IMPROVING WHEAT VARIETIES FOR NEBRASKA

2006 STATE BREEDING AND QUALITY EVALUATION REPORT

Report to the

NEBRASKA WHEAT DEVELOPMENT, UTILIZATION
AND MARKETING BOARD

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I. INTRODUCTION

Wheat variety development research in Nebraska is a cooperative effort between the Agricultural Research Division, IANR of the University of Nebraska-Lincoln, and the Agricultural Research Service/USDA, Northern Plains Area. Winter wheat breeding, which includes variety, line, and germplasm development, is a major component of the state wheat improvement research. This report will deal only with the state portion of the total wheat breeding effort (located in the Department of Agronomy and Horticulture at the University of Nebraska-Lincoln). Very important contributions come from state, and federal researchers in the department and at the Nebraska research and extension centers, from state and private researchers in South Dakota, Wyoming, Kansas, Oklahoma, Texas, and Colorado, from researchers in the Department of Plant Pathology (both state and federal), from plant pathologists located at the USDA Cereal Disease Laboratory, St. Paul, Minnesota, and USDA entomologists at Manhattan, Kansas and Stillwater, Oklahoma. All of these programs invest time and funds in this program. Grants from the Nebraska Wheat Development, Utilization and Marketing Board provide key financial support for this research. Without the Wheat Board's support, much of the state breeding efforts would be curtailed and many of the wheat quality analyses to evaluate our breeding material would not be available.

II. THE 2005-2006 NEBRASKA WHEAT CROP

1. Growing Conditions

The 2005-2006 crop was planted into generally good conditions with adequate moisture throughout the state with the possible exception of parts of southeast Nebraska. The planting was completed in a timely manner. The fall was generally milder than normal which lead to various diseases across the state and emergence was good everywhere. The winter was relatively mild and winterkilling was minor. The spring growing season began on the dry side and drought was prevalent in many parts of the state. The Panhandle was particularly hard hit and many fields were severely damaged. The drought often held down diseases and insects and hastened harvest. In general, NE01643 (a new cultivar, see below), Jagalene, Infinity CL, Trego, Harry, Expedition (developed by South Dakota) and Wahoo performed well across or in specific sections of the state. Many of these lines tend to be early, hence avoided some of the drought. However, NE01643, Infinity CL, Harry, and Wahoo tend to be later maturing wheat varieties, hence may have some drought tolerance, benefited by late rains, or at least have broad adaptability.

2. Diseases

As mentioned above, the drought held back diseases in many areas. However, powdery mildew was heavy in eastern and south central NE and in irrigated fields in May. This disease is usually minor except on very susceptible varieties and will die off as temperatures rise. Tan spot was present across the state from April through June. Loose smut occurred throughout the state but the incidence was low. Common bunt (stinking smut) occurred in several counties in southeastern/south central NE. Seed treatments are effective ways of reducing seed borne smuts. Leaf rust occurred late (June) in south central and eastern NE- moderate to high incidence but low severity. Wheat streak mosaic was observed from the Panhandle to eastern NE and was severe in some fields. Soilborne mosaic occurred mainly in eastern NE but was also found in a field near

Grant/Ogallala. Black chaff occurred in several irrigated fields in southwestern Nebraska.

Wheat streak mosaic virus or other unknown viruses were found in several fields reported in counties all the way to the Missouri river. Several reports of wheat streak mosaic virus were from south central NE near Hastings/Grand Island. In western NE, where wheat streak mosaic virus is most common, there were numerous infected fields with low infestations of the wheat curl mite (the vector of wheat streak mosaic virus) but fortunately few catastrophic losses. A little soilborne mosaic virus was found in eastern NE. We expect to see wheat streak mosaic virus near Kimball in 2007 unless the growers did a very good job on their volunteer. Drs. Stephen Wegulo, Gary Hein (entomologist monitoring insects vectors of disease and the disease), and Roy French continue to be invaluable in disease identification, survey, and understanding.

3. Insects

In general, most insect pests were at low levels on wheat in 2005-2006. A few fields were severely damaged by Hessian fly (central part of state). We continue to see moderate increases in areas affected by wheat stem sawfly, primarily in Scotts Bluff and surrounding counties. More cereal aphids were seen this year than usual- greenbugs were in every field (at least in western NE) but low populations. Dr. Gary Hein continues to be invaluable in insect and disease vector identification, survey, and understanding.

4. Wheat Production

The 2006 Nebraska Wheat Crop was estimated at 61,200,000 bu, which represented a 36 bu/a state average yield on 1,700,000 harvested acres. The 2005 Nebraska Wheat Crop was 68,600,000 bu, which represented a 39 bu/a state average yield on 1,760,000 harvested acres. The 2006 crop was 11% lower than the 2005 crop. Despite continued genetic improvement, the main determinant in wheat production seems to be acres harvested, government programs, and weather (which also affects disease pressure and sprouting).

5. Cultivar Distribution

The 2006 wheat variety survey is the most current data available. Agripro Jagalene (23.4% of the state) was the most widely grown cultivar followed by Pronghorn (10.1%), Alliance (10.1%) and Millennium (9.5%).). The rise of Jagalene was very rapid, going from 4.5% in 2004 to 23.8% in 2006. Pronghorn is a tall (conventional height) wheat that has consistently done well in the drought prone areas of western Nebraska. A new tall wheat, Goodstreak (3.7%) seems to be very well received and should replace some of Pronghorn's and Buckskin's acreage. Millennium is an excellent wheat that is the replacement for Arapahoe with its broad adaptability, excellent disease resistance, and good end-use quality. Alliance is a semi-dwarf the variety having the greatest impact since the release of Arapahoe, but its impact is more localized, as Alliance does not have the broad adaptation in eastern Nebraska that Arapahoe had.

While no wheat listed below has all of the characteristics of an ideal wheat, the diverse wheats provide the grower an opportunity to choose high yielding, high quality wheats that have resistance or tolerance to the diseases or insects prevalent in his or her region. Cultivars developed by the University of Nebraska wheat improvement program occupied 57% of the state acreage. Other public varieties occupied 12% and private varieties occupied 31% of the state acreage.

	Percent									
Variety	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
2137	-----	1.4	3.6	8.2	10.4	8.0	10.3	7.8	4.3	3.5
2145										1.0
Above										1.3
Agripro Abilene	2.2	2.4	2.7	2.7	2.5	1.3	1.4	1.7	1.7	
Agripro Jagalene								4.5	16.8	23.8
Agripro Ogallala	1.5	1.6	1.2	1.4	2.2	1.5	3.6	2.4	2.0	1.4
Agripro Thunderbolt							2.0	3.0	1.9	1.9
Alliance	7.3	8.4	10.4	15.1	16.0	16.6	11.5	13.6	10.1	10.1
Arapahoe	30.1	28.3	25.0	19.8	13.4	13.0	8.7	6.8	5.2	2.9
Buckskin	6.0	6.5	5.0	2.9	4.7	6.2	7.3	4.9	3.7	5.0
Centura	9.8	7.7	7.7	6.9	3.7	3.4	1.8	2.1	2.4	1.9
Goodstreak						0.0			1.7	3.7
Jagger	-----	-----	1.1	2.9	2.4	3.4	3.9	2.8	3.1	2.5
Karl/Karl 92	6.9	6.6	5.5	4.4	4.1	3.3	3.8	3.3	2.7	2.7
Millennium						3.5	6.1	11.1	10.7	9.5
Niobrara	6.5	7.5	11.4	10.3	9.3	6.9	5.4	3.5	2.2	
Other Private Varieties	3.1	1.9	1.9	2.0	2.2	3.9	3.4	4.4	4.0	3.8
Other Public Varieties	5.4	5.9	4.1	5.4	7.6	6.5	4.9	8.8	7.2	6.1
Platte						0.0	1.0	1.3	1.6	
Pronghorn	-----	4.6	7.8	6.9	10.9	10.8	10.3	10.4	11.4	10.1
TAM 111										1.2
Wahoo						0.0	1.8	1.7	1.8	1.8
Wesley					1.1	2.2	3.6	5.9	5.5	5.8

6. New Cultivars

In 2006, NE01643 was recommended for release as Husker Genetics Brand Overland in honor of the pioneers who crossed and stayed in the northern prairies. Forms for the American Organization of State Certifying Agencies (AOSCA) have been submitted for approval which will allow the line to be sold with certification in adjacent states. The release document has been prepared and is currently being circulated internally for signatures prior to the development of the formal release documents. Similarly, the PVP application has been developed.

NE01643 was selected from the cross Millennium sib//Seward/Archer that was made in 1995. The F_1 generation was grown in the greenhouse in 1996 and the F_2 to F_3 generations were advanced using the bulk breeding method in the field at Mead, NE in 1997 to 1998. In 1999, single F_3-derived F_4 rows were planted for the selection. There was no further selection thereafter.

NE01643 was evaluated in Nebraska replicated yield nurseries starting in 2002, in the Northern Regional Performance Nursery in 2004 and 2005, and in Nebraska cultivar performance trials in 2004 to 2006. In the Nebraska cultivar performance trials, it is widely adapted and performs well throughout the state with the exception of irrigated wheat production systems where it performs near the average of the tested lines. The average Nebraska rainfed yield of NE01643 was 4072 kg ha^{-1} (39 environments from 2004 to 2006) was greater than the yields of other popular cultivars such as Antelope (3353 kg ha^{-1}), Goodstreak (3653 kg ha^{-1}), Harry (3556 kg ha^{-1}), Infinity CL (3919 kg ha^{-1}), Agripro Brand Jagalene (4028 kg ha^{-1}), Millennium (3815 kg ha^{-1}), Wahoo (3662 kg ha^{-1}), and Wesley (3719 kg ha^{-1}). Though NE01643

has excellent grain yield in rainfed environments, its grain yield (6034 kg ha^{-1}) in irrigated environments is slightly above the test average (6020 kg ha^{-1}) and lower than popular irrigated wheat cultivars Wesley (6464 kg ha^{-1}) and Agripro Jagalene (6383 kg ha^{-1}). The broad adaptation of NE01643 to the Northern Great Plains was evident in its performance in the Northern Regional Performance Nursery where it was the highest yielding line in 2004 (out of 40 lines tested) and 2005 (out of 32 lines tested). Compared to the check cultivars in the Northern Regional Performance Nursery, NE01643 (4698 kg ha^{-1}) was higher yielding than Nekota (3651 kg ha^{-1}) and Nuplains (3864 kg ha^{-1}).

Other measurements of performance from comparison trials show that NE01643 is moderately late in maturity (143 d after Jan.1, data from observations in NE), about 1 d later flowering than 'Wesley' and 0.5 day earlier than Millennium, respectively. NE01643 is a semi-dwarf wheat cultivar and contains the *RhtB1b* (formerly *Rht1*, data provided by Dr. Guihua Bai). The mature plant height of NE01643 (84 cm) is 1 cm shorter than Millennium and 8 cm taller than Wesley. NE01643 has good straw strength (5% lodged), similar to Wesley (3.7%), Millennium (3.9%) and Agripro Jagalene (5.8%), and superior to Goodstreak (15% lodged). The winter hardiness of NE01643 (84%) is good to very good, similar to Nekota (84%) and comparable to other winter wheat cultivars adapted and commonly grown in Nebraska.

NE01643 is moderately susceptible to stem rust (caused by *Puccinia graminis Pers.: Pers. f. sp. tritici* Eriks & E. Henn.) in field nursery tests inoculated with a composite of stem rust races (RCRS, QFCS, QTHJ, RKQQ, and TPMK) but resistant to the most prevalent race QFCS. NE01643 likely carries *SrTmp* and it is moderately resistant to race TTKS based on seedling tests (data provided by Y. Jin at the USDA Cereal Disease Laboratory). It is moderately resistant to leaf rust (caused by *P. triticina* Eriks), stripe rust (caused by *P. striiformis* Westendorp f. sp. t*ritici*, data obtained from field observations in the Great Plains), and Hessian fly (*Mayetiola destructor* Say, data provided by J. Hatchett and Ming-Shun Chen, USDA and Kansas State University). NE01643 also is more tolerant to Fusarium head blight (caused by *Fusarium spp*., data obtained from misted screening nurseries in Nebraska and South Dakota) than many widely grown lines. It is susceptible to wheat soilborne mosaic virus, barley yellow dwarf virus, and wheat streak mosaic virus (data obtained from the Northern Regional Performance Nursery, 2004-2005 and field observations in NE).

NE01643 is a genetically high in grain volume weight (74.0 kg hl^{-1}), similar to Millennium (73.7 kg hl^{-1}) and Infinity CL (73.7 kg hl^{-1}), and higher than Wesley (71.1 kg hl^{-1}) and Wahoo (70.7 kg hl^{-1}). The milling and baking properties of NE01643 were determined for five years by the Nebraska Wheat Quality Laboratory. In these tests, Millennium, an excellent milling and baking wheat, was used as for comparison. The average wheat and flour protein content of NE01643 (138 and 126 g kg^{-1}) were similar to Millennium (141 and 124 g kg^{-1}) for the corresponding years. The slightly lower grain protein content was confirmed by the Nebraska cultivar performance trials where NE01643 had 122 g protein kg^{-1} compared to Millennium with a value of 124 g kg^{-1}. The average flour extraction on the Buhler Laboratory Mill for NE01643 (715 g kg^{-1}) was slightly lower than Millennium (719 g kg^{-1}). The flour ash content (45 g kg^{-1}) was higher than Millennium (42 g kg^{-1}). Dough mixing properties of NE01643 were acceptable, but would be considered weak (mixtime peak was 2.74 minutes and mixtime tolerance was scored as 2.5) which was weaker than Millennium (mixtime peak of 4.00 minutes and mixtime tolerance scored as 3.5). Average baking absorption (620 H_2O g $kg^{-1)}$ was slightly higher than Millennium (616 H_2Og kg^{-1}) for the corresponding years. The average loaf volume of NE01643 (827 cm^3) was lower than Millennium (913 cm^3). The scores for the internal crumb grain and texture ranged from fair to good, which was poorer than Millennium which ranged from fair to very good). The overall end-use quality characteristics for NE01643 are adequate, but less than many commonly grown wheat cultivars and should be acceptable to the milling and baking industries.

In positioning NE01643, based on performance data to date, it should be well adapted to most rainfed wheat production systems in Nebraska and South Dakota, and in adjacent areas of the northern Great Plains. Being a broadly adapted wheat line may explain its excellent agronomic performance in the Northern Regional Performance Nursery. Where it is adapted, NE01643 should be a replacement for Arapahoe, Culver, and possibly Millennium and Wesley, thought Millennium and Wesley have better disease and insect resistances and end-use quality. NE01643 is genetically complementary to Agripro Jagalene, Goodstreak, Pronghorn, Wesley, and 2137. It is non-complementary to Arapahoe, Culver, Millennium, Wahoo, and Niobrara.

NE01643 is an awned, white-glumed cultivar. Its field appearance is most similar to Millennium. After heading, the canopy is open and erect to inclined. The flag leaf is erect and twisted (light to moderately) at the boot stage. The foliage is green to dark green with a light waxy bloom on the leaf sheath, but not on the leaves or spike at anthesis. The leaves are very lightly pubescent with very short hairs. The spike is tapering to oblong in shape, narrow, mid-long, and middense. The glume is long and narrow, and the glume shoulder is narrow to midwide and rounded to square. The beak is short in length with an acuminate to acute tip. The spike is predominantly inclined at maturity with some spikes nodding. Kernels are red colored, hard textured, and mainly elliptical in shape. The kernel has no collar, a large brush of medium length**,** angular cheeks, large germ, and a mid-wide and mid-deep crease.

NE01643 has been uniform and stable since 2004**.** Less than 0.5 % of the plants were rogued from the Breeder's seed increase in 2004. The rogued variant plants were taller in height (10 - 15 cm) or were awnless and/or with red chaff. Up to 1% (10:1000) variant plants may be` encountered in subsequent generations. The Nebraska Crop Improvement Association and Mr. Roger Hammons provided technical assistance in describing the cultivar characteristics and accomplishing technology transfer. The Nebraska Foundation Seed Division, Department of Agronomy and Horticulture, University of Nebraska-Lincoln, Lincoln, NE 68583 had foundation seed available to qualified certified seed enterprises in 2006. The U.S. Department of Agriculture will not have seed for distribution. The seed classes will be Breeder, Foundation, Registered, and Certified. The Registered seed class will be a nonsalable seed class. NE01643 will be submitted for plant variety protection under P.L. 10577 with the certification option. A research and development fee will be assessed on all certified seed sales. Small quantities of seed for research purposes may be obtained from the Dr. P. S. Baenziger and the Department of Agronomy and Horticulture, University of Nebraska-Lincoln for at least 5 yr from the date of this release. NE01643 was developed with partial financial support from the Nebraska Wheat Development, Utilization, and Marketing Board.

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One experimental line NE99495, which has exceptional end-use quality, has been licensed to the Kansas Organic Producers in 2005. It continues to perform well for the organic growers who have developed a relationship with a major food company for organic breakfast cereal. The license is part of our effort to ensure that the germplasm developed at the University of Nebraska for the public good is broadly available to interested parties. The ability to develop high end-use quality with good disease resistance that has acceptable yield potential is a natural complement to conventional lines which emphasize exceptional high yield performance that can be protected by fungicides, insecticides, and herbicides if needed. A major grant for breeding wheat varieties organic production has been submitted to the USDA.

III. FIELD RESEARCH

1. Increase of New Experimental Lines

No new lines originating by from the University of Nebraska program are under large scale increase for possible release in 2007. A number of lines are under small scale increase for possible release in 2008.

With the release of new varieties Antelope, Arrowsmith, Goodstreak, Hallam, Harry, Infinity, Millennium, Nuplains, Wahoo, and Wesley many of the most advanced current breeding lines are not expected to be released.

2. Nebraska Variety Testing

Numerous entries were included in some or all of the locations in the Fall Sown Small Grain Variety Tests in 2006. Eleven dryland and four irrigated locations were harvested for yield data. In 2006, the top ten entries for dryland production were:

Entry	Yield (bu/a)	Entry	Yield (bu/a)
Jagalene	52.57	NE02584	50.80
NE01643	52.85	Harry	52.82
Infinity CL	52.14	Expedition	51.06
Trego	50.70	2137	49.70
NE01481	50.51	Wahoo	51.72

Of the released lines tested in all dryland locations, Turkey (43.2 bu/a) and Scout 66 (47.2 bu/a) as expected, and Buckskin (47.5 bu/a) had the lowest grain yields. These yield levels are higher than the state average yield (36 bu/a) indicating our nurseries are on better production areas than many parts of the state. In Lincoln, some varieties had yields over 100 bu/a which would be unusual in most fields and represents a very high yielding environment. If Lincoln, was removed from the average, the top 5 lines would be NE01643 (52.9 bu/a), Harry (52.8 bu/a), Jagalene (52.6 bu/a), Infinity CL (52.1 bu/a), and Wahoo (51.7 bu/a).

