

**Washington Grain Commission
Barley Research Final Report**

Project #: 3019-3009

Title: Improving Barley Varieties for Feed, Food and Malt

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Executive summary:

Over the past three years (2015 to 2017), 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. Here I will briefly summarize their respective performance using multi-year, multi-location WSU Variety Testing data.

Muir was released in 2015 for the <16” rainfall zone. It is resistant to prevalent races of barley stripe rust, and ranks higher in yield than commonly grown barley varieties Lenetah, Champion, LCS Vespa, Lyon, LCS Genie, and CDC Copeland over a five-year span from 2013-2017 across the low rainfall zone locations. Muir has replaced Bob and Baronesse as the go-to variety in these locations.

Lyon was also released in 2015, with the high rainfall zone (>20”) as its target environment. Across multiple locations over five years (2013-2017), 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.

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. Over a three-year timespan (the most available), Survivor yielded equal to Lyon, Muir, Champion, LCS Genie, Lenetah, LCS Vespa, Claymore, LCS Odyssey and Oreana. In other words, Survivor stands with the best of the current barley varieties in terms of yield, and better than most for stripe rust resistance, in the high rainfall zone. 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.

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.

Malt barley: We have made excellent progress on our malt barley program as well, with top experimental line 11WA-107.58 performing exceptionally well over two years (2016-2017) in the high rainfall zone. Other top malt lines that have only been in WSU Variety Testing for one year include 11WA-107.36 which topped the high rainfall zone locations in 2017 and 12WA-120.14 which yielded over 1000 #/acre more than CDC Copeland across two intermediate rainfall zone locations in 2017. ***Our highest programmatic priority at this point is to release a high-quality, high-yielding malt barley variety within the next two years.***

Impact:

Of the earliest varieties released in my program, Lyon and Havener 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. Havener is already being exported to Asia, and I intend to keep this trend of increased yield coupled with high beta-glucan varieties going. 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 are within two years of releasing the first WSU malting barley in over three decades.

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.

Outputs and Outcomes:

Objective	Deliverable	Progress	Timeline	Communication
Hulled, Feed Barley	Two new feed barley varieties, <i>Lyon</i> and <i>Muir</i> , were released.	Excellent (with continued feed barley development expected to result in another release by 2020-2021).	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 2020-2021).	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.	Utilizing molecular markers, doubled haploids, single seed descent, and off-site winter nurseries, we have fast-tracked the malt barley program and are now within two years of releasing the first WSU high-quality malt barley in three decades.	2020-2021	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.