



Biomass Program

Feedstock Interface R&D

Multi-Component Harvesting of Wheat Straw

Using wheat straw as a feedstock for producing materials, fuels, and chemicals has been limited due to obstacles that include capital costs, energy consumption, waste streams, production logistics, and the quality of the biomass feedstock. The objective of this project is to develop commercially-viable technologies that will potentially overcome these barriers and enable the use of wheat residues as an inexpensive feedstock resource.

Researchers will focus on development of single-pass harvesting equipment that selectively harvests multiple crop components, and on plant science and engineering to optimize sugar production.

The wheat straw contains components such as silica, alkali minerals, and lignin that are less desirable than cellulose. In addition, the waxy cuticle that coats the straw interferes with the downstream processing of the straw to sugars and bioproducts. The single-pass harvester will enable the harvest of the desirable parts and leave the less desirable straw components in the field as nutrients and resist soil erosion.



Conceptual design of a single-pass harvester.

R&D Pathway

Expand the engineering understanding of today's grain harvesters through high-speed imagery/visualization, computational modeling, and virtual engineering techniques; and apply this new understanding to the engineering and development of a single pass multi-component harvester controlled by an autonomous intelligent control system. Research in plant science (e.g., gene regulation) will be undertaken to optimize the processing of wheat components into low-cost sugars that can then be more easily be converted into useful chemicals and fuels.

Benefits

- Allow wheat straw that would normally go to waste to be used for energy, fuels and biomaterials production

Applications

This project will develop commercially viable technologies needed to use crop residues as an inexpensive source of fermentable sugars.

Project Participants

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Visit the Web site for the Office of the Biomass Program (OBP) at www.eere.energy.gov/biomass.html

A Strong Energy Portfolio for a Strong America

Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and greater energy independence for America. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a diverse portfolio of energy technologies.