In 2005, the top ten entries for dryland production were:

Entry	Yield (bu/a)	Entry	Yield (bu/a)
NE01643	56.7	Goodstreak	50.4
Infinity CL	52.4	Blend 1	50.1
NE01481	51.4	NE01604	50.1
Millennium	51.4	NE00403	50.1
NuFrontier	50.9	Gen. Mills 10006	49.8

In 2004, the top ten entries for dryland production were:

Entry	Yield (bu/a)	Entry	Yield (bu/a)
Jagalene	57.1	Harry	52.1
Blend #10	55.1	Infinity CL	51.8

NuHills	54.6	NE99495	51.7
2137	53.8	Trego	51.6
W99-194	52.6	Wesley	51.6

3. Irrigated Wheat Trials:

In 2006, four irrigated environments (two in NE and two in WY) were used to evaluate irrigated wheat production. The top ten lines in 2006:

Variety	**Yield bu/a**	**Variety**	**Yield bu/a**
TAM 111	102	NE01422	99
Bond CL	102	NuDakota	99
NI04421	100	2137	98
NuFrontier (W)	99	Jagalene	97
Blend #10	99	Wesley	97

The top ten lines in 2005:

Variety	**Yield bu/a**	**Variety**	**Yield bu/a**
NuHorizon (W)	97.1	NI01824	90.0
N02Y5117	93.5	Dumas	89.6
NI02425	92.1	TAM 111	89.4
Blend #10	91.1	NuFrontier (W)	88.7
NW97S139-1 (W)	90.1	Gen. Mills 10006 (W)	87.7

The top ten lines for 2004 in Nebraska and Wyoming were:

Entry	**Yield**	**Entry**	**Yield**
	bu/a		**bu/a**
Yumar	121.2	NW99L7068	115.2
NW97S139-1	120.4	Blend #10	113.9
NI03427	117.9	Halt	113.5
NW98S097	116.0	NuHorizon	113.3
Wesley	115.7	NE97V121	112.9

The irrigated data this year continue to show the benefits of having a dedicated irrigated wheat development nursery. NI04421 came directly from the irrigated wheat development nursery. In addition, it is good to see a number of experimental lines in the best lines group. We hope that with the four locations there will be more consistent performance among the irrigated wheat lines. Currently there is a yearly shuffle among the top lines and it is hard for growers to choose the most consistent performer.

As in the past, we have an experimental line irrigated nursery, which is grown under irrigation in western Nebraska and under dryland conditions throughout the state. The goal of this nursery is to identify higher yielding lines under irrigation and under higher rainfall conditions, which periodically occur in Nebraska.

The data for 2006 are:

VARIETY	Flowering date	Height (in)	Linc. bu/a	N. Platte bu/a	Allian. bu/a	Rainfed Avg. bu/a	Rank	Sidney Irr bu/a	Rank	Avg. bu/a	Rank
Jagalene	22.2	31.2	83.69	41.25	43.67	56.20	36	**74.32**	**37**	60.73	39
Wesley	21.1	31.6	92.12	43.69	42.79	59.53	23	**83.83**	**16**	65.61	18
Antelope	21.5	31.2	75.48	49.55	41.02	55.35	38	**87.71**	**6**	63.44	32
NI04414	21.8	31.5	92.05	45.56	39.66	59.09	27	**69.39**	**40**	61.67	37
NI04421	21.9	31.8	97.20	53.89	40.84	63.98	8	**78.90**	**31**	67.71	14
NI04428	21.4	31.1	104.93	59.52	40.89	68.45	4	**75.02**	**36**	70.09	6
NI04430	20.0	31.7	84.52	46.95	42.61	58.03	31	**80.31**	**27**	63.60	30
NI04436	20.9	32.4	104.01	43.59	42.82	63.47	10	**92.64**	**1**	70.77	4
NE03486	20.5	32.6	94.22	45.12	41.32	60.22	19	**81.01**	**23**	65.42	20
NI05706	22.4	32.7	103.25	47.70	42.32	64.42	6	**80.31**	**26**	68.40	10
NI05711	22.5	31.5	99.20	46.45	45.00	63.55	9	**82.07**	**21**	68.18	12
NI05713	22.9	33.1	93.02	42.13	44.27	59.81	21	**78.19**	**32**	64.40	25
NI05714	22.4	31.9	78.58	51.38	44.49	58.15	30	**87.35**	**8**	65.45	19
NI05718W	21.7	32.7	87.94	52.81	46.94	62.56	13	**70.44**	**39**	64.53	24
NI05720W	21.8	33.3	95.94	49.66	49.06	64.89	5	**79.60**	**29**	68.57	9
NI05722W	20.8	31.9	82.21	38.94	42.72	54.62	40	**73.97**	**38**	59.46	40
NI04427	21.3	31.3	111.32	51.98	43.86	69.05	3	**87.35**	**7**	73.63	2
NI03427	21.3	31.7	89.59	47.82	45.12	60.84	18	**90.17**	**3**	68.18	13
NI06719	22.3	31.9	91.88	43.31	42.52	59.24	25	**77.49**	**33**	63.80	28
NI06720	21.6	32.0	80.60	48.19	46.08	58.29	29	**79.95**	**28**	63.71	29
NI06721	22.0	31.7	82.54	54.97	49.30	62.27	14	**83.48**	**17**	67.57	15
NI06722	21.1	32.2	84.61	46.75	46.19	59.18	26	**75.38**	**35**	63.23	33
NI06723	21.6	32.4	77.43	52.10	43.95	57.83	32	**82.07**	**20**	63.89	27
NI06724	21.1	32.6	97.20	52.27	40.63	63.37	11	**84.88**	**14**	68.75	7
NI06725	21.7	32.6	87.40	37.63	44.58	56.54	35	**82.42**	**19**	63.01	36
NI06726	22.3	32.4	100.29	49.16	40.06	63.17	12	**85.24**	**13**	68.69	8
NI06727	22.1	30.6	81.65	46.32	41.81	56.59	34	**83.12**	**18**	63.23	34
NI06728	22.9	32.0	85.81	46.91	39.26	57.33	33	**85.24**	**12**	64.31	26
NI06729	22.3	32.6	96.18	46.83	40.37	61.13	16	**89.47**	**4**	68.21	11
NI06730	22.7	31.1	91.04	48.96	38.99	59.66	22	**84.53**	**15**	65.88	17
NI06731	20.7	31.2	92.31	49.71	40.70	60.91	17	**86.65**	**9**	67.34	16
NI06732	21.9	31.5	88.89	52.42	44.34	61.88	15	**75.73**	**34**	65.35	21
NI06733	20.5	32.0	75.44	52.98	46.66	58.36	28	**79.25**	**30**	63.58	31
NI06734	22.7	31.7	76.19	43.60	45.77	55.19	39	**81.01**	**22**	61.64	38
NI06735	21.7	31.6	82.34	43.00	42.10	55.81	37	**85.24**	**11**	63.17	35
NI06736	22.3	31.2	113.01	50.45	43.82	69.09	2	**85.94**	**10**	73.31	3
NI06737	20.5	32.0	107.7	43.46	41.51	64.24	7	**88.06**	**5**	70.19	5

			4								
NI06738	21.5	30.5	120.27	50.04	39.02	69.78	1	**90.87**	**2**	75.05	1
NI06739	22.3	31.4	88.57	46.44	44.82	59.94	20	**80.66**	**25**	65.12	22
NI06740	21.3	31.5	91.09	45.38	41.29	59.25	24	**80.66**	**24**	64.61	23
Average	**21.7**	**31.8**	**91.54**	**47.72**	**43.08**	**60.78**		**82.00**		**66.09**	

Of the check varieties, only Antelope under irrigation performed well. Both Jagalene and Wesley did not do as well as expected in this nursery. One of the more interesting aspects was that the rainfed Lincoln yields were actually greater than the Sidney irrigated yields, hence we have a measure of both irrigated and high-end rainfed production. Of note is that NI04421 continued to do well in rainfed production and that lines such as NI06738 did extremely well in both rainfed and irrigated production. The latter line is exactly the type of lines that we hope this nursery can identify. Also, it should be noted that the average performance is highly biased by the Lincoln performance were there was the greatest variation for grain yield (the highest yielding line was 30 bu/a higher than the average for the trial which gave its line mean an 7.5 bu/a advantage in the average over all locations). Only NI05720W was higher than the nursery average in all of the rainfed environments and it was lower than the nursery average in the irrigated environment. We correlated the yield data from Lincoln, North Platte, Sidney Irrigated, and Alliance. Lincoln was weakly and negatively correlated with Alliance indicating lines that do well at Lincoln do poorly at Alliance. That the four sites are generally not correlated indicates that they represent four different environments and that each are needed to evaluate our lines.

The data for the 2005 Nursery is:

VARIETY	Linc.	Rank	N.Platte	Rank	Hemming.	Rank	**Irrigated**	**Rank**	Dryland Avg.	Rank	**State Avg.**	Rank
	bu/a		bu/a		bu/a		**bu/a**		bu/a		**bu/a**	
Jagalene	66.93	27	64.32	2	89.38	3	**101.44**	**7**	73.54	3	**80.52**	2
NI04403	69.08	21	26.60	40	83.41	16	**68.88**	**40**	59.70	34	**61.99**	37
NI04414	74.51	9	49.50	21	86.99	8	**82.66**	**26**	70.33	7	**73.42**	15
NI04421	81.72	1	71.81	1	88.09	6	**110.63**	**1**	80.54	1	**88.06**	1
NI04424	56.69	35	43.18	29	79.93	19	**83.49**	**24**	59.93	33	**65.82**	33
NI04425	66.50	29	30.71	38	79.64	20	**91.84**	**19**	58.95	35	**67.17**	29
NI04426	67.67	26	44.40	28	88.17	5	**92.26**	**18**	66.75	20	**73.13**	16
NI04427	72.03	14	43.31	30	83.59	14	**98.53**	**10**	66.31	22	**74.37**	13
NI04428	76.21	8	42.54	33	88.31	4	**101.03**	**9**	69.02	12	**77.02**	11
NI04430	78.81	5	50.32	19	86.99	9	**96.85**	**11**	72.04	4	**78.24**	6
NI04436	77.29	7	48.27	24	83.42	15	**93.10**	**17**	69.66	8	**75.52**	12
NI03427	79.47	4	52.36	17	79.49	21	**101.44**	**8**	70.44	5	**78.19**	7
NI04419	66.54	28	40.02	35	78.61	24	**78.48**	**32**	61.72	28	**65.91**	32
NI04431	61.58	33	42.54	32	89.70	2	**90.59**	**20**	64.61	26	**71.10**	23
NE03486	80.69	2	60.80	4	81.91	17	**93.93**	**15**	74.47	2	**79.33**	3
NE03581	71.86	15	33.99	37	95.46	1	**75.14**	**37**	67.10	19	**69.11**	28
NI05701	52.24	38	54.52	11	62.83	39	**72.64**	**39**	56.53	37	**60.56**	38
NI05702	69.22	20	47.81	25	81.30	18	**82.66**	**25**	66.11	23	**70.25**	25
NI05703	68.53	24	49.54	20	65.08	38	**75.15**	**36**	61.05	30	**64.58**	34
NI05704	65.71	30	27.06	39	76.67	29	**80.99**	**30**	56.48	38	**62.61**	36
Wesley	73.71	11	40.01	34	61.84	40	**76.82**	**35**	58.52	36	**63.10**	35
NI05705	70.69	16	56.03	9	77.68	26	**85.58**	**22**	68.13	17	**72.50**	18

NI05706	69.35	19	49.15	22	83.63	12	**95.18**	**13**	67.38	18	**74.33**	14
NI05707	68.89	23	52.59	16	85.80	11	**82.24**	**28**	69.09	11	**72.38**	19
NI05708	67.96	25	51.36	18	86.20	10	**80.99**	**31**	68.51	16	**71.63**	21
NI05709	42.19	40	53.81	13	65.30	37	**77.23**	**34**	53.77	40	**59.63**	39
NI05710	51.76	39	45.53	27	65.62	36	**73.89**	**38**	54.30	39	**59.20**	40
NI05711	69.84	17	62.31	3	75.61	32	**104.37**	**3**	69.25	10	**78.03**	8
NI05712	79.75	3	48.62	23	77.72	25	**82.24**	**29**	68.70	15	**72.08**	20
NI05713	77.68	6	54.63	10	78.85	23	**101.86**	**6**	70.39	6	**78.26**	5
NI05714	74.32	10	47.07	26	87.46	7	**108.13**	**2**	69.62	9	**79.25**	4
NI05715W	64.57	31	53.80	12	76.88	28	**86.42**	**21**	65.08	25	**70.42**	24
NI05716W	54.73	36	57.64	8	71.36	35	**93.51**	**16**	61.24	29	**69.31**	26
NI05717W	73.08	12	34.71	36	78.92	22	**78.07**	**33**	62.24	27	**66.20**	31
NI05718W	60.31	34	58.58	6	76.39	30	**95.60**	**12**	65.09	24	**72.72**	17
NI05719W	72.33	13	53.32	15	74.40	33	**85.16**	**23**	66.68	21	**71.30**	22
NI05720W	69.36	18	60.51	5	77.03	27	**101.86**	**5**	68.97	13	**77.19**	10
NI05721W	53.26	37	58.02	7	71.40	34	**82.66**	**27**	60.89	31	**66.34**	30
NI05722W	68.93	22	54.02	14	83.62	13	**103.53**	**4**	68.86	14	**77.53**	9
Antelope	62.65	32	43.26	31	76.30	31	**94.77**	**14**	60.74	32	**69.25**	27
GRAND MEA	**68.22**		**48.96**		**79.52**		**89.05**		**65.57**		**71.44**	
CV	6.80		11.73		5.96		**9.94**		0.00			
LSD	6.31		7.81		6.45		**12.03**		0.00			

The data for the 2004 nursery are:

					----------bu/a----------					bu/a		bu/a	
VARIETY	HD04L	HT04L	Dis.	Lodg.	Lincoln	N. Platte	Hemming.	St. Avg	Rank	Sidney	Rank	St. Avg.	Rank
	May	(in)						Dry		Irr.			
NI01824	10.5	33.5	5.5	1.0	89.48	62.10	60.30	70.6	11	97.3	43	77.3	26
NI03415	13.5	34.0	7.5	1.0	67.88	53.45	60.05	60.5	47	99.9	41	70.3	47
NI03418	14.0	33.0	5.0	1.0	92.65	54.38	59.08	68.7	16	104.8	33	77.7	20
NI03419	14.0	33.0	5.5	0.0	82.23	55.90	54.50	64.2	40	107.5	24	75.0	38
NI03424	14.0	35.5	4.5	0.5	94.23	53.53	53.53	67.1	28	92.8	47	73.5	39
NI03426	14.5	34.0	5.0	0.0	94.30	54.75	52.83	67.3	27	105.6	30	76.9	29
NI03427	18.0	37.0	4.0	1.0	95.55	67.20	57.03	73.3	4	110.8	18	82.6	9
NI03434	16.5	38.0	4.5	0.5	88.40	50.78	47.25	62.1	46	101.7	37	72.0	44
NI04401	16.0	32.0	6.5	0.0	80.58	62.55	59.05	67.4	25	103.6	35	76.5	30
NI04402	18.0	31.0	6.0	0.0	66.83	46.20	50.15	54.4	50	100.5	40	65.9	50
NI04403	18.5	34.0	4.5	0.0	91.13	49.83	51.50	64.2	41	112.1	12	76.2	32
NI04404	17.5	39.5	5.5	1.0	82.33	49.85	55.60	62.6	45	88.4	49	69.1	49
NI04405	17.0	39.0	5.5	1.0	79.78	57.80	54.38	64.0	43	96.4	44	72.1	43
NI04406	17.5	35.0	5.0	0.0	80.78	56.63	61.08	66.2	33	106.6	27	76.3	31
Jagalene	16.0	32.5	4.0	0.0	90.78	61.93	61.98	71.6	9	124.5	1	84.8	2
NI04407	17.5	33.5	5.5	0.0	77.05	55.83	63.15	65.3	37	105.4	31	75.4	35
NI04408	18.5	35.5	4.5	0.0	84.85	57.53	60.73	67.7	23	108.9	22	78.0	18
NI04409	18.0	35.5	5.5	0.5	97.08	63.13	57.68	72.6	6	117.9	3	83.9	5
NI04410	18.0	33.5	7.0	0.0	78.30	55.23	63.28	65.6	36	93.8	46	72.7	40
NI04411	18.5	32.5	4.0	0.0	96.60	70.68	60.13	75.8	2	106.6	28	83.5	6
NI04412	18.5	37.5	3.0	0.5	99.83	61.00	60.03	73.6	3	117.3	4	84.6	4

NI04413	19.5	40.0	4.5	0.0	96.88	51.98	52.23	67.0	29	99.4	42	75.1	36
NI04414	17.0	36.0	5.0	0.0	98.70	62.38	56.00	72.4	7	115.0	8	83.0	7
NI04415	19.0	37.0	4.5	0.5	88.10	51.33	52.53	64.0	42	89.8	48	70.4	46
NI04416	17.5	37.0	4.5	0.0	104.33	48.58	55.73	69.6	13	107.0	26	78.9	14
NI04417	18.0	35.0	5.0	0.5	84.33	59.38	60.10	67.9	22	100.7	39	76.1	33
NI04418	12.0	37.5	5.5	1.0	84.20	58.63	59.33	67.4	26	85.6	50	71.9	45
NI04419	13.0	32.5	7.0	1.5	88.10	64.05	59.55	70.6	12	114.0	10	81.4	10
NI04420	13.0	35.0	5.5	1.0	94.45	56.25	65.53	72.1	8	115.4	6	82.9	8
Antelope	17.0	35.5	6.0	0.0	78.78	43.75	68.10	63.5	44	109.8	20	75.1	37
NI04421	16.5	36.0	6.0	0.5	96.50	67.45	71.45	78.5	1	115.4	7	87.7	1
NI04422	17.0	35.5	5.0	0.0	86.63	49.50	64.13	66.8	30	107.4	25	76.9	28
NI04423	12.0	35.5	6.0	1.0	84.23	60.73	61.18	68.7	15	104.2	34	77.6	22
NI04424	18.0	32.5	6.0	0.0	71.98	47.03	57.95	59.0	49	112.3	11	72.3	42
NI04425	16.0	32.0	5.5	0.0	91.63	48.80	57.08	65.8	35	112.1	13	77.4	24
NI04426	14.0	35.5	5.5	0.5	100.28	43.58	59.18	67.7	24	110.2	19	78.3	17
NI04427	13.0	33.5	5.0	0.0	89.45	50.55	64.78	68.3	18	115.6	5	80.1	12
NI04428	13.5	33.0	6.5	0.0	96.48	55.23	60.78	70.8	10	111.8	14	81.1	11
NI04429	13.5	33.0	6.5	0.0	93.78	50.70	59.43	68.0	21	105.2	32	77.3	27
NI04430	18.0	34.5	4.5	0.5	93.78	50.28	54.85	66.3	32	114.4	9	78.3	16
NI04431	19.5	34.0	4.5	1.0	84.45	49.80	59.08	64.4	39	110.8	17	76.0	34
NI04432	18.5	36.5	4.0	1.0	98.38	52.33	55.18	68.6	17	111.5	16	79.3	13
NI04433	16.0	37.0	4.5	0.5	74.88	48.90	55.83	59.9	48	101.4	38	70.3	48
NI04434	17.0	37.0	5.5	0.5	96.53	44.05	58.80	66.5	31	109.8	21	77.3	25
Wesley	17.0	33.5	4.0	0.0	94.38	47.20	56.83	66.1	34	111.6	15	77.5	23
NI04435	17.0	35.5	5.0	1.0	98.03	47.08	63.10	69.4	14	103.1	36	77.8	19
NI04436	14.0	36.0	6.0	0.0	96.88	59.60	62.78	73.1	5	119.6	2	84.7	3
NI04437	18.0	39.5	5.5	1.0	88.40	52.40	53.05	64.6	38	95.8	45	72.4	41
NI04438	17.0	35.0	6.0	0.0	91.33	53.88	59.58	68.3	19	108.8	23	78.4	15
NI04439	12.0	37.5	5.0	1.0	97.43	48.75	57.85	68.0	20	106.5	29	77.6	21
Average	16.1	35.5	5.2	0.5	91.4	52.8	59.4	67.9		108.0		77.9	

In 2006, 16 lines were continued for further testing in the irrigated nursery and 1 line was advanced to the Nebraska Triplicate Nursery (NTN). In 2005, 15 lines were continued for further testing in the irrigated nursery and 3 lines were advanced to the Nebraska Triplicate Nursery (NTN). Currently in the NIN there are 5 lines from this nursery.

