REMOVING A BARRIER TO THE BIOMASS TO BIOFUELS PROCESS: A MICROBE TO CLEAN UP FERMENTATION FEEDSTOCKS

N.N. Nichols and B.S. Dien

Fermentation Biotechnology Research, National Center for Agricultural Utilization Research, ARS-USDA, 1815 N. University Street, Peoria, IL 61604, USA

Agricultural biomass such as grasses, wheat straw or cornstalks is an alternative to starch for producing ethanol or other fermentation products. However, the biomass-to-ethanol process is more complicated than the starch process.

Like starch, those cellulose-rich materials contain useful sugars that can be fermented to ethanol. But, the fibrous nature of these residues means that getting out the sugars requires some combination of chemicals, enzymes, heat, and pressure. This in turn can cause problems for the microbes that make the ethanol, because the pretreatments used to release the sugars also give rise to a mixture of inhibitory chemicals.

The inhibitors present in biomass-derived sugar streams can cause fermentations to fail. Current methods to mitigate inhibitors are costly, rely on physical/chemical treatments, and generate waste. ARS's technology uses a microorganism, isolated from soil, to detoxify the sugar stream. The bioabatement process could be relatively inexpensive, use less process water, and generate little or no chemical waste.

The bioabatement microbe, *Coniochaeta ligniaria* NRRL30616 is added to the biomass mixture prior to fermentation. The microbe metabolizes multiple inhibitory compounds and totally eliminates the most problematic ones. Furfural and 5-hydroxymethylfurfural as well as a number of aromatic acids, aldehydes, and alcohols are removed. Sugars can then be fermented to ethanol or another product.

Contact: Nancy N. Nichols, Fermentation Biotechnology Research, NCAUR-ARS-USDA, 1815 N. University Street, Peoria, IL, 61604, USA. Tel: 309-681-6271. Email: Nancy.Nichols@ars.usda.gov