

Washington Grain Commission Barley Research Final Report

Project #: 3019-3009

Title: Improving Barley Varieties for Feed, Food and Malt

Cooperators: Kevin Murphy, Max Wood, Deven See, Xianming Chen,

Executive summary:

Over the past several years, significant and substantial progress in breeding and varietal development has been achieved within each market class – feed, malting, and food – of barley. A total of five barley varieties have been released: Lyon and Muir in the conventional feed barley class, Survivor in the herbicide tolerant feed barley class, and Havener and Meg’s Song in the hulless food barley class. One substantial change has been the successful use of Lyon barley as an all-malt barley type. Here I will briefly summarize these varieties, and begin by introducing the malt barley breeding update.

Malt barley: Our highest programmatic priority at this point is to release a high-quality, high-yielding malt barley variety within the next two years. The preceding sentence is a direct quote from the previous progress report submitted in January 2018. We are now in position to release one to two malting barley varieties, including top experimental lines 11WA-107.43 and 12WA-120.14. Each of these have high yields, strong agronomic qualities, and excellent malting quality.

Lyon was also released in 2015, with the high rainfall zone (>20”) as its target environment. Across multiple locations over five years (2014-2018), Lyon is consistently (and statistically) among the highest yielding group of barley varieties in the high rainfall locations. Lyon has effectively replaced both Bob and Baronesse in these locations. In addition, in 2018 Lyon was used as a malting barley. It was malted by LINC Malt and beer was brewed by several breweries, including Mountain Lakes Brewery in Spokane, Fremont Brewery in Seattle, Baerlic Brewery in Portland, and Hunga Dunga Brewery and Moscow Brewing Company in Moscow. Demand for Lyon barley malt is increasing, and we anticipate additional breweries utilizing Lyon malt in 2019 and beyond.

Survivor was released in 2017 and in that year was among the highest three yielding varieties topping the high rainfall precipitation zone (4 locations). It is also the only IMI-herbicide tolerant variety available to farmers. We continue to test thousands of herbicide tolerant breeding lines each year to target both the malt and food market classes in addition to the feed barley market class.

Muir was released in 2015 for the <16” rainfall zone. It is resistant to prevalent races of barley stripe rust, and has performed well across the low rainfall zone locations, and quite well in several other locations in the intermediate and high rainfall zones. Muir was intended to replace Bob and Baronesse as the go-to variety in these locations.

Havener, the first hulless food barley released by the WSU Barley Breeding Program which addresses a need for higher yielding hulless varieties with an elevated β -glucan (a heart-healthy soluble dietary fiber) content, has continued to perform well. Developed specifically for human consumption, Havener contains 50 to 75% higher β -glucan than common Washington-grown varieties Lyon, Muir, Champion, Bob and Baronesse.

Released in 2015, Havener has higher yields and test weights across all eastern Washington rainfall zones than the hulless variety Meresse.

Meg's Song was released in 2017, with even higher β -glucan (~7.5%) than Meresse or Havener (~6.0%), and high yields across a broad spectrum of environments. Meg's Song has excellent tolerance to lodging in the field and has attracted the attention of seed dealers and end-users. It has a substantially different cooking and baking profile than Havener, giving them both a solid foothold on the emerging hulless food barley market.

Impact:

Of the earliest varieties released in my program, Lyon, Survivor, Havener, and Meg's Song are beginning to gain traction in the market. They were only recently made available to farmers, so although acreage of each is low, the reception they have received by growers and industry has been positive and should have an upward trend over the next funding period.

The two most pressing issues or constraints to barley production are the decreasing price of barley and the large acreage of Clearfield winter wheat grown in Washington. Price has decreased steadily from \$5.53/bushel in 2012, to \$4.12/bushel in 2013, \$3.54/bushel in 2014, \$3.31 in 2015, and \$2.90 in 2016 (wagrains.org). Understandably, harvested acreage and total production of barley has decreased over this period. Though it is difficult for my program to have a positive impact on barley price, we are doing so in two meaningful ways. The first is the development of value-added food barley varieties for the emerging market that pays a premium on higher beta-glucan varieties. In addition to releasing two new varieties, Havener (2015) and Meg's Song (2017), with a 50 to 75% increase in beta-glucan content over currently grown hulled feed barley, these new varieties are significantly higher yielding than their hulless predecessors. The second way we are addressing price is through the targeting of malt barley varietal releases, and in particular, that of craft malt. Prices are higher for the malt barley market class and could make a positive difference in the economics of growing barley. We intend to propose for release one to two WSU malting barley varieties in 2019.

To address the impact of Clearfield winter wheat on spring barley production in Washington, in 2017 we released Survivor, a feed variety tolerant to residual herbicide in the soil. Survivor will be first available to growers in 2018, and it too should have a positive impact on barley production in Washington. We have a robust pipeline of imi-tolerant barley lines from the feed, food and malt market classes.

Outputs and Outcomes:

Objective	Deliverable	Progress	Timeline	Communication
Hulled, Feed Barley	Two feed barley varieties, <i>Lyon</i> and <i>Muir</i> , were released.	Excellent	2015	Talks and presentations at field days; distribution of informative variety rack cards; Wheat Life articles.
Herbicide Tolerant Barley	Our first herbicide tolerant barley variety, <i>Survivor</i> , was released.	Excellent (with continued herbicide tolerant barley varieties across all market classes in development and expected for full release by 2022-2023).	2017	Talks and presentations at field days; distribution of informative variety rack cards; Wheat Life articles.
Hulless, Food Barley	Two new hulless, food barley varieties, <i>Havener</i> and <i>Meg's Song</i> , with high (>6%) beta glucan, were released.	Excellent (with continued hulless food barley development in progress, particularly for waxy types not represented in Havener or Meg's Song).	2015 (Havener) 2017 (Meg's Song)	a) Talks and presentations at field days; Wheat Life articles; b) Distribution of informative variety rack cards.
Malt Barley	This program was revived from scratch, and we now have 5 to 6 entries in WSU Variety Testing with excellent potential for an upcoming malt barley release.	We have fast-tracked the malt barley program and are now close to releasing the first WSU high-quality malt barley in three decades.	2019-2020	Talks and presentations at field days; 3 years of the annual Know Barley, Know Beer field day; distribution of informative variety rack cards; Wheat Life articles.