In the 2005 NIN, three IRR/DRY lines were received for large -scale analysis: NI02425, NI03418, and NI03427. Although NI02425 had flour protein of only 10.0%, the loaf volume of 930cc was quite good. NI03418 was noted for outstanding bread quality characteristics with bread scores of: External: VGood-; Crumb Grain: VGood, and Crumb Texture: Good+. This line appears to have very good potential for bread production. NI03427 had good loaf volume of 955cc with a 10.5% flour protein, but the bread scores were below average. External: Fair+; Grain: Good-; and Texture: Fair. The texture was noted as "weak".

4. Nebraska Intrastate Nursery:

The 2006 Nebraska Intrastate Nursery (NIN) was planted at six locations (Lincoln, Clay Center, North Platte, Sidney, Hemingford, and Mead, NE). Unfortunately, Sidney was lost to drought and mercifully to hail (thus making the decision to harvest or not harvest much simpler). In reviewing the data, Lincoln was correlated with Mead, Clay Center, and North Platte. Mead was also correlated with Clay Center and a

Colorado trial. Clay Center was also correlated with North Platte and Colorado. North Platte was also correlated with Alliance. These correlations were all weak and indicate each testing site is generally correlated with one or both that are near them, but not to ones more distant, again indicating the importance of testing across the state. Of the released lines, Infinity CL did the best across the state, but it was only ranked 20th out of 60 entries. These results indicate that our newer lines have performed very well compared to the previously released lines. NE01643 continued to have a good year and was ranked 4th in the trial indicating it will be very hard to identify superior lines to NE01643. None of our reselections were meritorious and all were dropped. The 2006 data are:

VARIETY	Lincoln Yield bu/a	Rank	Mead Yield bu/a	Rank	Clay Yield bu/a	Center Rank	North Platte Yield bu/a	Rank	Alliance Yield bu/a	Rank	**State Yield bu/a**	**Rank**
WESLEY	**79.72**	**25**	68.80	47	**80.06**	**15**	42.35	10	**44.41**	**44**	63.07	29
ALLIANCE	**75.43**	**44**	70.55	42	**70.19**	**48**	41.73	14	**47.45**	**34**	61.07	39
NE00403	**71.87**	**53**	67.29	55	**78.21**	**20**	41.87	12	**51.86**	**11**	62.22	32
NE01422	**73.29**	**48**	63.17	56	**73.20**	**38**	37.02	40	**40.43**	**55**	57.42	54
NE01481	**87.31**	**3**	78.78	13	**73.75**	**35**	39.52	22	**49.39**	**25**	65.75	11
NE01481-1	**70.09**	**55**	58.17	58	**71.22**	**44**	29.21	59	**44.61**	**43**	54.66	58
NE01604	**78.62**	**27**	69.75	45	**75.39**	**28**	37.90	32	**46.63**	**36**	61.66	35
NE01643	**80.78**	**21**	**84.31**	**2**	**83.82**	**7**	**39.47**	**23**	**50.34**	**15**	**67.74**	**4**
NE02465	**78.63**	**26**	73.77	31	**70.67**	**46**	35.35	47	**30.93**	**60**	57.87	52
NE02513	**72.44**	**52**	69.27	46	**81.74**	**10**	27.87	60	**42.51**	**49**	58.77	50
NE02528	**75.94**	**41**	76.80	18	**74.23**	**32**	32.88	56	**43.89**	**46**	60.75	42
NE02532	**76.14**	**39**	81.62	7	**79.53**	**18**	34.85	50	**43.03**	**48**	63.03	30
NE02533	**86.11**	**5**	76.37	20	**86.95**	**1**	37.48	37	**49.66**	**21**	67.31	5
NE02549	**77.30**	**36**	67.55	50	**72.27**	**41**	40.46	18	**47.48**	**32**	61.01	40
NE02558	**83.28**	**13**	72.26	38	**77.38**	**23**	40.99	17	**54.46**	**3**	65.67	12
NE02584	**82.43**	**16**	79.39	11	**77.54**	**22**	35.39	46	**50.26**	**18**	65.00	17
NE02588	**72.50**	**51**	76.09	23	**67.80**	**52**	37.87	33	**44.64**	**42**	59.78	47
NE02592-1	**74.59**	**46**	80.51	9	**62.01**	**57**	33.24	54	**38.50**	**59**	57.77	53
NI02425	**83.89**	**9**	77.29	16	**81.10**	**13**	36.18	43	**41.68**	**53**	64.03	22
NI02425-1	**77.89**	**29**	82.60	5	**74.56**	**30**	35.23	49	**39.85**	**57**	62.03	34
NE03457	**69.36**	**57**	60.70	57	**69.88**	**49**	34.43	52	**46.41**	**37**	56.16	55
NE03458	**79.90**	**23**	74.02	29	**41.97**	**60**	37.92	**31**	**41.95**	**52**	55.15	57
NE03488	**75.97**	**40**	72.84	34	**79.08**	**19**	37.51	**36**	**49.98**	**20**	63.08	28
NE03490	**85.95**	**7**	67.47	52	**70.64**	**47**	44.39	**3**	**59.83**	**1**	65.66	13
NH03609	**81.16**	**20**	76.20	22	**85.63**	**4**	38.10	**29**	**42.40**	**50**	64.70	18
NH03614	**83.55**	**10**	74.64	27	**79.65**	**17**	41.51	**16**	**49.65**	**22**	65.80	10
NI03418	**75.78**	**42**	67.37	53	**70.72**	**45**	35.64	**44**	**43.51**	**47**	58.60	51
HARRY	**77.64**	**32**	73.93	30	**67.96**	**51**	37.70	**34**	**48.32**	**29**	61.11	38
MILLENNIUM	**69.87**	**56**	75.15	25	**72.24**	**42**	38.92	**25**	**47.47**	**33**	60.73	43
Hallam	**77.48**	**35**	78.38	14	**65.44**	**55**	42.71	**8**	**52.18**	**9**	63.24	27
Infinity	**80.45**	**22**	81.20	8	**74.60**	**29**	38.85	**26**	**47.39**	**35**	64.50	20
WAHOO	**74.89**	**45**	67.50	51	**71.42**	**43**	42.07	**11**	**50.31**	**16**	61.24	37
NI03427	**84.66**	**8**	79.99	10	**81.57**	**12**	36.94	**41**	**42.07**	**51**	65.05	16
NW03638	**70.28**	**54**	77.12	17	**73.58**	**36**	36.24	**42**	**50.78**	**14**	61.60	36

NW03654	**77.58**	**33**	76.21	21	**73.78**	**34**	43.94	**4**	**49.62**	**23**	64.23	21
NW03666	**77.28**	**37**	79.33	12	**81.81**	**9**	43.45	**6**	**52.89**	**6**	66.95	6
NW03670	**72.90**	**50**	69.87	44	**73.36**	**37**	35.48	**45**	**51.45**	**12**	60.61	44
NW03681	**77.85**	**30**	67.71	49	**80.37**	**14**	40.32	**19**	**44.24**	**45**	62.10	33
NE04424	**87.04**	**4**	71.16	40	**79.80**	**16**	45.83	**2**	**50.30**	**17**	66.83	7
NE04435	**73.52**	**47**	69.91	43	**72.76**	**39**	34.79	**51**	**48.20**	**31**	59.84	46
NE04449	**82.59**	**15**	73.50	32	**86.34**	**3**	38.19	**28**	**45.78**	**39**	65.28	15
NE04466	**81.28**	**19**	72.62	36	**75.46**	**27**	42.51	**9**	**45.20**	**41**	63.41	25
NE04475	**76.99**	**38**	67.89	48	**67.52**	**53**	37.46	**38**	**48.88**	**26**	59.75	48
NE04490	**77.55**	**34**	83.02	4	**86.70**	**2**	43.39	**7**	**52.90**	**5**	68.71	3
NE04537	**73.23**	**49**	72.79	35	**65.61**	**54**	38.05	**30**	**52.52**	**7**	60.44	45
NE04550	**86.05**	**6**	74.61	28	**77.97**	**21**	41.72	**15**	**48.65**	**28**	65.80	9
NE04465	**83.10**	**14**	76.59	19	**69.61**	**50**	39.09	**24**	**50.19**	**19**	63.72	23
NE04653	**81.54**	**18**	76.01	24	**82.15**	**8**	37.64	**35**	**50.84**	**13**	65.64	14
NE04662	**75.70**	**43**	72.56	37	**53.56**	**59**	32.67	**57**	**45.53**	**40**	56.00	56
NE04665	**81.74**	**17**	77.59	15	**76.13**	**26**	38.85	**27**	**38.73**	**58**	62.61	31
NW04673	**83.48**	**11**	73.23	33	**74.36**	**31**	40.17	**20**	**46.06**	**38**	63.46	24
NW04685	**78.22**	**28**	70.76	41	**81.71**	**11**	33.43	**53**	**40.35**	**56**	60.89	41
NI04411	**77.72**	**31**	74.66	26	**76.38**	**25**	39.88	**21**	**48.28**	**30**	63.38	26
NI04416	**83.40**	**12**	83.09	3	**74.13**	**33**	32.53	**58**	**49.54**	**24**	64.54	19
NI04420	**89.33**	**2**	85.23	1	**77.28**	**24**	43.63	**5**	**48.71**	**27**	68.84	2
NI04421	**90.01**	**1**	81.63	6	**84.21**	**5**	53.00	**1**	**52.04**	**10**	72.18	1
NI04427	**79.75**	**24**	71.87	39	**83.84**	**6**	41.84	**13**	**53.27**	**4**	66.11	8
GOODSTREAK	**62.31**	**59**	67.37	54	**72.63**	**40**	37.18	**39**	**55.72**	**2**	59.04	49
SCOUT66	**55.92**	**60**	51.86	60	**57.86**	**58**	35.34	**48**	**40.82**	**54**	48.36	60
CHEYENNE	**64.52**	**58**	57.20	59	**62.07**	**56**	33.23	**55**	**52.29**	**8**	53.86	59
GRAND MEAN	**77.93**		**73.32**		**74.39**		**38.39**		**47.29**		**62.26**	
CV	4.94		5.31		9.80		7.54		9.89			
LSD	4.50		5.27		9.87		3.92		6.33			

From the 2005 NIN, twenty-five experimental lines and ten released varieties were received for large-scale analyses. NE00403, NE02513, and NE03488 received "good+" bread scores. One line, NE03490 was highlighted for outstanding bread quality characteristics. Other entries would be considered above average for bread making potential. Some of these are: NE03458, NW03670, and NE02584. One line was recommended to be dropped because of poor quality performance. NH03609 had an excessively long bake mix time of 8.5 minutes, and bread scores of: External: Poor+; Grain: Fair-; and Texture: Poor+. The texture was noted to be "weak" and "gummy." All other lines are considered to be acceptable. From the 2005 Triplicate, fourteen lines (excluding five IRR/DRY entries) were received for large-scale analyses. One entry, NE04424 was highlighted for very good bread quality characteristics. Among the very good bread scores, the Crumb Texture was noted to be silky". This is a very desirable trait. All other lines generally would be considered acceptable for quality with the exception of NE04550, which at best would be marginally acceptable, and NE04465. NE04465 was recommended to be dropped due to poor baking results. Lines in the 2006 NIN are advanced from the 2005 NIN and 2005 TRP.

The 2005 data are listed below:

VARIETY	QUAL	Linc.	Rank	Mead	Ran	C.Center	Ran	N. Platte	Ran	Sidney	Ran	Hemm.	Ran	State Avg.	Rank
		Bu/a		Bu/a		Bu/a		Bu/a		Bu/a		Bu/a			
WESLEY	**2.0**	**69.61**	**39**	**72.90**	**35**	**68.65**	**39**	**42.58**	**40**	**22.00**	**60**	**57.63**	**59**	**55.56**	**57**
ALLIANCE	**2.0**	**69.78**	**38**	**63.08**	**54**	**67.83**	**42**	**41.10**	**45**	**52.50**	**28**	**80.23**	**8**	**62.42**	**42**
N97V121	2.0	64.27	50	83.89	5	68.74	38	43.22	37	36.83	59	64.73	51	60.28	**47**
NE99489	1.0	79.07	5	57.87	57	59.24	55	41.61	42	54.50	24	76.92	17	61.54	**44**
NE99495	1.0	77.38	8	72.83	36	63.81	49	36.19	53	47.83	46	79.26	11	62.88	**39**
NE99656-1	1.0	76.01	12	71.50	40	60.54	52	40.16	47	51.83	31	80.37	6	63.40	**36**
NE00403	2.0	74.87	17	62.33	55	73.69	29	37.97	52	54.50	23	82.02	5	64.23	**31**
NE01422	2.0	69.15	41	78.63	16	68.11	41	51.94	14	56.83	12	76.39	19	66.84	**18**
NE01481	2.0	79.56	2	82.94	6	75.32	24	42.71	39	49.67	41	79.26	12	68.24	**12**
NE01508	1.0	53.43	59	81.94	11	60.00	54	45.84	31	44.67	51	67.56	44	58.91	**52**
NE01533	1.0	65.23	48	73.65	33	76.73	20	51.34	15	44.50	52	71.04	37	63.75	**35**
NE01550	1.0	73.22	25	66.21	52	70.61	36	50.15	21	41.33	55	63.09	55	60.77	**46**
NE01603	1.0	73.71	22	73.26	34	78.53	15	41.57	43	40.67	56	64.45	54	62.03	**43**
NE01604	1.0	73.84	20	86.09	3	78.10	16	47.74	25	55.50	18	73.08	27	69.06	**10**
NE01643	**3.0**	79.30	3	76.91	20	88.13	3	45.89	30	62.50	2	78.42	13	71.86	**4**
NE02465	1.0	66.69	47	77.41	17	75.59	23	44.62	33	56.33	14	76.70	18	66.22	**23**
NE02484	2.5	55.33	58	67.52	49	71.80	34	43.14	38	51.00	34	71.45	35	60.04	**48**
NE02495	**9.0**	85.80	1	85.98	4	76.90	18	50.42	20	52.17	30	75.45	24	71.12	**7**
NE02513	2.0	70.11	37	74.66	24	85.29	4	47.83	24	51.00	35	71.41	36	66.72	**20**
NE02528	2.0	70.29	35	74.53	25	80.00	12	57.24	5	55.67	17	71.80	34	68.26	**11**
NE02532	2.0	64.84	49	65.42	53	71.28	35	50.66	19	55.00	21	77.86	15	64.18	**33**
NE02533	2.0	70.87	33	74.31	26	74.34	26	46.65	28	55.33	20	84.28	3	67.63	**16**
NE02549	2.0	73.03	27	68.23	47	75.97	22	52.69	11	53.33	25	77.58	16	66.81	**19**
NE02558	2.0	70.49	34	74.03	29	81.21	10	64.38	2	60.50	7	79.60	9	71.70	**5**
NE02584	2.0	69.24	40	82.81	7	90.49	2	54.51	8	50.83	36	67.37	46	69.21	**9**
NE02588	2.0	73.40	24	69.47	42	81.38	9	52.71	10	51.33	32	72.03	31	66.72	**21**
NE02592	**9.0**	72.81	28	94.00	1	82.85	5	68.66	1	49.67	40	74.59	25	73.76	**1**
HARRY		**78.71**	**7**	**66.47**	**51**	**49.83**	**59**	**22.37**	**60**	**50.50**	**37**	**83.70**	**4**	**58.60**	**55**
MILLENNIUM		**76.44**	**10**	**73.88**	**30**	**78.73**	**14**	**44.97**	**32**	**53.33**	**26**	**76.38**	**20**	**67.29**	**17**
Hallam	**1.0**	**73.11**	**26**	**68.34**	**46**	**72.77**	**33**	**39.58**	**48**	**49.00**	**43**	**73.69**	**26**	**62.75**	**41**
Infinity	**2.0**	**72.54**	**30**	**80.57**	**12**	**73.79**	**28**	**49.71**	**23**	**55.00**	**22**	**76.34**	**21**	**67.99**	**14**
WAHOO		**68.47**	**43**	**69.16**	**43**	**67.23**	**44**	**50.82**	**17**	**57.17**	**11**	**78.01**	**14**	**65.14**	**27**
NH01036	2.5	62.00	54	66.69	50	52.63	58	35.20	55	45.83	49	67.79	43	55.02	**59**
NH01037	2.5	76.23	11	61.21	56	60.85	51	32.21	57	49.33	42	71.92	32	58.63	**54**
NI02425	2.0	76.97	9	88.34	2	77.20	17	59.61	4	57.50	10	71.90	33	71.92	**3**
NE03417	2.0	56.65	57	73.80	32	60.05	53	35.36	54	49.67	39	62.90	56	56.41	**56**
NE03424	2.0	63.96	51	76.23	21	58.61	56	34.95	56	52.83	27	66.01	50	58.77	**53**
NE03432	1.0	61.42	55	71.80	39	64.12	48	47.62	26	48.33	45	62.16	57	59.24	**50**
NE03435	1.0	73.71	23	79.27	15	81.55	8	46.47	29	38.17	58	59.91	58	63.18	**38**
NE03457	2.0	63.65	53	75.23	22	75.14	25	51.16	16	64.67	1	79.54	10	68.23	**13**
NE03458	1.0	78.89	6	68.49	44	80.30	11	52.04	13	61.50	3	88.45	1	71.61	**6**
NE03488	2.0	74.10	19	68.38	45	73.09	32	43.99	34	60.83	6	70.09	39	65.08	**28**
NE03490	2.0	75.43	13	75.22	23	73.59	30	38.76	50	49.83	38	70.05	40	63.81	**34**
NE03522	**3.0**	73.84	21	71.99	38	73.28	31	38.99	49	48.67	44	69.79	42	62.76	**40**
NH03609	2.0	74.34	18	82.41	8	76.73	21	40.53	46	46.67	48	64.71	52	64.23	**32**

NH03614	1.0	72.08	32	70.24	41	68.54	40	41.15	44	61.33	4	75.84	23	64.86	30
NI01824	2.0	47.45	60	77.09	19	67.03	45	54.38	9	45.00	50	64.52	53	59.25	49
NI03418	2.0	67.66	45	74.15	27	76.80	19	46.66	27	56.17	15	69.84	41	65.21	26
NI03427	2.0	74.99	16	73.82	31	79.81	13	43.24	36	51.00	33	67.53	45	65.07	29
NW03637	1.0	72.19	31	79.53	13	66.01	46	38.11	51	40.33	57	70.46	38	61.11	45
NW03638	3.0	67.77	44	77.22	18	68.94	37	55.71	6	55.67	16	72.40	29	66.29	22
NW03654	2.5	66.82	46	72.73	37	67.71	43	50.13	22	56.50	13	80.30	7	65.70	24
NW03665	2.0	68.75	42	82.25	9	63.37	50	50.81	18	47.17	47	67.23	48	63.26	37
NW03666	2.0	72.70	29	79.50	14	81.99	7	42.23	41	43.33	53	72.03	30	65.30	25
NW03670	1.0	75.24	14	67.55	48	74.09	27	54.58	7	60.50	8	75.98	22	67.99	15
NW03681	3.0	70.29	36	82.03	10	82.30	6	59.98	3	58.83	9	67.27	47	70.12	8
NW03698	3.0	79.30	4	54.92	58	64.50	47	26.75	59	55.50	19	72.92	28	58.98	51
GOODSTREAK		**75.12**	**15**	**74.08**	**28**	**93.36**	**1**	**52.35**	**12**	**61.00**	**5**	**84.38**	**2**	**73.38**	**2**
SCOUT66		**60.33**	**56**	**54.44**	**59**	**45.45**	**60**	**30.53**	**58**	**41.83**	**54**	**54.66**	**60**	**47.87**	**60**
CHEYENNE		**63.87**	**52**	**49.08**	**60**	**56.56**	**57**	**43.78**	**35**	**52.33**	**29**	**66.54**	**49**	**55.36**	**58**
GRAND MEAN		**70.61**		**73.31**		**71.85**		**45.80**		**51.39**		**72.50**			
CV	0.000	7.29		6.39		8.73		10.22		8.47		6.76			
LSD	0.000	6.02		6.34		8.49		6.34		5.89		6.64			

All of the testing sites had very good grain yields. Hemingford was sprayed with fungicides so this is a "disease-free" nursery. Goodstreak, Millennium, and Infinity CL performed very well among the "released" varieties, but a number of excellent experimental lines are progressing well towards future release (the previously mentioned NE01643 with minimally acceptable end-use quality and NI02425 with better quality).

