Improving Winter Wheat Varieties for Nebraska

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We finally completed planting on November 2. The last two field planted were the organic fields at Clay Center (October 30, 2007) and at Mead (November 2, 2007). The late planting was due to weeds in the organic plots needing to be killed by a frost before the soybeans could be harvested. We had a long fall with no killing freeze until very late in the season. Remarkably the wheat emerged and is "growing" everywhere, though this long cold winter has most plants well locked into dormancy. Our best estimate of the current growing conditions are: western NE--good stands and sufficient surface moisture, but virtually no subsoil moisture; southwest NE—very similar to western NE with perhaps slightly better soil moisture, south-central NE—good stands where the wheat was not planted too late and adequate moisture, and eastern NE—good stand where the wheat was not planted late, ample surface and subsoil moisture. In the west, there has been relatively little blowing which has been a huge benefit for our wheat production. In the east, the ample moisture delayed planting so long that some fields were not planted; hence the overall state wheat planted acreage (1,950,000 acres) is less that in 2006-2007 (2,050,000 acres).

We successfully planted our main greenhouse and it is growing very well. We have started making crosses on the earliest lines with the expectation that the main crossing block will begin in about 3 weeks. In our fall, greenhouse, we made over 70 crosses including many made for the *FHB1* gene from Sumai 3 in adapted backgrounds (thanks to Dr. Guihua Bai who developed the backcross derived lines). As part of this greenhouse effort, we have nearly completed developing a single seed descent mapping population for Harry x Wesley. In addition, we have sent our duplicate, all of lines which may have *FHB1* or *WSMV1* (the resistance to wheat streak mosaic virus in Mace) to the Genotyping Center (Dr. Guihua Bai) for genotyping so we know lines actually have *FHB1* or *WSMV1*. In addition, we optically sorted an F_2 population segregating hard and soft kernels (thus removing the soft kernels), FHB1 and the QTL on 5As for Fusarium head blight and send one half seeds to the Genotyping Center to determine which lines have FHB1 and the QTL on 5As. We germinated the seed and put them in the vernalizer so we will only transplant those lines with the desirable genes/QTLs. This experiment is part of an allele enrichment study will may become one our major uses of marker assisted selection.

In January, two lines from this program, NE01604 and NH03614 CL, were recommended for release by the Variety Release committee. NE01604 will be licensed to NuPride Genetics Network and marketed as Camelot. NH03614 CL will be tentatively co-released by the USDA-ARS and the University of Nebraska and co-released by Wyoming and South Dakota. WE have not given it a name yet. The broad adaptation of NH03614 CL will be an excellent complementary wheat for Infinity CL. Infinity CL is an excellent wheat with very good winter hardiness, hence has been grown widely in Nebraska and South Dakota. It was the best imi-tolerant wheat for these environments. However, with the release of NH03614 CL, it appears that NH03614 CL does slightly better than Infinity CL in western NE, eastern WY, and SD. Infinity CL, while doing well everywhere, does best in eastern NE. Hence growers will have more choices in selecting an imi-tolerant wheat and will have more choices for their farm and chose the lines which are best for their farms and their unique circumstances. In addition, to the two wheat cultivars released by this program, the USDA-ARS took lead on developing and releasing Mace (an excellent wheat streak mosaic virus tolerant wheat) and Anton (a new white wheat with very low PPO which is highly desirable for Asian noodles).

The annual report is being written, but is late due to my writing a book chapter on wheat breeding. Support from the Nebraska Wheat Board is gratefully acknowledged and critical to the continued success of this program.