

Improving Winter Wheat Varieties for Nebraska

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Our planting season has been somewhat the opposite of our harvest season. At Lincoln for the first time in 21 years, we harvested every plot without a rain delay. As for planting, we planted Hemingford (Sept. 10 and 11, 2007) and Sidney (September 11 and 12, 2007) on time. We were rained out at North Platte, but planted it on September 17, 2007. Clay Center was planted September 28, 2007 due to rain delays. Planting at Mead began on September 24 and “finished” effectively on October 12, though we still need to put in our borders and depending upon the next rain will move plots from Lincoln to Mead if it is drier there. Planting at Lincoln began on October 1 and remains to be completed. Basically with the exception of the western locations, we have been planting one to two days a week then rained out for the rest of the week. Needless to say it has played havoc with our work schedules, but has made us wonder if there are ways we can improve upon our efforts. For example, normally North Platte is drier than Lincoln and Mead, so rather than have planted at North Platte on Sept. 17, would we have been better off planting lines at Lincoln or Mead. Historically we have felt that we need to get North Platte in before concentrating on eastern NE, but that usually means we are consistently planting North Platte before the recommended date. In years like this one, every dry day (and some not some dry) were used to plant in eastern NE, while North Platte may have received less rain and we could have planted while we waited for the eastern fields to dry, which also would mean that we would plant closer to the optimum date. One strategic error with the planting this year is that we cluster our white wheats together at Lincoln in our observation nursery. This year we have an excellent number of white wheats (about 20-25% of the total observation nursery), but they are often put in order after the red wheat and mixed red and white wheat entries. This year, they are among the rain delayed planting at Lincoln while the majority of the red and mixed red and white were planted on October 12—our last good planting day. The entire observation nursery has been planted at Mead in the rows for winter injury scoring, so they will have an increase, but it would be nice to have them planted by now at Lincoln. It should be recognized that Greg Dorn, Mitch Montgomery, and Marc Walter (thanks to Lan Xu and the Wheat Board support) and various graduate students have worked very diligently during this awkward planting schedule (e.g. working week-ends and until dusk on the dry days). For their help, I am truly appreciative.

I would also like to acknowledge Lan and Marc for successfully completing all of the microquality analyses on the 2007 observation nursery in time for us to use the data to select lines for advancement in the 2008 Duplicate Nursery. In addition, to being very timely, Marc and Lan were presented is a more difficult scoring effort this year because the high yields at Lincoln in 2007 reduced the protein percentage in the grain, so our samples had to be evaluated at lower protein levels that we would have preferred. Lower grain and flour protein contents make the mixographs “flatter” and more difficult to interpret.

On the brighter side, we shipped our F₁ crosses for increase to Yuma AZ on time and this saves us considerable effort and expense in greenhouses. Also, in working with the USDA-ARS, we were lent a kernel-sorting machine to separate red from white kernels and potentially many other kernel characteristics. We sorted some of our segregating bulks to enrich (increase the frequency of white kernels) and also, sorted our preliminary seed increases of white lines so they should be purer as they are advanced. The machine is relatively slow, but the cost is about \$4000 worth of parts and labor. When they become available, we will definitely want to consider purchasing one because the slowness is not a real issue in that once you set it up and let it go, it runs by itself and you can stop it any time. Hence, you can very effectively work on other tasks while it is sorting. In addition, an

undergraduate student, Ms. Laura Tiehen will be doing a research project to see if we can screen for low polyphenol oxidase (PPO) at the single kernel level using a biochemical solution, “rescue” the treated kernels (the solution may kill the kernel or germinate it) and grow low PPO lines. If this works, it may be a very nice way of screening critical populations and selecting for low PPO segregants thus increasing our chances of obtaining low PPO varieties.

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

After note: Planting was completed at Lincoln on October 22, 2007 and at Mead on October 23, 2007 with the exception of the organic trials which are waiting for soybean harvest.