

Washington Grain Commission
Wheat and Barley Research Annual Progress Reports and Final Reports

Project #: 3667

Progress Report Year: ___1_ of _3___ (*maximum of 3 year funding cycle*)

Title: **End-Use Quality Assessment of Washington State University
Wheat Breeding Lines**

Cooperators: *Mike Pumphrey, Arron Carter, Craig F. Morris, Doug Engle*

Executive summary:

WSU spring and winter wheat variety development programs heavily emphasize selection for superior end-use quality. Quality evaluation of WSU breeding lines has been ongoing for over 50 years. Effective quality testing is essential for the recent release of new varieties from all market classes that are at or near the top of end-use quality rankings. This project supports a scientist to conduct thousands of quality tests per year for the WSU wheat breeding programs in conjunction with the USDA-ARS Western Wheat Quality Laboratory. The majority of wheat from the PNW is exported to overseas markets. To maintain current markets, penetrate new markets, and recapture lost markets, PNW wheat must possess quality characteristics that make it superior for use in both domestic and overseas markets. Therefore, before it is released, a new variety must be tested to determine if it is suitable for use in specific end-use products. In addition, increased competition from traditional and non-traditional exporters necessitates enhancing the end-use quality of our wheat. The loss of overseas markets will continue to cause a reduction in the demand and therefore the price of wheat, resulting in losses to Washington farmers. Washington State University, Washington Wheat Growers, the State of Washington, and the PNW, as well as grain buyers, will benefit from the availability of wheat varieties that require less inputs and possess superior, consistent end-use quality.

Impact:

Otto, Puma, Jasper, Sequoia, Glee, JD, Louise, Sprinter, Chet, Alum, Seahawk, Melba, Tekoa, Ryan, Whit, Babe, Dayn and Diva are examples of recent top-performing variety releases that are widely adopted that also have very good to excellent end-use quality. One of our goals as public breeding programs in Washington State is to set a high-bar for end-use quality, and continue to raise that bar for long term market health. By releasing lines with superior agronomics, paired with most desirable end-use quality, we provide growers with options that put quality in the decision process, while not sacrificing yield or other agronomic and protection traits. Several of our newest varieties are preferentially sourced because of their superior end-use quality, and specific traits like gluten strength and breadmaking quality, low cadmium concentration, partial waxiness, and outstanding cookie and cracker quality. Landmark varieties like Louise and Xerpha, are being replaced by better end-use quality replacements with higher yields, better agronomics, and stable performance. This short, medium, and long-term impact is of paramount importance to the Washington grain industry.

Outputs and Outcomes: File attached

WGC project number: 3667
WGC project title: End-Use Quality Assessment of Washington State University Wheat Breeding Lines
Project PI(s): Mike Pumphrey and Arron Carter
Project initiation date: 1-Jul-14
Project year (X of 3-yr cycle): 2 of 3 year cycle

Objective	Deliverable	Progress	Timeline	Communication
Early to late generation quality testing of WSU experimental lines to aid variety development	New spring wheat and winter wheat varieties that are superior to existing varieties. This effort includes all market classes of spring and winter wheat and all precipitation regions in Washington state.	Over 1500 breeding samples were analyzed by numerous milling and baking quality tests each year in recent years. This is a substantial increase over previous years and has allowed enhanced selection of advanced breeding lines with good quality. Two new wheat varieties were released in part due to this project and data in 2017.	The economic return for this work will manifest itself each breeding cycle with superior quality varieties and germplasm.	Progress will be summarized and discussed at numerous field days (>10 per year), grower meetings (~10 per year), the annual Research Review, through WSCIA meetings, Wheat Life, Variety Release Meetings, and direct communication with the WGC every year. Graduate student Kendre Jernigan won the Crop Science Society of America research poster award competition in 2015 summarizing this work.
Support genetic analysis of end-use quality to identify desirable alleles and to predict end-use quality through new genotyping methods	Improved germplasm selection procedures which translate to more efficient, cost-effective, and consistent genetic gain for end-use quality.	A hard red spring wheat bi-parental population was milled and baked to map breadmaking quality traits in 2017. Milling and baking analysis of a bi-parental winter wheat mapping population has also been completed. A new breadmaking quality marker, WBM, was tested and validated in 2017, and used to screen elite spring wheat germplasm.	The reward for this work will compound each year and will fully be realized for many years to come as these lines continue to be crossed into existing breeding lines. We expect this effort to result in routine selection of outstanding quality wheat.	