Cleaner Sugars from Biomass

A. What is this technology?

Biological abatement uses a novel microbe to “scrub out” inhibitory compounds, thus improving the fermentability of sugars obtained from biomass (agricultural residues, energy crops, etc.).

B. What problem does it address?

Cellulose-rich materials contain sugars that can be converted to ethanol or other valuable products, but the fibrous nature of biomass necessitates using some combination of chemicals, enzymes, heat, and pressure to obtain usable sugars. This can cause problems for fermenting microbes, because the pretreatments used to release the sugars also give rise to a mixture of inhibitory chemicals. Pre-treated biomass does not yield a clean sugar stream.

C. What is the significance of this solution?

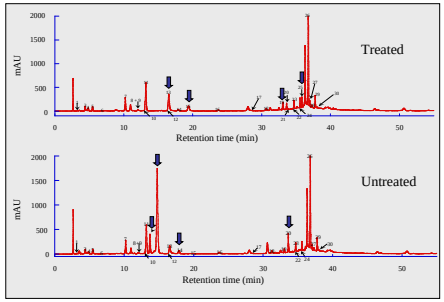
Bioabatement addresses one of the obstacles in the biomass to ethanol process, by offering a new method for detoxifying biomass-derived sugar streams. This method for inhibitor mitigation uses a microorganism, isolated from soil, to detoxify the sugar stream. Multiple inhibitory compounds are targeted, and the most problematic ones are totally eliminated.

D. Who could use this technology?

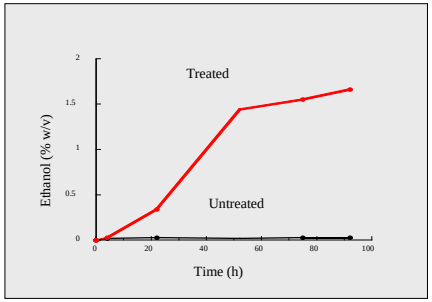
Companies engaged in manufacturing fuels or chemicals from biomass could explore use of this biotechnology for mitigation of fermentation inhibitors.

E. How is this technology unique?

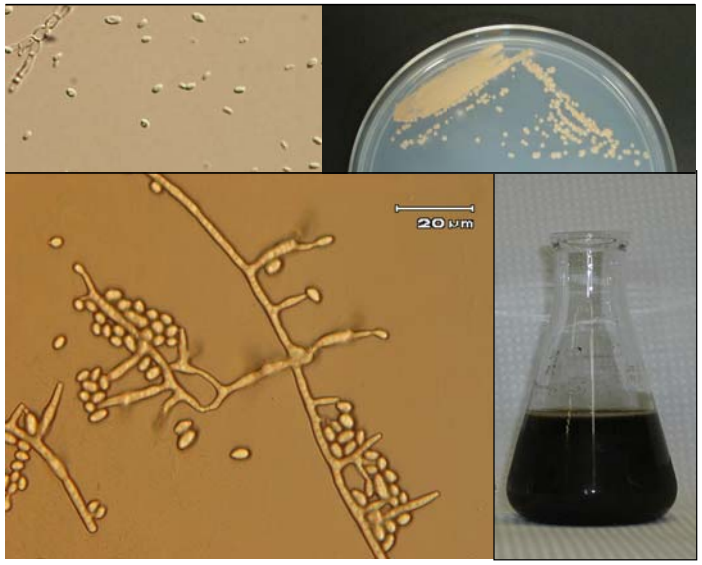
Current methods for inhibitor abatement are costly, rely on physical/chemical treatments, generate waste, and/or result in water waste. This process is inexpensive and easy to use, generates no waste, and conserves water. Bioabatement uses a microbe to metabolize inhibitory compounds, yielding a cleaner sugar stream.



HPLC–UV chromatograms of corn stover dilute acid hydrolysate. Bioabatement mitigates numerous inhibitory compounds.



Successful fermentation (SSF) of dilute-acid corn stover hydrolysate after bioabatement.



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

Stage of Development

The bioabatement microbe is available for licensing:

PARTNERSHIP OPPORTUNITY

Nichols N.N., Dien B.S., Lopez M.J., and Bothast R.J. Culture containing biomass acid hydrolysate and *Coniochaeta ligniaria* fungus. U.S. Patent # 7,067,303.

Moving Forward

This technology will require additional research for large-scale commercial use. A partner is needed for additional R & D including scale up.

Researchers

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