**Research supported by the Brewers Association and the Flavor Pack.**

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| **Germplasm**  | **Malts and beers**  | **Sensory**  | **Metabolomics**  | **Flavor gene mapping**  | **Publication**  | **Messages** | **Questions**  |
| **Oregon Promise** Doubled haploids derived from Golden Promise x Full Pint  | 34 experimental malts, + parents, nano-beers x 3 locations | Trained panel beer | No  | Preliminary  | Herb et al. a,b | There is a genetic basis to flavor. There is terroir. Degree of modification important but does not override genetic contribution.  | Are results limited to the germplasm and to the small scale malts and beers and the sensory assessment method?  |
| **Oregon Promise** | 3 experimental malts, pilot beers + Copeland check  | Brewery panels, lab panel, consumer panel  | Yes | Haplotype alignment  | Bettenhausen et al. in press.  | There is a genetic basis to flavor. Differences are not scale dependent.Different panel types identify unique differences.There are consistent associations of metabolites and flavor descriptors.  | Will a variety be released? Probabaly…Can genes/markers be associated with relevant flavor metabolites? Need mapping, see next |
| **Oregon Promise**  | 228 for map construction; 160 for mapping malt and sensory QTLs; a subset for mapping beer metabolic compounds metabolomics  | Trained panel beer | In process  | Higher density linkage map completed; QTL mapping in progress | Munoz-Amatriain et al. In process | The first comprehensive attempt at mapping barley contributions to beer flavor – using malting quality, beers sensory and metabolite data.  | Will metabolite and sensory QTLs align and allow for identifying candidate genes, selectable markers? |
| **Romp of Otters** Doubled haploids derived from crosses of Maris Otter with Violetta and 04-028-36  | 4 experimental malts, pilot beers + Wintmalt check 1 location  | Lab panel beer and malt hot steep, consumer panel  | Yes | Haplotype alignment  | In process  | Grain harvested 2019; malt, brewing, sensory in 2020 | What unique flavors are there in Maris Otter and its partners? |
| **Romp of Otters** | 4 experimental malts + Maris Otter, + Wintmalt from Corvallis 17, 18, and 19 harvests; Lebanon 18 and 19 harvests.  | Lab panel hot steep  | No | Haplotype alignment | Windes et al.  | Genotype, environment (terroir) and genotype x e(t)  | What are the relative effects of g and e(t) on malt analysis specs and hot steep sensory?  |
| **La crème** Oregon State University potential new winter and facultative doubled haploid varieties derived from different crosses  | 4 experimental malts, pilot beers + Thunder check 4 locations  | Lab panel beer and malt hot steep, consumer panel  | Yes | Haplotype alignment  | Halstead et al. In process  | Grain harvested 2020; malt, brewing, sensory in 2021 | What unique flavors are there in a broader sample of germplasm?What are the relative contributions of genotype and environment? What are the contributions of nitrogen fertilization?  |
| **Naked barleys + check**Streaker, DH133783, Copeland | 2 naked malts + Copeland check, brewed two different ways- Mash filter and lauter tun + rice hulls | Lab panel, consumer panel | Yes? | Haplotype alignment | Meints et al. In process | Grain harvested 2019; malt, brewing, sensory in 2020 | Flavor differences between naked and covered and brewing method |

**Research supported by the Western Rivers Conservancy and Mecca Grade Estate Malt Brewers Association and the Flavor Pack – Leveraging Brewers Association and Flavor Pack resources.**

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| **Germplasm**  | **Malts and beers**  | **Sensory**  | **Metabolomics**  | **Flavor gene mapping**  | **Publication**  | **Messages** | **Questions**  |
| Five commercially available winter varieties Calypso, Flavia, Thunder, Violetta, Wintmalt  | 5 malts, pilot beers x 1 location  | Trained panel beer and malt hot steep, consumer panel  | Yes  | Haplotype alignment  | Windes et al. In process.Target spring, 2020 | There are differences and preferences, based on consumer panel. Lab panel in process. Target pub | How much variation in flavor will there be in a sample of unrelated commercially available varieties?  |
| Next Pints Three potential varieties derived from crosses of Full pint with Maris Otter and Violetta  | 3 pilot beers + Full Pint x 1 location  | Lab panel beer and malt hot steep, consumer panel  | Yes | Haplotype alignment  | Windes et al. In process.Target spring 2020 | In process | What unique flavors are there in Full Pint derivatives of crosses with Maris Otter and Violetta? Can flavor be used as a criterion for variety release?  |