



Biomass Program

Fungal Genomics

Fungi are the group of microorganisms largely responsible for recycling biomass in nature. In industry, fungi are used to produce beta lactam antibiotics (e.g., penicillin), ethanol, and citric acid and they offer the potential for rapid, highly productive conversion of lignocellulosic biomass sugars to other value-added products. However, current processes have been developed over many years without a clear understanding of the underlying ability to control and utilize fungal organisms. In order to effectively tap the potential of fungal organisms, this project is improving the basic understanding of fungal biotechnology to enable the rapid development of novel fermentation systems for biobased product manufacturing.

R&D Pathway

Researchers are identifying and examining the morphology control genes of fungi to determine their usefulness in controlling morphology in different fungal species. The goal is to be able to control the morphology of any fungal system and thereby increase its productivity and ability to functionally grow in a fermenter.

Genomic and proteomic tools are being developed to identify and/or confirm genes and regulatory elements that control fungal morphology, hyperproductivity, and biosynthesis of products. These tools will accelerate and streamline the transformation process of fungi to produce specific products.

Researchers will use the proteomics tools and chemostat technology to compare different fungal systems to identify the common critical factors involved in the hyperproductivity of organic acids, one of the top opportunity products identified by the *Top Value Added Products from Biomass, Volume I* (sugars and syngas) study.

The results from the morphology and hyperproductivity studies and the tools developed will be used to evaluate the feasibility of using fungal systems. The technology required for direct biomass-to-product conversion will also be identified.

The research plan and results will be reviewed by the Partners Review Board which is composed of industry partners.

Bioproducts R&D

Benefits

- Enable rapid development of fungal systems for new value-added biobased products

Applications

Fungal systems will enable the production of a variety of biobased products and boost the profitability of lignocellulosic biorefineries.

Project Participants

Archer Daniels Midland Company
BC International Corporation
Cargill, Inc.
Dyadic International, Inc.
Genencor International
Iowa Corn Promotion Board
Novozymes North America, Inc.
Pacific Northwest National Laboratory

Project Period

FY 2005 – FY 2010

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