The 2004 data are listed below:

VARIETY	Linc	Mead	C.Center	N.Platte	Sidney	Alliance	STAVG04	St. Rank	Winner, SD	TWT
WESLEY	91.71	23.79	70.20	60.93	50.00	54.18	58.47	38	39.9	53.2
ALLIANCE	95.56	30.35	63.12	64.39	49.95	49.40	58.80	33	45.0	57.6
N97V121	95.51	30.03	71.57	66.18	56.58	54.03	62.32	10	45.8	54.2
Hallam	100.68	36.71	70.86	54.27	49.43	46.06	59.67	27	42.7	55.6
NE99464	84.76	29.78	64.93	61.29	51.57	50.21	57.09	44	42.8	54.8
NE99495	96.65	35.82	50.80	62.52	54.86	51.60	58.71	35	32.3	53.9
NE99543	91.82	41.15	60.17	59.47	51.05	53.60	59.54	28	40.8	58.5
NE00403	86.62	30.99	59.97	55.92	53.21	55.01	56.95	45	47.2	55.1
NE00564	92.83	23.45	60.77	49.32	55.27	53.69	55.89	50	36.5	53.4
NE00633	87.97	26.78	67.12	64.36	51.14	49.43	57.80	42	39.2	56.9
NE00658	91.63	28.56	41.28	58.53	53.14	49.69	53.81	54	44.0	56.5
NE01422	100.73	41.79	78.05	49.23	48.62	47.61	61.01	16	53.1	57.4
NE01481	105.84	29.96	62.29	56.16	49.12	47.64	58.50	37	46.5	55.7
NE01508	85.37	25.10	83.52	58.08	53.59	46.96	58.77	34	25.4	53.7
NE01533	97.81	39.71	76.41	49.71	50.69	45.62	59.99	24	49.4	57.7
NE01603	98.53	29.91	70.92	71.68	46.65	48.34	61.01	17	45.5	58.6
NE01550	91.74	28.79	66.90	63.42	47.93	53.09	58.65	36	39.4	57.3
NE01604	95.86	41.15	66.26	61.39	56.70	59.71	63.51	7	42.7	55.8
NE01564	98.82	36.19	52.05	56.37	52.81	53.66	58.32	41	49.1	56.3
NE01643	93.92	34.63	75.34	60.39	51.91	56.75	62.16	12	57.4	58.0
NE01709	90.75	31.40	72.62	55.99	47.72	48.10	57.76	43	41.7	56.0
NI01828	96.71	16.82	54.66	53.08	50.78	45.03	52.85	56	38.9	55.0
NE99533-3	83.35	23.53	47.43	64.12	54.38	59.28	55.35	52	38.2	53.5
NE99533-5	83.00	18.12	61.86	61.17	55.69	53.26	55.52	51	45.1	59.2
NE99656-1	104.93	28.70	58.56	58.37	54.93	50.12	59.27	29	46.8	57.7
NE99489	110.09	28.97	75.67	57.73	51.86	50.87	62.53	9	49.6	55.6
NE99656	102.86	30.60	66.56	60.43	53.93	49.08	60.58	22	48.9	56.7
NE00435	88.30	11.34	63.84	60.55	41.61	54.91	53.43	55	34.7	56.6
HARRY	99.44	34.65	54.14	63.40	58.66	54.62	60.82	20	41.4	52.0
MILLENNIUM	91.76	31.95	71.93	62.50	49.79	50.26	59.70	26	51.7	57.5
WAHOO	101.60	30.14	54.58	63.85	53.49	47.10	58.46	39	53.0	56.0
NE02484	93.92	21.69	79.94	61.05	51.16	52.23	60.00	23	35.6	53.8
NE02495	94.39	48.53	67.45	64.97	52.84	57.71	64.32	4	44.5	55.9
NE02496	91.46	37.67	78.86	54.19	53.65	50.81	61.11	14	40.0	52.0
NE02513	93.50	36.09	69.18	57.56	52.75	55.50	60.76	21	44.1	58.3
NE02528	91.89	35.33	63.62	61.75	53.78	59.91	61.05	15	42.0	58.2
NE02533	102.03	28.46	68.45	63.78	53.60	57.32	62.27	11	47.1	56.8
NE02545	91.83	28.90	52.95	55.79	50.17	47.82	54.58	53	45.2	56.4
NE02549	95.24	30.46	62.45	61.55	55.49	54.04	59.87	25	58.7	58.9
NE02558	103.94	47.39	70.37	61.26	53.22	56.23	65.40	2	58.3	58.2
NE02584	99.26	37.18	83.17	70.23	57.11	59.91	67.81	1	51.9	59.5
NE02588	102.54	33.40	66.81	63.84	50.07	49.97	61.11	13	51.0	55.1
NE02592	106.29	40.35	63.87	59.98	52.29	43.30	61.01	19	53.5	57.6
NE02647	88.61	14.61	66.57	57.89	44.52	43.05	52.54	57	36.9	54.0
NE02672	96.75	23.32	62.20	57.60	55.90	41.99	56.29	48	43.5	55.1
NI02425	96.54	39.36	82.50	59.06	57.98	54.88	65.05	3	43.6	55.1
Infinity CL	103.62	35.86	70.38	63.00	55.46	57.42	64.29	5	45.3	58.3
NE02465	97.68	22.17	79.25	54.63	47.09	53.72	59.09	31	19.9	49.8
NE02501	86.28	34.54	71.39	55.67	51.70	53.50	58.85	32	38.5	56.3
NE02512	82.86	28.99	37.30	52.12	45.16	48.39	49.14	60	37.0	58.1
NE02532	95.27	37.81	82.27	63.93	50.25	55.41	64.16	6	49.8	58.0
NH01036	95.60	33.07	79.83	59.20	51.24	47.11	61.01	18	43.4	54.4
NH01037	100.30	27.44	74.67	50.50	51.96	49.81	59.11	30	39.7	53.8
NH01048	97.60	26.88	67.16	53.52	56.04	49.23	58.41	40	52.3	55.4
NH01049	92.16	19.54	72.24	55.52	50.39	45.73	55.93	49	37.6	51.5
NH01042	87.45	20.98	71.59	60.11	50.67	47.83	56.44	47	45.1	54.4
CHEYENNE	86.33	22.98	51.71	50.21	50.00	46.40	51.27	58	46.3	56.4
SCOUT66	75.40	25.07	47.97	52.19	48.71	46.51	49.31	59	44.0	59.7

Data from 2004 to 2006 from the Nebraska Intrastate Nursery for Grain Yield (bu/a)

	Lincoln	Mead	C.Center	N.Platte	Sidney	Alliance	STAVG	Rank
VARIETY	bu/a	bu/a	bu/a	bu/a	bu/a	bu/a	bu/a	
NE02558	85.90	64.56	76.32	55.54	56.86	63.43	67.59	1
NE02584	83.64	66.46	83.73	53.38	53.97	59.18	67.34	2
NE01643	84.67	65.28	82.43	48.58	57.21	61.84	67.25	3
NI02425	85.80	68.33	80.27	51.62	57.74	56.15	67.00	4
NE02533	86.34	59.71	76.58	49.30	54.47	63.75	65.74	5
Infinity	85.54	65.88	72.92	50.52	55.23	60.38	65.59	6
GOODSTREAK	79.47	60.70	77.94	48.86	57.84	65.39	65.10	7
NE01604	82.77	65.66	73.25	49.01	56.10	59.81	64.74	8
NE01481	90.90	63.89	70.45	46.13	49.40	58.76	64.16	9
NE02532	78.75	61.62	77.69	49.81	52.63	58.77	63.79	10
NE02528	79.37	62.22	72.62	50.62	54.73	58.53	63.35	11
MILLENNIUM	79.36	60.33	74.30	48.80	51.56	58.04	62.57	12
NE02549	81.86	55.41	70.23	51.57	54.41	59.70	62.56	13
NE02588	82.81	59.65	72.00	51.47	50.70	55.55	62.54	14
NE02513	78.68	60.01	78.74	44.42	51.88	56.47	62.08	15
Hallam	83.76	61.14	69.69	45.52	49.22	57.31	61.89	16
NE01422	81.06	61.20	73.12	46.06	52.73	54.81	61.76	17
WAHOO	81.65	55.60	64.41	52.25	55.33	58.47	61.61	18
NE00403	77.79	53.54	70.62	45.25	53.86	62.96	61.13	19
NE02465	81.00	57.78	75.17	44.87	51.71	53.78	61.06	20
ALLIANCE	80.26	54.66	67.05	49.07	51.23	59.03	60.76	21
HARRY	85.26	58.35	57.31	41.16	54.58	62.21	60.18	22
WESLEY	80.35	55.16	72.97	48.62	36.00	52.07	59.03	23
CHEYENNE	71.57	43.09	56.78	42.41	51.17	55.08	53.50	24
SCOUT66	63.88	43.79	50.43	39.35	45.27	47.33	48.51	25

Note the excellent, consistent performance of NE01643 and NE02584. Many of these lines are under increase for possible release.

5. Nebraska Triplicate Nursery (NTN):

The same comments about the NIN data apply to the NTN. In this nursery, the check lines performed very well compared to the experimental lines. Again the locations tended to be weakly or not correlated indicating the need to test at different locations within the state. The 2006 data are:

	Lincoln	Mead	Clay Center	N. Platte	Alliance	Average	Rank
VARIETY	bu/a	bu/a	bu/a	bu/a	bu/a	bu/a	
Goodstreak	**73.58**	**62.32**	**69.19**	**38.54**	**49.04**	**58.53**	**40**
Jagalene	**86.29**	**71.62**	**91.66**	**39.12**	**48.40**	**67.42**	**3**
Wesley	**84.42**	**61.89**	**93.96**	**43.21**	**44.78**	**65.65**	**11**

NE05403	89.94	75.95	80.70	38.07	41.35	65.20	15
NE05418	74.56	71.47	84.58	35.03	42.65	61.66	25
NE05425	86.45	65.51	93.14	37.76	48.30	66.23	9
NE05426	90.03	73.61	89.04	37.10	45.20	67.00	5
NE05427	78.23	70.42	101.44	34.77	46.56	66.28	6
NE05430	86.92	81.56	81.00	45.38	42.76	67.52	2
NE05434	82.64	69.69	90.22	33.76	40.79	63.42	19
NE05435	70.56	60.16	65.17	26.27	34.12	51.26	59
NE05442	80.09	66.14	55.96	33.61	47.98	56.76	50
NE05443	81.11	62.28	66.59	38.35	44.26	58.52	41
NE05453	88.56	71.72	81.13	36.36	50.93	65.74	10
NE05454	79.63	65.50	61.76	31.08	44.01	56.40	53
NE05458	85.93	75.17	82.67	40.27	47.22	66.25	7
NE05459	82.32	69.02	89.62	42.54	47.71	66.24	8
NE05462	74.13	59.91	64.62	38.62	49.47	57.35	46
NE05463	81.70	58.26	80.24	35.60	42.57	59.67	35
NE05468	81.11	69.01	68.61	41.59	44.23	60.91	28
NE05481	65.22	59.42	73.90	36.41	47.35	56.46	52
NE05489	74.60	64.68	81.78	36.95	42.61	60.12	32
NE05495	84.70	68.14	81.96	42.21	50.65	65.53	12
NE05496	89.03	66.83	88.73	49.26	50.31	68.83	1
NW05502	71.34	58.53	80.86	38.13	35.73	56.92	49
NW05517	86.80	63.59	95.05	35.73	46.38	65.51	13
NW05518	82.70	61.45	84.76	40.05	46.10	63.01	21
NE05523	83.13	57.24	74.12	36.51	47.21	59.64	36
NE05529	84.82	75.70	60.69	35.48	46.57	60.65	30
NE05532	79.52	60.93	80.14	39.07	36.80	59.29	37
NE05537	75.12	61.81	91.70	27.55	42.87	59.81	34
NE05538	82.55	63.92	83.17	33.82	37.90	60.27	31
NE05548	81.01	62.67	87.10	36.59	48.68	63.21	20
NE05549	82.11	64.20	81.85	39.54	45.84	62.71	22
NE05558	81.83	64.62	88.80	44.37	41.39	64.20	17
NE05564	80.83	65.88	69.04	43.84	47.06	61.33	27
NE05566	71.58	64.59	64.49	42.13	44.00	57.36	45
NE05567	87.30	72.06	74.35	34.00	41.88	61.92	24
NE05568	77.19	66.54	73.37	40.04	46.67	60.76	29
NE05569	82.56	62.80	92.21	40.24	49.56	65.47	14
NE05572	73.49	49.71	73.71	27.85	42.25	53.40	58
NE05578	69.64	66.45	85.10	32.47	42.04	59.14	38
NW05584	70.18	48.81	83.14	40.94	46.30	57.87	43
NW05589	71.71	61.31	97.61	35.06	26.33	58.40	42
NW05601	73.03	60.43	77.09	32.85	42.22	57.12	48
NW05605	78.76	59.46	72.64	30.93	38.81	56.12	54
NW05608	78.85	57.38	77.96	31.81	40.55	57.31	47
NW05617	90.69	57.50	91.78	35.29	46.00	64.25	16
NE05625	72.24	54.42	76.82	38.49	46.59	57.71	44
NE05627	82.88	62.89	54.24	35.07	47.80	56.58	51
NE05629	79.46	70.65	90.51	43.97	50.50	67.02	4

NE05631	66.13	51.60	81.60	38.41	41.26	55.80	55
NE05638	78.38	67.78	78.59	35.67	47.03	61.49	26
NW05643	83.39	61.27	79.59	44.77	50.76	63.96	18
NE05652	88.78	70.31	69.95	31.09	39.89	60.00	33
NE05674	71.55	74.24	87.23	35.39	42.35	62.15	23
NE05699	57.64	56.44	60.75	35.57	40.69	50.22	60
NI05713	72.59	58.59	81.56	37.27	45.19	59.04	39
NI05714	79.00	62.39	53.17	33.76	43.73	54.41	57
NI05722W	78.21	52.96	55.55	38.41	51.35	55.30	56
GRAND MEAN	**79.31**	**64.19**	**78.80**	**37.23**	**44.49**	**60.81**	
CV	6.95	6.47	8.49	8.23	7.52		
LSD	7.47	5.62	9.05	4.15	4.53		

In the 2005 Duplicate and Irrigated-Dryland Nurseries, 57 lines and three varieties were advanced to the 2006 Triplicate and evaluated for large-scale analyses. Five lines were dropped as being too soft for bread making and were not baked. Form the Irrigated-Dryland Nursery, NI05713, and NI05722W had acceptable to good bread quality. However, NI05714 was recommended to be eliminated for inferior bread production traits. The dough was noted to be "very sticky" out of the mixer, the loaf volume was unacceptably low at 705cc, and the bread scores were also less than acceptable. External: Poor+, Grain: Fair+, and Texture: Fair.

From the 2005 Duplicate Nursery, fifty-five experimental lines (excluding the three IRR/DRY entries), and three check samples were received for large-scale analyses. The check varieties were: Goodstreak, Jagalene, and Wesley. This nursery is the initial opportunity to evaluate these entries by large-scale methods. These methods include milling a 2.5kg sample by the Buhler Laboratory Mill. In this initial milling test, fifty-one experimental lines had acceptable or better milling results. However, four lines: NE05564, NE05517, NW05617, and NE05562 received "very poor" milling scores as they plugged the reduction rolls of the mill. These lines were recommended to be dropped. They were eliminated from the baking assay, as they'll be eliminated due to the poor milling results. The remaining forty-seven experimental lines were analyzed by the Laboratory's standard methods. Three entries were noted for very good bread production potential. NE05434 had very good bread scores, in spite of flour protein content of only 10.2%. NE05625 had very good bread scores, with acceptable protein content of 11.05%. It was noted to have "bright white" crumb color. This is a desirable quality trait. NE05631 would be considered to have the most outstanding potential. This line had good flour protein of 11.8%, good loaf volume of 950cc, very good bread scores, and was also noted for "bright white" crumb color. Several other lines performed above average. Some of these are: NE05427, NE05442, NE05463, NE05572, and NW05589, Only one line was recommended to be discontinued, due to poor quality traits. NE05489 had unacceptably low loaf volume of 705cc, and less-than-acceptable bread scores. All other lines would be considered acceptable for quality. Twenty-four lines were advanced to the 2007 NIN.

The 2005 data are:

VARIETY	Linc.	RK	Mead	RK	C.Cen.	RK	N. Plat	RK	Sidn.	RK	Hemm.	RK	St. Avg.	RK	HT	HD
	bu/a		bu/a		bu/a		bu/a		bu/a		bu/a		bu/a		in	d
NE04424	77.0	20	85.3	3	91.9	2	56.9	5	52.2	13	75.5	46	73.1	4	35.8	17.2
NE04435	49.8	54	86.1	1	93.4	1	50.4	18	47.6	29	72.1	50	66.6	17	35.2	19.2
NE04449	69.8	34	76.5	15	81.3	9	39.8	42	49.1	26	87.5	3	67.3	13	32.8	19.4
NE04466	56.0	49	84.3	5	77.6	14	48.5	24	55.5	7	86.3	6	68.0	11	33.2	21.8
NE04475	42.7	58	85.3	2	75.6	22	53.7	12	55.8	6	90.1	2	67.2	14	35.3	21.4
NE04488	49.0	55	84.7	4	62.3	53	33.6	51	31.1	60	63.0	59	53.9	58	34.4	20.6
NE04490	99.0	1	82.0	8	84.6	6	64.5	2	59.7	2	86.6	5	79.4	1	36.4	20.4

