

Project: Barley for Rural Development

Brief Description: Montana State University, the University of Idaho and North Dakota State University's Institute of Barley and Malt Sciences (IBMS) develop improved malt, feed, fructanolic ethanol and food barley varieties for our regional barley growers which will, in turn, enhance rural communities.

Executive Summary: Today's malting barley varieties often fail to produce malting quality barley when grown without irrigation. Regional irrigation resources are limited, but demand for malting barley is expanding rapidly. Barley for Rural Development (BFRD) focuses on the use of new technologies that improve rainfed malt barley performance. Our joint barley improvement projects have four new malting barley varieties in their final years of plant-scale malting and brewing evaluation. We expect these varieties to displace the widely grown malting barley varieties 'Harrington' and 'Metcalfe'; with improved grain yield and quality. Fuel ethanol production presents a growing opportunity to America's barley growers. Regional barley growers produce about six million tons of waste straw annually. BFRD scientists recently demonstrated that some barley genotypes store large quantities of the water-soluble carbohydrate, fructan, in straw. Fructan can be easily degraded and fermented to produce ethanol. In addition to grain, barley growers will be able to harvest straw from these varieties to produce fuel. We estimate that an average dryland barley grower could produce 45 gallons of ethanol per acre from the straw of these lines, adding to farm profitability and rural community sustainability. We are moving the genes contributing to high straw fructan content into our best adapted, highest yielding varieties as rapidly as possible. Converting waste barley straw into ethanol using straw fructans could generate \$250M per year in ethanol sales and could displace 125M gallons of liquid fuel imports in this region.

This project will continue the collaborative partnership development and release of high quality dryland malt, feed, food and ethanol barley varieties that will better serve the American barley industry. Recently, the U.S. malting industry has invested in new malting capacity in Montana and Idaho. Current varieties fail to fill the capacity of these new plants because they fail to produce grain meeting malting standards when grown in rainfed systems. New, more reliable varieties will keep Canadian malting barley north of our borders and enhance our competitive edge.

Barley is a healthy grain. MSU, University of Idaho and Idaho-based USDA-ARS scientists have collaborated to develop low phytate and high fiber barley varieties with improved food and feed value. These barley varieties provide increased fiber for breakfast cereals and improved mineral nutrition for swine and poultry producers.

The American West is one of the best places in the world to produce barley. We will continue to add value to this uniquely suitable crop for dryland producers and will contribute to sustainable rural development in the West.

Congressional Action Required: An appropriation of \$600,000.

Importance to Montana: Barley for Rural Development will lead to a doubling of Montana's barley crop value and to significant expansion of acreage devoted to barley. The potential Montana fructan-based ethanol industry could utilize as much as 2 million tons of barley straw to produce 60 million gallons of ethanol, generating new farm income.

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Barley for Rural Development (BFRD) – Talking Points

- The Montana State University and University of Idaho/ARS barley breeding programs have four new malting barley varieties in their final year of plant scale evaluation with the malting and brewing industries. These varieties out yield the most widely grown current varieties. At current prices, the added farmgate value these new varieties will provide will be more than \$60 million per year.
- BFRD scientists mapped and marked several genes that contribute to variation in barley straw's potential utility as a feedstock for ethanol production. MSU filed a provisional patent application on the barley straw-to-ethanol process, and BFRD funding helps support the research effort to bring this technology to market.
- MSU scientists genetically mapped a gene that extends grainfill duration by five days. This gene, when deployed in well-adapted barley varieties, leads to an overall increase in grain starch yield and a decrease in grain protein percentage. This results in improved malting quality and has the potential to significantly decrease growers' risk of rainfed malt barley production.
- BFRD supports crop management to production system economics to speed development of economically productive barley varieties and more sustainable production practices for regional barley growers.
- BFRD supported the joint Montana-North Dakota barley extension program focused on the transfer of state-of-the-art barley production and grain quality management technologies to Montana, North Dakota and Idaho barley growers.
- The BFRD stakeholders' committee consisting of academic, industrial and farmer members from Montana and Idaho advises and monitors BFRD. Our third annual meeting was held at the North American Barley Researchers' Workshop in Madison, WI in October, 2008.