2004 Annual Progress Report

Plant Science Pamphlet No. 19

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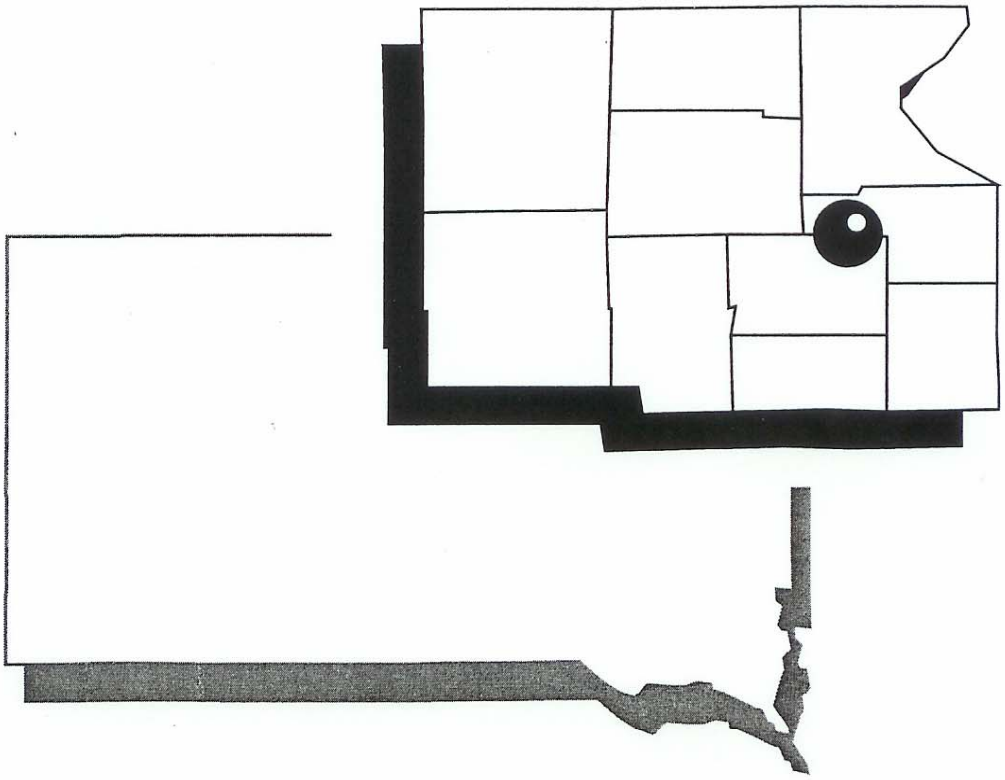
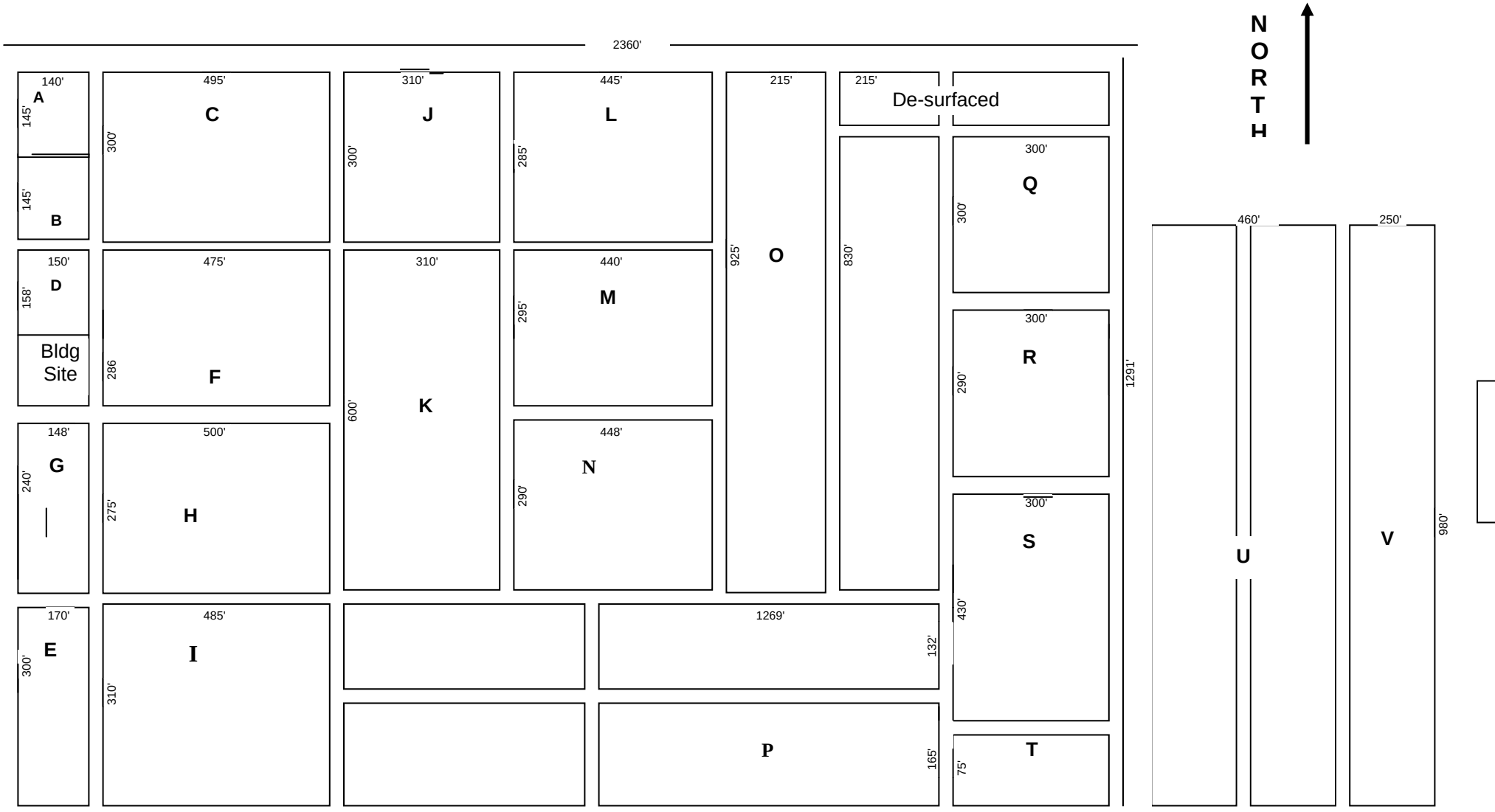


Northeast Research Station

Watertown, South Dakota

Plant Science Department • South Dakota State University • Brookings, SD 57007

Northeast Research Station (Watertown)
2004 Land Use Map



Plot Acreage:

A	0.49	H	3.15	O	9.57	V	5.5
B	0.49	I	3.44	P	8.65		
C	3.40	J	2.13	Q	2.06		
D	0.54	K	4.27	R	2.00		
E	1.20	L	3.00	S	3.00		
F	3.12	M	3.00	T	0.51		
G	0.86	N	2.98	U	9.72		

Roadways: 25 feet wide
Acreage in farm: 86
Experimental Acreage: 74

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2004
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* County Extension Educator
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Annual Progress Report, 2004

Northeast Research Station

J. D. Smolik

The growing season was one week longer than average (Table 1). Growing season precipitation (April-October) was 10 inches above average, and the 2004 season was the second wettest in the 49-year history of the station. Precipitation was near normal in April, well above normal in May, near normal in June, well above in July, well below normal in August, and well above in September and October. Growing season precipitation over the past 49 years is summarized in Figure 1. The growing season was cool and all months except July had at least one night when the overnight low dropped into the 30's. The farm was fortunate and escaped the area frosts that occurred in mid and late August.

Crops were planted in a timely manner and development of small grains and cool season forage crops was very good. Spring wheat yields were slightly above last year, oat yields were nearly 60 bushels per acre higher, and barley yields were 30 bushels above last year. Alfalfa yields were 80 percent higher than last year. The cool season dramatically slowed row crop development. However, September temperatures were generally warm, which allowed soybeans to mature and greatly aided corn development. Corn and soybean yields were nearly double the previous years level. Average corn yields were 140 bushels per acre and soybeans averaged 40 bushels per acre. In general, plant disease and insect problems were minor.

Two tours were held in 2004. The summer tour included herbicide studies, small grain varieties and diseases, soil fertility studies, a weather network update, corn and soybean insects, and alfalfa varieties. The fall tour emphasized row crops and included corn and soybean performance, soybean breeding, corn and soybean insects, herbicide studies, and forage crop updates. We thank the area Crop Improvement Associations for sponsoring the lunch following the summer tour. Thanks also to Orrin Korth and family for assistance with harvest operations. We also thank the Floyd Linhart research fund, the spring wheat project, and the Extension weed, disease, and insect projects for their assistance in the purchase of a newer, more reliable combine.

Note: Much of the information in this report is based on ongoing studies and results should therefore be considered tentative. The use of trade names in this publication is not an endorsement of the product by either the Plant Science Department or the Agricultural Experiment Station.

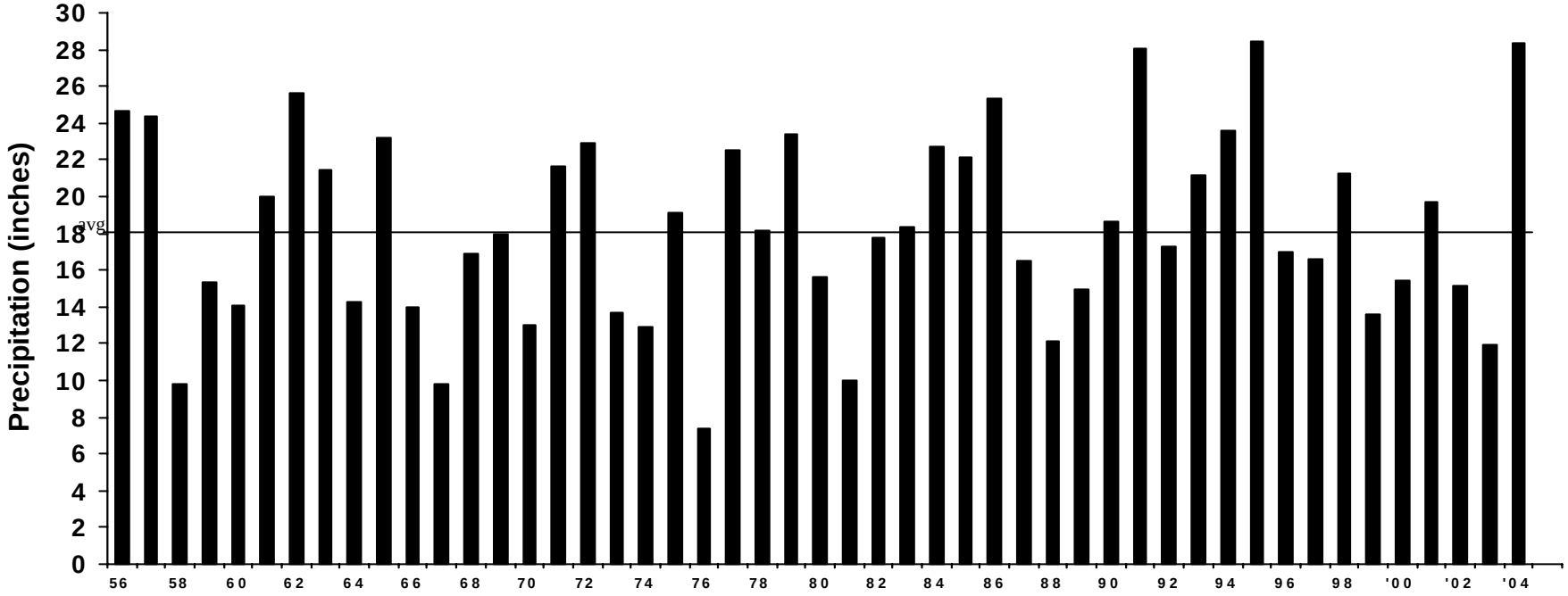
Special thanks to Lucinda Olson for her assistance in preparing this report.

Table 1. Growing Season Precipitation* (inches) 1956 - 2004

Year	April	May	June	July	Aug.	Sept.	Oct.	Total	Frost-Free Days
1956	1.80	2.88	6.56	4.02	6.25	0.70	2.44	24.65	125
1957	4.26	5.98	2.85	0.74	5.26	2.12	3.12	24.33	119
1958	1.41	1.49	2.65	2.68	0.57	0.81	0.18	9.79	116
1959	0.58	3.47	1.91	1.66	4.69	1.10	1.95	15.36	110
1960	1.53	3.84	4.05	0.79	1.03	1.30	1.50	14.04	123
1961	2.16	5.75	4.01	4.62	0.62	1.84	1.00	20.00	138
1962	1.39	5.48	3.98	10.36	1.89	1.39	1.11	25.60	143
1963	1.41	3.54	3.22	5.74	2.51	4.33	0.68	21.43	158
1964	2.39	1.07	3.62	2.01	4.22	0.93	0.04	14.28	92
1965	2.89	6.08	3.66	2.34	2.63	4.33	1.23	23.16	104
1966	1.49	0.77	1.88	2.19	4.59	1.53	1.52	13.97	138
1967	0.92	0.69	4.58	1.05	1.13	1.06	0.35	9.78	129
1968	3.04	2.15	3.18	2.39	1.53	2.56	2.00	16.85	132
1969	1.52	3.44	1.96	4.52	2.48	1.86	2.18	17.96	109
1970	2.00	1.98	1.07	2.29	1.00	1.66	2.01	13.01	148
1971	1.33	1.78	7.61	1.02	2.93	1.46	5.56	21.69	168
1972	1.90	7.73	2.92	6.35	2.57	0.11	1.37	22.95	172
1973	1.14	2.87	1.12	2.05	1.27	3.81	1.39	13.65	183
1974	1.22	3.37	1.45	2.09	3.70	0.22	0.91	12.96	141
1975	4.15	2.18	4.76	1.25	2.89	2.28	1.64	19.15	139
1976	1.10	1.26	1.49	0.51	0.79	1.62	0.57	7.34	144
1977	2.64	2.24	5.78	2.47	2.70	3.67	3.06	22.56	180
1978	3.38	5.15	2.26	2.08	2.43	2.32	0.53	18.15	178
1979	3.14	2.17	5.78	3.10	5.21	0.53	3.50	23.43	162
1980	0.43	3.09	4.97	1.96	3.82	0.72	0.68	15.67	150
1981	0.48	0.99	2.73	2.23	1.20	0.52	1.88	10.03	136
1982	0.35	5.50	1.37	4.05	0.64	2.73	3.11	17.75	175
1983	0.70	1.64	3.43	5.45	3.00	2.86	1.30	18.38	140
1984	2.88	1.66	7.45	1.85	3.09	1.14	4.69	22.76	147
1985	1.93	3.90	2.07	5.21	3.65	3.77	1.59	22.12	167
1986	5.55	4.64	3.62	4.14	3.11	4.19	0.13	25.38	159
1987	0.55	2.03	1.20	4.16	5.64	2.44	0.45	16.47	162
1988	0.59	2.76	0.69	0.86	4.03	2.98	0.22	12.13	144
1989	2.95	1.15	1.74	2.41	4.58	1.56	0.56	14.95	147
1990	1.04	2.26	5.13	3.73	2.58	2.16	1.78	18.68	136
1991	4.01	4.41	10.45	2.69	4.37	1.45	0.63	28.01	146
1992	0.91	1.45	7.95	3.08	0.75	3.17	0.02	17.33	154
1993	1.69	2.53	6.58	6.70	1.40	2.05	0.17	21.12	149
1994	2.48	2.12	6.11	4.65	3.67	2.47	2.11	23.61	162
1995	2.92	3.66	2.89	8.05	6.09	2.45	2.43	28.49	152
1996	0.18	4.20	1.36	3.43	2.92	2.34	2.57	17.00	154
1997	2.20	0.97	0.76	4.77	4.23	1.39	2.25	16.57	152
1998	0.69	4.18	2.96	1.93	3.94	0.02	7.58	21.30	167
1999	1.45	2.57	4.96	1.56	0.49	2.29	0.25	13.57	165
2000	1.20	2.35	3.29	4.29	0.88	1.00	2.45	15.46	157
2001	6.96	2.75	3.94	2.85	0.18	2.35	0.67	19.70	165
2002	1.75	1.67	2.57	2.48	4.44	0.75	1.45	15.11	135
2003	1.78	3.26	1.18	1.94	1.40	1.75	0.67	11.98	160
2004	1.83	5.70	3.34	5.88	1.20	4.77	5.64	28.36	153
Avg:	1.97	3.04	3.60	3.23	2.77	1.97	1.75	18.33	146

*1960-1962, 1973-1976, 1978 and 1979 data obtained from Watertown FAA station.

Growing Season Precipitation, 1956 - 2004



2004 SMALL GRAIN VARIETY PERFORMANCE TRIALS

R. G. Hall, K. K. Kirby, and L. Hall

This is a report of the 2004 NE Research Farm performance trials for hard red spring wheat, oat, and barley varieties and experimental lines conducted by the South Dakota State University Crop Performance Testing (CPT) program. These trials were seeded and harvested by L. Hall, Research associate, SDSU Oat Breeding Project.

Experimental Procedures

Four plots measuring 5 X 20 feet for each entry were seeded and later cut back to a uniform dimension prior to harvest. A cone-drill seeder with seven seed tubes spaced on 7-inch rows was used. Plots were seeded at 1.2 million pure-live-seeds per acre on April 12, 2004 into a Trent silt loam previously cropped to soybeans. ***Research funding & support sources:*** The SD Agricultural Experiment Station and testing fees obtained from the SD Crop Performance Testing Program.

Measurements of Performance

Yield (bu./a) and bushel weight (lbs.) values are an average of four replicates. Yields are adjusted to 13.5% grain moisture (dry matter basis) and bushel weights of 60 (wheat), 32 (oats), or 48 lbs. (barley). Grain protein values were obtained from one sample per entry as determined by a FOSS TECATOR Model Infratec 1229 grain analyzer. Yield values are reported for year 2004 and for 3-years (2002-04), while bushel weight and grain protein values are reported for 2004.

Performance Results

Hard red spring wheat: As indicated in table 1 the average yield for 2004 was 52 bu./acre and for the longer 3-year period it was 43 bu./acre. In 2004, varieties had to yield 58 bu./acre to be in the top performance group for yield; and for the 3-year period varieties had to average 42 bu./acre to qualify for the top performance group for yield. The top performance group for yield in 2004 included the varieties Briggs, Steele-ND, and Knudson and the SD experimental lines SD 3687, SD 3860, and SD3868. For the longer 3-year period the top performance group for yield included the varieties Forge, Briggs, Granger, Oklee, Knudson, Oxen Russ, Reeder, Norpro, and Alsen, and the experimental line SD 3623.

