

Improving Winter Wheat Varieties for Nebraska

P. S. Baenziger, M. Shipman, and D. D. Baltensperger, University of Nebraska

August 1, 2006

In May, June and July, most of our work was involved in the field evaluating new breeding lines. Similar to the conditions across Nebraska, our nurseries were highly variable and grain yields ranged from 78 bu/a (Lincoln) to 39 bu/a (North Platte). In addition to Lincoln, Mead (73 bu/a) and Clay Center (74 bu/a) had excellent grain yields, while Alliance had much better grain yields (47 bu/a) than would be expected for the very little moisture that the plots received. Sidney was severely affected by drought and then damaged by hail so badly that it had to be abandoned. The data for the harvested locations are attached. In the data there are numerous interesting points, but three items are particularly noteworthy.

First NE01643 continues to do well. It was the highest yielding line in Southeast and Southwest, NE for the last three years. It also has performed very well in Panhandle (3rd highest yielding line) and Southcentral, NE (5th highest yielding line). These data follow-up two exceptional years (2004 and 2005) in the North Regional Performance Nursery (NRPN coordinated by Dr. Bob Graybosch) where it was the highest yielding line in both years. The strengths of this line are its very good grain yield, test weight, and straw strength. Its weaknesses are that it is not highly resistant to many diseases, but the diseases never seem to hurt the line. For example in 2005 when stripe rust was everywhere in the Great Plains, it topped the State Variety Trial and the NRPN. Its end-use quality is also not exceptional and would be considered adequate. A recommendation to release or not release the line by the Small Grains Variety Release Committee will be made in early August.

Second, NI04421 was the highest yielding line in the Nebraska Intrastate Nursery (NIN). This line was entered in the Southern Regional Performance Nursery (SRPN) and had the second highest grain yield in the preliminary nursery report. Normally, our lines are too late and often lack the disease resistance needed for the southern Great Plains. Of course this year was highlighted by persistent drought in many Great Plains states so disease resistance was less important. However, no line developed by the joint USDA-University of Nebraska has ever performed so well in the SRPN. This line was developed in our irrigated wheat program and indicates that by selecting for irrigated wheat production, we have been able to select for earlier lines that may be adapted both to higher rainfall areas (similar to irrigated production) and to the southern parts of Nebraska. This result is a very welcome result because we have had difficulty selecting early lines and lines specifically adapted to the most southern counties of Nebraska. Our efforts to develop lines for all parts of Nebraska and the various cropping systems will continue.

Third, the transition of the white wheat breeding effort from the USDA to the University of Nebraska appears to be successful and the white wheat experimental lines are gaining in stature and proportion of the program. In this case, NW03666 had a very good year, ranked 6th in the NIN. What is particularly good, it is that the one location where it was below the nursery average was Lincoln, where we are not targeting white wheat production. In western Nebraska, where we expect white wheat to best fit the cropping systems, it performed consistently well. Though the data are not included here, an increasing number of white wheat lines are doing well in the early generation nurseries.

Excellent progress is also being made in developing adapted lines with greatly enhanced wheat streak mosaic virus resistance and for tolerance to imi-herbicides. Molecular markers are increasingly being used to scab and stem rust resistant lines.

The search for the lab manager for the Seed Quality laboratory continues. So far two candidates have been interviewed and the third candidate will be coming for an interview on August 9, 2006. We hope that a decision will be made shortly thereafter so we can try to have as much overlap between Mary and the new person as possible.

