

USWBSI Barley CP Planning Meeting Report

“Protecting U.S. Barley from Fusarium Head Blight and DON”

Ft. Collins, CO, Tuesday, June 3rd, 2008

The Barley CP planning group met at the Anheuser-Busch Brewery in Ft. Collins, CO on June 3rd 2008. The following people were present at the meeting: Kevin Smith, Char Hollingsworth, Blake Cooper, Linnea Skoglund, Ben Millet, Brian Steffenson, Mike Davis, Rich Horsley, Tilahun Abebe, Jeff Stein, Lynn Dahleen, Joel Ransom, Scott Halley, Stephen Neate, Marvin Zutz, Art Brandli, Paul Schwarz, Louis Arnold, Scott Heisel, Karen Hertsgaard. Marcia McMullen, Andy Kleinhofs, and Liane Gale participated by phone. Flavio Cappetini submitted a letter to the group and subsequent discussions occurred by email. The meeting began at 8:00 AM and ended at 3:00 PM. After the meeting the group took part in tours of the brewery and of Busch Agriculture research facilities (malting and breeding). Below is a summary of some of the more important topics and discussions that took place at the meeting.

Summary of Progress

Each participant was given the opportunity to provide a brief update on progress or relevant developments that will help inform the planning process for the Barley CP.

Brian Steffenson gave a summary of efforts to screen available *Hordeum* germplasm for novel sources of resistance to FHB. This work has been ongoing for several years and thus far 25,000 accessions have been screened. Last year there was enhanced coordination of screening efforts and a plan was put in place to screen an additional 4,000 accessions in the next few years. Dr. Steffenson proposed that this final “surge” may be the last substantial screening effort for new sources of resistance. Some sources of resistance have been utilized and this short list of accessions is being characterized with molecular markers to facilitate future mapping and breeding efforts. Some sources of resistance have been introgressed into the breeding programs and are at various stages of development. The group had a discussion about how much additional screening was necessary. Some argued that we had looked pretty hard at the primary germplasm pool and identified the relatively few promising accessions to exploit and thus further screening was not warranted. Others thought that given the limited lack of success so far, we should continue screening more lines. There was general agreement that the plan in place in the Barley CP should be followed.

Flavio Cappetini was not present but did distribute a letter summarizing the CIMMYT/ICARDA research related to FHB and the USWBSI. There was some discussion and clarification of what Dr. Cappetini had completed thus far and how the results and other information from his work were being shared with the group. His work has encompassed screening new germplasm, participating in the regional nursery, and sharing of advanced germplasm. The Barley CP has outlined some pre-breeding activity that several in the group thought was a higher priority. After the meeting the coordinating committee and others participated in some email discussion to discuss priorities and timelines for this work.

Andy Kleinhofs distributed a powerpoint presentation and lead a discussion of the work to clone the FHB QTL located on chromosome 2H bin 10. He presented evidence that he and **Rich**

Horsley had identified a recombinant that was resistant, six-rowed and normal in plant height. Additional data will be needed to confirm this. He also showed maps that revealed a lack of useful markers in this region and presented a rationale to proceed with sequencing BAC clones that contig this region to facilitate cloning efforts and generate more markers that could be used in MAS. The BAC sequencing portion of his project was not included in the CP when submitted last year. The group discussed the merits of the sequencing project now and in general agreed that it would be useful to the overall project. Dr. Kleinhofs indicated what he needed in terms of salary and sequencing costs. The group is encouraging him to submit a standalone proposal to the USWBSI and the Barley CP coordinating committee will draft a letter of support.