In 2004, the average bushel weight was 56 lbs. the average grain protein was 13.9%, and the average plant height was 38 inches. In 2004, varieties with a bushel weight of 58 lbs. or higher were in the top performance group for bushel weight. This included the varieties Briggs, Granger, Oklee, and Mercury, and the experimental lines SD 3618, SD 3623, SD 3860, and MN 97803A. In 2004, the varieties Freyr, Dapps, Chris, and Mercury tended to have the high grain protein. In 2004, entries had to attain a height of 42 inches or more to be in the top performance group for maximum plant height. This group only included the old check variety Chris. In contrast, entries had to attain a height of 35 inches or less to be in the top performance group for minimum plant height. This group included the varieties Trooper, Oxen, Norpro, and Mercury.

Table 1. Spring wheat performance results- NE Farm, 2003-2004.

Variety	(Hdg.)*	Bu/A 2004	Bu/A 3-Yr	Bu.Wt. Lb.	Prot. %	Ht. in.
Ingot	(1)	42	41	57	14.0	41
Trooper	(1)	48	.	54	13.3	33
Forge	(1)	49	43	57	13.7	37
Walworth	(2)	46	41	56	13.9	38
Briggs	(2)	61	48	58	14.5	38
Granger	(2)	55	46	58	14.5	41
Freyr	(3)	55	.	57	15.0	39
Dapps	(4)	49	40	57	15.2	40
Steele-ND	(4)	59	.	57	14.6	39
Oklee	(4)	57	42	58	13.1	38
Knudson	(4)	58	45	56	13.8	36
Oxen	(4)	48	42	55	14.3	35
Russ	(4)	49	44	56	13.6	39
Reeder	(5)	50	45	56	14.1	38
Norpro	(5)	43	42	51	14.4	35
Chris,CK	(5)	36	33	53	15.2	44
Dandy	(7)	45	.	57	13.3	37
Alsen	(6)	51	43	57	14.1	39
Mercury	(7)	54	.	58	15.2	33
Granite	(7)	43	40	56	14.8	36
Polaris	(9)	47	.	50	13.1	37
Experimentals:						
SD 3618	(-)	57	.	59	13.9	40
SD 3623	(-)	57	49	60	13.3	41
SD 3635	(-)	50	.	57	13.5	39
SD 3668	(-)	53	.	57	14.0	41
SD 3687	(-)	63	.	56	13.9	39

Table 1. Spring wheat performance results - NE Farm (Continued).

Variety	(Hdg.)*	Bu/A 2004	Bu/A 3-Yr	Bu.Wt. Lb.	Prot. %	Ht. in.
SD 3746	(-)	54	.	54	13.4	38
SD 3747	(-)	55	.	56	13.4	36
SD 3827	(-)	48	.	56	12.6	41
SD 3860	(-)	60	.	58	12.6	41
SD 3868	(-)	60	.	57	13.5	39
BZ998-447WP	(-)	49	.	55	13.9	39
MN 97803A	(-)	54	.	58	14.1	38
Test avg.:		52	43	56	13.9	38
Lsd(.05):		5	7	2	.	2
# TPG-value:		58	42	58	.	42
C.V.:		6	7	3	.	5

* Heading, relative difference in days compared to Briggs.
# Minimum value required for the top performance group.

Oats: As indicated in table 2 the average yield for 2004 was 145 bu./acre and for the longer 3-year period it was 95 bu./acre. In 2004, varieties had to yield 161 bu./acre to be in the top performance group for yield; and for the 3-year period varieties had to average 84 bu./acre to qualify for the top performance group for yield. The top performance group for yield in 2004 included the varieties Morton and HiFi, and for the longer 3-year period the varieties Don, Reeves, Hytest, Jerry, Morton, Loyal, and the hull-less variety Buff.

In 2004, the average bushel weight was 38 lbs. the average grain protein was 14.3%, and the average plant height was 43 inches. In 2004, varieties with a bushel weight of 41 lbs. or higher were in the top performance group for bushel weight. This included all of the hull-less varieties. Among the standard varieties, the top performance group for bushel weight included the varieties Hytest (40 lbs.) and Jerry (38 lbs.) and the SD experimental lines SD 366, SD366-7, SD11226, SD 366-23, and SD 366-36. The varieties Hytest, Loyal, Buff (hull-less), Stark (hull-less), Paul (hull-less), and the SD experimental line SD 366-23 tended to have the high grain protein. In 2004, entries had to attain a height of 46 inches or more to be in the top performance group for maximum plant height. This group included the variety Morton and the SD experimental line SD010062. In contrast, entries had to attain a height of 40 inches or less to be in the top performance group for minimum plant height. This group included the varieties Don and the hull-less variety Buff.

Table 2. Oat performance results- NE Farm, 2003-2004.

Variety (Hdg.)*	Bu/A 2004	Bu/A 3-Yr	Bu.Wt. Lb.	Prot. %	Ht. in.
Standard types:					
Don (1)	138	102	36	12.9	38
Reeves (2)	135	99	36	14.1	42
Hytest (4)	132	91	40	15.6	43
Jerry (5)	151	105	38	13.9	44
Morton (7)	163	105	36	13.6	46
Loyal (8)	155	102	35	16.0	43
HiFi (8)	171	103	37	13.1	42
Hull-less types:					
Buff Hls (3)	131	87	43	14.6	39
Stark Hls (6)	130	.	42	14.6	43
Paul Hls (7)	117	63	43	14.9	42
Experimentals:					
SD 366 (-)	150	.	39	14.5	44
SD 366-7 (-)	140	.	39	14.0	44
SD010062 (-)	147	.	37	14.2	47
SD011226 (-)	160	.	38	14.3	42
SD011315 (-)	155	.	35	12.5	44
SD 366-15 (-)	151	.	37	14.4	45
SD 366-23 (-)	134	.	38	15.3	44
SD 366-36 (-)	150	.	38	14.3	44
Test avg.:	145	95	38	14.3	43
Lsd(.05):	10	21	2	.	2
# TPG-value:	161	84	41	.	46
C.V.:	5	7	3	.	4

* Heading, relative difference in days compared to Don.

\# Minimum value required for the top performance group.

Barley: As indicated in table 3 the average yield for 2004 was 104 bu./acre and for the longer 3-year period it was 72 bu./acre. In 2004, varieties had to yield 109 bu./acre to be in the top performance group for yield; and for the 3-year period varieties had to average 70 bu./acre to qualify for the top performance group for yield. The top performance group for yield in 2004 included the varieties Haxby and Eslick, and the SD experimental line ND 19-119. For the longer 3-year period the top performance group for yield included the varieties Lacey, Conlon, Drummond, and Excel

In 2004, the average bushel weight was 48 lbs. the average grain protein was 11.7%, and the average plant height was 38 inches. In 2004, varieties with a bushel weight of 48 lbs. or higher were in the top performance group for bushel weight. This included the varieties Conlon, Tradition, Haxby, Eslick, and Valier, and the experimental line ND 19-119. The varieties Conlon, Haxby, Eslick, and Valier are classified as two-row feed barleys. Conlon is also classified as a malting barley. The varieties Lacey, Conlon, Tradition, Drummond, Robust, Legacy, Valier, and the experimental ND16301 were above average in grain protein. In 2004, entries had to attain a height of 39 inches or more to be in the top performance group for maximum plant height. This group included the variety Lacey, Tradition, Drummond, Robust, Excel, Legacy and the experimental lines ND16301 and ND 19-119. In contrast, entries had to attain a height of 37 inches or less to be in the top performance group for minimum plant height. This group included the varieties Conlon, Eslick, and Valier.

Table 3. Barley results- NE Farm, 2003-2004.

		Agronomic Performance Averages				
Variety	(Hdg.)*	Bu/A 2004	Bu/A 3-Yr	Bu.Wt. Lb.	Prot. %	Ht. in.
Lacey	(1)	104	76	47	12.1	39
Conlon	(1)	102	79	50	12.3	36
Tradition	(1)	107	.	48	11.7	39
Drummond	(3)	98	72	46	12.0	39
Haxby	(3)	110	.	50	11.4	36
Excel	(4)	103	72	46	11.4	38
Robust	(4)	84	68	46	11.5	41
Eslick	(4)	115	.	48	10.8	35
Legacy	(4)	108	.	45	12.5	39
Valier	(5)	106	.	50	12.3	37
Experimentals:						
ND16301	(-)	95	67	46	11.5	38
ND 19-119	(-)	119	.	48	10.4	38
Test avg.:		104	72	48	11.7	38
Lsd(.05):		10	9	2	.	2
# TPG-value:		109	70	48	.	39
C.V.:		6	5	3	.	3

* Heading, relative difference in days compared to Lacey.

Minimum value required for the top performance group.

2004 SOYBEAN VARIETY PERFORMANCE TRIALS

R. G. Hall and K. K. Kirby

This reports the 2004 NE Research Farm performance trials for both non-Roundup-Ready and Roundup-Ready soybean varieties conducted by the South Dakota State University Crop Performance Testing (CPT) program.

Experimental Procedures

Entries were placed into either a maturity group-0 or group-I test trial according to maturity ratings reported by a given seed company. **NOTE**: Each company selects the appropriate maturity group trial (0 or I) for their entries at a location. Generally, each company has one or more maturity group checks for the varieties they market. However, there are no standard regional or national check varieties for maturity. Consequently, a late group-0 variety from one company may be similar in maturity to an early group-I variety from another company because they use different check varieties for maturity. As a result, this testing program can not guarantee that all entries are placed in the proper maturity trial. In some trials, borderline entries with maturity group ratings at or near the arbitrary breaks between the late group-0's and early-group-I's may crossover.

Entries were seeded in three replications with each variety randomly located within a replication. Plots consisted of four 30-inch rows, 20 feet long. Plots were seeded on May 21, 2004 into a Brookings silty loam previously cropped to soybeans. A Monosem precision row crop planter was used for seeding and delivered 165,000 seeds per acre, regardless, of seed quality and germination percentage. Granular Nitragin brand Soybean Soil Implant metered down the seed tube was used for seed inoculation.

Except for weed control the experimental procedures described above apply both to the non-Roundup Ready and the Roundup Ready trials. In the Roundup Ready trials two post emergence applications of Roundup Ultra (32 oz/acre) were applied. The first when weeds were 2-4 inches tall, followed by a second application when weed growth was again 2-4 inches tall. In the non-Roundup Ready test trials, post-emergence weed control consisted of banded Lasso II at label rates.

Yield values (bu/a) are an average of three replications, adjusted to 13% moisture (dry-matter basis) and a bushel weight of 60 pounds. Yield, least significant difference (Lsd), and minimum top-yield values are rounded off to the nearest whole bushel per acre. The reported protein and oil values are for the current season. Three replicate samples of every variety in each trial was combined into one composite sample and tested for protein and oil using a FOSS TECATOR Model Infratec 1229 grain analyzer. Plant Height was measured from the soil surface to the top node of the main stem. Lodging scores are an average of how erect the main stem of all the plants are at maturity. 1 = all plants erect, 2 = slight lodging, 3 = lodging at a 45^{o} angle, 4 = severe lodging, and 5 = all plants flat.

Measurements of Performance

Check for the "least significant difference" (Lsd) value at the bottom of each column of data values. The reported Lsd values can be used in two ways. First, the Lsd value indicates how much a variable such as yield must differ between two varieties before there is a real yield difference. For example, in the non-Roundup Ready test (Table 1), the year 2004 Lsd value of 3 bu/a can be used to compare the yields of any two varieties in trial. If variety A yields 28 bu/a and variety B yields 26 bu/a the yield difference is 2 bu/a (28 - 26 = 2). In this case the two varieties do not differ in yield because their yield difference of 2 bu/a is less than the reported Lsd value of 3 bu/a. In contrast, if variety C yields 24 bu/a the yield difference between variety A and variety C would be 4 bu/a (28-24 = 4). In this case the yield difference of 4 bu/a is more than the reported Lsd value of 3 bu/a; therefore, variety A has a significantly higher yield than variety C.
The second use for the Lsd value is to identify the top group for the current year yield, two-year yield, and lodging percentage. For example, in Table 1 the highest current year yield was 28 bu/a. To determine if it is the only top yielding variety in this trial use the Lsd value of 3 bu/a at the bottom of the 2004 yield column. In order for varieties to be in the top performance group for yield they must yield 25 bu/a (28-3 = 25) or higher. Technically, a yield of 26 bu/a is in the top yield group while a yield of 25 bu/a is not be in the top yield group. However, since all yields and Lsd values are rounded to the nearest whole number. We can say 25 bu/a, because of the rounding-off, is the more appropriate minimum value for top yield varieties in this test trial. Top yield varieties for 2004 are those varieties that are equal or higher than the minimim top yield group value. In addition, the minimum top yield group value is indicated for the 2 yr. (2003-04) average unless there were no significant yield differences. The minimum yield required to qualify for the top performance group for yield is listed at the bottom of each yield column (TPG-value).

Similarly, the top group for lodging can be determined. For example, in Table 1, the minimum lodging percentage was 1%. In Table 1 current year yields must equal 28 bu/ac or higher, two-year yields must equal 24 bu/ac, and lodging must be equal to 1 or less to be in the top performance group for these factors. Since only one sample was tested for protein and oil content statistical analysis was not used to determine variety differences in these two variables.

Performance Trial Results

General: The non-Roundup Ready variety yield averages for 2004 were only slightly better than for 2003-04 averages. In contrast, the 2004 yield averages for the Roundup Ready varieties were about 10 bushel per acre higher than the 2003-04 averages. The rather small yield difference in the non-Roundup Ready varieties between the one-year and two-year averages may have been the result of two factors. First, the summer at this location was cooler than normal. Second, following herbicide application it may have taken longer for the non-Roundup Ready varieties to recover to a full growth rate. In combination, both of these factors may have negatively affected the non-Roundup Ready yields. In contrast, with the Roundup Ready varieties, the use of Roundup Ready for weed control, had little affect the soybean plants and enabled them to maintain a higher growth rate. Consequently, the Roundup Ready trials out yielded the non-Roundup Ready trials this year.

Non-Roundup Ready varieties: Results for year 2004 and for years 2003-04 follow:

Maturity Group-0 soybean test, Table 1**.** The 2004 and two-year test yield averages were **25 and 24** bushels per acre, respectively**.** Varieties had to average 25 bushels or higher to be in the top yield group for 2004. Likewise, varieties had to average 24 bushels or higher to be in the top yield group for two years. Variety yield averages had to differ by 3 bushels in 2004 and for two years to be significantly different. The 2004 protein, oil, and lodging score test averages were **35.1%, 16.2%, and 1**, respectively**.** The reason the protein and oil percentages in this non-Roundup Ready trial was higher than in the Roundup Ready trial was likely due to the fact that a number of SDSU experimental lines with a relatively higher protein and oil content were in this trial consisting of only 11 entries. Lodging score averages among the varieties were not significantly different from one another.

Maturity Group-I soybean test, Table 2**.** The 2004 and two-year test yield averages were **29 and 25** bushels per acre, respectively**.** Varieties had to average 34 bushels or higher to be in the top yield group for 2004. In this trial, only two varieties have been tested for two years and they were not significantly different in yield. Variety yield averages had to differ by 3 bushels or more in 2004 to be significantly different. The 2004 protein, oil, and lodging score test averages were **34.4%, 16.7%, and 1**, respectively**.** Lodging score averages among the varieties tested were not significantly different from one another.

Table 1. Non-Roundup Ready maturity group-0 soybean variety performance averages- NE Research Farm, South Shore, SD, 2003-04.

Brand/Variety (by 2-Yr & 2004 yield)	Agronomic Performance Averages					
	Bu/Acre 2004	Bu/Acre 2-Yr	Protein %	Oil %	Lodging* (1-5)	DTM^
PUBLIC/SD99-700EXP	26	27	35.5	16.5	1	130
PUBLIC/SD99-1358EXP	23	25	36.2	15.6	1	127
PUBLIC/SURGE	24	24	35.6	16.5	1	128
PUBLIC/SPINK	23	23	33.9	16.6	1	124
PUBLIC/MN 0901	22	21	34.5	16.7	1	129
PUBLIC/SD99-1909EXP	28	.	35.0	16.0	1	129
PUBLIC/SD00-141EXP	27	.	34.0	16.1	1	131
PUBLIC/SD00-41EXP	26	.	33.9	16.6	1	132
PUBLIC/SD00-719EXP	25	.	35.0	16.0	1	127
PUBLIC/SD00-405EXP	24	.	37.5	15.3	1	130
PUBLIC/SD00-1588EXP	24	.	34.5	16.6	1	130
Test avg.:	25	24	35.1	16.2	1	129
Max. avg.:	28	27	37.5	16.7	1	132
Min. avg.:	22	21	33.9	15.3	1	124
# Lsd (.05):	3	3			NS	
## TPG-value:	25	24			1	
@ Coef. Var.:	8	11			0	
No. Entries:	11	5	11	11	11	

* Lodging, 1= all plants erect, 5= all plants flat.

^ DTM= days from seeding on May 21, 2004 to maturity.

Lsd,(.05)= amount values in a column must differ to be significantly different. NS- differences among column values are non-significant.

Minimum value required to qualify for the top performance group.

@ Coef. Var.= a measure of trial experimental error.

Table 2. Non-Roundup Ready maturity group-I soybean variety performance averages- NE Research Farm, South Shore, SD, 2003-04.

Brand/Variety (by 2-Yr & 2004 yield)	Agronomic Performance Averages					
	Bu/Acre 2004	Bu/Acre 2-Yr	Protein %	Oil %	Lodging* (1-5)	DTM^
SANDS/SOI 187	33	29	33.9	17.1	1	133
PUBLIC/STRIDE	18	22	32.9	16.4	1	132
NUTECH/NT-170	37	.	32.7	16.9	1	133
THOMPSON/T-3189	36	.	34.0	16.9	1	134
NUTECH/NT-180	35	.	36.1	17.0	1	135
NUTECH/NT-190	33	.	33.8	16.5	1	135
THOMPSON/T-3182	32	.	33.2	17.1	1	133
PUBLIC/SD00-307EXP	31	.	33.4	17.4	1	131
PUBLIC/SD00-735EXP	31	.	34.5	16.5	1	135
PUBLIC/SDX98-74331E	29	.	37.7	15.7	1	134
PUBLIC/SD00-1638EXP	28	.	33.9	16.8	1	130
PUBLIC/SD00-533EXP	27	.	34.4	16.2	1	130
PUBLIC/SD96-135-3EX	26	.	33.9	17.6	1	131
PUBLIC/SD00-622EXP	24	.	33.6	17.2	1	135
PUBLIC/SDX98-82302E	22	.	38.4	14.6	1	128
Test avg.:	29	25	34.4	16.7	1	132
Max. avg.:	37	29	38.4	17.6	1	135
Min. avg.:	18	22	32.7	14.6	1	128
# Lsd (.05):	3	NS			NS	
## TPG-value:	34	22			1	
@ Coef. Var.:	7	13			0	
No. Entries:	15	2	15	15	15	

* Lodging, 1= all plants erect, 5= all plants flat.

