

Barley Coordinated Agricultural Project Work Plan FY07 (4/1/07 – 3/31/08)
Kevin P. Smith, University of Minnesota

1) Describe the research, education, and outreach activities you are planning for the next year (4/1/07 – 3/31/08)

Research We will identify the UM 96 CAP breeding lines for the 2007 growing season per the requirements outlined in the CAP Participants Guide. We will plant these lines in our preliminary yield trials at 3 locations (Saint Paul, Morris, Crookston, MN) in 2-row (3m long) plots with two replicates per location, including the CAP common checks Robust, Harrington, and Baronesse. We will collect data on heading date, height, lodging, yield, plump grain, test weight, and grain protein concentration. We will submit selected lines for malting quality analyses to the USDA Cereal Crops Research Unit in Madison, WI.

We will also participate in a collaborative FHB trial with the four Midwest breeding programs (384 entries). We will send seed from our 96 entries to North Dakota. We will plant two misted and inoculated FHB nurseries (Crookston and Saint Paul, MN) in single row plots (1.5 m long), 2 replicates per location in a RCB design including the checks Robust, Stander, MNBrite, Chevron, CI 4196. We will collect data on heading date, FHB severity, and DON. All data collected from the above trials will be sent to Jennifer Kling in spreadsheets designed in collaboration with Jennifer.

We will collect breeders source seed from all of the 2007 lines from each of the ten participating breeding programs. This seed will be used for DNA isolation and seed multiplication (spring habit lines only).

We will conduct the DNA source grow out for all 960 CAP lines. We will plant 4 seeds per pot (from breeders source seed) in the greenhouse. Winter lines will vernalized for six weeks at 6° C. We will thin to one plant per line, harvest leaf tissue from each plant, freeze dry, and ship to Shiaoman, Chao for SNP genotyping. We will harvest all the seed from each individual plant for the DNA source seed to be stored at the USDA facility in Aberdeen, ID. We will use the rest of the breeders source seed to grow out the spring habit lines in Minnesota for seed multiplication in single 3 m rows. We will harvest this seed in early august and distribute it to collaborators as described in the Barley CAP Participants Guide.

Education I have one PhD student, Carol Powers, that is working on malting quality traits. She will be involved in the yield trials described above and analysis of data from 2006. Masters student Jon Massman, funded through another grant, will work on FHB using the Barley CAP resources.

Outreach I will include a slide about the Barley CAP at the Prairie Grains Conference in December. I will provide a brief update on the Barley CAP at field days in Morris and Crookston. I will provide input and feedback to Peggy Lemeax in the revision of brochures, posters, and powerpoint presentations etc... as needed.

2) List specific outcomes and deliverables that will be accomplished in the first 6 months (3/1 – 8/31). These will be used as benchmarks for your bi-annual progress report.

- Seed multiplication of entries from spring programs by Aug 15
- Re-distribution of seed to collaborators by Oct 15.
- Preliminary yield trials and FHB collaborative trials planted in April or early May.
- Plant out seed for DNA source in August.
- Send FHB data (severity and HD) to Jennifer Kling in August

3) List specific outcomes and deliverables will be accomplished in the second 6 months (9/1 – 2/29). These will be used as benchmarks for the bi-annual progress report.

- Submit grain samples from PYT to USDA-CCRU for malting quality analysis in October.
- Submit grain samples from FHB trial for DON analysis in October.

- Send yield trial data to Jennifer King in October.
- Send leaf tissue from 960 CAP lines to Chao in December.
- Prairie Grains Conference presentation in December

Barley Coordinated Agricultural Project Biannual Progress Report
FY06 (10/1/06 – 3/31/07)
Kevin P. Smith, University of Minnesota

1) Describe the research, education, and outreach activities you completed in the first half of the FY06 (10/1/06 – 3/31/06)

Research We identified the UM 96 CAP breeding lines for 2007 per the requirements outlined in the CAP Participants Guide. We sent out requests for 2007 seed from all of the participants and have received seed from about half so far. The remaining programs have indicated when their seed will arrive to insure timely planting of seed increase in Crookston.

We have submitted grain samples for malting quality analysis on all 96 2006 lines along with checks from three locations grown in MN in 2006. The USDA lab recently moved and is behind in malt analyses. We expect to get data in the next few months. We are currently summarizing FHB data from 2006 ND and MN trials for the four Midwest breeding programs (384 entries). Drought conditions were responsible for the loss of two trials to low disease. We obtained disease data from Crookston (2 reps), Fargo (1 rep), and Langdon (1 rep). We sent the 384 lines to China to obtain another location (2 reps) and will assess disease in May. Grain samples have been cleaned and are in the queue for DON analysis from Langdon, Fargo, and Crookston (2 reps each). We obtained morphological data from the spring lines (excluding Utah) from a spot blotch nursery that was planted by Dr. Steffenson in St. Paul. An undergraduate student is now summarizing and analyzing that data. We grew out the 960 2006 CAP lines for DNA isolation in the greenhouse over the winter. We obtained variable amounts of seed from this grow out. Approximately 60 lines had very little seed and we have replanted those in a growth chamber for DNA grow out. The spring lines that had sufficient seed will be planted in single rows in St. Paul for a seed increase. The remaining lines will be increased in the greenhouse this fall. Winter lines will be sent to their respective breeders for seed increase.

Education Two graduate students are working on their respective projects on malting quality (Carol Powers) and FHB resistance (Jon Massman). Jon has done analyses of FHB data. Carol is still waiting for malting quality data. Both Jon and Carol are developing near-isogenic lines for QTL identified by previous association mapping studies to be used in validation experiments this summer. Magan Friskop, undergraduate, has been measuring spike morphology traits on material collected in 2006 and summarizing the data.

Outreach I gave an oral presentation at the ASA/CSSA Annual Meeting in Indianapolis in November entitled “Detecting marker-trait associations in barley breeding germplasm for MAS” that described some of the activities of the Barley CAP to a science audience. I submitted a related article on this topic for the January BarleyCAP newsletter.

2) List specific outcomes and deliverables accomplished in the first half of FY06 (4/1 – 9/30).

- Harvested and dried leaf tissue for DNA from 2006 CAP lines; replanted lines with little seed.
- Summarized agronomic data from 2006 trials and sent to J. Kling.
- ASA Presentation in November.
- Cleaned 2006 grain and submitted to Mycotoxin Lab for DON analysis (FHB Study)
- Cleaned 2006 grain and submitted to Cereal Crops Research Unit for malting quality (Breeders Trials)