even more, the yeast is being further modified to produce another bioalcohol - [butanol](#) instead of ethanol.

"Compared to [ethanol](#), butanol shows superior properties as a potential biofuel." It has a lower vapour pressure, ignites at a higher temperature and is less corrosive. Butanol could replace fossil fuels up to 100% without modifying existing engines," said Professor Boles.

BUTALCO is a company started by Professor Boles together with chemist Dr Gunter Festel that is developing a special technology to modify the yeast for pentose utilization and butanol production. The company is currently finalising the technology to use both pentoses and hexoses for bioethanol manufacture. Eventually a whole process chain will be developed covering all the steps of bioalcohol production from engineering through to downstream processing.

Provided by Society for General Microbiology

Citation: Sugar-hungry yeast to boost biofuel production (2010, March 29) retrieved 18 April 2024 from <https://phys.org/news/2010-03-sugar-hungry-yeast-boost-biofuel-production.html>

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