^ DTM= days from seeding on May 21, 2004 to maturity.

Lsd,(.05)= amount values in a column must differ to be significantly different. NS- differences among column values are non-significant.

Minimum value required to qualify for the top performance group.

@ Coef. Var.= a measure of trial experimental error.

Performance Trial Results (continued)

Roundup Ready varieties: Results for year 2004 and for years 2003-04 follow:

Maturity Group-0 soybean test, Table 3. The 2004 and two-year test yield averages were **39 and 30** bushels per acre, respectively**.** Varieties had to average 39 bushels or higher to be in the top yield group for 2004. Likewise, varieties had to average 30 bushels or higher to be in the top yield group for two years. Variety yield averages had to differ by 6 bushels in 2004 and 4 bushels for two years to be significantly different. The 2004 protein, oil, and lodging score test averages were **33.5%, 16.7%, and 1**, respectively**.** Lodging score averages among the varieties were not significantly different from one another.

Maturity Group-I soybean test, Table 4. The 2004 and two-year test yield averages were **41 and 30** bushels per acre, respectively**.** Varieties had to average 43 bushels or higher to be in the top yield group for 2004. The two-year yield averages among varieties did not differ significantly. Therefore, the variety with the lowest two-year yield of 28 bushels was still in the top yield group for two years. Variety yield averages had to differ by 5 bushels in 2004 to be significantly different; while for two years there was no yield difference among the varieties. The 2004 protein, oil, and lodging score test averages were **32.3, 17.2%, and 1**, respectively**.** Although lodging score averages among the varieties were significant they were almost negligible because the Lsd value was almost zero. Lodging score averages had to be 1 to qualify for the top performance group.

Table 3. Roundup Ready maturity group-0 soybean variety performance averages- NE Research Farm, South Shore, SD, 2003-04.

Brand/Variety (by 2-Yr & 2004 yield)	Agronomic Performance Averages					
	Bu/Acre 2004	Bu/Acre 2-Yr	Protein %	Oil %	Lodging* (1-5)	DTM^
NORTHSTAR/NS 0954RR	45	34	34.4	17.0	1	129
MUSTANG/M-094RR	44	33	34.9	16.0	1	130
WENSMAN/W 2103RR	44	32	33.2	16.8	1	128
KRUGER/099+RR	40	32	34.6	17.0	1	128
KRUGER/101RR	42	31	32.9	17.0	1	129
SANDS/SOI 0931RR	40	31	33.2	16.8	1	126
MUSTANG/M-092RR	39	31	34.4	16.3	1	129
MUSTANG/M-083RR	38	31	34.3	17.0	1	129
MUSTANG/M-053RR	37	31	33.6	16.9	1	125
KRUGER/098RR	42	30	32.8	17.1	1	129
PRAIRIE BR./PB-0923RR	40	30	32.6	17.0	1	128
PRAIRIE BR./PB-1043RR	40	30	33.0	17.6	1	132
DAIRYLAND/DSR-040/RR	39	30	33.3	17.0	1	126
PRAIRIE BR./PB-0812RR	39	30	33.8	16.9	1	129
DEKALB/DKB07-52	38	30	34.3	16.3	1	125
PUBLIC/SD93-1233T	38	30	34.7	16.2	1	130
PUBLIC/SD00-1037R	36	30	31.6	17.0	1	131
ASGROW/AG0801	38	29	32.5	16.4	1	126
PRAIRIE BR./PB-1063RR	38	29	34.4	16.3	1	129
WENSMAN/W 2062RR	37	29	34.6	16.2	1	125
TOP FARM/6102RR	36	29	33.7	16.9	1	126
SODAK GENETICS/SD1091RR	38	28	36.3	16.0	1	129
SODAK GENETICS/SD1081RR	36	28	32.7	17.2	1	129
PUBLIC/MN-0904RR	36	28	34.3	16.9	1	129
PUBLIC/SD00-1258R	37	27	34.1	16.2	1	133
PUBLIC/SD00-1251R	35	27	34.3	16.7	1	130
NUTECH/NT-0999RR	45	.	32.9	16.9	1	128
SANDS/EXP 0969RR	44	.	32.1	16.7	1	129
KRUGER/EXP089RR	44	.	33.9	16.6	1	129
PRAIRIE BR./PB-0954RR	44	.	32.7	17.4	1	130
DYNA-GRO/DG 33R09	44	.	32.9	16.3	1	129
MUSTANG/M-095RR	43	.	32.5	17.2	1	131
NUTECH/NT-0889RR	43	.	32.8	17.5	1	129
TECH. DIRECT/TD-099RR	43	.	32.5	17.1	1	129
GOLD COUNTRY/2509RR	43	.	32.8	17.3	1	128

Table 3. Roundup Ready maturity group-0 soybean variety performance averages (continued).

Brand/Variety (by 2-Yr & 2004 yield)	Agronomic Performance Averages					
	Bu/Acre 2004	Bu/Acre 2-Yr	Protein %	Oil %	Lodging* (1-5)	DTM^
NUTECH/NT-0711ARR	42	.	33.6	16.4	1	132
NUTECH/NT-0848RR	42	.	33.8	16.8	1	129
KRUGER/090RR	42	.	34.4	16.0	1	129
THOMPSON/T-0889+RR	42	.	32.4	17.4	1	130
NUTECH/NT-0606RR	41	.	34.3	16.4	1	125
NUTECH/NT-0676+RR	41	.	33.8	16.2	1	127
TECH. DIRECT/TD-077RR	41	.	33.9	16.2	1	126
STINE/S0900-4	41	.	32.5	17.7	1	130
DYNA-GRO/DG 37A10	41	.	32.8	16.9	1	129
NORTHSTAR/NS 0609RR	41	.	35.4	15.9	1	127
PUBLIC/SD01-2475R	41	.	31.8	17.2	1	131
MUSTANG/M-075RR	40	.	33.9	16.2	1	126
MALLARD/EXP RR0914	40	.	32.3	16.3	1	128
TECH. DIRECT/TD-055RR	40	.	34.0	16.7	1	124
NORTHSTAR/NS 0517RR	40	.	34.3	16.4	1	125
SEEDS 2000/2090RR	40	.	34.6	16.4	1	130
BIO GENE/BG0913RR	40	.	34.3	16.6	1	130
ASGROW/AG1001	39	.	33.2	16.8	1	126
DYNA-GRO/DG 32Y09	39	.	32.5	17.1	1	126
PUBLIC/SDX00R-035-39	39	.	31.9	17.6	1	130
BIO GENE/BG100RR	38	.	33.0	17.0	1	131
MUSTANG/M-055RR	37	.	33.3	16.5	1	126
PUBLIC/SD01-1253R	37	.	35.9	15.2	1	126
PUBLIC/SD1091RR-4	37	.	34.8	16.2	2	132
DAIRYLAND/DST08-000/RR	36	.	33.0	17.1	1	130
WENSMAN/W 2090RR	36	.	32.3	17.2	1	127
SANDS/SOI 0661RR	35	.	35.3	16.2	1	126
THUNDER/2209RR	35	.	34.0	17.1	1	129
PUBLIC/SD01-2736R	35	.	33.4	17.2	1	130
STINE/S0906-4	34	.	33.4	16.9	1	132

Table 3. Roundup Ready maturity group-0 soybean variety performance averages (continued).

Brand/Variety (by 2-Yr & 2004 yield)	Agronomic Performance Averages					
Brand/Variety (by 2-Yr & 2004 yield)	Bu/Acre 2004	Bu/Acre 2-Yr	Protein %	Oil %	Lodging* (1-5)	DTM^
NORTHSTAR/NS 0509RR	34	.	33.7	17.0	1	123
NORTHSTAR/NS 0805RR	34	.	31.9	17.3	1	127
PUBLIC/SD01-187R	34	.	33.6	17.0	1	132
DYNA-GRO/DG 31B08	33	.	32.1	17.4	1	126
PUBLIC/SD01-1780R	33	.	35.4	15.7	1	130
Test avg.:	39	30	33.5	16.7	1	128
Max. avg.:	45	34	36.3	17.7	2	133
Min. avg.:	33	27	31.6	15.2	1	123
# Lsd (.05):	6	4			NS	
## TPG-value:	39	30			1	
@ Coef. Var.:	9	10			19	
No. Entries:	70	26	70	70	70	

* Lodging, 1= all plants erect, 5= all plants flat.
^ DTM= days from seeding on May 21, 2004 to maturity.
# Lsd,(.05)= amount values in a column must differ to be significantly different. NS- differences among column values are non-significant.
Minimum value required to qualify for the top performance group.
@ Coef. Var.= a measure of trial experimental error.

Table 4. Roundup Ready maturity group-I soybean variety performance averages- NE Research Farm, South Shore, SD, 2003-04.

Brand/Variety (by 2-Yr & 2004 yield)	Agronomic Performance Averages					
	Bu/Acre 2004	Bu/Acre 2-Yr	Protein %	Oil %	Lodging* (1-5)	DTM^
KRUGER/223+RR	47	34	31.3	17.5	1	.
KRUGER/223RR	46	32	31.4	17.8	1	135
KRUGER/211+RR	43	32	31.7	17.7	1	135
PRAIRIE BR./PB-1620RR	42	32	30.9	17.1	1	135
STINE/S0943-4	43	31	32.4	16.9	1	130
PETERSON/PFS 0410RR	43	31	32.9	16.8	1	129
ASGROW/AG1401	41	31	32.1	17.5	1	130
MUSTANG/M-153RR	42	30	31.0	17.5	1	132
PRAIRIE BR./PB-1552RR	42	30	31.0	16.9	1	133
MUSTANG/M-151RR	41	30	30.6	17.0	1	134
SODAK GENETICS/SD1151RR	41	30	34.0	16.8	1	131
MUSTANG/M-124RR	40	29	32.6	18.0	1	131
PUBLIC/SD00-236R	39	29	34.6	16.9	1	130
MUSTANG/M-174RR	37	29	33.3	16.6	1	.
GOLD COUNTRY/6016RR	37	29	30.4	17.2	1	133
DYNA-GRO/DG 31C15RR	39	28	30.8	17.3	1	133
PUBLIC/MN-1803RR	38	28	32.6	17.1	2	135
KRUGER/191RR	48	.	32.0	17.3	1	.
NUTECH/NT-2002RR	47	.	31.8	17.6	1	.
NUTECH/NT-1909RR	46	.	32.1	17.7	1	.
STINE/S1918-4	46	.	32.2	17.6	1	135
STINE/S1300-4	46	.	32.2	17.5	1	133
ASGROW/AG1903	45	.	33.3	16.3	1	.
NUTECH/NT-1010RR	45	.	32.2	17.8	1	129
KRUGER/192RR	45	.	32.2	17.4	1	133
PRAIRIE BR./PB-1954RR	45	.	32.6	17.0	1	.
THOMPSON/T-7234RR	45	.	32.0	17.7	1	.
SANDS/SOI 1261RR	44	.	32.1	16.2	1	134
NUTECH/NT-2202RR	44	.	31.8	17.6	1	.
TECH. DIRECT/TD-202RR	44	.	32.1	17.6	2	.
PRAIRIE BR./PB-1754RR	44	.	33.3	16.9	1	.
PRAIRIE BR./PB-1914RR	44	.	31.5	17.8	1	.
THOMPSON/T-7205RR	44	.	30.8	18.0	1	.
PETERSON/PFS 0511RR	44	.	31.1	16.9	1	134
SANDS/SOI 1540RR	43	.	32.4	16.8	1	134

Table 4. Roundup Ready maturity group-I soybean variety performance averages (continued).

Brand/Variety (by 2-Yr & 2004 yield)	Agronomic Performance Averages					
	Bu/Acre 2004	Bu/Acre 2-Yr	Protein %	Oil %	Lodging* (1-5)	DTM^
SANDS/EXP 1766RR	43	.	33.7	16.6	1	.
PUBLIC/SDX00-022R-53	43	.	33.1	17.2	1	132
KRUGER/195+RR/SCN	43	.	30.9	18.3	1	.
DYNA-GRO/DG 34R12	43	.	32.5	17.4	1	133
NORTHSTAR/NS 1019RR	43	.	31.9	16.8	1	130
ASGROW/AG1603	42	.	32.4	17.5	1	132
MUSTANG/M-115RR	42	.	30.5	17.1	1	131
MALLARD/EXP RR1512	42	.	33.3	16.9	1	134
KRUGER/EXP167RR	42	.	30.8	17.4	1	134
STINE/S1586-4	42	.	31.6	16.9	1	134
ZILLER/EXP33513R	42	.	30.2	17.1	1	134
MUSTANG/M-155RR	41	.	33.5	16.6	2	133
MALLARD/EXP RR1314	41	.	30.6	16.7	1	133
TECH. DIRECT/TD-199RR	41	.	30.7	17.3	1	134
KRUGER/149+RR	41	.	33.2	16.9	1	133
LATHAM/EXP-E1330R	41	.	30.5	17.1	1	134
PRAIRIE BR./PB-1294RR	41	.	29.7	17.3	1	134
ZILLER/BT 7145R	41	.	32.2	17.5	1	131
JACOBSEN/J642R	41	.	33.6	16.9	1	130
WENSMAN/W 2121RR	41	.	30.6	17.0	1	133
THOMPSON/T-1444RR	41	.	32.5	16.8	1	129
SEEDS 2000/2130RR	41	.	30.5	17.4	1	130
BIO GENE/BG150RR	41	.	30.5	16.9	1	134
NK BRAND/S17-P9	40	.	30.9	16.9	1	133
KRUGER/125RR	40	.	34.5	16.7	1	130
THOMPSON/T-7193RR/SCN	40	.	31.1	18.5	1	.
NK BRAND/S14-A7	39	.	32.2	17.3	1	129
GOLD COUNTRY/3512RR	39	.	30.2	17.4	1	135
STINE/S0992-4	39	.	32.7	17.3	1	129
PUBLIC/SDX00-053R-46	39	.	31.8	17.6	2	134
JACOBSEN/J647R	39	.	31.6	17.4	1	133
NORTHSTAR/NS 1409RR	39	.	32.2	17.0	1	132
EXCEL/8151RR	39	.	33.9	16.7	1	132
PETERSON/EXP 1.2RR	39	.	33.5	17.1	1	130
PETERSON/PFS 0415RR	39	.	30.5	17.3	1	135

Table 4. Roundup Ready maturity group-I soybean variety performance averages (continued).

Brand/Variety (by 2-Yr & 2004 yield)	Agronomic Performance Averages					
	Bu/Acre 2004	Bu/Acre 2-Yr	Protein %	Oil %	Lodging* (1-5)	DTM^
KRUGER/EXP152RR	38	.	33.0	17.1	1	133
PRAIRIE BR./PB-1254RR	38	.	31.2	18.0	1	130
PRAIRIE BR./PB-1354RR	38	.	34.3	16.8	1	133
ZILLER/EXP4431OR	38	.	33.7	17.0	1	130
THOMPSON/T-1577RR	38	.	32.7	17.1	1	135
EXCEL/8160RR	38	.	31.7	17.2	1	135
MALLARD/EXP RR1111	37	.	34.1	17.1	1	129
DAIRYLAND/DST13-000/RR	37	.	32.2	17.6	1	133
DAIRYLAND/DST15-000/RR	37	.	33.0	17.2	1	134
DYNA-GRO/DG 32F12	37	.	34.1	16.7	1	131
THOMPSON/T-1901RR	37	.	34.0	16.6	1	.
THOMPSON/T-2121RR/SCN	37	.	33.3	17.0	1	.
PUBLIC/SDX00R-035-59	37	.	33.5	16.9	1	134
KELTGEN AGVENTURE/AV 10	36	.	33.3	17.4	1	129
LATHAM/EXP-E1230R	36	.	33.6	17.1	1	132
WENSMAN/W 2144RR	36	.	32.6	17.2	1	133
THOMPSON/T-1818RR/SCN	36	.	33.9	16.8	1	.
PUBLIC/SD01-1792R	36	.	34.2	16.4	1	130
PUBLIC/SDX00-022R-23	35	.	33.5	16.8	1	130
PRAIRIE BR./PB-1634RR	34	.	32.1	17.4	1	133
PUBLIC/SDX00R-035-12	30	.	31.8	16.6	2	.
GOLD COUNTRY/6117RR	25	.	35.5	16.1	1	.
Test avg.:	41	30	32.2	17.2	1	132
Max. avg.:	48	34	35.5	18.5	2	135
Min. avg.:	25	28	29.7	16.1	1	129
# Lsd (.05):	5	NS			0	
## TPG-value:	43	28			1	
@ Coef. Var.:		10			28	
No. Entries:	92	17	92	92	92	

* Lodging, 1= all plants erect, 5= all plants flat.
^ DTM= days from seeding on May 21, 2004 to maturity.
# Lsd,(.05)= amount values in a column must differ to be significantly different. NS- differences among column values are non-significant.
Minimum value required to qualify for the top performance group.
@ Coef. Var.= a measure of trial experimental error.

Research funding & support sources: The SD Agricultural Experiment Station and testing fees obtained from the SD Crop Performance Testing Program.

2004 PRECISION-PLANTED CORN HYBRID PERFORMANCE TRIALS

R. G. Hall and K. K. Kirby

This reports the 2004 NE Research Farm performance trials for both non-Roundup-Ready and Roundup-Ready corn hybrids conducted by the South Dakota State University Crop Performance Testing (CPT) program.

Experimental Procedures

Entries were placed into either an early or late maturity trial according to ratings reported by a given seed company. The break between the early and late test was 95-day for both the non-Roundup Ready and Roundup Ready hybrid trials. Entries were seeded in three replications with each hybrid randomly located within a replication. Plots consisted of four 30-inch rows, 20 feet long. Plots were seeded on May 6, 2004 into a Brookings silty loam previously cropped to soybeans. A Monosem precision row crop planter was used for seeding plots. During seeding a starter fertilizer of 100 pounds/acre of 37-18-00 was applied 2" below and 2" to the side (2x2) of the seed row. The precision planter was calibrated and delivered 27,878 seeds per acre, regardless, of seed quality and germination percentage. Therefore, the harvest population is an indication of initial seed quality and the ability of the seed to cope with the production environment. Force insecticide was applied down the seed tube at its label rate for corn rootworm control. In addition, Pounce granular was applied at its label rate down the whorl with a tractor mounted granular applicator prior to canopy closure.