NE04495	77.8	18	75.2	18	54.4	58	35.9	46	44.4	40	79.2	30	61.1	43	35.3	19.4
NE04496	86.7	4	68.4	43	70.9	38	34.3	50	40.7	52	81.8	19	63.8	33	33.6	20.1
NE04437	67.3	39	62.5	57	73.0	33	46.1	27	56.0	5	81.5	21	64.4	30	33.0	17.7
NE04499	81.3	13	62.5	56	56.3	57	29.2	59	41.8	48	79.9	28	58.5	55	35.7	20.0
NE04508	41.8	59	69.3	39	58.2	56	25.4	60	43.7	42	83.3	16	53.6	59	36.9	22.2
NE04509	51.8	52	72.3	30	70.7	39	33.0	52	49.8	23	77.9	33	59.3	52	43.0	21.2
NE04529	82.8	10	75.8	17	77.2	16	30.9	56	41.3	50	79.8	29	64.6	27	53.7	23.1
NE04537	62.2	43	77.9	10	85.1	5	56.9	4	54.2	9	83.6	12	70.0	6	39.8	20.9
NE04544	81.7	12	77.6	13	52.1	60	32.4	53	43.2	45	85.5	9	62.1	41	37.0	21.3
NE04547	71.3	30	74.6	22	75.8	21	47.4	25	38.1	56	71.6	52	63.2	38	31.6	20.8
NE04548	74.7	24	69.7	36	70.9	37	45.9	28	36.8	57	63.4	58	60.2	47	25.2	22.0
NE04549	71.2	31	76.4	16	69.1	45	47.3	26	36.3	58	65.4	57	60.9	44	30.5	22.3
Jagalene	**74.5**	**25**	**79.2**	**9**	**87.3**	**3**	**61.4**	**3**	**57.2**	**4**	**84.3**	**10**	**74.0**	**3**	**32.1**	**19.2**
NE04550	93.8	2	67.4	45	73.5	30	35.2	49	52.7	11	86.0	7	68.1	10	38.2	21.0
NE04574	56.7	48	61.3	59	61.5	54	49.8	21	62.0	1	76.9	40	61.4	42	34.9	22.3
NE04583	59.5	47	73.5	26	73.7	29	44.0	34	52.2	14	78.7	32	63.6	35	34.6	21.6
NE04584	61.8	44	75.1	19	70.0	43	35.8	47	49.2	25	83.4	14	62.6	40	36.8	22.2
NE04465	60.5	46	77.9	11	83.1	8	50.9	17	51.3	16	80.4	26	67.3	12	32.8	20.1
NE04587	48.8	56	66.2	48	73.0	34	39.0	43	42.4	47	66.8	56	56.0	57	30.4	21.6
NE04607	67.5	38	74.7	21	77.0	17	30.8	57	38.6	54	75.7	45	60.7	45	35.0	21.3
NE04613	70.1	33	73.9	23	75.9	20	50.4	19	46.3	30	70.7	54	64.6	28	33.9	22.6
NE04615	55.7	50	72.1	31	75.2	24	31.1	55	45.0	37	81.9	18	60.2	48	31.4	22.5
NE04617	62.3	42	73.5	27	74.7	25	44.6	32	50.5	21	78.9	31	64.1	31	37.7	24.5
NE04636	78.7	16	65.9	49	64.3	51	51.5	15	50.6	20	80.9	22	65.3	24	40.9	23.6
NE04653	85.0	5	72.1	32	73.8	28	50.0	20	38.2	55	77.6	34	66.1	19	36.1	21.9
NE04662	73.0	26	62.9	55	75.3	23	53.8	11	50.8	19	80.5	24	66.0	20	35.8	22.4
NE04665	83.8	7	71.9	33	79.0	12	54.9	8	49.8	24	76.9	39	69.4	7	36.7	23.1
NE04667	64.8	40	65.1	52	73.1	32	55.7	7	43.8	41	77.3	37	63.3	37	35.1	23.1
NW04668	62.8	41	67.0	46	62.8	52	38.9	44	43.3	44	82.0	17	59.5	50	33.4	17.8
NW04673	79.0	15	69.6	37	80.6	11	49.5	22	52.3	12	83.3	15	69.1	8	35.3	20.0
NW04679	75.0	23	68.8	40	76.9	18	54.6	10	43.7	43	69.2	55	64.7	26	36.8	21.0
NE04477	52.2	51	73.9	24	73.4	31	45.3	30	41.2	51	75.8	44	60.3	46	33.6	20.7
Pronghorn	**48.2**	**57**	**69.6**	**38**	**70.2**	**41**	**38.8**	**45**	**53.4**	**10**	**80.4**	**25**	**60.1**	**49**	**38.4**	**20.0**
NW04685	75.5	22	73.4	28	76.3	19	51.1	16	45.5	34	76.7	41	66.4	18	34.5	20.9
NW04686	71.5	28	74.8	20	69.6	44	44.0	33	45.7	33	77.3	36	63.8	32	33.8	21.2
NW04687	82.0	11	68.2	44	66.7	48	45.7	29	45.3	35	83.5	13	65.2	25	34.8	21.1
NW04688	89.8	3	69.8	35	74.0	27	44.7	31	44.7	38	85.6	8	68.1	9	34.5	20.9
NW04689	83.3	8	64.6	53	69.1	46	43.3	37	41.4	49	80.8	23	63.7	34	35.4	20.5
NW04693	40.2	60	66.5	47	65.9	50	32.0	54	39.7	53	72.3	49	52.8	60	34.6	21.4
NW04697	61.3	45	71.1	34	83.9	7	42.2	38	44.5	39	77.2	38	63.4	36	35.3	22.9
NW04698	76.8	21	68.5	42	59.2	55	30.6	58	48.6	27	71.7	51	59.2	53	33.2	23.5
NW04699	50.0	53	82.0	7	78.5	13	43.6	36	50.8	18	72.6	48	62.9	39	32.9	24.3
NI04411	80.0	14	61.5	58	72.2	35	51.5	14	54.8	8	75.2	47	65.9	21	30.4	23.5
NI04412	72.5	27	68.5	41	66.2	49	43.8	35	51.8	15	84.2	11	64.5	29	35.5	23.3
NI04414	77.0	19	73.7	25	74.0	26	52.1	13	48.2	28	76.1	43	66.9	15	35.5	22.9
NI04416	68.0	36	77.8	12	77.6	15	54.6	9	45.2	36	76.6	42	66.6	16	34.8	21.2
NI04419	78.0	17	64.5	54	54.1	59	35.8	48	46.3	31	77.5	35	59.4	51	32.9	17.8

NI04420	83.2	9	82.7	6	86.5	4	56.2	6	50.0	22	86.9	4	74.3	2	35.5	17.3
NI04421	70.8	32	65.4	51	81.0	10	71.3	1	57.5	3	92.6	1	73.1	5	37.1	20.4
NI04428	84.8	6	72.5	29	68.1	47	41.0	40	45.7	32	80.1	27	65.4	23	32.8	19.1
NI04439	67.8	37	60.3	60	70.1	42	41.0	39	43.2	46	71.3	53	58.9	54	35.3	20.6
NI04427	71.5	29	76.6	14	72.0	36	41.0	41	51.3	17	81.7	20	65.7	22	33.9	19.8
Wesley	**69.3**	**35**	**65.8**	**50**	**70.4**	**40**	**49.0**	**23**	**33.3**	**59**	**59.8**	**60**	**57.9**	**56**	**31.7**	**21.9**
GRAND MEA	**69.4**		**72.3**		**72.8**		**44.9**		**47.1**		**78.3**		**64.1**		**35.0**	**21.1**
CHECK MEA	**64.0**		**71.5**		**76.0**		**49.7**		**48.0**		**74.8**		**64.0**			
CV	16.5		6.1		7.3		10.2		7.8		7.5					
LSD	15.5		6.0		7.2		6.2		5.0		7.9					

The nursery mean is near the check line mean, indicating there are many high yielding experimental lines. Jagalene continues to perform at many locations. Nineteen lines were advanced to the 2005 NIN.

VARIETY	HD AVG	HT. Avg.	Dis.Avg.	Linc.	Mead	Cl. Center	N. Platte	Sidney	Hemming.	St. Avg.	Rank
NW03405	15.0	27.9	5.2	96.94	35.03	78.33	70.85	49.67	61.93	65.46	6
NE03417	15.1	29.9	5.3	89.15	42.12	67.19	60.88	47.88	55.24	60.41	33
NE03424	15.0	30.2	5.9	90.81	36.06	73.88	62.35	54.69	60.02	62.97	11
NE03426	13.8	28.8	5.9	87.36	40.49	59.25	52.62	44.96	58.33	57.17	54
NE03428	15.5	27.3	6.4	93.38	40.06	74.91	50.89	50.39	51.98	60.27	35
NE03432	15.1	29.7	6.4	99.29	32.27	54.59	60.06	54.25	63.39	60.64	32
NE03434	14.8	25.6	6.9	75.49	27.83	49.45	51.18	37.99	55.82	49.63	60
NE03435	17.3	27.1	5.9	96.68	33.00	75.56	62.51	47.42	59.84	62.50	14
NE03439	14.4	28.4	6.1	92.81	31.91	69.35	51.00	50.73	53.47	58.21	49
NE03442	15.0	28.3	5.4	91.01	36.98	67.82	59.84	51.04	54.84	60.26	36
NE03452	13.5	29.3	6.1	80.16	37.17	66.04	53.21	44.09	52.17	55.47	56
NE03454	17.6	27.4	6.7	84.86	30.18	64.96	50.04	43.28	53.21	54.42	58
NE03457	17.7	25.9	5.7	93.01	35.64	71.21	61.06	50.39	60.95	62.04	16
NE03458	17.3	25.8	5.3	95.78	39.80	70.20	72.37	56.11	69.11	67.23	2
NE03473	16.5	26.7	6.7	95.82	30.46	68.13	60.58	55.82	58.52	61.56	22
NE03482	18.1	28.0	5.9	95.74	32.78	61.16	64.57	50.64	59.84	60.79	30
NE03486	18.3	27.5	5.2	102.94	25.23	65.58	64.86	48.01	55.59	60.37	34
NE03488	18.3	27.5	5.1	100.18	37.61	70.45	67.40	49.29	58.77	63.95	8
NE03490	17.5	26.5	5.3	106.62	35.57	64.79	66.31	55.07	65.89	65.71	5
Jagalene	16.5	26.1	4.8	95.77	23.77	78.28	62.65	53.33	51.26	60.84	29
NE03491	16.4	28.1	6.8	98.40	29.31	68.81	62.25	51.68	59.14	61.60	21
NE03511	14.6	27.4	6.8	88.01	31.76	72.43	56.96	49.70	55.35	59.04	41
NE03515	17.4	29.8	6.4	93.97	31.58	58.28	68.13	52.84	56.11	60.15	37
NE03518	16.4	29.1	5.2	100.03	42.30	76.27	59.13	56.56	60.21	65.75	4
NE03520	17.7	31.0	5.1	89.05	32.64	59.71	59.79	48.78	55.14	57.52	53
NE03522	17.3	30.7	5.0	97.81	38.14	59.96	60.50	55.22	60.33	61.99	17
NE03524	17.5	28.0	5.5	89.22	30.03	67.68	59.80	42.65	53.42	57.13	55
NE03531	14.2	27.1	7.5	83.15	35.40	58.54	61.83	50.02	62.21	58.53	45
NE03532	18.7	28.0	5.7	90.88	38.74	55.13	64.02	49.73	56.04	59.09	40
NE03535	18.8	27.6	5.9	97.18	33.05	62.74	60.48	51.16	61.44	61.01	26
NE03580	19.6	28.9	7.2	97.59	25.92	63.79	65.80	52.05	60.81	60.99	27
NE03581	20.5	27.2	5.1	107.77	29.27	54.72	63.92	41.04	59.36	59.35	39
NE03582	20.3	27.9	6.2	93.53	18.24	75.18	61.62	43.93	59.97	58.75	42

NE03595	20.0	28.2	7.0	97.74	21.80	56.00	60.09	49.49	61.34	57.74	51
NH03609	18.4	27.3	6.0	97.00	32.85	78.37	66.55	53.80	58.94	64.59	7
NH03614	16.5	27.0	5.8	99.49	33.81	90.56	69.50	53.74	65.08	68.70	1
NW03621	13.8	27.6	5.0	85.96	39.53	68.22	57.32	45.51	55.07	58.60	44
NW03631	16.7	29.9	7.1	98.66	22.83	63.05	57.65	46.27	61.80	58.38	47
NW03637	17.7	28.8	6.1	95.62	36.67	62.55	63.97	46.41	62.53	61.29	24
Millenniu m	18.9	30.0	5.0	98.84	29.24	70.62	65.55	55.33	57.39	62.83	12
NW03638	16.3	29.4	5.9	99.07	35.81	68.15	68.06	51.62	57.56	63.38	10
NW03640	17.6	28.7	6.3	92.10	33.18	57.86	63.10	47.89	56.41	58.42	46
NW03642	15.9	28.6	6.7	84.13	27.70	73.85	58.06	48.15	58.01	58.32	48
NE03643	17.7	26.0	6.1	92.79	36.26	77.42	59.10	47.13	57.27	61.66	20
NW03644	18.5	28.7	6.6	82.88	27.21	48.89	60.26	51.23	61.61	55.35	57
NW03647	17.9	30.7	5.9	90.82	22.79	54.58	53.14	44.63	55.30	53.54	59
NW03654	15.1	28.5	5.6	95.61	35.29	56.34	60.61	52.48	65.36	60.95	28
NW03665	18.1	29.3	6.2	99.08	26.03	66.30	61.68	47.73	66.75	61.26	25
NW03666	18.8	28.8	5.8	99.28	32.79	57.10	65.53	51.05	64.62	61.73	19
NW03670	18.1	29.9	6.2	93.54	34.99	69.51	61.46	54.55	62.22	62.71	13
NW03671	17.6	28.3	6.0	93.39	31.74	43.78	61.64	59.53	55.86	57.66	52
NW03681	19.3	28.0	4.9	102.15	39.92	82.37	65.68	51.45	53.33	65.82	3
NW03694	20.9	29.1	6.0	105.91	29.77	64.26	59.93	48.78	55.83	60.75	31
NW03698	21.6	29.1	5.0	98.01	23.31	56.73	64.20	53.10	60.82	59.36	38
NI01824	13.6	27.6	6.4	95.17	33.20	69.31	63.62	52.17	57.17	61.77	18
NI03418	15.3	26.9	6.6	96.25	30.97	76.46	62.26	55.62	58.99	63.43	9
NI03426	17.7	26.8	5.7	98.86	18.88	69.25	64.78	47.90	52.50	58.70	43
NI03427	19.8	26.7	5.3	97.52	23.90	73.73	69.36	48.44	56.03	61.50	23
NI03434	18.4	27.3	5.7	86.56	25.65	81.48	59.28	48.20	46.64	57.97	50
Pronghorn	16.0	29.4	6.2	92.07	38.48	69.64	62.71	50.41	59.97	62.21	15

6. Regional Nurseries

In 2006, we continued to combine into one larger nursery the Southern Regional Performance Nursery (SRPN), the Northern Regional Performance Nursery (NRPN), which were planted at Lincoln, North Platte, Sidney (lost to hail), and Alliance. At Clay Center, only the SRPN was planted. To fill out the nursery, we added a few other lines mainly to compare selections out of lines to see if the selection (often for disease or end-use quality) was an improvement agronomically compared to original line.. The data for 2006 are:

	Flower	Height	Lincol n	N. Platte	Allianc e	St. Avg.	Ran k	C.Cente r		SRPN avg.
LINE	May	in	bu/a	bu/a	bu/a	bu/a		bu/a	CLASS	bu/a
Kharkof	26.7	43.0	56.60	26.70	36.00	39.77	88	39.69	HRW	39.75
Scout 66	22.3	44.7	69.10	35.82	38.95	47.96	78	48.53	HRW	48.10
TAM-107	18.3	40.7	87.87	34.38	46.60	56.28	38	69.07	HRW	59.48
Trego	21.3	39.7	86.93	38.72	42.30	55.98	41	77.07	HWW	61.26
KS03HW158	21.3	37.3	93.77	40.80	19.03	51.20	69	79.08	HWW	58.17
KS03HW6-6CL	20.7	41.0	88.78	39.10	36.90	54.93	51	72.43	HWW	59.30
OK93P656H3299-2C04	20.7	40.7	104.07	48.25	42.63	64.98	2	81.62	HRW	69.14
OK01420	18.0	42.7	98.97	40.38	43.13	60.83	8	78.35	HRW	65.21

OK00310-367101	20.7	40.3	101.67	38.07	40.73	60.16	14	80.29	HRW	65.19
OK00224-36805	18.7	41.7	85.88	31.87	38.77	52.17	63	68.92	HRW	56.36
OK02405	21.0	38.0	91.73	36.02	41.57	56.44	33	78.18	HRW	61.88
OK02522W	20.0	38.7	93.42	34.63	36.33	54.79	53	83.31	HWW	61.92
T150	19.7	41.3	90.47	36.18	39.43	55.36	47	69.56	HRW	58.91
T151	18.0	41.3	91.98	30.25	45.30	55.84	44	86.93	HRW	63.62
T152	17.3	38.7	94.50	41.53	46.45	60.83	7	86.24	HRW	67.18
T153	17.0	40.7	98.22	42.98	44.62	61.94	5	84.05	HRW	67.47
HV9W94-CB94005R	17.7	37.0	104.33	41.95	36.10	60.79	9	85.07	HRW	66.86
HV9W02-846R	19.3	40.7	105.58	48.05	49.52	67.72	1	82.90	HRW	71.51
HV9W96-1270R-1	17.0	41.0	86.68	36.57	33.62	52.29	61	77.54	HRW	58.60
HV9W96-1383W	17.7	38.7	87.70	53.22	38.18	59.70	16	80.69	HWW	64.95
CO01212	20.3	43.7	88.67	46.37	42.93	59.32	17	58.45	HRW	59.11
CO01385-A1	20.7	40.3	93.88	42.13	46.20	60.74	10	66.74	HRW	62.24
CO01473	21.7	42.3	70.80	39.98	40.42	50.40	73	60.68	HRW	52.97
CO01W171	22.7	38.3	88.58	35.23	44.50	56.10	40	73.19	HWW	60.38
CO01W172	23.3	39.3	84.07	35.05	48.50	55.87	43	63.52	HWW	57.79
NI03418	24.3	39.3	90.98	35.65	37.12	54.58	55	69.07	HRW	58.21
NI02425	19.7	39.3	81.62	31.37	42.93	51.97	65	69.11	HRW	56.26
NE03490	22.0	37.7	96.12	44.90	48.65	63.22	4	76.67	HRW	66.59
NI04421	21.3	41.3	97.18	47.75	45.58	63.50	3	83.26	HRW	68.44
KS00F5-14-7	18.3	39.7	86.15	34.47	38.77	53.13	58	87.40		61.70
KS00F5-20-3-2	18.3	39.7	94.47	35.18	44.05	57.90	24	85.97		64.92
KS970197-8-9	17.7	40.7	79.65	29.47	42.55	50.56	72	65.87		54.39
KS980512-11-~2	18.3	37.0	100.28	38.63	40.83	59.91	15	87.64		66.85
AP02T4342	18.3	39.3	70.32	34.18	38.12	47.54	79	64.63	HRW	51.81
AP03T6115	19.0	38.7	81.12	28.25	37.07	48.81	76	69.10	HRW	53.89
AP03T6126	19.3	41.3	60.63	25.93	26.80	37.79	90	64.97	HRW	44.58
AP03TA7525	24.7	36.7	88.87	38.25	39.97	55.70	45	82.88	HRW	62.49
TX01A5936	19.3	40.3	81.27	35.15	39.85	52.09	64	69.71	HWW	56.50
TX01V5314	19.0	40.7	92.22	41.72	43.05	59.00	18	78.22	HRW	63.80
TX01V6008	19.7	39.0	90.92	30.90	47.25	56.36	35	77.28	HRW	61.59
TX01A7326	17.3	39.7	87.88	36.83	41.38	55.36	48	74.42	HRW	60.13
TX99A0153-1	19.3	36.0	89.97	49.78	41.03	60.26	13	80.89	HRW	65.42
TX03M1004	17.7	37.3	88.63	33.78	41.82	54.74	54	73.25	HRW	59.37
TX03M1096	17.7	40.0	92.90	43.10	40.77	58.92	20	64.06	HRW	60.21
TX03M1179	18.3	40.7	68.83	28.10	19.52	38.82	89	59.86	HRW	44.08
NW03Y2016	25.7	34.7	66.32	40.27	26.35	44.31	85	58.89	HWW	47.96
APW03-20	19.0	38.7	88.37	39.47	40.73	56.19	39	84.93		63.38
BC97ROM-50W	21.7	37.7	102.45	32.77	45.98	60.40	11	89.74		67.74
98x0338-13	20.3	40.0	100.68	35.30	36.93	57.64	26	87.48		65.10
98x0435-15	19.0	37.7	88.85	41.57	40.90	57.11	29	85.18		64.13
Harding	24.7	41.7	75.23	28.57	36.88	46.89	81		HRW	
Nuplains	25.0	37.7	77.08	33.22	36.93	49.08	75		HWW	
Wesley	22.7	36.3	88.03	41.88	39.70	56.54	32		HRW	
NX02Y4481	24.0	39.3	75.60	36.72	39.68	50.67	71		waxy	
Wahoo	23.7	40.7	93.23	39.52	44.23	58.99	19			
NW03Y2022	22.0	43.0	63.23	37.65	34.63	45.17	84		HWW	

