

Improving Winter Wheat Varieties for Nebraska

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After what seemed like a slow start, the fields are progressing very quickly. We initially thought the season would be about 7 to 10 days later than normal, but hot early spring weather seems to have forced the crop and we are now about 4-7 days earlier than normal. So far in Lincoln, most of the wheat has headed and flowered. All of the barleys have flowered, and most of the triticales have also flowered. As opposed to last year, the plots at Lincoln and Mead are much more vigorous and generally in pretty good shape, though we have had problem with herbicide drift from spraying our alleyways at Lincoln and Mead, though no where else. The wheat look good in western and central Nebraska, but soilborne wheat mosaic virus (SBWMV) was a problem at Lincoln and for the first time at Clay Center. This disease is due to a virus that is spread by fungus that lives in the soil. Normally, when wheat is planted on time or later, the fungus is not very active and does not spread the virus. For example, wheat planted after soybeans, almost always avoids. However our warm falls tend to make the wheat look as if it were planted earlier and we have major SBWMV infections at Lincoln and Clay Center where we have good notes on our lines for resistance and susceptibility. Though not many of our recent released cultivars have resistance to this virus, many of our new lines do, so we hope that in one to two years we will be able to release a high yielding, SBWMV resistant cultivar. For example NE01481 is resistant to SBWMV. One difficulty with breeding in NE is that SBWMV is only found in eastern NE, so susceptible lines that look as if they are very poor yielding in eastern NE, may actually do well whenever and wherever the disease is not present (e.g. western NE). Similarly in western NE, wheat streak mosaic virus (WSMV) can be devastating, but is generally found only at low levels in eastern NE.

We successfully completed our greenhouse cycle with approximately 80 crosses made in both barley and triticale, and 950 crosses made in wheat. Normally we want at least 60 crosses in barley and triticale and about 800 crosses in wheat. The cool spring allowed us to spread our crossing out and to make more crosses. The graduate students were a huge help with the barley crosses and with the wheat crosses over the spring vacation when our student workers were not available. They came down every morning to help emasculate and we literally could not have made these crosses without their help.

Two lines, NI04421 and NE01483, are tracking for possible release in 2009 and 2010, respectively. NI04421 has an excellent yield record under irrigation in western NE and eastern WY (actually its best area of adaptation), as well as a good dryland yield record in western NE. It appears to have good drought tolerance and can finish well under irrigation when the water is turned off or under dryland conditions. Its main concern is that it is very susceptible to stinking smut and should only be planted if treated by a fungicide seed treatment. If released, we will need to have a real educational campaign to make sure growers use seed treatment on this line. NE01483 is a high yielding line with excellent quality and resistance to SBWMV. It will be targeted for southeastern NE where its disease resistance and yield record are the best.

We have 21 additional lines under increase for possible release. Grain of all these lines were sent to ConAgra for milling and baking to see how their larger loaf baking compares to our smaller loaf baking. We have begun as serious of very informative talks with ConAgra to learn how they do their end-use quality evaluation. While we work with all of the major milling companies, it is very convenient to have our people visit their labs. As part of these discussions we have included Dr. Vicki Schegel who is an analytical chemist and may help us with doing LECO protein analysis, which is needed for a constant dough volume procedure for the Mixograph. Historically our wheat lines have low water adsorption and we are concerned that this might be due to our using a constant water absorption (60%) in our initial Mixograph testing. If we are making a dough, not having

enough water will make the Mixograph have a shorter time to peak and less tolerance, something we quickly eliminate from our germplasm. Hence we may be removing some lines which with higher absorption could have better quality. We will be looking into this over the next year.

With the current economic concerns for higher education, we have been busy writing grant proposals to federal agencies. In the last quarter we submitted grant proposals to: 1. develop marker assisted breeding on a large scale, 2. further study a resistance QTL for SBWMV (part of the Wheat Coordinated Project Renewal effort), 3. better understand the genetics of winterhardiness in barley, and 4. support an international student from the Monsanto Beachell-Borlaug International Scholars (MBBIS) program. As is often the case, we have numerous meritorious students apply to our program which unfortunately we can not support due to funding issues. We would be particularly pleased if we receive support from the MBBIS program as Dr. Hank Beachell was a native Nebraska who helped develop the Green Revolution rice cultivars and Dr. Norman Borlaug developed the Green Revolution wheat cultivars. Both of them are role models for plant breeders everywhere.

The annual report on the wheat breeding and end-use quality project was completed and can be found at: <http://agronomy.unl.edu/grain/WHTANN08F.PDF> . The efforts of Ms. Lan Xu in putting the report together, as well as her dedication to testing end-use quality are truly appreciated.

Support from the Nebraska Wheat Board is gratefully acknowledged and critical to the continued success of this program.