



Hulled winter barley ready for harvest.

## Boosting Barley for Bioenergy

**A**gricultural Research Service (ARS) scientists Kevin Hicks and David Marshall want winter barley to become a prime-time player in bio-energy production.

“The 2007 Energy Independence and Security Act requires production and use of 36 billion gallons of renewable transportation fuels by 2022. Today we only make 9 billion,” says Hicks. “We see winter barley as the perfect biofeedstock for making biofuels on the East Coast.”

So Hicks and others in the ARS Crop Conversion Science and Engineering Research Unit in Wyndmoor, Pennsylvania, are developing new sustainable technologies to convert varieties of hulled and hull-less winter “energy” barley into fuel ethanol. This initiative also includes Virginia Polytechnic Institute and State University scientists Carl Griffey, Wynse Brooks, and Mark Vaughn, who are supervising ongoing research efforts to develop improved varieties of hulled and hull-less barley.

Their combined efforts could help farmers from southern Pennsylvania to South Carolina develop a profitable 2-year rotation of winter barley, corn, and soybeans. Winter barley is grown on seasonally fallow land. It acts as a cover crop by protecting soil and nutrients and preventing migration of fertilizers from crop fields to the Chesapeake Bay—which is why the Chesapeake Bay Commission supports the development of winter barley as an energy crop. And since the field would otherwise be left fallow, producing biofuels from winter barley would not interfere with food production.

Now, too, there is a major marketing opportunity for growers of winter barley. Osage Bio Energy, headquartered in Glen Allen, Virginia, is well under

way in constructing the first major barley-to-ethanol production facility in the United States.

Meanwhile, in Raleigh, North Carolina, Marshall coordinates the regional winter barley testing nursery, which has the best experimental lines from both public and private winter barley breeding programs in the United States. He and other scientists in the ARS Plant Science Research Unit are just a few years into making crosses between hull-less barley and barley with resistance to Ug99, a stem rust that can inflict crop losses of up to 100 percent.

Once the researchers have developed robust lines that contain both traits, they’ll begin breeding for traits to enhance ethanol production, such as starch content. “In several years, we hope to release barley varieties with traits for enhanced agronomic performance, good grain-to-ethanol qualities, and good resistance to stem rust,” Marshall says.—By **Ann Perry**, ARS.

*This research is part of Plant Genetic Resources, Genomics, and Genetic Improvement (#301), Bioenergy and Energy Alternatives (#307), and Quality and Utilization of Agricultural Products (#306), three ARS national programs described at [www.nps.ars.usda.gov](http://www.nps.ars.usda.gov).*

*Kevin B. Hicks is with the USDA-ARS Crop Conversion Science and Engineering Research Unit, Eastern Regional Research Center, 600 E. Mermaid Lane, Wyndmoor, PA 19038; (215) 233-6579, [kevin.hicks@ars.usda.gov](mailto:kevin.hicks@ars.usda.gov).*

*David S. Marshall is in the USDA-ARS Plant Science Research Unit, North Carolina State University, 3411 Gardner Hall, Raleigh, NC 27695; (919) 515-6819, [david.marshall@ars.usda.gov](mailto:david.marshall@ars.usda.gov). \**