NW03Y2023	22.7	41.3	62.15	35.53	33.45	43.71	86		HWW	
HV9W02-942R	21.0	36.7	94.63	41.90	44.37	60.30	12		HRW	
NE01604	22.0	43.3	87.80	37.48	43.58	56.29	37		HRW	
NE02528	21.3	41.7	82.17	35.47	52.55	56.73	31		HRW	
NE02584	20.3	39.7	87.78	38.42	50.37	58.86	21		HRW	
NE03458	22.0	37.3	84.12	37.67	45.83	55.87	42		HRW	
NH03609	21.3	39.3	90.72	38.57	41.63	56.97	30		HRW	
NH03614	21.0	38.3	93.53	45.42	43.97	60.97	6		HRW	
NI03427	20.7	39.7	92.40	35.98	40.55	56.31	36		HRW	
NI04430	22.3	38.7	89.33	34.42	39.20	54.32	56		HRW	
NW03638	21.3	45.3	82.10	36.70	45.97	54.92	52		HWW	
NW03681	24.3	38.0	86.52	40.93	39.12	55.52	46		HWW	
Goodstreak	21.0	46.3	75.92	31.75	46.12	51.26	68		HRWW	
SD02279	24.7	44.3	80.68	25.55	36.25	47.49	80		HRWW	
SD02480	22.0	40.0	81.57	38.27	45.33	55.06	50		HRWW	
SD02286	23.3	42.7	66.23	31.57	39.57	45.79	83		HRWW	
SD02771	25.0	44.7	78.32	28.75	37.53	48.20	77		HRWW	
SD01058	20.7	41.3	81.65	36.73	39.32	52.57	59		HRWW	
SD96240-3-1	24.0	39.0	72.80	24.62	32.53	43.32	87		HRWW	
SD98W175-1	22.7	40.7	88.97	42.32	42.00	57.76	25		HWW W	
SD01W064	24.3	43.0	92.77	40.77	38.27	57.27	28		HWW W	
SD00151-7	26.0	44.0	74.60	29.53	36.28	46.80	82		HRWW	
Millennium	23.7	41.0	89.20	39.30	40.80	56.43	34			
NH01036	22.0	41.7	84.33	35.18	35.77	51.76	66			
Millennium-45	23.3	40.0	92.90	32.85	39.68	55.14	49		ALS1	
Millennium-27	24.3	39.3	91.12	39.37	43.53	58.01	22		ALS1	
Wahoo-33	23.0	39.0	88.22	29.77	36.67	51.55	67		ALS1	
Wahoo-1	23.0	38.7	86.10	29.68	40.87	52.22	62		ALS1	
Millennium-9	24.7	42.7	86.15	32.60	42.43	53.73	57		ALS2	
Millennium-2	24.3	40.3	86.95	31.05	39.28	52.43	60		ALS2	
Wahoo-4	24.3	40.7	94.03	36.55	43.32	57.97	23		ALS2	
NE02495	21.7	42.3	96.10	39.18	37.00	57.43	27			
NE02592	22.3	43.0	87.18	30.35	35.08	50.87	70			
NE02592-1	23.0	45.0	84.73	32.92	29.75	49.13	74			
GRAND MEAN	21.3	40.2	86.41	36.69	40.19	54.43		74.45		60.14
CV	3.9	3.8	7.00	11.12	11.81					
LSD	1.1	2.0	8.17	5.51	6.41					

One of the pleasant surprises with this nursery is that three of the top 10 lines were developed in Nebraska. It appears that moderately early lines were favored in this nursery, most likely due to the drought and earlier than normal finish in many parts of NE. As NE lines tend to be later than most SRPN lines, having three very good lines gives optimism to the program. In looking at the two data sets (combined RPN and SPRN separately), a number of points are clear. The Nebraska early germplasm needs better straw so it can complete better in the south central region (e.g. Clay Center) where yields are often very high. Better straw strength will also help our irrigated wheat breeding efforts. It is hoped that our irrigated wheat program will assist in this effort. In order to focus on this region, we will probably have to modify our

Lincoln and Clay Center selection nurseries to look for "race-horse" wheats that can really perform when conditions are right. Perhaps the fertility level at Lincoln needs to be increased to eliminate some of the taller lines with weaker straw. If this were done, then Mead will become the selection nursery for the later lines that are well adapted to the longer season of western Nebraska. Another major point is that generally our better-adapted lines appear to be later flowering, maturing lines (e.g. those that will enter the NRPN in preference to the SRPN) and will not be favored in early years. We need to identify high performing lines that are early. Finally, the regional white wheat efforts continue to expand, thus increasing the germplasm available for parent use in creating new white wheat lines.

7. Multiple-Location Observation Nursery

Five replications (locations) in Nebraska (Lincoln, Mead, Clay Center, North Platte, Sidney –again lost to hail, and Hemingford) and one in Kansas of this nursery were harvested and used for selection. The table gives the grain yields for all of the locations, the average, the rank and the averages of the ranks to give an idea of the "stability" of the lines. A high yielding line could be high yield because it is did spectacularly well in a few locations and average in others (high rank average) or it did consistently well across all locations (low rank average). All of the top ten lines were higher yielding than any plot of the replicated check lines. Fifty-six lines were advanced for further testing.

	Lincoln	Mead	C.Center	N. Platte	Alliance	Kansas	Average	Rank
Line	bu/a	bu/a	bu/a	bu/a	bu/a	bu/a	bu/a	
NE06691	93.65	82.50	94.90	42.45	45.20	62.6	70.22	1
NE06654	89.15	70.00	82.55	46.15	42.35	72.5	67.12	2
NE06552	92.40	69.70	88.85	41.45	47.90	60.7	66.83	3
NE06544	82.10	73.05	87.15	38.35	45.75	71.2	66.26	4
NE06415	80.45	73.75	78.95	44.05	49.80	69.7	66.12	5
NE06441	83.45	81.20	77.00	47.70	40.25	65.3	65.81	6
NE06431	97.20	57.40	88.95	41.25	52.75	55.5	65.51	7
NE06476	84.15	71.05	82.35	42.15	50.45	62.3	65.41	8
NE06499	86.60	67.15	88.40	45.80	49.55	54.4	65.32	9
NE06683	75.40	70.50	79.50	39.75	53.05	73.5	65.28	10
NE06545	83.80	77.80	79.05	40.20	46.95	63.0	65.14	11
Jagalene	**85.10**	**80.55**	**85.30**	**38.40**	**43.05**	**57.5**	**64.98**	**12**
NE06477	76.70	61.65	85.95	48.20	48.60	68.7	64.96	13
NE06549	92.15	73.30	73.35	43.95	45.45	60.3	64.75	14
NE06430	81.70	68.70	80.95	48.20	49.90	58.8	64.70	15
NE06462	70.30	76.45	83.70	59.30	49.65	48.5	64.65	16
NE06602	83.90	75.65	92.65	36.65	44.45	52.9	64.36	17
NE06471	78.60	79.05	71.10	46.05	48.10	62.7	64.26	18
NE06672	82.45	74.15	82.25	46.70	43.25	56.6	64.23	19
Wesley	**80.55**	**69.55**	**89.05**	**30.35**	**62.65**	**53.1**	**64.20**	**20**

8. Early Generation Nurseries

a. Single-plot Observation Nursery

Eighteen hundred thirty-five lines were evaluated at Lincoln in 2006. Of the 1835 lines and checks, 1383 where red or mixed red and white seeded (including over 88 herbicide tolerant lines) and 452 where white seeded. Of this group, 532 were harvested and 435 samples were submitted for Quadrumat Junior milling, flour protein content, and dough mixing properties. As in the past, the turn-around time in the Wheat Quality Laboratory was excellent (all quality evaluations completed by the end of August). On the basis of agronomic and quality performance, 265 red and 35 white lines were selected for further testing. In future more white lines will need to be selected

b. Headrow Nursery

Over 36,000 headrows were planted at Lincoln. In general, the headrow nursery had an excellent start due to early planting (our two planting crew effort) and adequate moisture with little winter injury. Space was somewhat constrained so the head rows were planted an numerous fields. The later plantings seemed to separate out the better lines from the poorer lines, which may make us consider deliberately planting later (of course then you can get caught with an early winter or rainy fall). Harvest went very well. We harvested over 2000 lines and planted 1998 (1617 red or segregating red and white; and 323 white wheat lines). Of the red and white wheat lines, 286 where sent to Dr. Baltensperger for planting at Scottsbluff in our irrigated observation nursery, 59 for herbicide tolerance testing, and 232 lines to Gary Hein to test for wheat steak mosaic virus tolerance.

c. F_3 bulk hybrids

The F_3 bulk hybrid nursery contained 704 red or red and white segregating bulks. All plots were planted at Mead and most were planted at Sidney. Most bulks survived the winter and the bulks grew well with little lodging, hence we can select for bulks that should do well in western NE where straw strength is less important may have been lost. The number of F_3 bulks is large. Over 41,000 head rows were selected for fall planting. The headrows were planted relatively early on one large field. In general, their emergence and stands were excellent though the fall. The project goal remains to have sufficiently good segregating F_3 material to select about 40 - 45,000 headrows.

b. F_2 bulk hybrids

The F_2 bulk hybrid nursery contained 744 bulks and check plots with most of them planted at Mead. Eight-nine bulks were plants at Lincoln for herbicide selection. The bulks generally survived the winter, but some were winterkilled (those involving wintertender parents). As in the past, we continue to share our bulks with other programs and receive bulks from other programs. Due to the large number of bulks, about 654 bulks were advanced as individual bulks for further consideration in 2007 from our program.

9. Winter Triticale Nursery

In 2006, no new triticale lines were recommended for release; however, we selected five lines for increase as possible replacements or to complement NE426GT and NE422T which continue to perform well. Because triticale is a small market crop, we are carefully deciding how best to release new triticale cultivars so as to not cause inventory problems with the previously released cultivars. We are now beginning to move to higher and more consistent grain yield levels. With the interest in maize for ethanol, we believe that the future is very bright for triticale in that it can be grown over the winter as forage or grain crop in areas where maize can not be grown successfully. The grain will substitute for maize in animal rations and the forage can be used as forage, cellulosic ethanol feed stocks, or as a grown cover. Cooperation with Iowa State University continues to provide excellent efforts in the grain and we believe in the future bioenergy uses of triticale. The forage data for the 2006 triticale variety trial was provided by Dr. Ken Vogel and the USDA-ARS. Again NE426GT and NE422T performed well, but other experimental lines are equal or better to these lines. An awnless wheat line that can be used for grazing or hay (NE97426) does not have the forage potential of triticale.

The triticale-breeding program received about $8,589.2 this year in research and development fees, which is less than last year, but less the $10,000, which was received in 2004. These funds will be extremely important in developing a sustainable triticale-breeding program. A growing concern is that some producers are saving seed and replanting it on their farms or selling it to others. This practice will hinder the development of new triticale varieties and an ethical seed business. The practice of brown bagging is historically common in triticale and the University needs to protect its intellectual property rights. Marketing in nearby states will become increasingly important if triticale emergences as an important alternative small grains crop. The results of the 2006 triticale variety grain trial were:

VARIETY	Flowering	Height	Lincoln	Mead	Average	Grain	Dry Forage	IVDMD	Forage
	May	in	lbs/a	lbs/a	lbs/a	Rank	lbs/a	%	Rank
NE426GT	**23.2**	**52.5**	**5665**	**4817**	**5241.0**	**4**	5766	59.8	12
NE422T	**26.8**	**57.8**	**4179**	**3671**	**3925.0**	**29**	5372	65.3	24
JAGGER	19.0	41.9	5006	3412	4209.0	28	4610	55.4	30
NT01451	23.5	52.0	5793	4635	5214.0	6	5826	61.3	8
NT02421	23.0	54.7	5482	4605	5043.5	9	5333	58.9	25
NT02431	22.8	52.4	5028	3774	4401.0	21	5557	60.4	18
NE03T416	21.2	54.0	5830	4818	5324.0	1	5467	58.5	22
NT02458	23.4	50.9	5285	4600	4942.5	13	5744	58.8	13
NT00421	24.2	54.3	5151	3567	4359.0	22	5324	61.9	27
NT01435	24.8	52.9	5099	4350	4724.5	17	6510	61.6	1
NT02435	23.2	56.9	5614	3744	4679.0	18	5796	59.0	10
NE03T449	25.7	60.3	3688	3615	3651.5	30	5671	63.2	14
NT02456	24.5	56.3	4547	3934	4240.5	26	5591	62.9	16
NT04417	23.7	51.4	5027	4793	4910.0	14	5598	61.9	15
NT04432	23.5	50.4	5256	4518	4887.0	15	5917	60.8	5
NE03T407	21.5	55.8	5732	4683	5207.5	7	5888	58.8	6
NT04403	24.0	55.9	4801	3832	4316.5	23	5814	61.5	9
NT04424	22.2	55.0	5693	4304	4998.5	10	5329	60.5	26
NT05414	24.0	58.7	4472	4129	4300.5	25	6150	62.7	3
NT05417	24.7	58.5	4864	3590	4227.0	27	5783	61.4	11

NT05421	22.8	58.2	5028	4113	4570.5	19	6175	62.1	2
NT05425	25.5	58.3	4730	3897	4313.5	24	5383	62.7	23
NT05426	19.3	49.0	5724	4210	4967.0	11	5300	59.0	28
NT05429	20.9	51.9	6072	4489	5280.5	2	5298	59.7	29
NT05433	23.2	51.7	5737	4773	5255.0	3	6133	57.4	4
NT05434	21.9	53.2	5625	4291	4958.0	12	5577	57.2	17
NT05442	24.0	52.4	5631	4562	5096.5	8	5479	60.2	21
NT05443	23.7	52.2	5717	4711	5214.0	5	5552	61.1	19
NT05444	23.5	49.9	5292	4249	4770.5	16	5853	58.6	7
NT05448	25.0	58.3	4771	4068	4419.5	20	5523	63.5	20
GRAND MEAN			**5217.97**	**4225.13**	**4721.55**		**5643.91**	**60.54**	
CV			8.63	9.74			8.0	3.629	
LSD			614.91	561.85			528.7	2.583	

The results of the 2005 triticale variety grain trial were:

2005	**Linc.** ---------		**Mead** ---------		**Sidney--** -------		---------	--------- **State** ---------		
	Yield	Rank	Yield	Rank	Yield	Rank	Heading	Height	**Yield**	**Rank**	
VARIETY	lbs/a		lbs/a		lbs/a		Date	(in)	**lbs/a**		TYPE
NE426GT	5366	2	3333	27	3354	15	20.2	43.3	**4018**	**12**	GR
NT00428	4521	23	3546	20	3549	10	20.0	44.1	**3872**	**20**	GR
NT01410	5030	10	4100	8	3192	21	20.2	45.3	**4108**	**7**	GR
NT01451	5529	1	4103	7	4099	2	20.9	45.5	**4577**	**1**	GR
NT02403	5342	3	3597	18	3120	25	20.0	45.7	**4020**	**11**	GR
NT02410	5265	5	3430	25	3110	26	20.7	47.8	**3935**	**16**	GR
NT02419	5120	8	4453	3	2736	36	21.1	46.4	**4103**	**8**	GR
NT02421	5218	6	4690	1	2957	30	20.3	47.4	**4288**	**3**	GR/FO
NT02431	4566	22	4297	5	3600	8	21.4	44.4	**4154**	**5**	GR/FO
NT02454	4754	15	3602	17	3301	17	20.6	46.1	**3885**	**19**	GR
NE03T407	4631	17	3441	23	3959	4	20.0	47.0	**4010**	**13**	GR
NE03T411	4454	26	4253	6	3130	24	20.1	43.9	**3946**	**15**	GR
NE03T416	5128	7	3887	12	3367	14	19.4	43.5	**4127**	**6**	GR
NE03T432	4866	12	2446	38	3172	22	20.6	45.2	**3495**	**27**	GR
NE03T451	4691	16	3495	22	3353	16	20.7	45.6	**3846**	**21**	GR
JAGGER	3685	37	3703	13	2145	39	16.6	33.1	**3178**	**37**	GR, wheat
NE03T456	3953	33	3662	14	3468	12	22.1	48.4	**3694**	**24**	GR
NT02458	5314	4	3639	15	3540	11	21.0	46.2	**4165**	**4**	GR.FO
NE03T452	4504	24	2708	34	2984	29	19.0	44.9	**3399**	**33**	3SEED FLORET
NT00421	4317	28	2043	40	2881	34	20.8	47.6	**3080**	**38**	A-/FO
NT01435	4971	11	3170	28	4065	3	23.2	46.9	**4069**	**9**	F/G
NE422T	3785	36	2735	33	3229	19	25.4	55.9	**3249**	**36**	FO
NT00449	3613	38	3371	26	3138	23	20.9	50.8	**3374**	**34**	FO
NT02435	4619	19	4361	4	4309	1	20.9	50.1	**4429**	**2**	FO
TRICAL	2899	40	2074	39	2915	32	25.6	52.7	**2629**	**40**	FO
NE03T413	4477	25	3966	10	3052	28	20.7	52.0	**3831**	**22**	FO
NE03T449	4021	31	3579	19	2633	37	25.2	57.4	**3411**	**32**	FO
NE03T454	3806	35	3081	29	3376	13	24.3	54.1	**3421**	**30**	FO
NT02456	4215	30	2909	32	2926	31	22.5	49.3	**3350**	**35**	FO.A-

NE03T447	3599	39	3011	30	2122	40	24.1	55.1	**2911**	**39**	FO?
NT04403	4277	29	2591	35	3890	5	21.1	48.5	**3586**	**26**	F
NT04407	4330	27	4043	9	2829	35	22.3	51.9	**3734**	**23**	F
NT04415	4007	32	3431	24	3585	9	19.6	45.3	**3675**	**25**	G
NT04417	4597	20	3950	11	3291	18	21.2	43.5	**3946**	**14**	G
NT04424	4804	13	4502	2	2895	33	20.3	44.9	**4067**	**10**	G
NT04427	5105	9	3638	16	3057	27	20.9	45.3	**3933**	**17**	G
NT04429	4795	14	2938	31	2510	38	20.8	46.2	**3415**	**31**	G
NT04431	4623	18	2589	36	3219	20	21.3	45.1	**3477**	**28**	G
NT04432	4587	21	3504	21	3637	7	20.7	43.4	**3909**	**18**	G
NT04451	3878	34	2555	37	3841	6	23.4	44.8	**3425**	**29**	G
GRAND MEA	**4310**		**3234**		**3214**		**22.0**	**48.8**	**3586**		
CV	8.9		13.5		9.3						
LSD	547.7		636.2		408.0						

The 2005 forage data are:

