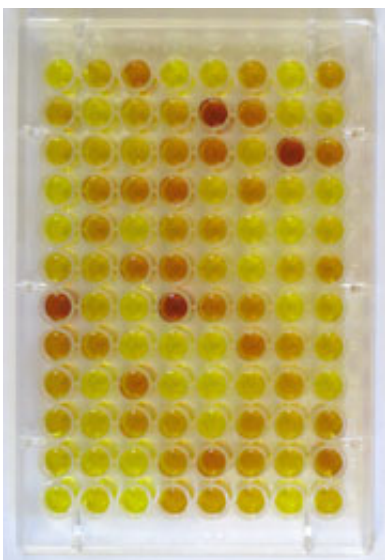


# Improved test can screen fungal pests for biofuel sources

February 12 2009, By Sarah Perdue

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Fungal extracts were added to a 96-well plate containing DNS, which changes color in the presence of cellulose breakdown products. The darker wells indicate extracts that broke down more cellulose; the lighter wells indicate extracts with little or no cellulose breakdown.

(PhysOrg.com) -- Those pesky fungi that wreak havoc on such important crops as corn and wheat just might be the key to low-cost biofuel production, report Cornell researchers who have improved a method to screen hundreds of fungal species rapidly to find ones that can most efficiently produce biofuels.

A report about their method is available online and will be published in a

forthcoming issue of the journal *Biotechnology and Bioengineering*.

To make ethanol from plants, complex cellulose molecules in plant cell walls need to be broken down into simple sugars that are then fermented into ethanol. Plant pathogenic fungi have evolved to quickly and efficiently break down cell walls as they infect plants, making them an untapped resource in the search for cheap bioethanol, said Marie Donnelly, a graduate student in biological and environmental engineering and a co-lead author of the study.

This study is an important early step in identifying biofuel sources from agricultural plant waste, said Cornell plant pathologist and adjunct professor Donna Gibson and senior author of the paper. Current bioethanol production is too inefficient to be cost-effective, Donnelly added. Also, most bioethanol is derived from feed corn, which has made corn more expensive due to an increase in demand.

"We were looking for fungi that most efficiently break down nonfood plant materials, such as switchgrass and crop residues," she said.

The researchers extracted cellulose-degrading enzymes, or cellulases, from four fungal species. They tested the ability of the extracts to break down cellulose sources, from pure cellulose to plants themselves.

"Until recently, most research has focused on just cellulose degradation, but the plant cell wall is more complicated than pure cellulose," said Brian King, a graduate student in plant pathology and plant-microbe biology and also a co-lead author. "We're hoping to identify enzymes that are more effective on plant material than the current industrial enzymes."

Current methods assess how well fungal extracts degrade plant material by adding a chemical that changes color in the presence of the products

derived from cellulose breaking down. The more degradation, the more intense the color change. The researchers greatly increased the rate of screening by using 96-well plates to perform the reactions; rather than putting each extract in an individual tube, they handled 96 samples in one 3-by-5-inch plastic dish. "We can collect data from 10,000 samples in a week," said King.

The rapid screening was first developed on a small scale to optimize the technique for large sample numbers.

"Before we can screen these thousands of isolates, we had to have a standardized methodology that we hope will capture the potential of these fungi," said Gibson. King is currently using this technology to screen dozens more fungi in an effort to identify the best species, or combination of species, for degrading a variety of plant materials.

Other researchers in the study include Gary Bergstrom, professor of plant pathology and plant-microbe interactions, and Larry Walker, professor of biological and environmental engineering.

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