Except for weed control the experimental procedures described above apply both to the non-Roundup Ready and the Roundup Ready hybrid trials. In the Roundup Ready trials two post emergence applications of Roundup Ultra (32 oz/acre) were applied. The first when weeds were 2-4 inches tall, followed by a second application when weed growth was again 2-4 inches tall. In the non-Roundup Ready test trials, pre-emergence weed control consisted of Harness Extra (1.0 qt./ac.), while a light cultivation was used for post-emergence control.

Measurements of Performance

Yield values are an average of three replicates (plots), and are expressed as bushels per acre, adjusted to 15.5% moisture on a dry-matter basis and a bushel weight of 56 pounds. Moisture content is expressed as the percentage of moisture in the shelled grain at harvest.

Check for the "least significant difference" (Lsd) value at the bottom of each column of data values. The reported Lsd values can be used in two ways. First, the Lsd value indicates how much a variable such as yield must differ between two hybrids before there is a real yield difference. For example, in the early non-Roundup Ready test (Table 1), the year 2004 Lsd value of 11 bu/a can be used to compare the yields of any two hybrids in the early maturity trial. If hybrid A yields 163 bu/a and hybrid B yields 158 bu/a the yield difference is 5 bu/a (163 -

158 = 5). In this case the two hybrids do not differ in yield because their yield difference of 5 bu/a is less than the reported Lsd value of 11 bu/a. In contrast, if hybrid C yields 151 bu/a the yield difference between hybrid A and hybrid C would be 12 bu/a (163-151 = 12). In this case the yield difference of 12 bu/a is more than the reported Lsd value of 11 bu/a and therefore hybrid A has a significantly higher yield than hybrid C.

The second use for the Lsd value is to identify the top group for the current year yield, two-year yield, bushel weight, grain moisture at harvest, and stalk lodging below the ear percentage. For example, in the non-Roundup Ready hybrid early maturity trial (Table 1) the highest current year yield was 163 bu/a. To determine if it is the only top yielding hybrid in this trial use the Lsd value of 11 bu/a at the bottom of the 2004 yield column. In order for hybrids to be in the top performance group for yield they must yield 152 bu/a (163-11 = 152) or higher. Technically, a yield of 153 bu/a is in the top yield group while a yield of 152 bu/a is not in the top yield group. However, since all yields and Lsd values are rounded to the nearest whole number. We can say 152 bu/a, because of the rounding-off, is the more appropriate minimum value for top yield hybrids in this early maturity test in 2004. Top yield hybrids for 2004 are those hybrids that are equal or higher than the minimim top yield group value. In addition, the minimum top yield group value is indicated for the 2 yr. (2003-04) average unless there were no significant yield differences. The minimum yield required to qualify for the top performance group for yield is listed at the bottom of each yield column (TPG-value).

Similarly, the top group for other performance factors like bushel weight, grain moisture at harvest, and stalk lodging below the ear percentage can be determined. For example, in the early maturity test (Table 1), the minimum bushel weight value to qualify for the top group was 52 lbs. Note that yield and bushel weight values needed to qualify for the top group are reported as a minimum top group value. In contrast, the grain moisture and lodging below the ear percentages needed to qualify for the top-group are reported as a maximum top group value. In other words, yield and bushel weight top-group values must exceed a certain percentage while grain moisture and lodging below ear percentages must be equal to or less than certain percentage to qualify for the top group depending on the performance factor measured. In Table 1 current year yields must equal 152 bu/ac or higher, two-year yields must equal 118 bu/ac or higher, bushel weight must be 52 lbs. or higher, grain moisture must be 23% or less, and stalk lodging below the ear must be 2% or less to be in the top performance group for these factors.

Performance Trial Results

General: Compared to 2003, the yield averages for 2004 were higher, the moisture content of the grain at harvest was higher, and the grain bushel weight averages were lower. The high harvest moisture and bushel weight averages at harvest was likely the result of the cooler than normal temperatures in May which delayed or slowed seedling emergence and/or growth. In general, this location experienced lower than normal heat unit production in 2004. The result of the cooler than normal spring and cooler than normal summer was a general delay in the development of the corn throughout the

growing season. Consequently, at harvest, the resulting above average moisture content of the grain at harvest also resulted in below average bushel weight averages. Although the cooler growing season did not markedly affect yield in 2004 it definitely affected grain quality through its affect on bushel weight.

Non-Roundup Ready hybrids: Results for year 2004 and for years 2003-04 follow:

Early maturity corn test, Table 1**.** The test trial yield average was 148 bu/ac for year 2004 and 117 bu/ac for two years (2003-04). Hybrids that yielded 152 bu/ac or more in 2004 and 118 bu/ac or more for two years qualified for the top yield group. Hybrids had to differ in yield by 11 bu/ac in 2004 and by 10 bu/ac for two years to be significantly different from one another. In 2004, bushel weights averaged 51 lbs, grain moisture averaged 28%, lodging averaged 1% and the final plant population averaged 26,826 ppa. In order for a hybrid to be in the top performance group for these factors they had to equal 52 lbs. or higher in bushel weight, 23% or less in grain moisture, 2% or less in stalk lodging, and 24,249 ppa in final population. This final population of 24,249 ppa was the lowest population; however, the differences in final population were non-significant (NS). This top performance final population of 24,249 ppa was 87% (24,249/27,878) of the population delivered at planting.

Late maturity corn test, Table 2**.** The test trial yield average was 130 bu/ac for year 2004 and 99 bu/ac for two years (2003-04). Hybrids that yielded 161 bu/ac or more in 2004 qualified for the top yield group. Since there were no significant differences in yield in hybrids tested for two years, even the lowest yield of 86 bu/ac qualified for the two-year top yield group. Hybrids had to differ in yield by 13 bu/ac in 2004 to be significantly different from one another, while there was no significant yield differences for hybrid tested two years. In 2004, bushel weights averaged 50 lbs, grain moisture averaged 34%, lodging averaged 2% and the final plant population averaged 27,349 ppa. In order for a hybrid to be in the top performance group for these factors they had to equal 50 lbs. or higher in bushel weight, 28% or less in grain moisture, 3% or less in stalk lodging, and 25,991 ppa in final population. The top performance final population of 25,991 ppa was 93% (25,991/27,878) of the population delivered at planting.

Table 1. Non-Roundup Ready early maturity corn performance results-
NE Research Farm, South Shore, SD, 2003-2004.

Brand/Variety (by 2-Yr & 2004 yield)	Agronomic Peformance Averages						
	Bu/Acre 2004	Bu/Acre 2-Yr	2004 Bu. wt. Lb.	2004 H2O %	2004 Ldg. %	2004 PPA	RM*
KRUGER/9392YGCB	161	128	52	27	2	26,426	90
WENSMAN/W 5212BT	158	121	50	27	1	25,991	95
CROW'S/1703 B	157	121	49	28	1	28,024	95
WENSMAN/W 4212	157	118	51	27	0	28,169	95
SEEDS 2000/2953BT	153	118	51	28	1	28,024	95
KRUGER/9496YGCB	153	117	49	28	1	26,717	94
WENSMAN/W 5117BT	157	116	52	27	1	27,007	92
MIDWEST/G 6963 B	153	114	49	28	0	25,265	95
GOLD COUNTRY/94-01CB	152	113	50	27	1	25,845	94
DAIRYLAND/STEALTH-5194	133	102	52	26	1	25,700	94
DEKALB/DKC40-05	163	.	53	21	0	28,169	90
DEKALB/DKC42-89 (YGPL)	157	.	53	26	1	27,297	92
JACOBSEN/4025	156	.	49	27	2	25,846	92
WENSMAN/W 7212RW	156	.	50	27	0	27,733	95
KELTGEN/AV4880CB	151	.	51	28	0	26,427	95
NUTECH/4595 YGCB	149	.	50	28	0	27,443	94
WENSMAN/W 7117BTRW	147	.	52	28	0	27,298	92
NUTECH/1992 LL/BT	146	.	52	28	0	27,733	92
NUTECH/4393 YGCB	146	.	52	28	0	26,281	95
NUTECH/4191 YGCB	144	.	53	27	1	25,265	90
MYCOGEN/2R426	144	.	50	28	1	27,007	95
MALLARD/3411CB	140	.	50	29	2	27,298	92
MALLARD/BT-2430	140	.	49	28	0	27,298	95
MALLARD/EXP 05-04	137	.	52	26	0	26,572	91
SEEDS 2000/2933BT	137	.	50	33	0	27,297	93

Table 1. Non-Roundup Ready early maturity corn performance results-
NE Research Farm (continued).

Brand/Variety (by 2-Yr & 2004 yield)	Agronomic Peformance Averages						
	Bu/Acre 2004	Bu/Acre 2-Yr	2004 Bu. wt. Lb.	2004 H2O %	2004 Ldg. %	2004 PPA	RM*
DAIRYLAND/STEALTH-5692	136	.	50	30	2	27,152	93
JACOBSEN/4068CB	134	.	51	31	1	27,588	95
KRUGER/5093YGCB	132	.	50	23	0	24,249	93
Test avg.:	148	117	51	28	1	26,826	
Max. avg.:	163	128	53	33	2	28,169	
Min. avg.:	132	102	49	21	0	24,249	
# Lsd (.05):	11	10	1	2	NS	NS	
## TPG-value:	152	118	52	23	2	24,249	
@ Coef.Var.:	5	7	2	2	165	4	
No. Entries:	28	10	28	28	28	28	

* RM= relative maturity reported by seed company. Seeded on May 6, 2004
# Lsd= amount values in a column must differ to be significantly different.
NS indicates differences among values in a column are non-significant.
Minimum or maximum value required to qualify for top performance group.
@ Coef. of variation= measure of trial experimental error.

Table 2. Non-Roundup Ready late maturity corn performance results-
NE Research Farm, South Shore, SD, 2003-2004.

Brand/Variety (by 2-Yr & 2004 yield)	Agronomic Peformance Averages						
	Bu/Acre 2004	Bu/Acre 2-Yr	2004 Bu. wt. Lb.	2004 H2O %	2004 Ldg. %	2004 PPA	RM*
DEKALB/DKC50-18 (YGCB)	142	111	50	29	1	27,733	100
DEKALB/DKC52-45 (YGCB)	134	107	48	30	0	27,152	102
SANDS/SOI 103YGCB	116	91	49	38	0	28,023	103
KRUGER/9404YGCB	125	86	50	32	1	28,169	103
KRUGER/9306YGCB	161	.	51	29	2	27,878	103
KRUGER/5594YGCB	145	.	52	28	1	27,878	96
KRUGER/9002YGCB	141	.	51	26	5	27,443	102
NUTECH/4999 YGCB	135	.	50	34	1	27,007	99
KRUGER/8504HX	132	.	49	31	2	28,023	102
MYCOGEN/2R570	130	.	51	41	4	28,024	104
KRUGER/9401YGCB	129	.	50	32	1	26,281	101
KRUGER/9203YGRW	129	.	51	31	1	27,007	103
GOLD COUNTRY/103-02CB	126	.	51	37	1	25,991	103
KRUGER/8503HX	121	.	50	42	4	27,733	103
MYCOGEN/2G626	118	.	50	36	6	26,571	105
KRUGER/5405YGCB	115	.	50	39	2	27,152	105
KRUGER/5805YGCB	115	.	50	39	4	26,862	105
Test avg.:	130	99	50	34	2	27,349	
Max. avg.:	161	111	52	42	6	28,169	
Min. avg.:	115	86	48	26	0	25,991	
# Lsd (.05):	13	NS	NS	2	3	NS	
## TPG-value:	148	86	48	28	3	25,991	
@ Coef.Var.:	6	5	2	4	99	4	
No. Entries:	17	4	17	17	17	17	

* RM= relative maturity reported by seed company. Seeded on May 6, 2004
# Lsd= amount values in a column must differ to be significantly different.
NS indicates differences among values in a column are non-significant.
Minimum or maximum value required to qualify for top performance group.
@ Coef. of variation= measure of trial experimental error.

Performance Trial Results (continued)

Roundup Ready hybrids: Results for year 2004 and for years 2003-04 follow:

Early maturity corn test, Table 3. The test trial yield average was 146 bu/ac for year 2004 and 114 bu/ac for two years (2003-04). Hybrids that yielded 147 bu/ac or more in 2004 qualified for the top yield group. Since there were no significant differences in yield in hybrids tested for two years, even the lowest yield of 109 bu/ac qualified for the two-year top yield group. Hybrids had to differ in yield by 11 bu/ac in 2004 to be significantly different from one another, while there was no significant yield differences for hybrid tested two years. In 2004, bushel weights averaged 53 lbs, grain moisture averaged 25%, lodging averaged 1% and the final plant population averaged 27,087 ppa. In order for a hybrid to be in the top performance group for these factors they had to equal 54 lbs. or higher in bushel weight, 21% or less in grain moisture, 2% or less in stalk lodging, and 27,282 ppa in final population. The top performance final population of 27,282 ppa was 98% (27,282/27,878) of the population delivered at planting.

Late maturity corn test, Table 4. The test trial yield average was 134 bu/ac for year 2004 and 104 bu/ac for two years (2003-04). Hybrids that yielded 144 bu/ac or more in 2004 qualified for the top yield group. Since there were no significant differences in yield in hybrids tested for two years, even the lowest yield of 102 bu/ac qualified for the two-year top yield group. Hybrids had to differ in yield by 11 bu/ac in 2004 to be significantly different from one another, while there was no significant yield differences for hybrid tested two years. In 2004, bushel weights averaged 49 lbs, grain moisture averaged 31%, lodging averaged 1% and the final plant population averaged 27,171 ppa. In order for a hybrid to be in the top performance group for these factors they had to equal 50 lbs. or higher in bushel weight, 27% or less in grain moisture, 2% or less in stalk lodging, and 26,884 ppa in final population. The top performance final population of 26,884 ppa was 96% (26,884/27,878) of the population delivered at planting.

Table 3. Roundup Ready early maturity corn performance results-
NE Research Farm, South Shore, SD, 2003-2004.

Brand/Hybrid (by 2-Yr & 2004 yield)	Agronomic Peformance Averages						
	Bu/Acre 2004	Bu/Acre 2-Yr	2004 Bu. wt. Lb.	2004 H2O %	2004 Ldg. %	2004 PPA	RM*
DEKALB/DKC42-95RR2YGCB	155	122	54	26	0	28,023	92
KRUGER/9392RR/YGCB	154	117	55	27	0	28,314	92
KRUGER/9392RR	156	116	55	25	0	27,443	90
INTEGRA/INT 6395RR	153	116	53	26	0	27,588	95
WENSMAN/W 6116RR	151	115	55	25	1	26,862	91
WENSMAN/W 6117BTRR	147	115	55	26	1	27,733	92
SEEDS 2000/2953RR	150	114	53	27	0	28,895	95
KRUGER/2391RR/YGCB	143	114	54	23	2	27,007	92
KRUGER/9496RR	151	113	53	26	0	28,314	94
WENSMAN/W 6212RR	150	113	52	26	0	27,878	95
CHANNEL/6925RB	146	112	54	26	0	27,152	92
CHANNEL/6939RB	144	111	53	23	0	27,443	93
DEKALB/DKC44-46RR2YGCB	140	110	49	28	1	27,298	94
INTEGRA/INT 6193RRYG	139	109	53	22	1	25,701	92
KRUGER/2291RR/YGCB	158	.	53	22	3	26,862	91
MYCOGEN/2R416	154	.	52	27	0	26,426	95
SEEDS 2000/2944RRBT	150	.	52	22	2	27,152	94
NUTECH/3595 RR	148	.	52	26	0	28,169	94
WENSMAN/W 7111RWRR	146	.	53	22	1	27,443	90
NUTECH/5990 RR/YGCB	145	.	52	23	2	27,443	92
NUTECH/5592 RR/YGCB	145	.	56	21	0	27,007	93
KRUGER/4193RR/YGRW	145	.	56	20	2	27,152	93
KELTGEN/AV4005R2CB	143	.	53	27	1	27,879	92
WECO SEEDS/EXPCS90RR	143	.	55	26	1	27,152	90
GOLD COUNTRY/92-01CBR	143	.	55	27	0	26,426	92
KELTGEN/AV4882R2	142	.	51	27	1	26,136	94
MALLARD/EXP 05-09	142	.	54	26	1	27,733	92
CHANNEL/6965 R	141	.	51	27	0	25,410	95
AGSOURCE SEEDS/3566	141	.	55	27	0	26,136	92
WECO SEEDS/EXPCS95RR	136	.	54	20	1	24,103	95

Table 3. Roundup Ready early maturity corn performance results-
NE Research Farm (continued).

Brand/Hybrid (by 2-Yr & 2004 yield)	Agronomic Peformance Averages						
	Bu/Acre 2004	Bu/Acre 2-Yr	2004 Bu. wt. Lb.	2004 H2O %	2004 Ldg. %	2004 PPA	RM*
MALLARD/RRBT-5810	116	.	50	26	2	25,410	90
INTEGRA/INT 6390RRYG	.	.	.	.	.	.	91
Test avg.:	146	114	53	25	1	27,087	
Max. avg.:	158	122	56	28	3	28,895	
Min. avg.:	116	109	49	20	0	24,103	
# Lsd (.05):	11	NS	2	1	2	1,613	
## TPG-value:	147	109	54	21	2	27,282	
@ Coef.Var.:	4	5	3	3	182	4	
No. Entries:	31	14	31	31	31	31	

* RM= relative maturity reported by seed company. Seeded on May 6, 2004
# Lsd= amount values in a column must differ to be significantly different.
NS indicates differences among values in a column are non-significant.
Minimum or maximum value required to qualify for top performance group.
@ Coef. of variation= measure of trial experimental error.

Table 4. Roundup Ready late maturity corn performance results-
NE Research Farm, South Shore, SD, 2003-2004.

Brand/Hybrid (by 2-Yr & 2004 yield)	Agronomic Peformance Averages						
	Bu/Acre 2004	Bu/Acre 2-Yr	2004 Bu. wt. Lb.	2004 H2O %	2004 Ldg. %	2004 PPA	RM*
GOLD COUNTRY/1016RRBT	139	106	49	33	2	27,588	104
KRUGER/9203RR/YGCB	135	102	48	34	0	27,152	103
DEKALB/DKC48-52 (RR2)	155	.	52	25	2	27,443	98
AGSOURCE SEEDS/3931	153	.	52	26	0	27,878	96
DEKALB/DKC47-10RR2YGCB	150	.	52	26	1	28,169	97
DAIRYLAND/STEALTH-6497	149	.	50	27	0	27,733	97
ACCESS/EXP1500RR	141	.	50	27	1	27,443	100
NUTECH/5101 RR/YGCB	139	.	50	33	2	28,459	100
ACCESS/EXP1597RR	139	.	49	27	2	27,878	97
CHANNEL/7135RB	136	.	49	32	1	27,733	101
MYCOGEN/2K541	135	.	47	34	0	28,169	103
KRUGER/2103RR/YGCB	133	.	49	29	2	27,007	103
SANDS/NGS 1030RR/YGCB	132	.	49	34	1	26,862	103
AGSOURCE SEEDS/4556	132	.	49	33	1	27,878	101
NUTECH/3005 RR/YGCB	131	.	50	30	0	26,571	100
JACOBSEN/4167RBT	131	.	49	35	1	26,136	101
KRUGER/1200RR	128	.	49	30	2	25,555	100
WENSMAN/W 7309RWRR	127	.	51	33	2	27,443	100
WENSMAN/W 6274RR	122	.	49	30	2	25,700	98
KRUGER/1100RR	121	.	47	32	1	25,119	100

Table 4. Roundup Ready late maturity corn performance results-
NE Research Farm (continued).