2005		---------	**Mead----**	--------	--------	--------	**Sidney**	------	-------	---------	------	**Average**	-------
		Dry	Dry	Rank	H date	Height	Dry	Dry	Rank	Height	Dry	Dry	Rank
		Matter	Matter				Matter	Matter			Matter	Matter	
VARIETY	TYPE		Ton/a			in		Ton/a		in		Ton/a	
NE426GT	GR	0.384	5.479	13	22.0	38.4	0.392	4.032	4	39.1	0.388	**4.756**	7
NT00428	GR	0.380	6.072	5	22.1	42.2	0.336	2.755	29	34.0	0.358	**4.414**	19
NT01410	GR	0.398	5.959	6	21.5	42.8	0.353	2.931	28	39.5	0.376	**4.445**	18
NT01451	GR	0.372	5.822	7	22.4	42.5	0.360	3.517	17	40.4	0.366	**4.670**	10
NT02403	GR	0.368	5.533	11	21.4	43.8	0.353	3.715	11	41.7	0.361	**4.624**	11
NT02410	GR	0.363	5.188	20	21.9	41.0	0.370	3.370	22	42.6	0.367	**4.279**	23
NT02419	GR	0.360	5.600	10	22.4	43.7	0.380	3.392	21	42.0	0.370	**4.496**	14
NT02421	GR	0.432	6.651	2	22.4	40.1	0.401	3.522	16	42.3	0.417	**5.087**	2
NT02431	GR	0.440	6.897	1	22.2	40.1	0.362	3.430	19	38.1	0.401	**5.164**	1
NT02454	GR	0.405	6.509	3	22.3	43.6	0.382	3.262	24	39.6	0.394	**4.886**	5
NE03T407	GR	0.361	5.199	19	21.9	45.4	0.361	3.702	13	46.2	0.361	**4.451**	16
NE03T411	GR	0.405	5.648	8	21.9	45.6	0.362	3.247	25	39.8	0.384	**4.448**	17
NE03T416	GR	0.395	5.526	12	22.0	47.3	0.393	3.994	5	40.6	0.394	**4.760**	6
NE03T432	GR	0.379	5.417	14	21.9	44.9	0.368	3.711	12	40.3	0.374	**4.564**	12
NE03T451	GR	0.365	5.118	22	22.3	40.9	0.347	3.610	14	42.0	0.356	**4.364**	21
NE97426	GR-wheat	0.389	4.692	28	22.0	40.9	0.346	2.743	30	34.1	0.368	**3.718**	30
NE03T456	GR	0.337	5.013	25	23.3	44.2	0.332	3.217	26	44.2	0.335	**4.115**	28
NT02458	GR.FO	0.359	5.128	21	22.6	40.2	0.373	3.834	6	40.8	0.366	**4.481**	15
NE03T452	3 seed Flor.	0.414	5.035	24	20.2	36.3	0.360	2.995	27	37.9	0.387	**4.015**	29
NT00421	A-/FO	0.359	5.340	17	23.5	38.3	0.361	3.486	18	42.9	0.360	**4.413**	20
NT01435	F/G	0.365	6.342	4	25.0	47.0	0.335	3.798	9	42.5	0.350	**5.070**	3
NE422T	FO	0.327	5.074	23	28.7	46.9	0.354	3.327	23	48.2	0.341	**4.201**	26
NT00449	FO	0.365	5.004	26	23.2	44.2	0.360	3.526	15	45.4	0.363	**4.265**	24
NT02435	FO	0.358	4.838	27	22.5	43.4	0.387	3.403	20	43.4	0.373	**4.121**	27
TRICAL	FO	0.326	4.549	30	29.3	40.9	0.347	4.097	3	48.4	0.337	**4.323**	22
NE03T413	FO	0.313	4.632	29	23.4	37.6	0.346	3.800	8	48.2	0.330	**4.216**	25
NE03T449	FO	0.349	5.351	15	28.4	51.3	0.373	4.539	1	53.6	0.361	**4.945**	4

NE03T454	FO	0.350	5.275	18	27.6	45.0	0.347	4.109	2	50.0	0.349	**4.692**	9
NT02456	FO.A-	0.349	5.342	16	24.5	43.4	0.357	3.767	10	45.5	0.353	**4.555**	13
NE03T447	FO?	0.369	5.635	9	27.3	42.2	0.382	3.833	7	50.8	0.376	**4.734**	8
GRAND MEA		**0.371**	**5.462**		**23.4**	**42.8**	**0.363**	**3.555**		**42.8**	**0.367**	**4.509**	
CV		8.125	10.738		2.7	11.8	11.220	14.739		7.0			
LSD		0.035	0.690		0.8	5.9	0.048	0.616		3.5			

The results of the 2004 triticale variety trial harvested for grain were:

GRAIN

	---------	--------- Mead---		-------	--------- Lincoln---		------- Sidney---		State	
	Hdate	Height	Grain Yield	Hdate	Height	Grain Yield	Heights	Grain Yield	Average	St. Rank
VARIETY	In May	in	lbs/a	In May	in	lbs/a	in	lbs/a	Lbs/a	
NE426GT	19.0	37.5	3805	13.3	44.7	6913	34.6	4082	4933	1
NT00428	18.4	38.6	3476	13.0	46.7	7217	34.1	3876	4857	2
NT01410	17.5	42.0	3876	13.0	46.7	6535	33.7	3976	4796	3
NT01451	19.9	38.2	3825	13.3	43.7	6326	33.1	4106	4752	6
NT02403	17.9	39.6	3596	13.0	44.0	5836	33.6	3437	4290	17
NT02410	17.8	42.5	2770	13.0	47.0	6350	33.7	3588	4236	18
NT02419	19.0	42.4	3910	13.7	48.7	6671	33.8	3755	4779	4
NT02421	17.2	43.0	3375	12.7	47.3	6464	34.8	3819	4552	13
NT02431	19.1	42.4	3456	14.0	48.3	6917	33.8	3578	4650	8
NT02454	18.1	41.9	3884	13.0	45.3	6097	33.2	4173	4718	7
NE03T407	17.5	42.0	3716	11.0	49.0	6410	34.1	3709	4612	10
NE03T411	18.2	40.5	3734	13.3	46.3	6081	33.3	4009	4608	11
NE03T416	14.8	38.1	3179	12.0	45.0	6272	32.4	4160	4537	14
NE03T432	20.5	40.3	2610	13.7	45.3	5518	32.1	3839	3989	22
NE03T451	18.9	40.9	3456	14.0	47.7	6105	33.1	4359	4640	9
JAGGER	15.2	27.0	619	10.0	34.7	3975	31.0	3424	2673	30
NE03T456	21.0	43.2	2498	15.7	46.7	6601	33.7	4433	4511	15
NT02458	19.3	42.7	3478	14.0	45.0	6611	34.4	4227	4772	5
NE03T452	14.7	39.6	3397	10.7	43.7	5895	34.2	3672	4321	16
NT00421	20.7	41.0	2110	13.0	47.3	5917	35.0	3655	3894	24
NT01435	21.9	41.5	2715	15.7	48.3	4958	32.5	3691	3788	26
NE422T	25.2	53.1	2822	20.3	54.7	6129	39.2	3464	4139	20
NT00449	18.6	45.3	2904	12.3	51.3	5820	37.5	3581	4102	21
NT02435	18.4	41.3	3062	13.7	50.0	5955	35.0	3605	4208	19
TRICAL	26.1	49.6	1374	22.0	51.3	4556	37.1	2864	2931	29
NE03T413	18.6	47.5	3414	12.7	53.7	6488	39.6	3808	4570	12
NE03T449	23.6	52.8	1625	17.0	59.3	6425	40.8	3230	3760	27
NE03T454	23.6	51.0	2084	16.7	58.3	5360	39.3	3449	3631	28
NT02456	20.7	40.2	2307	16.0	51.7	5774	35.3	3785	3955	23
NE03T447	21.8	49.6	2105	16.7	60.0	5665	38.6	3667	3812	25
GRAND MEA	19.4	42.5	2972.8	14.1	48.4	6061.4	34.9	3767.4	4267.2	
CV	3.7	3.1	10.26	5.4	3.3	8.9	4.8	5.7		
LSD	1.0	1.8	416.40	1.0	2.2	738.7	2.3	295.0		

The forage data for the 2004 triticale variety trial was provided by Dr. Ken Vogel and the USDA-ARS. The 2004 data are:

	---------- --------- Mead---------- ----------				'----Sidney------- ---------- State			State
	Hdate	Height	Dry matter	Forage YLD	Dry matter	Forage YLD	Average	Rank
VARIETY	In May	in	At Cutting (%)	t/a	At Cutting (%)	t/a	t/a	
NE426GT	19.0	39.9	0.347	4.92	0.455	2.96	3.94	2
NT00428	19.0	41.0	0.327	4.50	0.500	2.91	3.71	12
NT01410	18.1	41.8	0.335	4.50	0.468	2.78	3.64	18
NT01451	20.7	39.1	0.334	4.45	0.473	2.87	3.66	16
NT02403	18.6	40.9	0.334	4.71	0.465	2.88	3.80	5
NT02410	18.8	42.9	0.338	4.66	0.455	2.89	3.78	6
NT02419	18.5	43.2	0.342	4.54	0.443	2.93	3.74	8
NT02421	18.9	43.5	0.334	4.66	0.470	2.76	3.71	11
NT02431	19.0	41.7	0.330	4.21	0.460	2.65	3.43	26
NT02454	19.3	40.5	0.324	4.50	0.460	2.80	3.65	17
NE03T407	15.9	44.2	0.334	4.59	0.468	3.06	3.83	4
NE03T411	16.9	41.6	0.343	4.58	0.493	2.85	3.72	9
NE03T416	15.9	41.5	0.346	4.41	0.453	2.65	3.53	22
NE03T432	19.3	38.8	0.326	4.11	0.488	2.74	3.43	27
NE03T451	18.9	40.5	0.332	4.41	0.460	2.71	3.56	20
NE97426	18.4	31.5	0.364	3.37	0.580	2.41	2.89	30
NE03T456	21.6	42.1	0.315	4.60	0.428	2.95	3.78	7
NT02458	19.8	40.9	0.334	4.50	0.445	2.88	3.69	13
NE03T452	16.3	40.7	0.350	4.89	0.490	2.83	3.86	3
NT00421	21.7	41.1	0.336	4.26	0.430	2.81	3.54	21
NT01435	22.9	42.4	0.303	4.61	0.443	2.74	3.68	15
NE422T	25.9	51.0	0.311	4.43	0.420	2.83	3.63	19
NT00449	18.9	45.2	0.349	4.47	0.465	2.95	3.71	10
NT02435	19.9	42.1	0.348	4.44	0.463	2.93	3.69	14
TRICAL	25.4	50.3	0.327	4.27	0.410	2.16	3.22	29
NE03T413	20.3	47.4	0.348	5.04	0.445	2.88	3.96	1
NE03T449	23.5	53.1	0.341	4.33	0.450	2.61	3.47	24
NE03T454	24.5	51.5	0.300	4.30	0.433	2.62	3.46	25
NT02456	21.8	41.7	0.319	4.00	0.438	2.67	3.34	28
NE03T447	22.0	49.9	0.338	4.52	0.450	2.47	3.50	23
GRAND MEA	20.0	43.1	0.334	4.46	0.460	2.77	3.62	
CV	3.7	3.4	3.351	7.29	4.248	8.85		
LSD	0.9	1.7	0.013	0.38	0.023	0.29		

Mr. Lekgari A. Lekgari completed his M.S. thesis to study triticale forage yields. Lekgari found that there was considerable variation among the tested triticale lines for grain and forage yield and forage quality and for seeding rates to optimize forage triticale production that approximately 90 lbs/a of seed was needed in eastern NE, whereas a seeding rate of 60 lbs/a was appropriate in western NE.

The three-year summary (2004-2006) of the released lines is:

	Grain Yield			
	Lincoln	Mead	Sidney	State AVG.
Variety	lbs/a	lbs/a	lbs/a	lbs/a
JAGGER	4222	2578	2785	3353
NE422T	4698	3076	3346	3771
NE426GT	5981	3985	3718	4731
	Forage Yield			
		Mead (3)	Sidney (2)	Stavg (5)
		TON/A	TON/A	TON/A
WHEAT*		4.380	2.577	3.658
NE422T		5.140	3.079	4.316
NE426GT		5.583	3.496	4.748

* The wheat variety was either NE97426 or Jagger.

10. Wheat Transformation and Tissue Culture Studies

Wheat transformation has been greatly reduced though it continues to be a key strategic effort in the wheat improvement overall effort. In collaboration with Dr. T. Clemente and Ms. S. Sato of the Transformation Core facility (does our wheat transformation), Dr. S. Wegulo, Ms. J. Breathnach, and J. Counsell of the Department of Plant Pathology (does the screening of conventionally bred and transgenic wheat lines with FHB). We are looking at two new transgenes to see if they have merit in reducing the level of FHB damage in wheat.

11. Chromosome Substitution Lines

This research was undertaken with the expectation as we learn more about the wheat genome, we would be able to develop better breeding strategies. It is done in collaboration with Drs. Kent Eskridge, Kulvinder Gill (now the Vogel Chair at Washington State University), and Ismail Dweikat. Dr. Md. Liakat Ali is the postdoctoral scientist who heads up the project. In 2005 and 2006, we evaluated 230 recombinant inbred chromosome lines in a Cheyenne background for chromosome 3A (CNN(RICL3A)) in a four replicated trial in three environments (Lincoln, Mead, and Sidney). Unfortunately, Sidney, 2006 was lost to hail. Currently we have two good trials (Mead, 2005 and 2006; Sidney, 2005; Lincoln, 2006). We planted the trials at Mead and North Platte for harvest in 2007. We are testing in replicated trials recombinant chromosome lines involving 3A and 6A in a Cheyenne background (CNN(RICL3A+6A)) to study epistasis. We are increasing in the field WI(RICL3A)s and WI(RICL3A+6A)s to compare to our CNN(RICL3A)s and CNN(RICL3A+6A)s. Dr. Mujeeb Kazi created these lines for us using doubled haploid techniques and we are very appreciative of his efforts. We will continue our large field tests to identify where the genes affecting agronomic performance are found on chromosome 3A. This research is supported by a grand from the USDA-CSREES-NRI competitive grants program.

12. White Wheat

Dr. Bob Graybosch, USDA-ARS and I continue our orderly transfer of white wheat germplasm to the state wheat breeding. The cooperation has been excellent and the goal will be to continue the University of Nebraska wheat improvement effort, while building a unified cultivar release program. Nuplains, Antelope

and Arrowsmith have been release and are available to growers. Interestingly, many of these white wheat lines have found a niche market with organic wheat producers. The first white wheat developed from this program was entered into the Nebraska State Variety Trials in 2005. However the line did not have sufficient end-use quality or agronomic performance to continue its testing. The progress on this front has been slower than we would like and we continue to try to find ways to speed up the effort. As in the past, we have just begun screening all of the lines advanced in 2005 for low polyphenol oxidase, an enzyme that is believed to discolor wet noodles and other wheat products. The results were as follows:

Nursery 2006	Total Number of Lines	Low PPO Lines	Higher PPO Lines	Low PPO Percent of Lines
NIN	60	2	58	3.33
Triplicate	60	5	55	8.33
Duplicate	300	6	294	2.00
Irrigated-Dry	40	2	38	5.00

* Low PPO is scored on a 0-5 scale with 0 having no discoloration and 5 being virtually black in the assay. Lines with scores of 2 or below were considered as being low PPO for this summary.

13. Collaborative Research on Wheat Diseases

Dr. Stephen Wegulo, Department of Plant Pathology, and their staff continue to inoculate our experimental lines with wheat stem rust and Fusarium head blight (FHB, research funded by the U.S. What and Barley Scab Initiative), and as time permits with wheat leaf rust. We continue to improve the greenhouse tests for stem rust, as we seem to be using a slightly more virulent race of the disease than in the past. The major event in stem rust research is the emergence of a new race Ug99 (Ug 99---for its being first found in Uganda in 1999) that can overcome some of the previously very durable resistance genes in wheat (e.g. *Sr6* and more recently *Sr24*). *Sr6* and *Sr24* are the two main genes used in our program, hence this is a huge potential loss for our breeding efforts. It appears that *Sr2* (found in Scout 66 but is associated with false black chaff), *Sr36* (found in Vista and possibly the new Colorado line Ripper), and *Sr1A.1R* (associated with Amigo derived lines) are still effective. Interestingly *SrTmp* which is found in many of our lines, including NE01643 is resistant to Ug99, but not to some of the races found in the United States. Much of the world is very concerned about tUg99 because it has moved from Africa to the Arabian Peninsula as expected. Its most likely path will be from Kenya/Ethiopia to North Africa (Egypt) and the Middle East to Central Asia. Virtually all of the wheat varieties in this area are susceptible and the consequences would be dire for small, barely self-sufficient farmers. Even where there are resistant varieties, the seed industry is weak and it would be impossible to rapidly change varieties. We are quickly adding *Sr25* and *Sr26* to our breeding efforts to add additional sources of resistance. Of course, with diseases, eternal vigilance is the key and we are very fortunate to have continued our breeding efforts on this potentially devastating disease despite the last major epidemic in the Great Plains occurring in 1986. Mr. Javed Sidiqi, from Afghanistan, will be screening Afghanistan lines for stem rust resistance.

Work continues on introgressing the resistance from *Agropyron* (the first real resistance/tolerance to wheat streak mosaic virus developed by Dr. Joe Martin, Kansas State University at Hays, Kansas and his co-workers) into adapted wheat varieties. A number of lines that may have this source of resistance were given to Gary Hein who is testing them in the field in Scottsbluff, NE. The frequency of lines carrying virus resistance remains lower than expected and it is our hope that molecular marker will be used to enrich our populations and enhance our frequency of elite lines with resistance.

Molecular markers will be an important aspect of our research on developing Fusarium head blight

(FHB, syn. scab) resistant lines. Working with FHB is hard because the disease assay must be done when the plants are at flowering (hence it is a very long assay) and it is very environmentally sensitive. Hence anything that can be done to select for plants in the seedling stages (as molecular markers would allow you to do) is very important. In 2006, we began making a series of crosses that should have fixed FHB QTLs, hence assuring that we will have at least one FHB QTL in the resultant populations. For example, we will cross hard red spring wheat lines with the 3BS QTL from Sumai 3 to soft red winter lines from Virginia with the 3BS QTL from Sumai 3 to one of the four currently identified Nebraska lines which have the marker at the 3BS QTL. The three way crosses will have two hard wheat parents and two winter wheat parents. We will use molecular markers to enrich the 3-way cross population (score the F_1 plants) with other molecular markers for possible segregating FHB QTLs to ensure we have plants than truly contain the 3BS QTL from Sumai 3 and additional FHB QTLs. In the F2 and possibly F3 bulk generations, we will use optical sorting to enrich the populations for kernel hardness (remove the soft kernel genotypes) and for elevated kernel protein level. Currently experiments to determine the efficacy of optical sorting for hardness and protein content are underway with Dr. Floyd Dowell of the USDA-ARS, Manhattan, KS. In this approach, minimally we should create populations that are fixed for the 3BS QTL, enriched for other FHB QTLs, and selected for hardness and protein content prior to visual selection.

As the early generation selection is based upon visual selection (at best only moderately effective selection system), we do weight our early generation selection indices heavily towards sampling for FHB tolerant populations to insure we have numerous potentially FHB tolerant lines in later generations. To test if this approach has merit, we will be screening a number of our head row populations for known FHB tolerant QTLs using molecular markers and harvesting those with and without the known FHB QTLs to determine how different our selections will be if they are based upon QTL markers and on visual selection. In the next generation we will harvest the FHB QTL lines and the non-FHB QTL lines to see if the FHB QTL lines that were not visually selected will survive the agronomic performance selection or become only parents. Mr. Neway Mengistu (who received a partial scholarship from Pioneer HiBred International) will be working on the FHB project. The scab research is supported by a grand from the USDA-National Wheat and Barley Scab Initiative program.

14. Plant Height and Diversity in Wheat

Mr. Zakaria Aj-alouni will be working with Dr. Guihua Bai (USDA-ARS, Genotyping Center) and Drs. Ali and Dweikat to determine the frequency or semi-dwarfing genes in our breeding lines. We are interested in knowing if *Rht$_1$* or *Rht$_2$* may have better height characteristics in our tall and short plant height environments. Rht are "reduced height" genes that are the basis of the Green Revolution. So far most lines appear to have the *Rht$_1$* gene, but more research is needed. We are also wondering why there are so many different responses to the environment for lines with *Rht$_1$* which we believe there must be useful modifier genes in the background that affect of *Rht$_1$*.

15. Coordinated Agriculture Project: Applied Wheat Genomics

As part of a large multistate project, we are developing a mapping population and adding the molecular markers. We had difficulties with our population in the our first population did not have sufficient doubled haploid (82 lines, but we needed 96 lines), the second population was lost due to a bad cross. The third population was lost due to heterogeneity in one parental line thus making the population suspect. Pat Byrne of Colorado State University gracious shared a population, TAM107-R7 x Arlin that his team developed for this work. We are increasing the population in the greenhouse and Arizona to have sufficient seed to go to the field in at three

locations in 2007-2008. We are extracting DNA with the goal of putting 60-100 SSR markers on the population by November 2007. In addition, we will be sending the population to Australia to use DArT markers and hope to add about 200 markers to the population. Mr. Nick Crowley will lead this research are part of his M.S. degree research. This research is supported by a grand from the USDA-CSREES-NRI competitive grants program.

