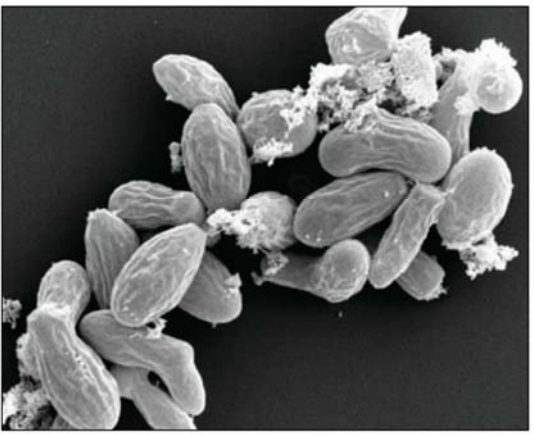
Bioenzyme For Biofuels

Dyadic Looked For Fungi To Break Down Lignocellulose



The C1 fungus seen through a microscope.

One of the biggest challenges facing the cellulosic ethanol industry is breaking down lignocellulose into sugars both quickly and cost effectively.

Many companies are focused on solving this challenge and one company, Dyadic International, Jupiter, FL (561-743-8333), believes it has found the solution with its bioenzyme developed from a fungi called C1 discovered in the Russian Far East.

According to Mark Emalfarb, Dyadic's chief executive officer, the company thought it could find better enzymes among the 75,000 known species of fungi and millions of unknown species. So, in the early 1990s, Emalfarb said, Dyadic searched the world for a novel fungus that would produce better enzymes.

Originally, Dyadic's motivation was driven by finding an enzyme to produce stone-washed jeans.

Today, Emalfarb said, the drive is provided by biofuel production and the need to better break down biomass quickly and cost-effectively into sugars that can be converted to fuels.

Dyadic has developed a propriety C1 fungus, comprised of approximately

11,000 genes, that is able to produce significantly more enzymes adapted to break down lignocellulose more efficiently.

Emalfarb believes the C1 fungus is a contender to solve the challenge of producing enzymes for efficiently converting biomass to fuel.

Several companies are working with C1 strains, including Codexis, Redwood City, CA (650-421-8100). "The Dyadic production system has proven to be an

Mark Emalfarb in Dyadic's biofuels and industrial enzyme research laboratory in Jupiter, FL.

important enzyme production platform across many programs in the Codexis product portfolio," said David Anton, chief technology officer for Codexis.

Current enzymes work best within specific ranges of temperatures and pH levels, according to Emalfarb, but Dyadic's C1 fungus performs within a wide range of temperatures and pH levels.

Flexibility Advantage

This flexibility gives the C1 fungus a huge advantage in helping develop cost-effective production technologies and processes for the production of cellulosic fuels, no matter the process or feedstock, Emalfarb explained.

Another key, he stated, is figuring out how to get more sugar out of the biomass.

Some companies are working to engineer crops with more cellulose and a cell wall that will break down easier.

However, Dyadic is focused on creating fungi that will turn cellulose into

Dyadic has a research and development center in Wageningen, The Netherlands, run by its subsidiary, Dyadic Nederlands B.V.

sugar faster and more efficiently. As a result, fewer enzymes are needed, leading to a lower cost of production.

"We think we have the best fungi for a lot of reasons," Emalfarb explained. "The fungi we have grow under a much lower viscosity."

Dyadic discovered the lower-viscosity trait through a combination of mutations and breeding. "We changed its physical form by accident," he said.

Dyadic changed the fungin by breaking it down, or micronizing it, into smaller particles so they secrete more protein and have much lower viscosity.

In the future, Emalfarb hopes that the C1 fungus will become an important part of all renewable biofuel and other bio-based production processes.

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