

**Barley Coordinated Agricultural Project Work Plan for Year 4 (4/1/2009-3/30-2010)**  
**Richard D. Horsley, North Dakota State University**

**1) Describe the research, education, and outreach activities you are planning for Year 4 (4/1/2009-3/30-2010)**

Research

We will identify 96 six-rowed and 96 two-rowed barley lines for the “96 CAP breeding lines” for 2009 per the requirements outlined in the CAP Participants Guide. Dependent on which experiments these lines will be entered, they will be grown at a minimum of two locations in North Dakota. Each entry will be replicated at least two times at a location, including the CAP common checks Robust, Harrington, and Baronesse. We will collect data on heading date, height, stem length, lodging, and yield. Data on plump grain and grain protein concentration will be provided for those lines submitted for malting.

We will participate in a collaborative FHB trial with the four Midwest breeding programs (384 entries). We will send seed of our 192 CAP entries to Minnesota. We will sow our misted-inoculated FHB nursery at Osnabrock, ND in single 1.0 m row plots, 2 replicates per location in a RCB design including the checks Robust, Stander, MNBrite, Chevron, and CIho 4196. We will collect data on FHB severity and DON. All data collected from the above trials will be sent to Jennifer Kling in spreadsheets designed by her. We will send breeders source seed of our 96 CAP lines seed to Brian Steffenson (5 g), Blake Cooper (10g), and Tom Blake (10 g) for evaluation of other traits.

We will determine the dormancy of the CAP lines with a spring growth habitat. An experimental unit will consist of three seeds of an entry sown in a 6-inch pot in the greenhouse. Because of space and time limitations each CAP entry will not be replicated, but the checks Robust (PHS resistant) and Stander (PHS susceptible) will be replicated a minimum of six times. A PhD student, Mr. Paul Werner, will oversee the screening of these lines and use the data for an association genetics study to identify QTL controlling dormancy.

Education

Mr. Paul Werner is a Ph.D. student being funded by the USDA-CSREES Barley CAP. His research will include use of association mapping methods to identify QTL controlling dormancy. Data for this project were obtained from Barley CAP lines with the spring-growth habit.

Outreach

I will assist Dr. Schwarz and Ms. Karen Hertsgaard (IBMS Barley Communication Specialist) in preparing quarterly newsletters and a web page for the NDSU Institute of Barley and Malt Sciences. Information on the Barley CAP will be included in IBMS issued press releases, newsletters, and the IBMS web page.

**2) List specific outcomes and deliverables that will be accomplished in the first 6 months. These will be used as benchmarks for your bi-annual progress report.**

- Send breeders seed to collaborators (Cooper, Steffenson, Blake) by April 1.
- Sow yield trial and FHB collaborative trials in April or early May.
- Collect dormancy data on FY08 Barley CAP lines.

- Assist Dr. Schwarz and Ms. Hertsgaard in preparing IBMS press releases, newsletters, and the web page.
- Send malt quality, DON, and dormancy data from the FY08 Barley CAP lines; and FHB severity and yield trial data from the FY09 Barley CAP lines to Jennifer Kling by the end of September.

**3) List specific outcomes and deliverables will be accomplished in the second 6 months.**

**These will be used as benchmarks for the bi-annual progress report.**

- Submit grain samples from 2009 yield trials to the USDA-CCRU for malting quality analysis.
- Submit grain samples from FHB trial for DON analysis r..
- Sow seed for PHS trials in the greenhouse beginning in October.
- Assist Dr. Schwarz and Ms. Hertsgaard in preparing press releases, IBMS newsletters, and the web page.

## **Barley Coordinated Agricultural Project Six-Month Progress Report**

**(4/1/08 – 9/30/08)**

**Richard D. Horsley, North Dakota State University**

### **1) Describe the research, education, and outreach activities you completed (4/1/08 to 9/30/08)**

#### Research

Malt and DON data from the 2007 CAP lines were assembled and delivered to Jennifer Kling in spring 2008. In addition, we identified the NDSU 96 six-rowed and 96 two-rowed CAP breeding lines for 2008 per the requirements outlined in the CAP Participants Guide. For FY08, the six-rowed lines were grown across three experiments. These experiments were the Variety Yield Trial at Carrington, Fargo, Langdon, Minot, and Osnabrock; the Advanced Yield Trial at Carrington, Fargo, Minot, Osnabrock, and Nesson Valley; and the Intermediate Yield Trial at Carrington, Fargo, Minot, and Osnabrock. The trials at Osnabrock were abandoned due to damage from excessive precipitation. The two-rowed lines were grown across two Preliminary Yield Trial experiments at Fargo and Langdon. In the FY08 experiments, entries were grown in 7-row (2m long) plots with three replicates per location for the six-rowed barley experiments and two replicates for the two-rowed barley experiments. All experiments included the CAP common checks Robust, Harrington, and Baronesse. Data collected varied by location, but data for days to heading, plant height, yield, and grain moisture at harvest were collected from all locations. Plump grain and protein concentration data will come from malting quality analysis of grain samples done the USDA-ARS-CCRU. These data are expected around April 2009. We participated in a collaborative FHB trial with the four Midwest breeding programs (384 entries). We grew entries in our misted-irrigated and inoculated nursery in Osnabrock, ND. Entries were sown in single row plots, three replicates per location in a RCB design including the checks Conlon, Robust, MNBrite, and Stander. Disease levels were fairly uniform and moderately high and FHB severity data were collected by determining the percentage of infected kernels on 10 spikes per row. Agronomic and FHB data were assembled and sent to Jennifer Kling in September. All plots were harvested for DON analysis will be submitted to the laboratory of Dr. Paul Schwarz for DON determination.

Seed of the spring growth habit CAP lines was received and sown in the greenhouse in January 2008. Spikes were harvested from each entry at harvest maturity and we are finishing the final tests to determine dormancy levels for the lines. The dormancy tests requires that spikes from each entry are harvested as they reach harvest maturity, placed in plastic bags, and stored at -20°C. Throughout the summer, the percent germination of each entry was recorded to determine the level of dormancy for each entry. Mr. Paul Werner, a Ph.D. student funded by the CAP oversaw the dormancy screening as part of his dissertation research.

#### Education

Four of my graduate students and I attended the CAP workshop on association mapping in St. Paul in June 2008.

#### Outreach

In conjunction with Ms. Karen Hertsgaard, a press release on dormancy and pre-harvest sprouting was prepared in September 2008. The press release mentioned that funding was obtained from the USDA-CSREES Barley CAP to determine dormancy levels of breeding lines from the Busch Agricultural Resources, LLC; North Dakota State University; and the University of Minnesota.

**2) List specific outcomes and deliverables accomplished (4/1/08 to 9/30/08)**

- § Sent seed of FY08 CAP lines to collaborators (Cooper, Steffenson, Blake) in mid- April.
- § Grew our 96 six-rowed and 96 two-rowed CAP lines in yield trials at multiple locations in North Dakota
- § Grew the FHB collaborative trials in our Osnabrock FHB nursery.
- § Worked with Karen Hertsgaard on development of a press release that discussed dormancy and pre-harvest sprouting. The press release mentioned work being done to determine the dormancy of breeding lines from multiple breeding programs associated with the Barley CAP.
- § Determined the dormancy of the FY07 Barley CAP lines.
- § Sent Dr. Jennifer Kling malt and DON data from the FY07 NDSU six- and two-rowed CAP lines, and agronomic and FHB data from the FY08 Barley CAP lines we tested this summer.