

Soft Wheat Quality Laboratory (SWQL), Wooster, Ohio



MISSION

Contribute to global food security by enabling the development of new high-yielding cultivars with end-use quality suitable for commercial food production in the soft wheat milling and baking industries and the export trade. The SWQL has sole responsibility for this within the USDA for the eastern United States (U.S.).

Address global climate change by reducing energy used to produce food through: 1) selecting cultivars with improved milling efficiency; 2) developing testing methods to assist in the purchasing of grain to match demands for high-efficiency milling and baking operations; and 3) reducing food loss due to flour shipments that do not meet specifications upon delivery at factories.

Improve human nutrition, in collaboration with eastern U.S. wheat breeding programs, through identifying and deploying genes for greater food quality and nutrition, and new varieties.

CURRENT OBJECTIVES

- Develop rapid methods to detect improved milling and flour quality in commerce.
- Develop improved standard cake baking method and alternatives for chlorinated flour.
- Characterize the anatomical and biochemical differences linked to genetic markers for quality in collaboration with regional genotyping labs and state breeding programs.
- Define soft wheat quality targets and measure eastern US soft wheat breeding materials against those targets for the breeding programs and the milling industry.

BACKGROUND

Wheat is the world's largest crop used for direct human consumption. Approximately half of the wheat in the U.S. is milled in the eastern region served by the USDA-ARS Soft Wheat Quality Laboratory (SWQL), Wooster, Ohio. Since the 1930's, the SWQL has conducted genetic studies of wheat quality through long established coordinated research with 14 state land-grant universities in the eastern U.S. It is one of the few laboratories in the world that that develops methods for testing the quality of soft wheat, the major wheat type grown in Ohio and the eastern U.S. 'Soft wheat' has lower levels of gluten and is used mostly for crackers and cookies.

Ohio is historically a large milling state, 4th in the U.S. Milling production increased by 20 percent from 2003 to 2008 in the state, a much greater increase than in the country overall through expansion of capacity and increases in operations of newer mills. Older, less efficient mills - located away from major population areas are closing and the flour milling industry is concentrating on newer, higher-yielding milling facilities. These new mills require cultivars with increased flour yield to match the improved milling efficiency. The SWQL critically evaluates the quality of nearly all the wheat cultivars marketed from Missouri to the Atlantic seaboard. It also publishes new methods and research in the area of milling and flour quality. This research is transferred through publication in peer-reviewed journals, participation in regional and national scientific and technical meetings, workshops and research meetings held in Wooster, Ohio, and through online support during the year.

CURRENT STAFF AND RESOURCES

Current base funding supports research and testing activities of two scientists (both positions are currently vacant), six full-time and one part-time USDA support staff. Extramural funding agreements provide support for two additional Ohio State University (OSU) support staff.

The SWQL's chemistry and grain handling laboratories in Williams Hall on the OSU/OARDC Campus were recently remodeled, and provide sufficient modern space for the lab's activities. In 2011 the flour milling facilities were renovated, including improved air handling, painting and acquisition of a new flour blender. Renovation of the HVAC system in the milling room is planned for 2012. The laboratory continues to assess milling quality with mills that are 50 to 100 years. Although these mills are in good working order, they require constant and careful maintenance by experienced personnel and custom manufactured replacement parts.

Over the past 4 years, increased efficiency in sample evaluation has allowed the SWQL to increase the total number of samples evaluated per year from 4,500 to 6,500, without increasing the number of personnel required.

LABORATORY IMPACTS

The SWQL has supported the development of wheat cultivars that produced \$1.5 billion in grain per year (2005-2007 USDA Ag Statistics). Using USDA economic multiplier effects, the grain cultivars result in annually \$4.0 billion in food and agricultural related business and \$9.9 billion in the U.S. economy as a whole. The genetic improvement in flour yield since 1990, due to breeding programs using the SWQL, resulted in an estimated \$12.7 million annually in increased flour extracted from the wheat milled in the U.S. (2007 production at \$16 per 100# of flour). These improved cultivars reduce consumer's food costs and improve the efficiency and competitiveness of the eastern U.S. milling industry.

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