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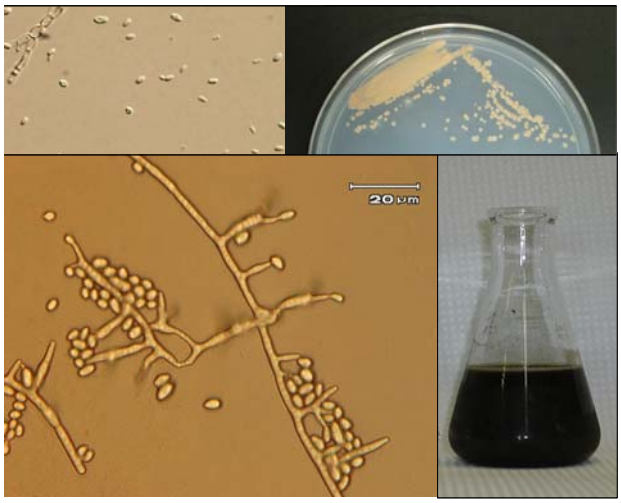
Challenges for Today. Solutions for Tomorrow.

Cleaner Sugars from Biomass



Clockwise from lower left: *Coniochaeta ligniaria* NRRL30616 mycelium, single cells, and growth on solid medium. Lower right: corn stover after pretreatment with dilute acid.

What is this technology?

Biological abatement uses a novel microbe to "scrub" inhibitory compounds and improve the fermentability of biomass sugars.

Agricultural biomass is a promising feedstock for production of biofuels…

- Cellulose-rich materials contain sugars that can be converted to fuels and chemicals
- Microbes are used to convert sugars to valuable products

…but biomass sugars are not a clean sugar stream

- The fibrous nature of biomass means that getting out usable sugars requires some pretreatment with chemicals, enzymes, heat, and pressure.
- The pretreatments used to release the sugars also give rise to a mixture of inhibitors.
- Inhibitors in biomass sugars can cause fermentations to fail.

Bioabatement offers a new method for detoxifying biomass-derived sugars

- Current methods for inhibitor abatement are costly, rely on physical/chemical treatments, generate waste, and/or result in water waste.
- Bioabatement would be facile and inexpensive, generate no waste, and conserve water. The technology uses a microorganism, isolated from soil, to detoxify the sugar stream.

Bioabatement results in improved ethanol fermentations

- Bioabatement targets numerous inhibitory compounds (furfural, 5-hydroxymethylfurfural, and aromatic acids, aldehydes, and alcohols) and eliminates the most problematic ones.
- Fermentation of glucose and xylose is improved in bioabated samples.

References

NN Nichols, LN Sharma, RA Mowery, CK Chambliss, GP van Walsum, BS Dien, and LB Iten. 2008. Fungal metabolism of fermentation inhibitors present in corn stover dilute acid hydrolysate. Enzyme Microbial Technol. 42:624-630.

NN Nichols, BS Dien, MJ Lopez, and RJ Bothast. 2006. U.S. Patent # 7,067,303. Describes a novel "bio-abatement" approach to detoxification of biomass hydrolysates.

Moving Forward

This technology will require additional research for large-scale commercial use. The bioabatement microbe, *Coniochaeta ligniaria* NRRL30616, is available for commercial use through a patent license.

Contact Information

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