Kevin Smith gave an update on mapping efforts that are focused on fine mapping QTL regions on chromosome 2H bin 8 and the chromosome 6H bin 6. Both projects are proceeding as planned and a new set of recombinants will be evaluated in a single location FHB nursery this summer. The screening of thousands of individuals with flanking markers was made possible with the collaboration of **Shiaoman Chao**. Dr. Smith also indicated that a new project using association mapping that leverages resources of the USDA funded Barley Coordinated Project (CAP) was beginning to bare fruit. A complete analysis of the first two years of this project will be complete this fall. Lastly, Dr. Smith reported on breeding progress and indicated that a variety candidate, M122, had been approved for plant scale evaluation in the AMBA testing program. The 2008 crop will be used for evaluation. Another line with enhanced FHB resistance from **Rich Horsley's** breeding program at NDSU, ND20448, is at the same stage of evaluation.

Rich Horsley provided an update on the NDSU breeding progress and also projects to validate a QTL on chromosome 2H bin 8 with the resistance allele donated from CI4196. Dr. Horsley also described the off-season FHB nursery in China that is used for screening.

Ben Millet gave a report on gene discovery work in **Gary Muelbauer's** lab using the Affymetrix GeneChip. This group has generated a list of genes that are differentially regulated in several different FHB-barley experiments. They are now working with **Steve Scofield** to conduct a functional analysis of these genes using VIGS.

Lynne Dahleen, Tilahun Abebe, and Stephen Neate talked about the work being done to generate transgenic barley lines and evaluate them for resistance in the field. This summer there will be a collaborative transgenic nursery seeded at locations in Minnesota and North Dakota. There was broader discussion about the need for more work in developing lines with new transgenes. Concerns were raised about commercial and public acceptance of GM barley as well as the path to commercialization that requires significant capital for licensing enabling technology. Others thought that there were new targets for transgenics that should be pursued. The barley community rated generation of new transgenics as a lower priority, but believed that it was important to test material already in the pipeline.

Liane Gale described her experiment to test several barley genotypes against several *F. graminearum* chemotypes in the field this summer. This experiment is also being carried out on wheat. Data will be collected for the first time this summer and should help inform current breeding/screening efforts.

Jeff Stein updated the group on disease forecasting models for barley. There was discussion about the kind of data sets that would be useful for developing and testing this model. Several researchers indicated that they may have historical data that may be useful for this purpose.

Charla Hollingsworth talked about the response of fungicide application, primarily strobilurin active ingredients, for increasing DON when applied as early as Feekes 2 growth stage (wheat). She was not funded by the USWBSI in 2008 for this work. There was some discussion about the research questions and the group suggested that she apply again to the MGMT RAC. Dr. Hollingsworth also talked about data she was collecting for the integrated management project that is currently supported by Busch Agriculture. Again, the group encouraged Dr. Hollingsworth to apply for funding from the USWBSI and make sure that her research is fully integrated with the MGMT group. Dr. Hollingsworth is also participating in the disease forecasting research lead by **Jeff Stein**.

Stephen Neate and **Scott Halley** discussed several research projects investigating fungicide application technologies as well as integrated management projects including host resistance and fungicides.

Review Milestones

Prior to the meeting each PI developed appropriate milestones from their Plans of Work for the Barley CP. These were compiled and distributed to the Barley CP co-PIs in the form of a Milestone Matrix (MM) document organized by “research area” and PI prior to the meeting. Working in small groups corresponding to research areas, we revised the MM document. Revisions were collected at the meeting and in some cases emailed after the meeting for compilation.

Discussion of Barley FHB Database. Mark Hughs has begun development of a database for USWBSI. The barley group needs to decide what kinds of data should be uploaded to this database and how that data will be used by the research community. We had a very short discussion of this topic due to lack of time. We will bring it up again at the Barley CP breakout at this year’s forum.

Changes in Plans of Work

There were no substantive changes made to work plans, thus the renewal of the Barley CP will be submitted unchanged. After further discussion with Dr. Cappetini, some additional details may be included for the renewal related to his portion.

Finalize Year 2 budget The year-two budget for the CP will be the same as the year-one budget. We decided to make no internal adjustments within the CP.

The meeting was adjourned at 3:00 PM and tours commenced.

Submitted by the Coordinating Committee,

Kevin Smith
Stephen Neate
Linnea Skoglund