Complete Saccharification and Fermentation of Wheat Straw and Rice

What is this technology?

Pretreatment process using alkaline peroxide and enzymes to completely saccharify wheat straw to fermentable sugars.

What problem does it address?

- Native lignocellulosic biomass is resistant to enzymatic hydrolysis. Pretreatment is essential prior to enzymatic saccharification.
- Certain pretreatments generate unwanted fermentation inhibitory compounds including sugar degradation products.
- Utilization of all sugars generated from any lignocellulosic feedstock is important to economically produce ethanol.
- Integration of process steps (pretreatment, enzymatic saccharification, fermentation and ethanol recovery) is needed in order to reduce the production cost.

What is the significance of this technology?

- Alkaline peroxide pretreatment is highly effective to solubilize hemicellulose and decrystallize cellulose.
- Enzymes work efficiently on the alkaline peroxide pretreated wheat straw and rice hulls.
- The pretreatment does not generate common fermentation inhibitors.
- The enzymatic saccharification and fermentation steps can be combined in a single step known as simultaneous saccharification and fermentation (SSF).
- Can be used for selective production of hemicellulosic and cellulosic sugars.

Stage of Development

Laboratory scale process technology has been developed. Details have been published.

Moving Forward

An industry partner is needed who can evaluate the technology further and develop the technology at pilot plant scale, perform an economic analysis with a goal to produce ethanol from lignocellulosic feedstock commercially.

Contact Information

Badal Saha, Ph.D.; Research Chemist; Fermentation Biotechnology Research Unit
309-681-6276; Badal.Saha@ars.usda.gov
http://ars.usda.gov/main/site_main.htm?modecode=36-20-65-00