Barley straw shows potential as transport biofuel raw material

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The hemicellulose sugars of barley straw can be effectively fermented into biobutanol, when starch is added during the pre-treatment or fermentation process, shows a new University of Eastern Finland study.

Seeking to find alternatives to ethanol as a fuel, the study established optimal pre-treatment conditions for turning straw lignocellulose and barley starch into fermentable sugars that can be used in the production of biobutanol. The hemicellulose sugars of barley straw (e.g. xylose) released during pre-treatment can be effectively fermented into biobutanol, when starch is added to the fermentation broth. The study found that the cooperation of xylanase and surfactants with cellulase during the hydrolysis of straw significantly increased the efficiency of cellulose utilisation in butanol fermentation. Moreover, the pre-treatment liquor of fresh barley silage was efficiently used for butanol fermentation, indicating the feasibility of utilization of green field biomass preserving by "silage" technique in biorefining processes.

In recent years, global warming and climate change have attracted widespread interest in biorefining and in particular the transport of biofuels production. Butanol as a competitive renewable biofuel is superior to ethanol in many aspects such as higher energy density, lower volatility and hygroscopicity, and less corrosion to existing infrastructure. Importantly, it can be directly used in automobile engines without modification. At present, sugar or starch-based biomass (sugarcane molasses, corn and wheat) are the main feedstocks for butanol production. Climatic and social sustainability of large-scale transport fuels production from these raw materials is under wide-ranging debate. The possible solution for obtaining enough fermentable substrates is the efficient utilization of plentiful lignocellulosic biomass available on earth. Barley has been regarded as a good supplement to corn biofuel production as well as a replacement for the production of biofuels.

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