

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

**Project #: 3208**

**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 USDA-ARS Western Wheat Quality Laboratory efforts.

The majority of wheat from the PNW is exported to overseas markets. To maintain current markets and penetrate new 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 export countries necessitates enhancing the end-use quality of our wheat. The loss of overseas markets would continue to cause a reduction in the demand and therefore the price of wheat, resulting in losses to Washington farmers. Washington wheat growers, as well as grain buyers and exporters, benefit from the availability of wheat varieties that require less inputs and possess superior, consistent end-use quality.

**Impact:**

Otto, Puma, Devote, Jasper, Sequoia, Stingray CL+, Glee, Net CL+, Chet, Alum, Seahawk, Melba, Tekoa, Ryan, are examples of top-performing WSU variety releases that are widely grown that also have very good to excellent end-use quality. One of our primary 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. This short, medium, and long-term impact is of paramount importance to the Washington grain industry.

**Outputs and Outcomes: File attached**

**WGC project number:** 3208  
**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-20  
**Project year (X of 3-yr cycle):** 1 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 1200 breeding samples were analyzed by numerous milling and baking quality tests each year of this project. <b>Four new wheat varieties were released in part due to this project and data in 2020. Others are planned for 2021 release.</b>	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. Arron Carter participates in multiple US Wheat trade tours and we hosted many trade teams in 2019-2020.
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.	Multiple special milling and baking trait experiments were evaluated in 2020, including evaluation of DNA markers for PPO and a dough strength locus. Milling and baking analysis of a bi-parental winter wheat mapping population has also been completed. A genetic map of hard red spring wheat quality QTL was generated, and this work presented at the PNW Wheat Quality Council with a peer-reviewed manuscript in preparation.	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.	