Brand/Hybrid (by 2-Yr & 2004 yield)	Agronomic Peformance Averages						
	Bu/Acre 2004	Bu/Acre 2-Yr	2004 Bu. wt. Lb.	2004 H2O %	2004 Ldg. %	2004 PPA	RM*
KRUGER/1202RR	120	.	49	37	1	27,007	102
CHANNEL/7138RB	120	.	50	32	4	26,572	101
KRUGER/1506RR	113	.	50	43	5	27,443	105
Test avg.:	134	104	49	31	1	27,171	
Max. avg.:	155	106	52	43	5	28,459	
Min. avg.:	113	102	47	25	0	25,119	
# Lsd (.05):	11	NS	2	2	2	1,775	
## TPG-value:	144	102	50	27	2	26,884	
@ Coef.Var.:	5	4	2	3	107	4	
No. Entries:	23	2	23	23	23	23	

* RM= relative maturity reported by seed company. Seeded on May 6, 2004
# Lsd= amount values in a column must differ to be significantly different.
NS indicates differences among values in a column are non-significant.
Minimum or maximum value required to qualify for top performance group.
@ Coef. of variation= measure of trial experimental error.

Research funding & support sources: The SD Agricultural Experiment Station and testing fees obtained from the SD Crop Performance Testing Program.

2004 Flax Variety Trials

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A yield trial of released flax varieties and experimental lines from South Dakota, North Dakota, and Canada was grown at the Northeast Research Station (Watertown, SD), Brookings, and Webster, SD in 2004. The purpose of the trial was to provide performance data on released flax varieties to producers and compare performance of experimental lines to established checks in order to identify possible new varieties. Data from the South Dakota trials are also included in the flax regional trial report, which summarizes the performance of experimental lines across the flax growing regions of SD, ND, and Canada.

In 2004, twelve experimental lines from the NDSU and Canadian flax breeding programs were tested against twenty-three released varieties. The Webster and Watertown trials were planted on May 4th. Brookings early-seeded was planted April 26th, and Brookings Late was planted May 20, 2004. An additional trial was planted at Brookings on June 23rd in a field infested with the flax wilt fungus, *Fusarium oxysporum* f. *lini*, in order to test the resistance of the flax varieties to wilt.

Experiment design at each location was a randomized complete block with three replications. Plots consisted of seven rows 13 ft. long, with rows spaced seven inches apart. Plots at all locations were harvested by cutting the middle three rows of each plot with a bundle cutter, then drying and threshing the bundles.

Stands were good at all locations. The 2004 growing season began with abnormally dry to moderate drought conditions in most of eastern South Dakota. Topsoil moisture was adequate at planting at all locations. All stations had below normal precipitation in April, June, and August but above-normal precipitation in May. Brookings and Webster had normal precipitation in July, while Watertown was wetter than average in July. Average temperatures were warmer than normal in April but cooler than normal for the remainder of the growing season at all three locations.

Seed yield and agronomic data on the 35 varieties tested are presented in Table 1. Yield averaged over varieties was highest at Webster (44.5 bu/A) and lowest at the late-seeded Brookings location (23.2 bu/A). There were no statistically significant differences in yield among the varieties when averaged over all four locations in 2004.

This research was funded by the SDSU Agricultural Experiment Station and the SDSU Plant Science Department Oilseed project.

Table 1. Summary of results of the 2004 flax Regional trial.

Variety	Origin -Year	Seed Yield (bu/A)** Bks E	Watrtn	Webstr	Bks L	Mean	Yield Rank	Oil %	Plant Hght	Bks E Lodg	Wilt*
						-4-		-4-	in.	(0-9)	(1-9)
AC Carnduff	CAN-99	***34.0***	33.9	***46.4***	***23.5***	***34.4***	3	41.1	24	1.1	5.2
AC Emerson	CAN-95	25.8	***36.6***	43.7	***22.6***	***32.2***	15	40.3	22	1.3	3.3
AC Hanley	CAN-02	28.0	30.1	***45.6***	***24.4***	***32.0***	17	40.0	22	2.3	4.5
AC Watson	CAN-97	24.7	35.0	***50.8***	***25.0***	***33.9***	5	42.0	22	1.2	4.1
Bison (check)	ND-27	27.3	31.9	35.8	***23.4***	***29.6***	26	39.9	24	0.4	3.5
Cathay	ND-97	23.9	27.8	39.9	***25.3***	***29.2***	27	41.7	24	1.6	3.2
CDC Arras	CAN-00	27.1	***41.2***	***48.4***	***21.6***	***34.6***	2	41.4	24	0.8	4.5
CDC Bethume	CAN-00	***29.1***	***38.2***	***47.8***	***23.3***	***34.6***	1	41.6	22	1.6	5.9
CDC Mons	CAN-03	***31.6***	30.7	***45.8***	***24.2***	***33.1***	9	41.3	23	0.8	5.5
CDC Normandy	CAN-96	26.4	26.6	41.9	***25.4***	***30.1***	25	40.8	23	1.5	4.0
CDC Valour	CAN-97	23.8	31.3	***48.7***	***22.6***	***31.6***	20	40.4	23	2.4	4.7
Linora	CAN-92	***32.5***	35.4	***45.0***	***23.1***	***34.0***	4	41.5	23	1.5	3.4
Linott (check)	CAN-66	27.4	32.3	***44.9***	***20.7***	***31.3***	23	41.3	24	0.8	4.1
McGregor (chk)	CAN-82	19.2	32.9	***47.9***	***21.1***	***30.3***	24	40.6	24	1.2	4.6
Nekoma	ND-02	***32.1***	32.0	39.2	***22.9***	***31.5***	21	41.4	22	1.3	6.5
Omega	ND-90	24.2	24.3	43.7	***20.7***	***28.2***	28	41.8	22	1.1	4.5
Pembina	ND-97	***28.9***	34.0	42.7	***26.5***	***33.0***	11	41.1	24	0.9	2.4
Prairie Blue	CAN-03	***33.9***	33.2	39.0	***26.2***	***33.1***	8	42.5	22	1.1	4.3
Rahab 94 (chk)	SD-94	25.8	***36.4***	***45.8***	***22.1***	***32.5***	13	41.9	23	1.2	4.5
Selby	SD-00	27.4	33.8	42.2	***26.9***	***32.6***	12	41.1	24	1.0	4.3
Verne 93	SD-93	***29.3***	27.3	***46.3***	***24.5***	***31.8***	18	40.9	23	1.3	1.2
Webster	SD-98	28.2	34.3	43.2	***27.3***	***33.3***	6	42.3	24	1.3	4.1
York	ND-02	***29.1***	34.1	***45.8***	***23.0***	***33.0***	10	39.9	22	0.6	3.3
N0010	ND-exp.	***32.4***	31.7	43.3	***21.8***	***32.3***	14	40.9	22	0.8	5.8
N2007	ND-exp.	24.4	31.4	--	***23.8***	--	--	--	--	1.4	--
FP2112	CAN-exp.	***32.9***	32.1	42.6	***25.3***	***33.2***	7	42.1	24	2.8	6.7
FP2114	CAN-exp.	24.7	31.8	***46.4***	***22.4***	***31.3***	22	41.5	22	1.6	2.7
FP2118	CAN-exp.	27.6	35.0	***47.5***	***18.5***	***32.1***	16	41.7	24	1.8	1.7
FP2119	CAN-exp.	***29.0***	33.2	***44.9***	***19.7***	***31.7***	19	40.3	22	2.2	6.1
N2010	ND-exp.	***30.1***	27.6	--	***20.5***	--	--	--	--	0.5	--
N2014	ND-exp.	28.2	32.5	--	***20.3***	--	--	--	--	1.4	--
N305	ND-exp.	25.2	30.8	--	***21.5***	--	--	--	--	1.2	--
N320	ND-exp.	***28.5***	***36.1***	--	***23.9***	--	--	--	--	1.2	--
N323	ND-exp.	***29.6***	***36.4***	--	***26.5***	--	--	--	--	0.5	--
N325	ND-exp.	***29.8***	31.7	--	***23.3***	--	--	--	--	1.3	--
Grand Mean		28.1	32.7	44.5	23.2	32.1		41.2	23	1.3	4.2
Check Mean		24.9	33.4	43.6	21.8	30.9		40.9	24	0.9	4.1
LSD 5%		5.7	5.1	6.6	ns	ns		0.8	ns	ns	1.6
C.V.		12.4	9.6	9.0	14.8	9.9		2.0	6.0	70.2	22.4

** Yields printed in bold type were in the top-yielding group, based on the LSD 5% value.

** Wilt ratings taken on wilt nursery. 1=best, 9=worst.

OAT RESEARCH

Lon Hall

Yield, yield stability, and test weight are the most important characteristics associated with the identification and eventual release of oat varieties. There are, however, several additional factors that contribute to the expression of these primary characteristics. Resistance to lodging, Barley Yellow Dwarf Virus (BYDV), stem rust, and crown rust all affect yield potential and test weight. Other traits that are considered prior to varietal release include: hull, protein, and oil percentages, as well as maturity, hull color, plant height, and whether it is hulled or hulless. Consumers desire different characteristics for specific needs. Millers generally want oats with high protein, high beta-glucan content, and low oil, whereas, livestock producers prefer tall varieties with high levels of protein and oil. The racehorse industry demands a high quality, white-hulled or hulless oat variety. Tall varieties, such as Loyal, are popular forage oats.

The main emphasis of the oat breeding programs is development of hulled varieties. Market demand for milling and feed oats isn't affected by hull color; however, the racehorse industry desires white-hulled varieties. Therefore, emphasis is placed on development of white-hulled varieties with desirable traits for milling and/or feed. Recently there has been interest in hulless oats for feed and other specialty uses, therefore, we have increased our effort to develop a high oil hulless oat. Plant breeding is a long drawn out process. The bulk breeding method takes, on average, at least 10 years from the initial cross to variety release. This process may be shortened by two to three years by using a modified single seed descent method, which involves two extra generations in the greenhouse, and a winter increase in New Zealand. Each year there are approximately 37,000 non-segregating plants and head rows observed within this program. In 2004, there were 3862 unique non-segregating lines yield tested. Out of a project total of 6870 yield plots, 3068 were grown at the Northeast Research Farm.

SD000366-15 and SD000366-36 are sister lines that have been approved to increase for intent to release. If approved for variety release, one of these lines will be available to the producers for the 2006 growing season. They are white-hulled oat lines with a high test weight, good disease resistance, and yield potential. When averaged over 13 tests, SD000366-15 yielded 7.6 bushels more and had a 1.1 lb test weight advantage over Jerry. SD000366-36 yielded 14 bushels more and had .9 lb test weight advantage over Jerry. They are slightly taller and head one and two days later than Jerry respectively. Limited data shows both lines have adequate stem rust and lodging resistance; however, crown rust rating from field and buckthorn nursery evaluations indicate both lines have excellent crown rust resistance. Barley Yellow Dwarf resistance appears to be good; however, there was only one evaluation in 2003. SD000366-15 and SD000366-36 will be evaluated next year in Crop Performance Testing and the Uniform Midseason Oat Nursery (UMO). UMO data is collected from 16 locations in the USA and Canada is very useful for seed quality and disease evaluations. UMO disease data is collected in buckthorn nurseries, inoculated tests, and field infections. Yield data from the UMO is considered; however, emphasis is placed on Crop Performance Trials and breeder data.

This research is supported by the SD Agricultural Experimental Station and the Quaker Oats Company.

Winter Wheat Breeding and Genetics

Amir Ibrahim, Steve Kalsbeck, Rich Little

Summary of Activities

The Winter Wheat Breeding and Genetics Program utilizes the Northeast Research Station primarily to conduct winterhardiness evaluations and for the state Crop Performance Testing (CPT) Variety Trial. The breeding program also conducts field-testing at several other sites throughout South Dakota (Brookings, Selby, Winner, Wall, and the Dakota Lakes Research Station near Pierre), for both early-generation selection and determination of the potential of experimental lines for cultivar release.

The winter wheat testing conducted at the Northeast Research Station during 2004 included:

i) The CPT Variety Trial, under the overall coordination of Bob Hall. The trial included 30 entries, consisting of 13 released varieties (including new releases from other states), 16 advanced experimental lines from our program, and one experimental line from Nebraska. This trial was also grown at 13 other sites in South Dakota. Prior to cultivar release, promising elite lines must be grown in the CPT Variety Trial for three years to accurately measure the potential performance across a range of environmental conditions.

ii) A Winter Wheat Fusarium Head Blight Seed Treatment Trial, including 18 lines and 4 replications, in cooperation with Marty Draper, Extension Plant Pathologist.

iii) A collaborative screening nursery, including 10 lines and three replications, with Dr. Peter Frank from Germany.

iv) A two-row winterhardiness nursery, consisting of short-row evaluations of several different breeding nurseries: the Regional Germplasm Observation Nursery (RGON, 292 entries); Nebraska Interstate Nursery (NIN, 60 entries); the Uniform Barley Winterhardiness (UBWHN, 17entries); the Western Regional Hard Winter Wheat (WRHWW, 20 entries); a collaborative nursery with Dr. Peter Frank from Germany (10 lines); and the South Dakota Advanced Yield Trial (45 lines).

Trial Conditions

The yield trials at the Northeast Research Station were planted into spring wheat stubble under dry soil conditions on 4 September 2003. The observation rows were planted under adequate soil moisture conditions into spring wheat stubble on 24 September 2003. Starter fertilizer was applied with the planter. Maverick was applied on 26 April 2004 at 0.66 oz per acre. Cheat grass competed with winter wheat, causing uneven stand, which resulted in unuseful observation row data. Grain yield data for the CPT Variety Trial at the NE Farm and other locations is presented in Table 1.

Acknowledgements

Each year, 800-1000 new cross combinations are made and 800-1000 new experimental lines are developed by the winter wheat breeding program. In addition to the excellent support of our wheat pathology programs (small grains pathology and virology), the solid and consistent financial support from the SD Wheat Commission and the SD Crop Improvement Association are vitally important to ensuring continued availability of improved winter wheat varieties for producers in South Dakota.

Table 1. Yield results of entries in the 2004 Crop Performance Testing (CPT) nursery.

	Grain Yield (bu/a)										TW (lb/bu)
Entry	Avg	Brookings	D. Lakes Pea	Highmore	Platte	Selby	Sturgis	Wall	Watertown	Winner	Average
SD97538	65	103	55	78	63	77	29	53	47	58	59
SD92107-5	63	96	52	78	76	71	27	61	42	49	59
SD00W024	63	99	53	71	71	70	28	59	44	53	59
SD97059-2	62	98	51	82	62	72	24	52	52	52	58
SD97394-1	62	99	58	77	62	75	29	47	46	51	59
SD98102	62	92	54	78	69	73	30	49	53	49	59
WAHOO	62	100	53	78	63	70	26	57	37	52	58
HARDING	61	93	46	76	72	68	27	56	45	52	58
JERRY	61	106	46	79	62	71	29	53	45	40	58
SD00258	61	103	47	73	66	70	24	50	47	52	58
MILLENNIUM	60	100	47	74	60	70	29	47	46	55	59
SD99073	60	91	57	76	61	66	24	49	46	51	59
JAGALENE	59	82	58	73	55	72	24	52	39	60	60
NE99533-4	59	90	55	73	60	67	29	50	44	50	60
SD97250	59	88	54	74	63	64	27	46	56	49	59
ALLIANCE	59	83	53	75	64	71	29	46	50	51	59
SD00111	58	84	55	76	59	71	24	46	46	48	59
SD97380-2	58	90	51	77	59	67	24	45	48	47	59
SD00032	57	90	53	71	57	68	19	46	53	49	59
TANDEM	57	84	53	71	63	65	26	51	42	46	60
SD97W671-1	57	88	55	76	53	67	21	47	41	46	59
WESLEY	56	96	47	72	60	58	25	48	42	39	58
SD97W609	56	86	50	67	58	69	22	41	38	44	58
TREGO	55	82	49	68	59	63	27	36	49	57	61
NEKOTA	55	86	51	72	58	60	28	45	31	47	59
SD00W041	54	78	45	73	56	65	21	49	25	56	59
ARAPAHOE	54	79	45	74	57	71	21	40	34	47	58
CRIMSON	54	80	53	64	57	66	27	48	41	38	59
EXPEDITION	53	91	45	62	58	62	21	47	39	40	60
SD97W604	53	86	42	66	48	65	25	45	39	50	59
MEAN	59	91	51	74	61	68	26	49	44	49	59
LSD .05[†]	3.5	16.4	13.1	7.6	10.4	6.9	7.2	5.7	13.8	8.1	0.47
CV%[‡]	12.2	12.9	18.2	7.2	12.1	7.2	17.4	8.1	15.5	11.64	1.6

[§ ‡] The CV (coefficient of variability) is a statistical measure of experimental error. In general, yield trials with a CV of 16% or greater are considered to contain too much experimental error for reliable data interpretation.

[†] The LSD (least significant difference) is the minimum value by which two entries must differ in order for that difference to be meaningful (and not be due to random chance alone). If the difference between two entries is equal to or less than the LSD value, the entries are not statistically different.

Spring Wheat Breeding

Karl D. Glover

Our primary objective is to improve the agronomic, milling, and baking characteristics of spring wheat varieties that are well adapted to South Dakota. Prior to the release of a new variety to growers, its advantageous features must be well documented. Characterization of material begins during the second growing season after a cross has been made. Thousands of breeding lines, each representing a potential variety, are created yearly and are subject to removal from consideration based on their susceptibility to disease and lack of agronomic promise. Lines chosen for additional testing are more heavily scrutinized with each successive testing year. Therefore, the number of lines included in preliminary and advanced yield tests is relatively few compared to early generation tests. Spring wheat production environments in our state can be dramatically different from year-to-year and even from location-to-location within a year. Unfortunately, this prevents varieties from being optimally adapted to all production environments. This necessitates that preliminary and advanced yield tests also be conducted in several environments throughout the state. The Northeast Research Station is one of two locations used for testing material in both early- and advanced-selection stages.