16. Genetic Diversity in Turkish and Nebraska Cultivars

Ms. Anyamanee Auvuchanon (who is supported by a scholarship from her government) will be working on the relationship between U.S. and Turkish wheat lines. In 1874, Turkey red winter wheat was brought to the Great Plains and became the most widely grown wheat in the United States. Since then the Turkish and U.S. breeding programs have interacted, but often used different germplasm. The goal of this research is to see if there are molecular markers or traits that consistently found in both groups of lines which would indicate that breeding for similar environments has lead to selecting for similar genes and the two regions have not diversified genetically greatly. If the two gene pools are greatly different, each gene pool could be a valuable resource for improving the other gene pool.

17. Organic Wheat Breeding Efforts

The long-term goal of this effort is to develop small grains cultivars and cropping systems incorporating small grains that will improve the profitability and competitiveness of organic producers. We will involve the organic community and have identified previously the need for high quality organic wheat varieties and management practices specific to organic farms. The specific objectives of our research are to: 1. Determine if current advanced experimental wheat lines and released cultivars have potential for organic wheat production, and 2. Based upon what we learn in the organic wheat trials, augment our wheat breeding program to develop wheat cultivars ideally suited to organic production. Others will attempt to 3. Develop an integrated organic soil fertility management program to increase grain protein content, and 4. Reduce tillage or increase organic matter in organic systems by the use of small grains cover crops to suppress weeds, or to suppress weeds by flaming. Our approach will be to conduct wheat state variety trials at 4 organic locations and target organic breeding effort at 2 locations complete with end-use quality and nutrient quality evaluations, soil fertility trials at two locations, and cover crop research at one location. Our outreach efforts will include the development of workshops and web-based materials to explain the wheat breeding process and variety selection, prioritizing the desirable traits for organic production and marketing, involving organic producers in the planning and on-farm evaluation (using on-farm demonstration plots) of an integrated organic farm package involving the best cultivar(s) grown using the best fertility regime and cover crops. This project should be very complementary to our conventional wheat breeding effort in that organic producers emphasize the need for excellent end-use quality and disease resistance, but can accept lower yields. Conventional wheat producers emphasize the need for higher yield and can accept average disease resistance and end-use quality. Hence each set of lines can be used as parents to develop improved lines or the complementary program.

IV. GREENHOUSE RESEARCH

In 2006, the majority of F_1 wheat populations were grown at Yuma, AZ. Only populations needing additional crosses are being grown in the Lincoln Greenhouses. This change reduced our greenhouse space and greenhouse labor, and provided much greater quantities of F_2 seed.

V. PROPRIETARY RESEARCH

With the advent of plant biotechnology, the necessity and desirability of interacting with commercial companies has increased. We continue to breed herbicide tolerant wheat with one company as can be seen by the release of Infinity CL wheat and the development of two-gene Clearfield wheat lines. Historically, the University of Nebraska has been reticent to aggressively enforce its intellectual property rights under the Plant Variety Protection Act. Non-enforcement or weak enforcement will jeopardize all future collaborations with companies who have the reasonable expectation that their intellectual property will be handled in accordance to the law.

We received our fifth year of research and development fees from an agreement with Paramount Seed Farms (a commercial seed company) for the exclusive release of our winter barley germplasm. We are increasing a number of barley lines for further testing and as possible new products.

The 2006 data for the Barley Variety Trial were:

VARIETY	Heading Date May	Height (in)	Colby Yield lbs/a	Colby Moist. %	Colby Test Wt lbs/bu	Linc. Yield lbs/a	Mead Yield lbs/a)	**Average Yield Lbs/a**	Rank
NB99845	11.3	32.4	3728	10.0	44.0	4795	4349	**4290**	25
NB018199	13.8	35.0	3350	10.3	43.5	4874	5262	**4495**	8
NB99874	18.5	35.4	3335	10.3	38.8	4706	4773	**4271**	26
NB99875	14.2	34.7	3602	10.8	43.3	4505	4976	**4361**	19
NB04427	12.8	35.3	3574	10.5	45.0	4902	4248	**4241**	27
NB018131	10.4	34.7	3283	10.0	44.5	4864	4778	**4308**	24
NB018211	10.9	34.0	3314	10.5	46.8	4517	3255	**3695**	40
NB97891	12.1	33.6	3520	10.0	44.8	5039	4397	**4319**	23
NB018187	11.8	33.6	3979	10.5	45.5	5195	4652	**4608**	4
NB03439	13.8	35.8	3643	11.0	48.3	4607	4920	**4390**	17
P-713	9.9	34.9	4034	10.3	43.8	5505	4893	**4811**	1
NB04436	13.2	35.0	4262	10.5	47.8	4331	4829	**4474**	9
NB03440	13.6	35.8	3743	11.0	47.0	4715	4770	**4409**	13
NB04442	13.5	37.5	3498	10.3	43.3	4113	3876	**3829**	38
NB018180	10.9	36.4	3505	10.5	46.5	4427	4215	**4049**	33
NB04418	10.6	36.0	3740	10.0	44.8	5222	4392	**4451**	11
NB04428	12.2	36.0	3293	10.3	43.5	5135	4760	**4396**	16
NB018163	11.2	36.5	3745	10.8	47.0	5183	4851	**4593**	5
P-954	13.3	33.6	3537	10.8	44.3	5170	4707	**4471**	10
NB03402	10.6	32.4	3889	10.5	46.3	5336	4755	**4660**	3
NB04412	14.4	36.9	3417	10.3	45.5	4241	4323	**3994**	35
NB03437	14.9	34.3	3584	10.3	44.8	5108	4893	**4528**	6
NB03403	9.9	34.9	3301	10.8	47.8	5015	4080	**4132**	30
NB03429	14.0	31.9	4014	10.3	45.5	5055	5063	**4711**	2
P-721	12.8	33.8	3814	10.8	45.3	4301	4203	**4106**	32
TAMBAR 501	9.5	35.3	2546	9.0	35.5	4136	4575	**3752**	39
NB04439	15.4	37.0	3841	11.0	47.0	4535	4752	**4376**	18
NB03435	13.6	34.2	3712	10.3	43.8	4891	4587	**4397**	15

NB99881	13.7	34.4	3562	11.5	45.8	4731	4917	**4403**	14
NB05417	9.7	34.6	3743	10.0	45.8	4386	4947	**4359**	20
NB05432	11.3	34.8	3834	10.8	46.3	5018	3275	**4042**	34
NB05420	11.3	31.6	2947	10.0	44.5	5262	4848	**4352**	21
NB05418	9.8	34.6	4013	10.3	45.3	5127	4367	**4502**	7
NB05428	11.7	35.8	3523	10.0	44.0	4621	4197	**4114**	31
NB05419	8.8	34.0	3743	10.0	46.3	4964	4295	**4334**	22
NB05423	7.8	34.3	3459	9.5	42.0	4862	4337	**4219**	28
NB05412	17.0	32.8	3872	10.8	45.0	4046	4574	**4164**	29
NB05407	12.8	34.0	3346	10.3	46.8	4064	4088	**3833**	37
NB05409	9.9	34.0	2845	10.3	43.5	4519	4365	**3910**	36
NB05410	10.0	33.9	3176	9.8	45.8	5240	4902	**4440**	12
GRAND MEAN			**3572**	**10.4**	**44.9**	**4781**	**4531**	**4295**	
CV			9.0	4.7	2.8	9.74	13.1		
LSD			376.1	0.6	1.5	545.91	1003		

The 2005 data for the Barley Variety Trial were:

2005	Lincoln	-----	Mead	-----	Sidney	------	--------	Colby, KS	------	------				
VARIETY	Yield	Rk	Yield	Rk	Yield	Rk	Lodg.	Yield	Rk	Most.	Hdavg.	Htavg.	**Average**	**Rank**
	(lbs/a)		(lbs/a)		(lbs/a)			(lbs/a)			d	in	**(lbs/a)**	
Perkins	**3755.3**	**40**	**3391.5**	**21**	**2499.8**	**29**	**6.3**	**3856.8**	**38**	**13.75**	**16.8**	**30.8**	**3376**	**39**
TAMBAR 501	**4645.5**	**36**	**2287.5**	**38**	**2830.5**	**22**	**1.3**	**4437.8**	**34**	**11.75**	**10.6**	**30.4**	**3550**	**37**
P-721	**4273.5**	**38**	**2907.0**	**27**	**3039.8**	**12**	**3.8**	**4927.3**	**20**	**13.25**	**13.5**	**29.5**	**3787**	**30**
P-954	**5322.8**	**9**	**3763.5**	**15**	**1496.3**	**39**	**1.3**	**5067.0**	**12**	**13.75**	**13.0**	**28.2**	**3912**	**21**
P-713	**4981.5**	**27**	**3850.5**	**14**	**3052.5**	**11**	**10.0**	**5029.3**	**14**	**11.75**	**12.0**	**31.9**	**4228**	**11**
NB97891	5160.0	14	4075.5	9	2603.3	26	11.3	5613.8	1	12.75	11.2	30.3	4363	8
P-919	**5016.0**	**24**	**4048.5**	**10**	**2859.8**	**21**	**3.8**	**3646.8**	**40**	**12.25**	**9.4**	**32.4**	**3893**	**25**
NB98936	5043.0	22	3747.0	16	1707.8	38	5.0	4942.0	18	13.00	12.1	29.2	3860	27
NB99845	5734.5	1	4299.0	4	3857.3	2	1.3	5245.3	7	12.50	10.7	29.0	4784	1
NB99874	5511.0	4	4260.0	6	3294.0	7	10.0	5170.3	9	13.50	16.9	31.7	4559	3
NB99875	5220.8	13	4308.0	3	3508.5	4	15.0	4880.5	23	14.75	13.4	31.5	4479	4
NB99881	4645.5	35	2899.5	28	2175.8	33	6.3	4896.5	22	13.50	13.9	29.9	3654	34
NB99885	5304.0	11	3513.0	19	1881.8	37	7.5	5375.3	5	12.00	10.9	30.1	4019	17
NB018131	5304.8	10	4162.5	7	3073.5	9	3.8	5229.3	8	12.00	9.6	33.3	4443	6
NB018163	5110.5	18	3157.5	23	2535.8	27	11.3	5062.3	13	12.25	10.5	31.8	3967	19
NB018180	4700.3	33	3933.0	11	2769.0	23	5.0	4703.0	27	12.75	11.1	33.7	4026	15
NB018187	5088.8	19	3861.0	13	2716.5	24	18.8	5381.8	4	12.25	12.8	30.4	4262	9
NB018199	5580.8	3	4690.5	1	3390.0	6	6.3	5119.0	10	12.75	10.9	31.8	4695	2
NB018211	4981.5	26	4111.5	8	3455.3	5	12.5	4923.5	21	12.00	11.3	33.1	4368	7
NB03402	5301.8	12	2986.5	26	2516.3	28	2.5	4812.0	24	12.00	10.3	27.5	3904	22
NB03403	5424.8	7	2080.5	40	3058.5	10	2.5	4981.3	16	12.25	10.3	32.2	3886	26
NB03423	5066.3	20	2563.5	33	2475.8	30	8.8	5003.5	15	13.00	11.9	31.6	3777	31
NB03429	5118.0	17	2530.5	35	2109.8	34	0.0	5399.5	3	12.25	13.2	27.0	3789	29
NB03435	4712.3	32	2347.5	36	2878.5	19	10.0	4941.0	19	12.25	14.1	28.8	3720	32
NB03437	5672.3	2	2551.5	34	1991.3	36	3.8	5362.3	6	12.50	14.9	29.6	3894	24
NB03439	5462.3	6	3088.5	24	3944.3	1	3.8	4521.8	31	13.00	12.9	33.9	4254	10
NB03440	5355.8	8	3556.5	18	3162.0	8	3.8	4386.0	36	13.25	13.1	32.5	4115	13

NB04427	5469.8	5	4387.5	2	2898.8	16	0.0	5074.8	11	12.75	11.9	32.8	4458	5
NB04439	5059.5	21	3399.0	20	912.8	40	1.3	4554.3	30	13.00	15.8	30.8	3481	38
NB04440	5016.8	23	3918.0	12	2221.5	32	2.5	4596.5	29	13.75	14.0	32.5	3938	20
NB04442	4892.3	28	2676.0	32	3028.5	13	0.0	5544.0	2	12.50	13.1	32.8	4035	14
NB04428	5139.8	16	4272.0	5	2017.5	35	2.5	4644.3	28	12.75	11.8	31.1	4018	18
NB04418	5158.5	15	3630.0	17	2886.8	18	3.8	4403.8	35	11.75	11.8	32.4	4020	16
NB04416	4673.3	34	2308.5	37	2987.3	14	5.0	4498.3	32	11.75	12.8	32.0	3617	35
NB04412	4869.8	29	3082.5	25	2867.3	20	6.3	4778.0	25	12.75	12.8	33.3	3899	23
NB04436	4624.5	37	3390.0	22	3687.8	3	1.3	4956.0	17	13.00	15.2	31.9	4165	12
NB04422	3868.5	39	2763.0	30	2346.8	31	2.5	3708.3	39	11.00	12.3	32.9	3172	40
NB04426	4810.5	31	2683.5	31	2934.8	15	0.0	4742.8	26	13.00	12.9	31.9	3793	28
NB04424	5015.3	25	2766.0	29	2685.0	25	1.3	4216.0	37	13.25	13.4	30.8	3671	33
NB04420	4860.0	30	2215.5	39	2892.8	17	1.3	4454.0	33	12.00	12.9	32.1	3606	36
GRAND MEAN	**5023.8**		**3361.6**		**2731.3**		**5.1**	**4827.1**		**12.66**	**12.6**	**31.2**	**3986**	**0**
CV	8.3		22.1		17.0		87.2	11.6						
LSD	489.3		1250.6		544.4		5.2	657.5						

With the current level of private sector investments in research, additional public-private interactions are to be expected. A key goal will be to develop working relationships that benefit the producer, the customer, and the public good.

VI. ALLIED RESEARCH

The wheat breeding or variety development project is only one phase of wheat improvement research at the University of Nebraska-Lincoln. The project interacts and depends on research in wheat germplasm development, wheat quality, wheat nutritional improvement, wheat cytogenetics, plant physiology and production practices, and variety testing. Much of the production research is located at the research and extension centers. All components are important in maintaining a competitive and improving wheat industry in Nebraska. The allied research is particularly necessary as grain classification and quality standards change and as growers try to reduce their production costs.

The program also depends on interactions and collaborations with the Wheat Board, Nebraska Wheat Growers Association, regional advisory boards, Foundation Seeds Division, Nebraska Crop Improvement Association, the milling and baking industry, and other interested groups and individuals. The Nebraska Wheat Quality Laboratory cooperates closely with the Wheat Quality Council and baked the large-scale cooperator samples. Numerous groups have visited the laboratory and participated in discussions on quality and marketing. Through these interactions, the program is able to remain focused and dedicated to being a premier provider of quality varieties, information, and technologies to help maintain the Nebraska Wheat Industry.

VII. Comings and Goings

Rarely has this report commented about staff changes. However all projects are more than crosses, selections, evaluations, data, and seed. At its heart, it is the people that make this research possible. Ms. Mary Shipman after years of dedicated service in wheat quality evaluations retired. Mr. Jerry Bohlmann, a dedicated technologist, took a position with Monsanto. Dr. David Baltensperger, who was the eyes and ears for wheat research in western Nebraska, took a position as Department Head, Department of Soil and Crop Sciences, Texas A&M University. We wish to thank both Mary and David for their excellent efforts. We also wish to welcome Ms. Lan Xu and Mr. Marc Walter who will work on wheat quality evaluations, Mr. Greg Dorn, new field technologist, and David's successor whose hiring search is ongoing.

Summary

The 2006 Nebraska Wheat Crop was estimated at 61,200,000 bu, which represented a 36 bu/a state average yield on 1,700,000 harvested acres. The 2005 Nebraska Wheat Crop was 68,600,000 bu, which represented a 39 bu/a state average yield on 1,760,000 harvested acres. The 2006 crop was 11% lower than the 2005 crop. Despite continued genetic improvement, the main determinant in wheat production seems to be acres harvested, government programs, and weather (which also affects disease pressure and sprouting).

In 2006, NE01643 was recommended for release as Husker Genetics Brand Overland in honor of the pioneers who crossed and stayed in the northern prairies. NE01643 was selected from the cross Millennium sib//Seward/Archer that was made in 1995. In the Nebraska cultivar performance trials, it is widely adapted and performs well throughout the state with the exception of irrigated wheat production systems where it performs near the average of the tested lines. The average Nebraska rainfed yield of NE01643 was 4072 kg ha^{-1} (39 environments from 2004 to 2006) was greater than the yields of other popular cultivars such as Antelope (3353 kg ha^{-1}), Goodstreak (3653 kg ha^{-1}), Harry (3556 kg ha^{-1}), Infinity CL (3919 kg ha^{-1}), Agripro Brand Jagalene (4028 kg ha^{-1}), Millennium (3815 kg ha^{-1}), Wahoo (3662 kg ha^{-1}), and Wesley (3719 kg ha^{-1}). Though NE01643 has excellent grain yield in rainfed environments, its grain yield (6034 kg ha^{-1}) in irrigated environments is slightly above the test average (6020 kg ha^{-1}) and lower than popular irrigated wheat cultivars Wesley (6464 kg ha^{-1}) and Agripro Jagalene (6383 kg ha^{-1}). The broad adaptation of NE01643 to the Northern Great Plains was evident in its performance in the Northern Regional Performance Nursery where it was the highest yielding line in 2004 (out of 40 lines tested) and 2005 (out of 32 lines tested). Compared to the check cultivars in the Northern Regional Performance Nursery, NE01643 (4698 kg ha^{-1}) was higher yielding than Nekota (3651 kg ha^{-1}) and Nuplains (3864 kg ha^{-1}). Other measurements of performance from comparison trials show that NE01643 is moderately late in maturity (143 d after Jan.1, data from observations in NE) and a semi-dwarf wheat cultivar (contains *RhtB1b,* formerly *Rht1*). The mature plant height of NE01643 (84 cm) is 1 cm shorter than Millennium and 8 cm taller than Wesley. NE01643 has good straw strength (5% lodged), similar to Wesley (3.7%), Millennium (3.9%) and Agripro Jagalene (5.8%), and superior to Goodstreak (15% lodged). The winter hardiness of NE01643 (84%) is good to very good, similar to Nekota (84%) and comparable to other winter wheat cultivars adapted and commonly grown in Nebraska.

NE01643 is moderately susceptible to stem rust in field nursery tests inoculated with a composite of stem rust races (RCRS, QFCS, QTHJ, RKQQ, and TPMK) but resistant to the most prevalent race QFCS. NE01643 likely carries *SrTmp* and it is moderately resistant to race TTKS based on seedling tests (data provided by Y. Jin). It is moderately resistant to leaf rust, stripe rust, and Hessian fly (data provided by J. Hatchett and Ming-Shun Chen). NE01643 also is more tolerant to Fusarium head blight than many widely grown lines. It is susceptible to wheat soilborne mosaic virus, barley yellow dwarf virus, and wheat streak mosaic virus. NE01643 is a genetically high in grain volume weight (74.0 kg hl^{-1}). The overall end-use quality characteristics for NE01643 are adequate, but less than many commonly grown wheat cultivars and should be acceptable to the milling and baking industries. In positioning NE01643, it should be well adapted to most rainfed wheat production systems in Nebraska and South Dakota, and in adjacent areas of the northern Great Plains. Where it is adapted, NE01643 should be a replacement for Arapahoe, Culver, and possibly Millennium and Wesley, thought Millennium and Wesley have better disease and insect resistances and end-use quality. NE01643 is genetically complementary to Agripro Jagalene, Goodstreak, Pronghorn, Wesley, and 2137. It is non-complementary to Arapahoe, Culver, Millennium, Wahoo, and Niobrara. With the release of new varieties Antelope, Arrowsmith, Goodstreak, Hallam, Harry, Infinity, Millennium, Nuplains, Wahoo, and Wesley many of the most advanced current breeding lines are not expected to be released.

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