Biomass Program

Integrated Corn-Based Bio-Refinery

A new kind of biorefinery, the Integrated Corn-Based Bio-Refinery (ICBR), is being developed to demonstrate the practicality of producing alternative fuels and chemicals from renewable resources. The ICBR process will use new technology to convert corn grain and stover into fermentable sugars for the parallel production of value-added chemicals such as 1,3-propanediol (PDO) and fuel ethanol. The ICBR design will be more economic through better utilization of corn plant components so that fuels and chemicals can compete with current petrochemical routes. Generalizing the ICBR approach, many different combinations of feedstocks and products can be used for the production of other value-added chemicals along with biofuels.

A key component of the project is the utilization of corn stover as a feedstock. Currently, the production of ethanol is based primarily on corn grain. In order to expand ethanol production, lignocellulose materials, such as corn stover, will need to be utilized. Because lignocelluloses are more difficult to hydrolyze than the starch in grain, part of the ICBR development will focus on the pretreatment of these materials.

Ultimately, the use of corn stover and similar agricultural residues will lead to lower production costs and expand the potential for new biorefineries.

Both corn grain and stover will serve as feedstocks for an ICBR.

R&D Pathway

Research will focus on:

- an integrated process that utilizes corn grain and stover both as feedstock and energy sources;
- saccharification enzymes that convert cellulose components into fermentable ethanol feedstock;
- biocatalysts that convert sugars into fuel ethanol; and
- a process to maximize the production of higher value chemicals, such as PDO, to enrich the value of the product output from the biorefinery.

Integrated Biorefineries R&D

Benefits

- **Lower capital investment**
- **Higher value outputs**
- **Less environmental impact**
- **Optimized cellulases will lead to lower biofuel costs**

Applications

The ICBR process will allow for parallel production of value-added chemicals and fuel ethanol.

Project Partners

E. I. Du Pont de Nemours & Co., Inc.
Diversa Corporation
Michigan State University
National Renewable Energy Laboratory

Project Period

FY 2003 – FY 2007

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