Twenty-seven lines that appear to hold the most potential for release as varieties are grown each year in our Advanced Yield Trial (AYT) test along with nine released varieties included for comparative purposes. Not all twenty-seven entries are advanced to a second year of AYT testing. Table 1 presents agronomic and disease resistance observations collected from ten experimental entries that were grown in both the 2003 and 2004 AYT tests at the Northeast Research Station. Yield data for each entry calculated as its average over eight AYT locations (Aurora, Brookings, Buffalo, Groton, Miller, Redfield, Selby, and Watertown) in both 2003 and 2004 are also presented.

Average yield among these entries at the Northeast Research Station was lower in 2003 due to dry conditions (Table 1). Growing conditions in 2004 prevented the incidence of any appreciable amount of leaf rust at the Northeast Research Station, however, an infestation of Fusarium Head Blight (FHB) was present. FHB resistance data presented in Table 1 were collected at the Brookings screening nursery and leaf rust ratings were collected at the Groton location.

Among these potential varieties, SD3687 appears most promising as it has above average yield potential, acceptable test weight, a good level of leaf rust resistance, and excellent scab resistance. Breeders seed of SD3687 is currently being increased and slated for large-scale increase in 2005. If it continues to perform as well as in previous years, it will be considered for release in the fall of 2005 and made available to certified seed growers as a new variety in 2006.

Efforts carried out, and varieties released, by this program are made possible with the financial support provided by the South Dakota Agricultural Experiment Station, South Dakota Wheat Commission, and South Dakota Crop Improvement Association.

Table 1. Agronomic and disease resistance performance data of ten potential hard red spring wheat varieties evaluated in 2003 and 2004 Advanced Yield Trials.

Entry	Northeast Research Station Yield (bu/ac)			2003 - 2004 Statewide Average *					
	2004	2003	2yr.	TW (lb/bu)	Heading (Day)***	Height (in)	FHB**	LR**	Yield (bu/ac)
SD3687	74.8	48.6	59.9	57.1	18.1	38.3	MR	MS	64.2
SD3618	64.7	45.9	53.9	59.4	19.2	39.0	MS	S	62.4
SD3746	52.3	46.7	49.1	56.6	20.0	37.8	MS	R	62.0
GRANGER	60.8	48.7	53.9	59.2	17.5	39.7	M	MS	61.4
SD3668	61.8	49.0	54.5	58.7	16.8	39.3	M	R	61.3
BRIGGS	64.1	47.6	54.7	57.8	16.8	37.5	MS	R	61.3
SD3756	53.0	51.0	51.9	56.2	21.3	37.3	M	MR	61.3
RUSS	54.8	45.5	49.5	57.5	19.3	40.0	MS	MS	60.5
SD3747	56.2	46.2	50.5	56.4	17.8	33.6	MS	MS	60.3
WALWORTH	52.6	48.2	50.1	57.4	17.2	37.8	M	MR	60.2
SD3748	49.6	46.4	47.8	55.6	20.3	37.6	M	S	59.5
SD3635	58.8	46.3	51.7	58.1	18.7	40.0	M	S	59.4
SD3751	53.3	48.3	50.4	59.1	20.5	39.6	S	MS	58.8
SD3641	66.7	48.5	56.3	58.8	14.7	34.7	M	MR	58.7
2375	53.1	46.3	49.2	59.0	18.2	36.3	S	MS	58.0
BUTTE 86	48.0	47.2	47.5	57.0	18.0	38.9	M	MS	56.3
OXEN	51.4	48.7	49.9	56.5	18.2	34.8	M	MR	56.0
CHRIS	38.0	36.1	36.9	53.8	19.5	44.2	S	MS	41.9
Average	56.3	47.0	51.0	57.5	18.4	38.1	-	-	59.1
LSD	5.9	2.8	2.9	1.1	0.4	1.0	-	-	2.2
CV	6.4	4.2	5.4	4.4	4.2	4.9	-	-	8.8

* Performance based on 16 AYT locations grown in 2003 and 2004.
** FHB and Leaf Rust resistance ratings; R = Resistant, MR = Moderately Resistant, M = Moderate, MS = Moderately Susceptible, S = Suseptible.
*** Heading expressed in days after 1 June.

Spring Wheat Disease Research Report

Jeffrey Stein and Lawrence Osborne
Plant Science Department

Summary

In 2004, the small grains pathology group utilized the Northeast Research Station fields and facilities to conduct research on root rot and *Fusarium* head blight (scab) of wheat. Spring wheat varieties were evaluated in a root rot disease nursery for resistance to soilborne fungi causing root and crown rot diseases. Another study area was planted to a scab-susceptible spring wheat variety. This area was used to monitor the development of scab and to assess inoculum (airborne spores) under a 'natural' environment (not intentionally altered with irrigation or inoculation). Finally, sampling was conducted on station to evaluate the survival and spatial distribution of scab inoculum on wheat plants in field situations.

Part I: Root Rot Complex Screening Nursery

Introduction and Research Methods

In 1998, continuous wheat and corn/wheat rotation systems were established in 75' by 100' sections of a field at the Northeast Research Station. The purpose of the plots was to establish natural reservoirs of root rotting and crown rotting fungi such as *Cochliobolus sativus*, *Fusarium* spp., *Pythium* spp. and *Rhizoctonia solani.* We also anticipated that substantial populations of *Fusarium* spp. within the corn/wheat rotation (especially *F. graminearum*, the causal agent of scab and root and crown rot in wheat) would develop.

Within the continuous wheat system, 36 spring wheat lines, consisting of both currently recommended, as well as several historically significant, varieties were planted into small plots with, 5' by 7' in dimension. Plots were planted into the continuous wheat section of the field with a 7-row grain drill, and no added fertilizer was added. The plots were inoculated by seed furrow placement of oat grains that had been previously colonized by *F. graminearum* or *C. sativus.* Near maturity, a portion of each plot (3.25' of row) was arbitrarily selected for disease evaluation. Plants were carefully dug using a tile spade, and attached soil was carefully dislodged from the root mass.

Each plot was evaluated for common root rot and crown rot diseases. Common root rot severity was rated on a scale of 0-3. A rating of zero (0) would indicate no disease, whereas ratings of 1, 2 or 3 represent the following disease levels: less than 25%, 26-50% and greater than 50% root area affected, respectively. Ratings were performed on 25-40 plants per plot, with 3 replicate plots. Crown rot disease was also assessed for each plant within the evaluated section of all plots. Plants were designated as 'infected' or 'not infected' based on specific symptoms at the crown area.

Results and Discussion

Common root rot disease severity was lower in 2004 than previous years and there were no significant differences between varieties (Table 1). In contrast to previous seasons, the plots were rarely under moisture stress, a requirement for infection by *C. sativus*. In comprison, foot rot incidence was at a similar level to

previous years. Approximately one-half of the varieties examined had 20% or less incidence, with 2375 and Argent having 50% or higher (Table 1).

Table 1. Results for 2004 Common Root Rot (*C sativus*) and Crown Root (*Fusarium* spp.) Spring Wheat Variety Trial.

Variety	Common Root Rot Disease Severity[a]	Foot Rot Disease Incidence (%)[b]
2375	1.52	50%
ALEX	1.33	37%
ALSEN	0.82	14%
ARGENT	1.19	60%
BRIGGS	1.09	12%
BUTTE86	0.93	27%
CHRIS	1.36	21%
EMBER	1.27	11%
ERA	1.34	20%
FORGE	0.96	22%
GRANDIN	1.25	18%
GRANGER	1.26	12%
GRANITE	1.05	23%
GUARD	0.77	54%
HAMER	1.38	16%
HJ98	0.75	38%
INGOT	0.73	21%
KNUDSON	1.22	17%
LEN	1.33	23%
MARSHALL	0.61	14%
MCVEY	0.73	30%
NORPRO	0.88	13%
OKLEE	0.98	27%
OXEN	0.48	34%
PARSHALL	1.16	7%
REEDER	0.66	16%
RUSS	0.82	17%
SD3618	1.52	33%
SD3635	0.72	16%
SD3668	0.81	27%
SD3687	1.33	21%
SD3746	0.88	8%
SHARP	1.12	12%
VERDE	0.17	10%
WALWORTH	0.51	1%
WHEATON	0.87	21%

a. Disease severity estimated using a 0-3 scale. There was NSD between treatments.
b. The percentage of crowns showing symptoms of disease. LSD = 28% (Significant at P<0.05).

Part II: Fusarium Head Blight (Scab) Monitoring

Introduction and Research Methods

Fusarium head blight, or scab, continues to be a serious disease of wheat for South Dakota producers. Efforts are underway to develop FHB-tolerant spring and winter wheat varieties; however, growers currently rely on the crop management practices of appropriate rotation decisions and fungicide applications to limit FHB severity. In order to optimize these control methods, researchers are examining the biology of *F. graminearum* in order to better understand its lifecycle, and ultimately provide information useful in the practical control of the disease.

The small grains plant pathology project is part of a regional collaboration to study FHB under a variety of cropping and environmental conditions. In 2004, 'Norm' spring wheat, a variety with high susceptibility to scab was planted over corn residue at the NE Research Station to serve as a monitoring crop for the disease. An instrument was also in place to trap airborne spores of the scab fungus to provide a daily estimate of the level of inoculum present throughout the growing season. In addition, after heading, several samples were collected from fields at the research station and analyzed for inoculum on various parts of the plant by plating the spores collected from the head or specific leaves onto *Fusarium* selective media. It is thought that the wheat plants in the field may serve as a reservoir for inoculum, which may be delivered to the susceptible heads by rain or wind, or through physical contact in the field. By estimating the inoculum on individual segments of the plants (head, flag leaf, flag-1, etc), we can better determine the primary source(s) of inoculum.

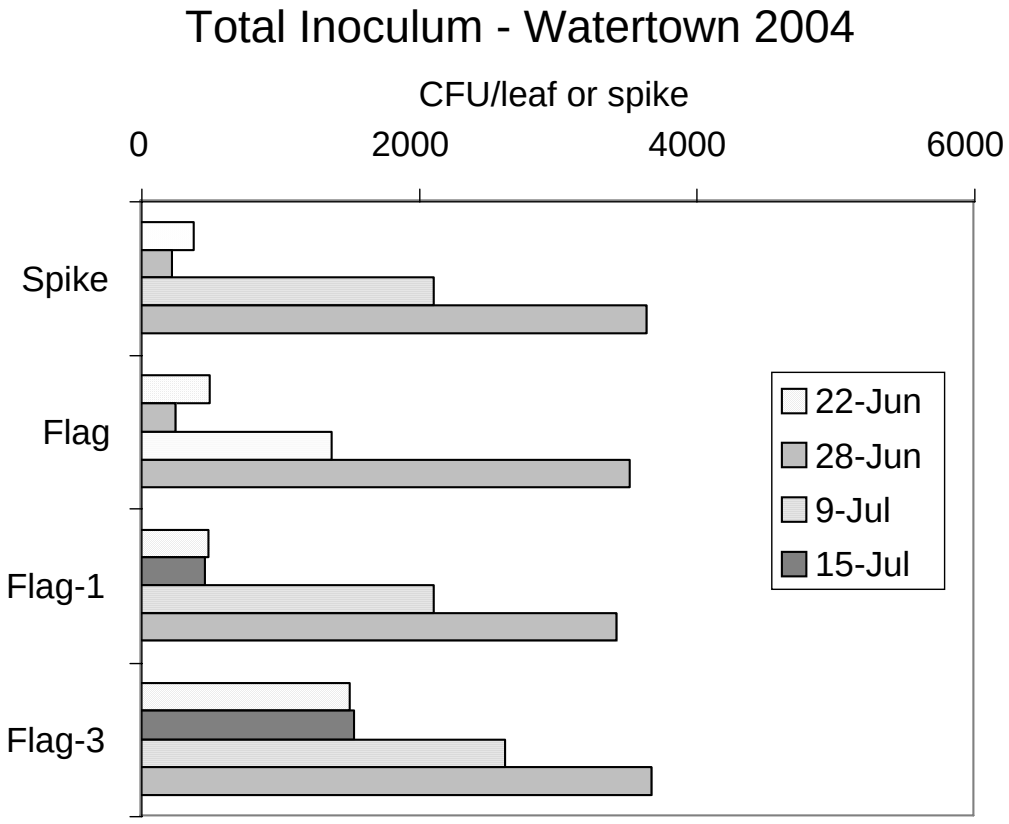
Results and Discussion

FHB was widespread and relatively severe in the Northeast spring wheat-growing region of South Dakota for 2004. The scab monitoring plot at the NE Research Farm had a 70% incidence for *Fusarium* infected wheat heads and 10% severity per head. This level would likely result in the grain being rejected due toxin presence.

At the time of writing, data collection for the daily estimate of airborne inoculum present from mid-June until mid-July had not been completed. These times are critical for scab development as the heads are most susceptible during flowering. Preliminary results indicate that the number of ascospores was relatively high during the flowering period. This inoculum load, combined with environmental conditions conducive to infection during flowering, was the reason the disease was so severe in 2004.

The inoculum distribution on the plants for the monitoring plot at the NE Research Farm is shown below (Figure 1). For all of the tissues sampled (spikes and leaves), the number of spores increased throughout the season. Also, early in the season, the number of spores collected was highest from the lower leaves. The spores collected on the lower leaves at the early sampling dates were probably ascospores (sexual spores) produced from the corn residue, whereas those collected later were probably conidia (asexual spores) produced from infected wheat heads. From this data, it is apparent that the number of spores produced during an epidemic increases throughout the season. Such information reinforces the fact that additional research needs to be conducted on this pathogen to better understand its biology.

Figure 1. Total inoculum collected from the spike, flag leaf, flag –1, and flag –3 leaves. For the *Fusarium* Head Blight monitoring plot at the NE Research Farm in 2004.



Acknowledgment: This research was supported by the US wheat and barley scab initiative, the SD Agricultural Experiment Station, and the SD Wheat Commission.

Cool-season Perennial Grass Evaluation

Peter Jeranyama and Vance Owens

Cool-season grasses make the bulk of forages consumed by livestock in South Dakota. Grass forage research has received very little attention in the North Central Region because alfalfa has dominated forage research in the past and present. There are some notable benefits of grass that include their potential to supply more consistent forage yields across a wide range of environments compared with monocultures of legume, and they are compatible with alfalfa and other forage legumes in mixtures. There is little production information on cool season grasses to help farmers make informed decision on which species to plant in hay or grazing systems.

In this study established at the Northeast Research farm, eight perennial cool season grasses were planted in four replications in the spring to evaluate forage yield, forage quality and regrowth potential after cutting. Forage yield and quality data were not taken in the establishment year (2004). Data will be collected from this trial in spring 2005 onwards. The grasses included in the trial are; intermediate wheatgrass, smooth bromegrass, meadow bromegrass, hybrid bromegrass, orchardgrass, timothy, reed canarygrass and tall fescue.

Table 1. Cool-season grass species, cultivars and seeding rates in pure live seed (PLS) used in the experiment

Cool-season grass species	**Cultivar**	**Lb of PLS/acre**
Smooth bromegrass	VNS Lincoln type	7
Meadow bromegrass	Hakari Mountain, NZ	11
Hybrid bromegrass	AC Knowles, Canada	9
Intermediate wheatgrass	Oahe	11
Orchardgrass	Pennlate	6
Reed canarygrass	Lincoln type	7
Tall fescue	Fawn	10
Timothy	Climax	3

2004 Alfalfa Production

Vance Owens and Chris Lee

Alfalfa cultivars are tested at several South Dakota research stations. Our objective is to provide producers with yield data from currently available alfalfa cultivars to aid them in cultivar selection. Even though our yield trial does not contain all available cultivars, it should be a helpful tool in identifying cultivars suitable for your specific needs.

Materials and Methods

Six replications of each cultivar were planted at 15 lbs pure live seed/acre. Fifty pounds of super phosphate (P_2O_5) was applied preplant. Later fertilizer application was made when necessary as recommended by the South Dakota State Soil Testing Laboratory. Forage was harvested with a sickle-type harvester equipped with a weigh bin for obtaining fresh plot weights. Random subsamples from the fresh herbage were taken to determine percent dry matter. Alfalfa cultivars were evaluated for maturity prior to harvest. Yield differences among cultivars were tested using the LSD at the 0.05 level of probability when significant F-tests were detected by analysis of variance.

Results

Table 1 provides forage production data for 15 alfalfa cultivars planted in 2001. Tons of dry matter yield are shown for three cuttings in 2004, annual production for 2003 and 2002, and a cumulative total for 2001 through 2004. Average cumulative yield in 2004 was 4.28 tons dry matter/acre (DM/A), up significantly from 2003 as a result of improved timeliness and amount of precipitation.

Cultivars are ranked from highest to lowest based on the cumulative production total. The least significant difference (LSD) listed at the bottom of each table is used to identify significant differences between the cultivars. If the difference in yield between two cultivars exceeds the given LSD, then they are significantly different.

Acknowledgements

Financial support for this research was provided by marketers of the various alfalfa seed entries and by the South Dakota Agricultural Experiment Station.

Table 1. Forage yield of 15 alfalfa cultivars entered in the South Dakota State University alfalfa testing program. Trial was planted 3 May 2001 at the Northeast Research Farm.

	2004				2003	2002	3-year
Entries	14-Jun	15-Jul	27-Aug	Total	Total	Total	Total
	Tons dry matter/acre						
WL 327	1.68	1.52	1.32	4.52	2.51	1.85	8.88
HybriForce-400	1.74	1.46	1.27	4.48	2.53	1.81	8.81
54V54	1.78	1.56	1.36	4.69	2.59	1.51	8.79
Monument II	1.69	1.62	1.23	4.54	2.37	1.63	8.54
Feast + EV	1.74	1.44	1.30	4.47	2.46	1.58	8.51
WL 342	1.64	1.47	1.27	4.37	2.45	1.64	8.47
Reliance	1.62	1.45	1.21	4.27	2.46	1.59	8.32
Macon	1.61	1.42	1.28	4.31	2.37	1.63	8.32
4 Traffic	1.69	1.39	1.26	4.35	2.25	1.66	8.26
Frontier 2000	1.58	1.20	1.27	4.05	2.37	1.58	7.99
Husky Supreme	1.46	1.32	1.27	4.05	2.30	1.59	7.94
GoldRush 747	1.61	1.32	1.21	4.14	2.32	1.37	7.83
Vernal	1.76	1.31	1.09	4.16	2.20	1.46	7.82
Maverick	1.54	1.22	1.21	3.96	2.36	1.47	7.78
Somerset	1.46	1.30	1.12	3.89	2.22	1.31	7.42
Grand mean	1.64	1.40	1.24	4.28	2.38	1.58	8.24
Maturity (Kalu & Fick)	5.0	4.8	5.0				
LSD (P=0.05)	0.21	0.16	NS	0.44	NS	NS	NS
CV (%)	11.0	10.1	11.4	9.0	14.4	21.9	9.9

NS = not significant at 0.05 level of probability

Evaluation of Red Clover Cultivars for the Northern Great Plains

Robin Bortnem and Arvid Boe

Red clover (*Trifolium pratense* L.) a short-lived perennial legume introduced into the United States in the 1600s by European colonists, produces high-quality forage and can be used in mixtures or pure stands. Red clover has excellent seedling vigor, is adapted to various climatic and soil conditions, and can be used for hay, pasture, wildlife habitat, and green manure. More shade tolerant in the seedling stage than other legumes, it is a good choice for pasture renovation. Though red clover is a short-lived perennial and is typically most productive in its second year, several recently released cultivars are both productive and persistent in their adapted areas for four-plus years.