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

VARIETY	Lincoln Yield bu/a	Rank	Mead Yield bu/a	Rank	Clay Yield bu/a	Center Rank	North Yield bu/a	Platte Rank	Alliance Yield bu/a	Rank	State Yield bu/a	Rank	Arkon, CO Yield bu/a	Rank	Flowering Date (May)	Plant Height (in)
WESLEY	79.72	25	68.80	47	80.06	15	42.35	10	44.41	44	63.07	29	27.19	53	24.1	35.0
ALLIANCE	75.43	44	70.55	42	70.19	48	41.73	14	47.45	34	61.07	39	26.16	54	23.4	36.7
NE00403	71.87	53	67.29	55	78.21	20	41.87	12	51.86	11	62.22	32	36.37	28	23.8	35.1
NE01422	73.29	48	63.17	56	73.20	38	37.02	40	40.43	55	57.42	54	15.20	59	24.1	36.9
NE01481	87.31	3	78.78	13	73.75	35	39.52	22	49.39	25	65.75	11	26.01	56	24.2	37.5
NE01481-1	70.09	55	58.17	58	71.22	44	29.21	59	44.61	43	54.66	58	28.97	48	20.6	36.5
NE01604	78.62	27	69.75	45	75.39	28	37.90	32	46.63	36	61.66	35	36.37	29	24.2	38.4
NE01643	80.78	21	84.31	2	83.82	7	39.47	23	50.34	15	67.74	4	54.58	1	25.2	36.0
NE02465	78.63	26	73.77	31	70.67	46	35.35	47	30.93	60	57.87	52	36.67	24	21.5	37.8
NE02513	72.44	52	69.27	46	81.74	10	27.87	60	42.51	49	58.77	50	40.52	11	22.0	35.4
NE02528	75.94	41	76.80	18	74.23	32	32.88	56	43.89	46	60.75	42	39.48	14	22.4	36.6
NE02532	76.14	39	81.62	7	79.53	18	34.85	50	43.03	48	63.03	30	30.45	46	25.0	37.2
NE02533	86.11	5	76.37	20	86.95	1	37.48	37	49.66	21	67.31	5	38.30	19	23.3	38.2
NE02549	77.30	36	67.55	50	72.27	41	40.46	18	47.48	32	61.01	40	28.08	51	24.8	35.7
NE02558	83.28	13	72.26	38	77.38	23	40.99	17	54.46	3	65.67	12	36.52	26	22.3	37.8
NE02584	82.43	16	79.39	11	77.54	22	35.39	46	50.26	18	65.00	17	44.37	3	23.8	36.3
NE02588	72.50	51	76.09	23	67.80	52	37.87	33	44.64	42	59.78	47	32.97	41	22.6	35.6
NE02592-1	74.59	46	80.51	9	62.01	57	33.24	54	38.50	59	57.77	53	40.22	12	24.1	38.8
NI02425	83.89	9	77.29	16	81.10	13	36.18	43	41.68	53	64.03	22	44.22	4	23.1	37.0
NI02425-1	77.89	29	82.60	5	74.56	30	35.23	49	39.85	57	62.03	34	39.63	13	24.1	36.9
NE03457	69.36	57	60.70	57	69.88	49	34.43	52	46.41	37	56.16	55	36.22	31	24.9	34.1
NE03458	79.90	23	74.02	29	41.97	60	37.92	31	41.95	52	55.15	57	34.89	36	23.8	34.1
NE03488	75.97	40	72.84	34	79.08	19	37.51	36	49.98	20	63.08	28	36.37	30	24.6	36.0
NE03490	85.95	7	67.47	52	70.64	47	44.39	3	59.83	1	65.66	13	40.96	9	23.5	33.2
NH03609	81.16	20	76.20	22	85.63	4	38.10	29	42.40	50	64.70	18	40.67	10	24.7	36.5
NH03614	83.55	10	74.64	27	79.65	17	41.51	16	49.65	22	65.80	10	38.45	18	23.2	35.5
NI03418	75.78	42	67.37	53	70.72	45	35.64	44	43.51	47	58.60	51	34.74	37	25.6	36.0
HARRY	77.64	32	73.93	30	67.96	51	37.70	34	48.32	29	61.11	38	32.82	42	25.6	33.8
MILLENNIUM	69.87	56	75.15	25	72.24	42	38.92	25	47.47	33	60.73	43	36.67	25	26.5	36.8
Hallam	77.48	35	78.38	14	65.44	55	42.71	8	52.18	9	63.24	27	33.71	39	22.5	39.1
Infinity	80.45	22	81.20	8	74.60	29	38.85	26	47.39	35	64.50	20	35.04	35	24.0	37.6
WAHOO	74.89	45	67.50	51	71.42	43	42.07	11	50.31	16	61.24	37	18.16	58	24.9	36.4

