

Flavor Report

June, 2016

We've made lots of progress and have exciting future prospects, thanks to your support and interest.

Review and recap

Barley Day: Deschutes, Russian River, and Sierra Nevada were most ably represented by Veronica, Mike, and Anders. Information, entertainment and motivation were all on tap.

Flavor Research Projects:

Dustin Herb is seeing light at the end of his PhD tunnel, with a projected December, 2016 thesis defense:

- He's headed back to Rahr Malting in Shakopee for the final stage of his Oregon Promise nano-brew sensory experiment.
- The Oregon Promise work at Rahr will be presented at the International Barley Genetics Symposium (where I'll also have a poster on the Oregon Promise population with a focus on New Glarus sensory data). The Flavor Project - and your support for the endeavor - will be prominent in both presentations.
- Coming soon in separate emails: (1) a draft of the IBGS poster for your review and comment, (2) updates on the analysis of the Rahr sensory data to date, and (3) updates on the "effects of modification on beer flavor" experiment.
- Dustin will present a poster at the 2016 World Brewing Congress, with an emphasis on the genetic determinants of beer flavor. More on that as the analysis progresses.

Flavor-related field trials:

- The Oregon Promise field trials at Lebanon and Madras (Oregon) look great.
- Winter barley harvest (Corvallis and Lebanon) will be early this year – projecting July 5 as the start date. There are some great looking flavor-related selections (such as doubled haploids from Maris Otter x Full Pint, Violetta x Full Pint) and much, much more.

Flavor-related Projects:

- The mini-malter is getting dialed in. Final adjustments to kiln temperature regulation are in process and with that done we will be on to making consistent and repeatable malts.
- We're also dialing in smaller-scale "table top" and intermediate-scale floor malting/bench top (FLUB) systems.
- The donated malt analysis equipment from Rahr is on the way – it had been held up in US customs. The plan is to have the analysis lab up and running in fall, 2016. Rebecca Jennings (from Rahr) will assist with training this fall. Aaron MacLeod (from Hartwick College) will be out to review and assist with the full scope of our malting program in the fall (with Brewers Association support).

Future Prospects

Another year of funding:

- *Todd Bastian and his colleagues at the OSU Foundation will be following up with you regarding continued funding of the flavor project.* Your continued support is essential and deeply appreciated.
- *What will the funds be used for?* Please see the following summary of where we've been and where we would like to go – details on milestones, deliverables, and budget to follow. The plan is to leverage your support (7 members x \$5,000/member = \$35,000) to apply for a matching Brewers Association grant.
- *A key consideration will be staffing:* I'd like to be able to keep Dustin on as post-doc in order to keep up the flavor project momentum. That's where your funding and the BA grant come in. However, if Dustin decides to take one of the many other opportunities that will likely come his way, we'll be looking for a new graduate student/assistant.

See the project in action:

- Join us in Central Oregon first or second week of August. That will be harvest time for Oregon Promise plots and seed increases at the Klann Family Farm.

A short summary of project progress, next questions to be addressed, and a flow chart of proposed experiments.

Barley Contributions to Beer Flavor Project Progress Report

1. Generated multiple data sets converging on the conclusion “yes, barley variety contributes to beer flavor”: final and definitive analyses, and publications, in progress. There are indications that where barley is grown can also have an impact on flavor.
2. Created doubled haploid genetic stocks, breeding material, and potential varieties to address flavor questions:
 - Golden Promise x Full Pint
 - Maris Otter x Full Pint
 - Violetta x Full Pint
3. Established nano-brew sensory as a method for assessing large numbers of barleys for flavor.
4. Identified regions of the barley genome associated with flavor.
5. Established a malting and malt analysis laboratory in order to further advance barley contributions to beer flavor research.
6. Systematically addressed the role of malt modification in barley contributions to beer flavor.
7. Helped generate an international awareness of the potential for barley variety to make direct contributions to beer flavor.

Questions for the Barley Contributions to Beer Flavor Project July 1, 2016 – June 30, 2017

1. Do the significant effects on beer flavor made by barley genotype and location that are detected in nano-brews carry through to larger-scale brews?
2. Are the “flavor genes” detected in a subsample of Oregon Promise doubled haploids confirmed using more doubled haploids from the same population?
3. What genes could be responsible for Golden Promise and Full Pint flavor?
4. Are the same flavors found in Golden Promise and Full Pint found in other barley varieties, such as Maris Otter and Violetta, or do these new varieties have new flavors?
5. If there are new and/or different flavors in barley – besides varieties, what is their genetic basis?
6. What effects do growth habit and planting date have on barley contributions to beer flavor?
7. Can analysis of beer using GC/MS bridge the gap between sensory descriptor and candidate gene?

Flow chart of proposed flavor project experiments : July 2016 – June, 2017 (and beyond)