Our objective was to compare several red clover cultivars of diverse genetic backgrounds with our recently developed cultivar for potential in renovating cool-season pastures in eastern South Dakota. Our cultivar, SD Select, is tentatively scheduled for release in 2005.

SD Select and 7 red clover cultivars were established in a spaced-plant (1-m interplant spacing) nursery in orchardgrass (*Dactylis glomerata* L.) sod to mimic pasture renovation in 2003. There were three replicates of 10 plants cultivar^{-1}. Persistence data were collected in June 2004. All three replicates were harvested in June to evaluate forage production (Table 1). Harvests for forage production were also made in July and August, but one of the replicates was left for evaluation of seed production.

Persistence is an important selection criterion for pasture renovation in eastern South Dakota. Cultivar survival ranged from 43 to 77%, with an overall mean of 59% (Chi-squared = 14.0*). SD Select and one other cultivar (Wildcat) had 77% survival. SD Select consistently ranked higher than the other cultivars (Table 1). Seed was harvested in October and is currently being processed.

Persistence and forage production data will be collected again in 2005. However, the high level of differential mortality that occurred during the first winter confounded subsequent data collection. This reinforces the importance of persistence in perennial crops in eastern South Dakota.

Table 1. Dry matter (DM) forage production during 2004 of several red clover cultivars.

Cultivar	10 June		14 July		16 August	
	g DM plant^{-1}	n	g DM plant^{-1}	n	g DM plant^{-1}	n
SD Select[†]	15.46	23	11.93	12	12.64	11
Plus	5.65	13	6.77	6	6.40	5
Prima	11.77	13	4.75	4	3.12	4
Redlangraze	10.42	13	13.59	7	7.50	7
Robust	12.41	17	11.12	8	12.62	8
Rudolf	9.59	17	9.84	7	4.31	8
Scarlett	9.42	19	14.61	10	8.60	10
Wildcat	14.98	23	14.68	13	11.25	12
Mean	12.68		10.91		8.30	
P level[‡]	0.10		0.25		0.07	

[†]Experimental population developed at South Dakota State University scheduled for release in 2005.

[‡]Probability of at least one significant difference between cultivar means.

Acknowledgements
The research was supported by the SDSU Agricultural Experiment Station and Plant Science Department.

Fertilizer Influences on Soil Test and Soybean Yield, Watertown, SD, 2004

Jim Gerwing, Ron Gelderman, Anthony Bly, and Allen Heuer

Introduction

Soil testing research has shown that knowledge of soil test levels can improve the profitability of fertilizer use. Profits increase if more fertilizer is used when soil test levels are low and less or no fertilizer is used when test levels are high. It is still a common practice, however, to apply fertilizer without a current soil test. Frequently all the major nutrients (N P K) and sometimes zinc are used. This experiment was initiated to demonstrate the effects of applying P, K and Zn regardless of soil test. The objective is to demonstrate soil testings' ability to predict crop response to fertilizer and fertilizer influence on soil tests. The intent is to continue the experiment on the same location at the NE Experiment Station for a number of years.

Materials and Methods

The site selected at the NE Experiment Station is a nearly level silty clay loam soil (Brookings) that is common to North East South Dakota. The experiment was initiated in 1996 with the same fertilizer nutrients applied to the same plots each year.

The check fertilizer treatment in this experiment received all fertilizer nutrients (50 lb/a N, 40 lb/a P_2O_5, 50 lb/a K_2O, 5 lb/a Zn). Each subsequent treatment received three of the four nutrients allowing a comparison of the "full" fertilizer program to a treatment lacking one individual nutrient (Table 1). Nutrient rates were the same each year except nitrogen. Fertilizer sources used were urea (46-0-0), super phosphate (0-46-0), potassium chloride (0-0-60) and zinc sulfate (35% Zn). Fertilizer was broadcast and incorporated by discing prior to planting. Soybeans were planted the second week of May. Plot size was 15 feet by 60 feet. Each treatment was replicated four times. Soybeans were harvested with a small plot combine.

Results and Discussion

Soil test results from samples taken April 14, 2004, are listed in Table 2. The nitrate soil test was 48 lb/a 2 feet where no nitrogen had been applied since 1995. The residual nitrate level was 196 lb/a 2 feet where 130 lb/a N was applied in the spring of 2003. The high carryover nitrogen levels are the result of low corn yields (65 bu/a) in 2003 due to drought. The 40 pounds of phosphorus and 50 pounds of potassium applied each year since 1996 raised the phosphorus soil test from 6 ppm in the check to 25 ppm and the potassium test from 155 ppm in the check to 209 ppm. Five pounds of zinc applied each year since 1996 raised the zinc soil test from 1.16 to 6.60 ppm.

Cool temperatures during 2004 growing season slowed soybean growth but adequate moisture helped yield reach 39 bu/a (Table 1). Nitrogen, potassium and zinc had no effect on yield. The lack of response to these nutrient additions was expected since soil test levels were high and soybeans do not regularly respond to nitrogen fertilizer. However, where phosphorus was not applied, yields were reduced 10 bushel per acre. The phosphorus soil test was 10 ppm in the phosphorus check plots compared to 25 ppm where 40 pounds phosphorus per year have been added. At 10

ppm, a response to phosphorus would be predicted by soil testing and a recommendation for phosphorus would have been made.

This site will be rotated to wheat in 2005. Similar fertilizer treatments (N rate will change) will be applied to the same plots. Yield and soil tests from the past years of this study can be found in the 1996 to 2003 NE Farm Progress Reports or in the 1996 to 2003 SDSU Plant Science Department Soil/Water Science Research Annual Report, TB No. 99.

Support for this study was provided by various sources including the Ag Experiment Station, Plant Science Dept, Cooperative Extension Services and the SDSU Soil Testing Lab.

Table 1. Fertilizer Treatments and Soybean Yield, North East Research Farm, Watertown, 2004.

Fertilizer[1]				Grain
N	P_2O_5	K_20	Zn	Yield
- - - - - - - - - - - - - lb/a - - - - - - - - - - - - -				bu/a
50	40	50	5	39
0	40	50	5	38
50	0	50	5	29
50	40	0	5	39
50	40	50	0	37
Pr > F				0.001
CV%				6.0
LSD .05				3.4

[1] P, K, Zn applied each year 1996-2004, N rate was 50, 95, 50, 75, 115, 50, 60, 130, 50 lb/a for years 1996-2004.

Table 2. Soil Tests for Fertilizer Experiment at NE Research Farm, Watertown, 2004.

Soil Test[1]	Fertilized[2]	Unfertilized
Nitrate-N, lb/a 2 feet	196	48
Phosphorus, ppm Olson	25	6
Potassium, ppm	209	155
Zinc, ppm	6.60	1.16
pH	6.2	---
Organic Matter, %	3.4	---
Salt, mmhos/cm	0.4	---

[1] Sampled 4/14/04

[2] each year since 1996

Nitrogen Rate and Sulfur Influence on Corn Yields, Watertown and Aurora, 2004

J. Gerwing, R. Gelderman, A. Bly, and A. Heuer

Objective

Nitrogen prices continue to increase prompting renewed questions about the most economical rate for corn. Observations in recent years have shown sulfur deficiencies have become more common and more severe where higher nitrogen rates have been applied. The objectives of this experiment were to determine the nitrogen rate needed for maximum corn yield and the influence of nitrogen rate on response to added sulfur.

Materials and Methods

Sites for this experiment were selected on the Watertown and Aurora experiment farms. Both sites had soybeans as a previous crop. The Watertown site was tilled while the Aurora site was no till. Nitrogen rates were in 35 lb increments from 0 to 140 lb/a (table 1). In addition to the N rates, 35 lbs sulfur per acre was applied with 70 and 140 lb nitrogen rates. Nitrogen was broadcast on the surface as urea shortly after planting at both sites. Part of the nitrogen in the sulfur treatments was supplied by the ammonium sulfate. All treatments were replicated four times. The growing season was unusually cool but there was adequate moisture at both sites. Beginning nitrate soil tests of 56 lb/a at Watertown and 43 lb at Aurora were in the normal range expected after soybeans.

Results and Discussion

Nitrogen significantly increased yield at both sites (table 1). At Watertown yields ranged from 99 bushels in the check where no N was applied to 150 bushels where 140 lb N was applied. It appears that about 105 lb fertilizer N was needed for maximum economic yield. That treatment resulted in 145 bushels although it was not significantly higher than the 70 lb N rate which had a yield of 136 bushels. At Aurora yields ranged from 100 bushels in the check where no N was applied to 164 bushels in the 140 lb treatment. Maximum yield was reached (159 bu/a) with 70 lbs of applied N. At the Watertown site, the amount of N needed to obtain optimum yield was near what SDSU would recommend considering soil test, yield goal, and legume credits. At Aurora, however, the amount of fertilizer N needed (70 lb) was less than the 137 lb that would have been recommended by SDSU for a 159 bushel yield goal on no till with a 43 lb nitrate soil test and a legume credit of 40 lb/a.

Observations early in the growing season and up to tasseling showed a dramatic response to sulfur, especially at Watertown. Plants were a darker green color and were taller. Plots without fertilizer sulfur had some striping early in the growing season that was indicative of sulfur deficiency. However, sulfur had no significant effect on corn yield at either site. Cool early season temperatures likely slowed mineralization of organic sulfur causing the early season deficiency. This early season visual response

to sulfur with no subsequent grain yield increase has been seen frequently in previous studies in SD. Sulfur soil tests were in the medium to high ranges (table 1) that normally supply adequate sulfur for maximum yield. There was no obvious evidence at these two sites that higher rates of N caused more severe sulfur deficiencies.

Acknowledgments: Support for these studies came from various sources including the Ag Experiment Station, Plant Science Dept, Extension Service and the SDSU Soil Testing Lab.

Table 1. Nitrogen and Sulfur Influence on Corn Yield, Watertown and Aurora, 2004

Fertilizer	Corn Yield	
Nitrogen + Sulfur	Watertown	Aurora
----------lb/a----------	----------bu/a----------	
0	99 a	100 a
35	119 b	126 b
70	136 c	159 c
70 + 35	140 cd	155 c
105	145 cd	158 c
140	150 d	159 c
140 + 35	150 d	164 c
Pr > F	.0001	.0001
CV %	6.6	6.3
LSD .05	13.1	13.7
Soil Tests		
NO_3-N, lb/a 2 ft	56	43
SO_4-S, lb/a 2 ft	44	30
OM %, 0-6 in.	3.6	3.3
Tillage	Yes	No
Previous Crop	Beans	Beans

Corn Breeding

Zeno W. Wicks, III *and* Dawn M. Gustafson
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Introduction:

The South Dakota State University's corn breeding and genetics program primary foci are to conduct applied research in corn breeding and to train graduate students. Specific objectives that we would like to achieve are to: 1) develop and release inbred lines and improved populations that can be used to develop hybrids for livestock feed, grain production or other value added products. Emphasis will be placed on yield, adaptation, stress tolerance, and pest resistance, 2) evaluate and select corn adapted to South Dakota for phosphorous and nitrogen content to be used as a compliment/supplement to DGs/co-product feed, 3) develop open-pollinated corn varieties, populations, and synthetics for sustainable agricultural operations (i.e. organic farmers) and conventional farming and, 4) continue to develop white corn as an alternative crop.

Accomplishments:

The corn breeding studies/trials conducted at the Northeast Research Station during the 2004 growing season included:

3. The early and late maturity single-cross trials, each consisting of 121 entries, replicated twice. These trials included lines that originated in the North Dakota State University (NDSU) breeding corn program, crosses of a few lines that were released from other public breeding programs, and crosses of NDSU lines with commercial testers. These lines have had extensive preliminary evaluation in recurrent selection studies and for general combining ability (GCA) in testcross trials.

   Preliminary yield data shows that several of the late maturity inbred testcrosses were superior at the Northeast Research Station in terms of yield and lodging. Yields for the check hybrids ranged from 67.7 bushels/acre to 107.3 bushels/acre, while the late maturity inbred testcrosses ranged from 17.7 bushels/acre to 121.8 bushels/acre. This indicates that the higher yielding inbreds have definite potential in the SDSU program to serve as improved germplasm sources.

   Several of the early maturity inbred testcrosses also yielded superior. Yields for the check hybrids ranged from 36.0 bushels/acre to 133.4 bushels/acre, while the early maturity inbred testcrosses ranged from 14.5 bushels/acre to 133.9 bushels/acre.

2. We also evaluated a maize population hybrid trial. This trial will help to determine the relative merit of improved populations for release. The population yields ranged from 30.5 bushels/acre to 127.3 bushels/acre, while the hybrid checks ranged from 65.9 bushels/acre to 86.7 bushels/acre. Based on these results, we have identified populations that will serve as an improved germplasm source for development of inbred parents for early maturing, high quality, and high yielding corn hybrids; and as elite parents for early maturing maize population hybrids that can be used as an alternative to commercial hybrids.

3. Our MS graduate student conducted a study on nitrogen (N) and phosphorous (P) concentration in silage corn. Increased ethanol production will mean increased distillers grain (DG), which is a feed source to livestock. Phosphorous and nitrogen content in DG is approximately three times greater than the content found in corn grain, resulting in losses to the environment. As a result, the phosphorous and nitrogen requirement must be balanced when feeding DGs to livestock. Our overall goal is to select adapted corn hybrids and make recommendations for low-phosphorous and low-nitrogen concentration for South Dakota producers.

Specific objectives include quantifying N an P concentration, detection of variance factors (environment, location, and year) for N and P content, identification of the relationship between N and P content and tonnage yield, and identifying the effect of plant population in N and P concentration. In 2004, three replications of 10 hybrids from various private companies were planted at two population densities at three locations. We are currently processing samples for P and N concentration analysis.

Acknowledgements

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We would also like to thank Allen Heuer, Farm Manager of the Northeast Research Station, for establishing and maintaining the corn nursery and for his readiness to aid our project.

NEW BT-CORN PERFORMANCE AGAINST EUROPEAN CORN BORER IN NORTHEASTERN SOUTH DAKOTA

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INTRODUCTION

In 2004, new transgenic Bt-corn hybrids containing resistance genes against both the European corn borer and corn rootworms were commercially grown for the first time in South Dakota. Also relatively new in 2004 were corn hybrids containing the Cry 1F gene called Herculex I. Corn hybrids containing Herculex I is advertised as being resistant to corn borers, black cutworm, and western bean cutworm. Past research (Catangui and Berg 2002, Catangui 2003) have indicated that complete immunity to insects does not necessarily translate into high corn yields at harvest. Thus, we were anxious to see how the new "stacked" as well as Herculex I Bt-corn hybrids would perform during times when the target pests may or may not be present in significant numbers on the field.

We also included several insecticides in the research to see how they compare with Bt-corn hybrids in controlling insects. Because European corn borers do not always occur in damaging numbers every season, and Bt-corn hybrids are highly specific to certain lepidopterous pests, there may be instances where the flexibility and broader spectrum of insecticidal sprays may be more desirable than Bt-corn in corn insect pest management.

MATERIALS AND METHODS

All experiments were conducted at the SD Northeast Research Station near South Shore during the 2004 growing season. All insecticide treatments were applied from July 17-19 on corn that was beginning to tassel.

The corn seeds were planted using a John Deere MaxEmerge 2 planter on April 29, 2004. Plant population was at 25,677 per acre. Each treatment was replicated 4 times and assigned in a randomized complete block fashion on each experimental unit. Each experimental unit was composed of four rows (50 ft. long) spaced 30 inches apart. One row per plot was destroyed and dissected for corn borer injuries. Three rows were kept intact then harvested at the end of season (November 15, 2004). Ten consecutive plants on one row were dissected from October 15-23, 2004 using a curved knife and examined for corn borer larval tunnels, tunnel length, and live corn borer larvae in the stalk, ear shank, and ear. Data were analyzed using SAS (SAS Institute 1989) after appropriate data transformations to normalize the data (Gomez and Gomez .1984).

Activities of corn borer moths at night were monitored with a light trap equipped with a 15-watt "black light" fluorescent bulb. An insecticide-impregnated rubber strip (dichlorvos) was placed in the collection container of the trap to quickly kill all insects attracted to the light trap. The light trap operated 24 hours a day from May 14 to September 14 during the growing season. Corn borer moths collected by the trap were counted regularly.

RESULTS AND DISCUSSION

Corn borer moth flight. Peak corn borer moth flight appears to have occurred on July 15 with about 11 moths captured per light trap in one night (Figure 1). This number is similar to the 2003 moth number and can be considered as a "low" year. Historical moth flights in the NE Research Station can be found online at the Extension Entomology Web site (Catangui 2004).

Yield. The "new" Bt-corn hybrids did not perform well despite being devoid of any corn borer infestations (Fig. 2A-B). The "stacked" corn hybrid containing both corn borer and rootworm genes (DKC 46-25) yielded 3.6 bushels per acre less than the untreated conventional DKC 46-28. Likewise, the corn hybrid containing the Herculex I gene (P38P04) did not significantly differ from the untreated P38P05. However, yield increases of 19.7, 14.6, and 15.8 bushels per acre were observed in the H-7007, N 25-55, and P38P06 Bt-corn hybrids, respectively. These Bt-corn hybrids contained the "old" YieldGard Corn Borer gene. Small increases in yield (3-9 bushels per acre) were also observed in conventional corn sprayed with several insecticides (Fig 2A).

Stalk injury. Twenty to 35% of the stalks in the untreated non-Bt hybrids were infested with corn borer larvae by the time the stalks were dissected in October (Figure 2B). None of the stalks in the Bt hybrids were infested with corn borers indicating that the Bt genes provided total protection against corn borer infestations throughout the growing season. The various insecticide treatments were also able to protect the corn stalks from being infested by corn borer larvae.

Summary. The "new" Bt-corn hybrids did not significantly improve yields despite providing excellent protection against European corn borer infestations. Most of the "old" Bt-corn hybrids, however, did improve yields by about 16-20 bushels per acre. Spraying with insecticides improved the yields by 3-9 bushels per acre.

