



# Biomass Program

## Separation of Corn Fiber and Conversion to Fuels and Chemicals: Pilot-Scale Operation

As the manufacturing base of the new bioindustry, the biorefinery will allow plants to maximize the use of biomass feedstocks by producing a wide range of products, including fuels, power, heat, chemicals and materials.

This project focuses on the development and pilot-scale testing of technologies that will enable the development of a biorefinery capable of economically deriving high-value chemicals and oils from lower value corn fiber.

Project goals include developing an integrated process for the separation of corn fiber into its principal components to produce chemicals and ethanol, and to develop novel, integrated separation and processing strategies that utilize hydrolysis and extraction methods.

In the process under development, starch is recovered as glucose, which is then converted to ethanol. The hemicellulose fraction is hydrolyzed to yield the 5-carbon sugars, arabinose and xylose. The xylose is converted to ethanol, and the arabinose is catalytically converted to ethylene glycol, propylene glycol, and glycerol. In addition, high-value oil components, sterols and stanols, are recovered.

The residual fiber (~50% by weight of the original corn fiber) contains primarily cellulose and protein. The protein concentration of the residual

fiber is approximately double that of the starting material and, therefore, has increased value as a feedstock (corn fiber value is roughly proportional to protein content).



**Advanced technologies will enable more complete utilization of biomass feedstocks such as corn.**

### R&D Pathway

In 2004, ADM researchers have contracted to begin thermochemical hydrolysis and liquid/solid separation operations at the pilot plant of a research facility. The scientists at the facility will perform a series of experiments over the course of a year, with direction from the ADM/PNNL/NCGA research team. The materials produced from the operations at the pilot plant will be further processed for food, fuel, and chemical applications at the ADM and PNNL pilot-scale research facilities.

## Integrated Biorefineries R&D

### Benefits

- Maximize range of outputs from biomass feedstocks
- Increase value of corn fiber
- Novel, cost-effective separation and processing technologies

### Applications

Developing pilot-scale corn fiber separation and conversion technologies will lead to the development of a more efficient biorefinery.

### Project Participants

Archer Daniels Midland Company (ADM)  
National Corn Growers Association (NCGA)  
Pacific Northwest National Laboratory (PNNL)

### Project Period

FY 2003 – FY 2007

### For more information contact:

Jim Spaeth  
DOE Golden Field Office  
[Jim.Spaeth@go.doe.gov](mailto:Jim.Spaeth@go.doe.gov)

EERE Information Center  
1-877-EERE-INF (1-877-337-3463)  
[www.eere.energy.gov](http://www.eere.energy.gov)

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April 2006