NI03427	84.66	8	79.99	10	81.57	12	36.94	41	42.07	51	65.05	16	31.49	44	22.5	37.7
NW03638	70.28	54	77.12	17	73.58	36	36.24	42	50.78	14	61.60	36	28.97	49	23.3	39.6
NW03654	77.58	33	76.21	21	73.78	34	43.94	4	49.62	23	64.23	21	37.11	21	23.6	39.0
NW03666	77.28	37	79.33	12	81.81	9	43.45	6	52.89	6	66.95	6	46.59	2	23.6	38.5
NW03670	72.90	50	69.87	44	73.36	37	35.48	45	51.45	12	60.61	44	36.96	23	24.0	38.8
NW03681	77.85	30	67.71	49	80.37	14	40.32	19	44.24	45	62.10	33	37.11	22	25.0	37.2
NE04424	87.04	4	71.16	40	79.80	16	45.83	2	50.30	17	66.83	7	39.48	15	21.6	37.7
NE04435	73.52	47	69.91	43	72.76	39	34.79	51	48.20	31	59.84	46	39.48	16	22.0	37.3
NE04449	82.59	15	73.50	32	86.34	3	38.19	28	45.78	39	65.28	15	35.19	34	22.7	35.5
NE04466	81.28	19	72.62	36	75.46	27	42.51	9	45.20	41	63.41	25	32.08	43	23.9	35.1
NE04475	76.99	38	67.89	48	67.52	53	37.46	38	48.88	26	59.75	48	28.82	50	24.6	35.4
NE04490	77.55	34	83.02	4	86.70	2	43.39	7	52.90	5	68.71	3	33.41	40	21.5	35.5
NE04537	73.23	49	72.79	35	65.61	54	38.05	30	52.52	7	60.44	45	36.52	27	24.3	37.7
NE04550	86.05	6	74.61	28	77.97	21	41.72	15	48.65	28	65.80	9	41.85	7	23.6	38.8
NE04465	83.10	14	76.59	19	69.61	50	39.09	24	50.19	19	63.72	23	26.16	55	22.7	37.5
NE04653	81.54	18	76.01	24	82.15	8	37.64	35	50.84	13	65.64	14	37.41	20	24.8	37.7
NE04662	75.70	43	72.56	37	53.56	59	32.67	57	45.53	40	56.00	56	19.94	57	24.9	37.0
NE04665	81.74	17	77.59	15	76.13	26	38.85	27	38.73	58	62.61	31	11.79	60	25.3	36.4
NW04673	83.48	11	73.23	33	74.36	31	40.17	20	46.06	38	63.46	24	27.49	52	22.5	37.2
NW04685	78.22	28	70.76	41	81.71	11	33.43	53	40.35	56	60.89	41	36.22	32	25.6	35.5
NI04411	77.72	31	74.66	26	76.38	25	39.88	21	48.28	30	63.38	26	34.74	38	25.3	34.3
NI04416	83.40	12	83.09	3	74.13	33	32.53	58	49.54	24	64.54	19	42.30	6	25.0	36.1
NI04420	89.33	2	85.23	1	77.28	24	43.63	5	48.71	27	68.84	2	43.18	5	22.3	38.2
NI04421	90.01	1	81.63	6	84.21	5	53.00	1	52.04	10	72.18	1	41.70	8	23.8	37.6
NI04427	79.75	24	71.87	39	83.84	6	41.84	13	53.27	4	66.11	8	30.60	45	22.4	36.7
GOODSTREAK	62.31	59	67.37	54	72.63	40	37.18	39	55.72	2	59.04	49	39.33	17	24.5	41.0
SCOUT66	55.92	60	51.86	60	57.86	58	35.34	48	40.82	54	48.36	60	35.63	33	24.5	43.1
CHEYENNE	64.52	58	57.20	59	62.07	56	33.23	55	52.29	8	53.86	59	30.45	47	25.4	41.8
GRAND MEAN	77.93		73.32		74.39		38.39		47.29		62.26		34.72		23.8	37.0
CV	4.94		5.31		9.80		7.54		9.89							
LSD	4.50		5.27		9.87		3.92		6.33							