The Center

August 2001 Volume 7, Issue 2

The Center is a quarterly newsletter compiled by WRRC to alert potential partners of technology transfer opportunities.

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Biorefinery Research Underway at WRRC

ARS researchers assess methods for growing dryland wheat with an image of a future biorefinery as a backdrop.

"Renewable fuels from agriculture" is one answer to the question "Where will our energy for future transportation needs come from?" Biodiesel and bioethanol from grains are currently available. Although corn predominates as feedstock, other grains such as wheat contribute to the approximate two billion gallons of ethanol produced produced in the U.S. annually. Further expansion of U.S. bioethanol production will depend on research to develop new crops or modified crops that can be grown specifically as energy feedstock. Researchers must also develop new methods for separating plant components to fermentable substrates, and improved methods for converting all plant components into intermediates or alternative products.

Many observers believe full development of biofuels will depend on adoption of the "biorefinery" concept that envisions future crop disassembly and conversion factories that make food, fuel, and biobased products at one site. These refineries would use a variety of separation and conversion technologies to produce sugar, cellulose or starch "platforms" from agricultural crops grown specifically for these purposes. The sugar platform would lead to ethanol and a variety of fermentation chemicals, the cellulose platform to composite polymers, sugars, ethanol, and variety of chemicals, and the starch platform to composite polymers and sugars.

Story Continues on Back Page

WRRC Patent Activity

January - June 2001

■ U.S. Patent Applications Filed:

January 30, 2001
Serial No. 09/774,810
"Intermediate-moisture Formed Food Products Made from Partially Dehydrated Fruit And/or Vegetables and Novel Methods of Packing Thereof"
Inventors: C. Huxsoll, T. McHugh, D. Olson

March 16, 2001
Serial No. 09/810,873
"Monoclonal Antibodies Against Campylobacter Jejuni and Campylobacter Coli Outer Membrane Antigens"
This application is a Divisional of application Serial No.09/277,599
Inventors: R. Mandrell, A. Bates, D. Brandon

April 30, 2001
Serial No. 09/826,518
"Acoustical Apparatus and Method for Sorting Objects"
Inventor: T. Pearson

April 23, 2001
Serial No. Not Yet Assigned
"Novel Bisexual Attractants, Aggregants and Arrestants for Adults and Larvae of Codling Moth and Other Species of Lepidoptera"
This application is a Divisional of application Serial No. 09/425,321
Inventors: D. Light, C. Hendrick

■ U.S. Patent Applications Allowed:

January 17, 2001
Serial No. 09/277,599
"Monoclonal Antibodies Against Campylobacter Jejuni and Campylobacter Coli Outer Membrane Antigens"
Inventors: R. Mandrell, A. Bates, D. Brandon

April 5, 2001
Serial No. 09/425,321
"Novel Bisexual Attractants, Aggregants and Arrestants for Adults and Larvae of Codling Moth and Other Species of Lepidoptera"
Inventors: D. Light, C. Hendrick

■ U.S. Patents Issued:

January 16, 2001
Patent No. 6,174,725
"Altering Dough Viscoelasticity with Modified Glutenins"
Inventor: O. Anderson

Continue: Biorefinery

The key to the biorefinery concept is to increase the efficiency and economic competitiveness of bio-based products by optimizing separation and conversion technologies and by using all components of agricultural commodities including components like rice or wheat straw, which are currently considered waste products.

WRRC biorefinery research is aimed at developing new, energy efficient enzymatic conversion technologies, developing new separation technologies, and identifying new products for some platform categories (starch and cellulose polymer composites, for example). This research will be conducted within the newly reorganized **Bioproduct Chemistry and Engineering Research Unit** at the Center. The reorganization will take effect October 1, 2001.

One early success of this WRRC research program is the development of variants of starch degrading enzymes that are more than 50 times more active than standard enzymes. Using combinatorial chemistry and directed molecular evolution, WRRC researchers mutated, selected and amplified vast populations of enzyme variants to develop the vastly improved variants. The new variants enzymatically convert starch to fermentable sugars at or below fermentation temperature thus reducing energy and other costs associated with cooking, liquefaction and saccharification of starch. Enzymes produced at WRRC are also being targeted for use in processing whole grains to preserve the functionality of proteins for food uses.

Other projects within the new **Bioproduct Chemistry and Engineering Research Unit** are developing new uses for wheat starch, wheat proteins, and for agricultural fibers such as wheat and rice straw and feather fibers.

WRRC is seeking industry partners to work with the new Unit in many of these areas.

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