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Fig. 1. European corn borer moth flight at the NE Research Station during the 2004 season

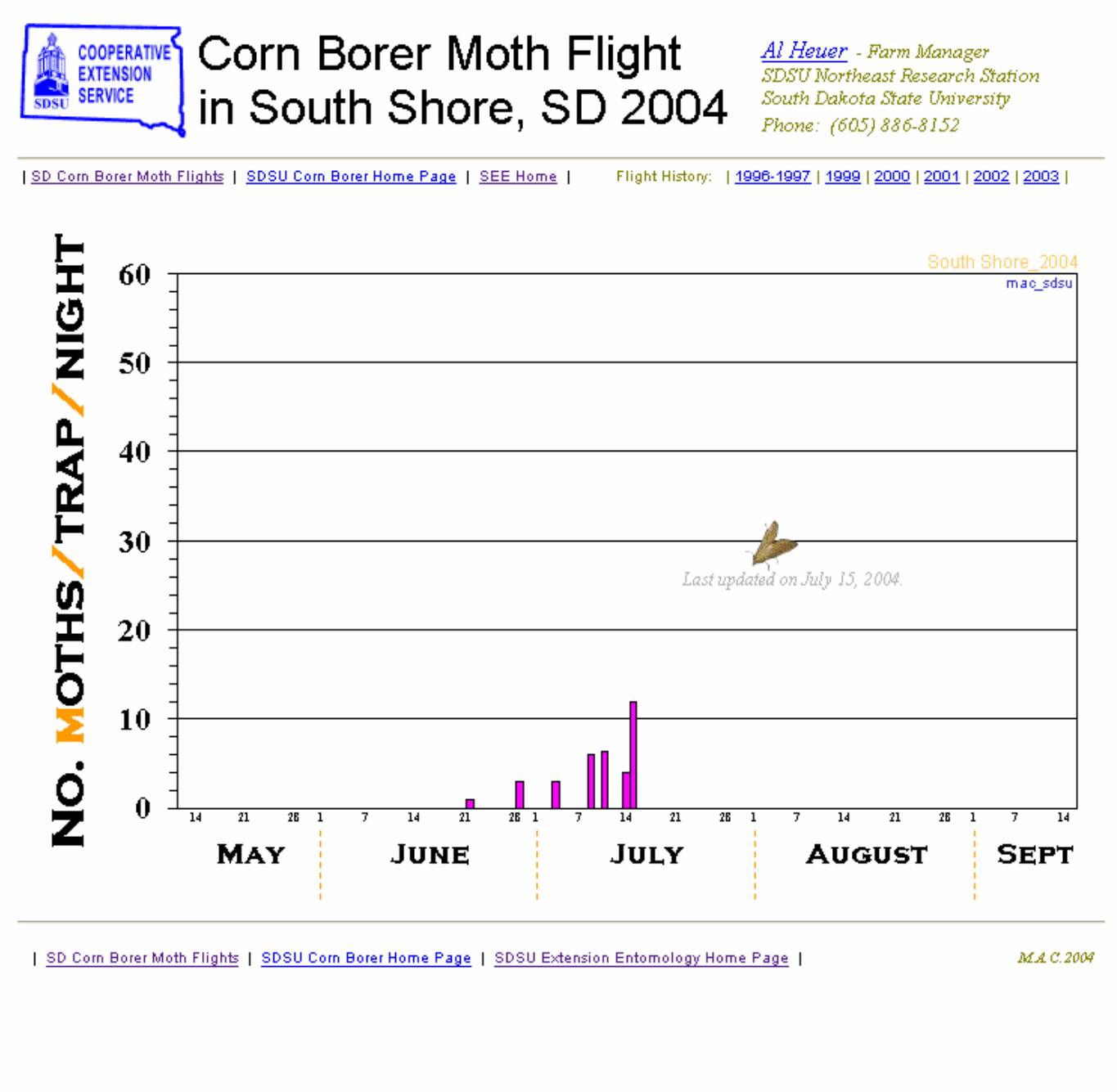
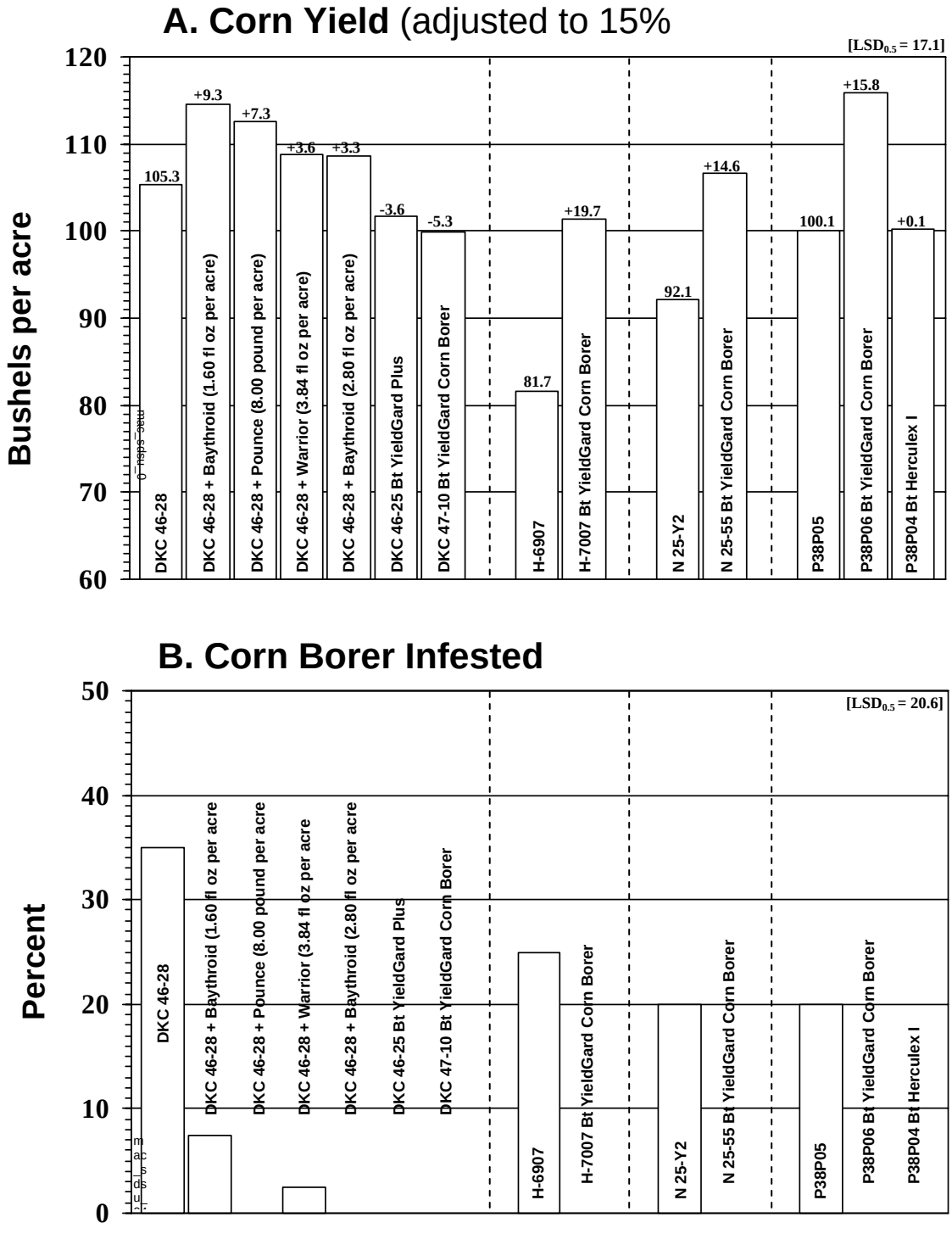


Fig. 2. Performances of Bt-corn and various insecticides against the univoltine ecotype European corn borer at the NE Research Station during the 2004 season



Weed Control - W.E.E.D. Project

L. Wrage, D. Deneke, D. Vos, and B. Rook

INTRODUCTION

The Northeast Station provides a strategic location to collect weed control data for northeastern South Dakota. Field plots provide side-by-side comparisons and comparative performance data. Plots are evaluated for weed control and crop tolerance. Yields are harvested from replicated tests.

2004 Tests

Early-season precipitation was adequate for preemergence herbicides in corn and soybean. Early weed emergence was slowed; timing for early post treatments were later than usual. Cool weather during the season delayed crop development. Corn harvest was delayed; test weight was low.

Tests using RR experimental wheat were terminated during the season in response to discontinuation of program development at this time.

Additional plot area provided from Korth Farms was used for several tests. The area provided a uniform site with adequate yellow foxtail densities for evaluation.

2004 Evaluation/Demonstration Tests Reported

1. Corn Herbicide Demonstration
2. Herbicide Tolerant Corn Demonstration
3. Glyphosate Programs in Corn
4. Glyphosate Tankmixes - Antagonism
5. Glyphosate Tankmixes - Injury
6. Glyphosate Residue in Corn
7. Priority/Steadfast Combinations in Corn
8. Weed Control in Corn
9. Soybean Herbicide Demonstration
10. Herbicide Tolerant Soybean Demonstration
11. Soybean Yield Response - Pre/Post
12. Soybean Yield Response - Late Rescue
13. Volunteer RR Corn Control in Soybeans - Time and Yield
14. Volunteer Roundup Ready Corn in Soybeans
15. Weed Control in STS/RR Soybeans
16. Volunteer Soybean Control in Corn
17. Herbicide Injury Symptoms in Canola
18. Weed Control in Canola
19. Field Pea Weed Control
20. Broadleaf Control in Spring Wheat
21. Oat Herbicide Tolerance

Weeds represent typical problem species in the area. Lambsquarter, redroot pigweed, and wild mustard are primary broadleaf weeds at the station and in the area. Recently, a form of waterhemp has appeared in some blocks. Yellow foxtail has become the predominant grassy weed in most blocks. Lambsquarter density has increased. Kochia in some test blocks appears to have a significant population of ALS resistant biotypes.

Additional evaluation plots include initial tests with experimental herbicides, additives, and tests for other crops. Data collected for additional tests are reported in the W.E.E.D. Project Report.

1. Alfalfa Demonstration - New Seeding
2. Flax Demonstration
3. Grass Control with V-10137 in Sunflower
4. Simulated Carryover Tolerance in Express and Clearfield Tolerant Sunflowers
5. Post Herbicide Tolerance in Express and Clearfield Tolerant Sunflowers
6. Weed Control in Corn with KIH-485
7. Weed Control with MANA-283 Tankmixes in Corn
8. Evaluation fo Broadleaf Tankmixes in Corn
9. Large Lambsquarter Control in Soybean
10. Glyphosate Injury Symptoms
11. Buccaneer Adjuvants in Soybeans

Acknowledgement

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South Dakota Soybean Research and Promotion Council
South Dakota Corn Utilization Countil
National Canola Research Association
South Dakota Oilseed Council
National Sunflower Association
Consortium for Alternative Crops
Crop Protection Industries

NOTE: Data reported in this publication are results from field tests that include labeled product uses, experimental products or experimental rates, combinations or other unlabeled uses for herbicide products. Tradenames of products used are listed; there frequently are other products available. Refer to the appropriate weed control fact sheet available from county extension offices for herbicide recommendations.

Table 1. Corn Herbicide Demonstration

Demonstration
Planting Date: 4/27/04
Variety: DeKalb DKC 44-46
PRE: 4/27/04
EPOST: 6/3/04; Corn 2-3 lf;
Yeft 1-3 lf, .5-1.5"; Colq 1-2"; Rrpw 1-3"
POST: 6/17/04; Corn 3 collar, 6";
Yeft 1-4 lf; Colq 2-5"; Rrpw 2-5"
Soil: Clay loam; 3.0% OM; pH 6.1

Precipitation:

PRE:	1st week	0.13 inches
	2nd week	0.58 inches
EPOST:	1st week	1.49 inches
	2nd week	1.41 inches
POST:	1st week	0.15 inches
	2nd week	0.97 inches

Yeft=Yellow foxtail
Bdlf=Common lambsquarter, redroot pigweed

COMMENTS: Uniform, moderate weed pressure. Performance comparisons under favorable conditions. Split pre/post and some pre programs tended to have highest ratings for both grass and broadleaves. Grass variability in part associated with yellow foxtail at this site.

Treatment	***Rate/A***	***% Yeft 7/14/04***	***% Bdlf 7/14/04***
Check	----	0	0
PREEMERGENCE			
Harness	1.5 pt	96	93
Harness	2.3 pt	95	95
Surpass	2.5 pt	94	93
Dual II Magnum	2 pt	88	84
Stalwart C	2 pt	84	78
Outlook	21 oz	86	75
Degree	4.25 pt	88	72
Define SC	21 oz	84	79
Balance Pro	2.25 oz	78	96
Epic	13 oz	90	98
Balance Pro+Define SC+atrazine	2.25 oz+12 oz+.75 qt	92	99
Lumax	3 qt	84	97
Python+Surpass	1.25 oz+2.5 pt	93	88
Bicep Lite II Magnum	2 qt	94	96
Stalwart Xtra	2.1 qt	85	92
G-Max Lite	3.5 pt	93	97
Harness Xtra	2.1 qt	91	98
Keystone LA	2.2 qt	90	98
Check	----	0	0
PREEMERGENCE & POSTEMERGENCE			
Dual II Magnum&Callisto+COC+28% N	1.67 pt&3 oz+1%+2 qt	86	99
Balance Pro&Callisto+COC+28% N	2.25 oz&3 oz+1%+2 qt	84	99
Balance Pro&Option+MSO+28% N	2 oz&1.5 oz+1.5 pt+2 qt	98	99
Outlook&Distinct+NIS+28% N	21 oz&6 oz+.25%+2 qt	91	99
Outlook&Distinct+atrazine+NIS+28% N	21 oz&4 oz+1.5 pt+.25%+2 qt	96	99
Outlook&Marksman+NIS+28% N	21 oz&2 pt+.125%+2 qt	89	99

Table 1. Corn Herbicide Demonstration (Continued . . .)

Treatment	***Rate/A***	***% Yeft 7/14/04***	***% Bdlf 7/14/04***
Surpass&2,4-D amine	2.5 pt&1 pt	88	95
Surpass&Aim EW+atrazine+ COC+28% N	2.5 pt&.5 oz+1 qt+ 1%+2 qt	94	99
Surpass&Stinger+Starane	2.5 pt&4 oz+8 oz	91	99
Keystone LA&Hornet WDG+Clarity+ NIS+AMS	2 qt&3 oz+4 oz+ .25%+2.5 lb	88	99
Surpass&Hornet WDG+Callisto+ COC+AMS	2.5 pt&3 oz+.75 oz+ 1%+2.5 lb	90	97
Surpass&Accent+atrazine+ COC+28% N	1.25 pt&.67 oz+1.5 pt+ 1%+2 qt	96	99
Dual II Magnum&Northstar+atrazine+ NIS+28% N	1.67 pt&5 oz+1.5 pt+ .25%+2 qt	94	99
Dual II Magnum&Callisto+atrazine+ COC+28% N	2 pt&3 oz+1 pt+ 1%+2 qt	93	99
Cinch&Steadfast+Callisto+ Atrazine+COC+AMS	.67 pt&.75 oz+2 oz+ 1 pt+1%+2.5 lb	97	99
Cinch&Steadfast+Marksman+ COC+28% N	1 pt&.75 oz+1 pt+ 1%+2 qt	96	99
Harness&Yukon+NIS+AMS	2.3 pt&4 oz+.25%+2 lb	89	98
Check	----	0	0
EARLY POSTEMERGENCE			
Harness Xtra	2.1 qt	99	98
Harness	2.3 pt	99	95
Option+MSO+28% N	1.5 oz+1.5 pt+2 qt	85	10
Option+atrazine+MSO+28% N	1.5 oz+1.5 pt+1.5 pt+2 qt	89	95
Option+Callisto+MSO+28% N	1.5 oz+2 oz+1.5 pt+1.5 qt	72	99
Define SC+Option+Callisto+ MSO+28% N	12 oz+1.5 oz+1 oz+ 1.5 pt+2 qt	86	98
Define SC+Option+Distinct+ MSO+28% N	12 oz+1.5 oz+4 oz+ 1.5 pt+2 qt	89	99
Option+Distinct+MSO+28% N	1.5 oz+4 oz+1.5 pt+2 qt	79	99
Option+Northstar+MSO+28% N	1.5 oz+3 oz+1.5 pt+2 qt	83	99
Option+Priority+MSO+28% N	1.5 oz+1 oz+1.5 pt+2 qt	80	99
EARLY POSTEMERGENCE			
Steadfast+atrazine+COC+28% N	.75 oz+1.5 pt+1%+2 qt	94	99
Steadfast+Priority+atrazine+ COC+AMS	.75 oz+1 oz+1 pt+ 1%+2.5 lb	93	99
Cinch ATZ Lite+Steadfast+Callisto+ NIS+AMS	2 pt+.75 oz+2 oz+ .25%+2.5 lb	97	99

Table 1. Corn Herbicide Demonstration (Continued . . .)

Treatment	*Rate/A*	*% Yeft 7/14/04*	*% Bdlf 7/14/04*
PREEMERGENCE & EARLY POSTEMERGENCE			
Atrazine&Steadfast+atrazine+ Callisto+COC+AMS	1.25 qt&.75 oz+.5 pt+ 2 oz+1%+2.5 lb	90	99
EARLY POSTEMERGENCE			
Lumax+Steadfast+COC+AMS	1.5 qt+.75 oz+1%+2.5 lb	98	99
Steadfast+atrazine+Callisto+ COC+AMS	.75 oz+3 pt+2 oz+ 1%+2.5 lb	97	99
Accent+COC+28% N	.67 oz+1%+2 qt	72	84

Table 2. Herbicide Tolerant Corn Demonstration

Demonstration
Varieties: Roundup Ready - DeKalb 44-46
Liberty Link - Pioneer 36N72
Clearfield - Pioneer 36R12
PRE: 4/27/04
EPOST: 6/3/04; Corn 2-3 lf;
Yeft 1-3 lf, .5-1.5 in.; Colq 1-2"; Rrpw 1-3"
POST: 6/17/04; Corn 3 collar, 6 in;
Yeft 1-4 lf; Colq 2-5 in.; Rrpw 2-5"

Soil: Clay loam; 3.0% OM; 6.1 pH

Precipitation:

PRE:	1st week	0.13 inches
	2nd week	0.58 inches
EPOST:	1st week	1.49 inches
	2nd week	1.41 inches
POST:	1st week	0.15 inches
	2nd week	0.97 inches

Yeft=Yellow foxtail
Bdlf =Common lambsquarter, redroot pigweed

COMMENTS: Moderate weed pressure. Most herbicide tolerant programs provided excellent weed control. Data suggests some late emergence in single pass early post treatments without a sufficient residual component.

Treatment	*Rate/A*	*% Yeft 7/14/04*	*% Bdlf 7/14/04*
	LIBERTY LINK - Pioneer 36N72		
Check	----	0	0
EARLY POSTEMERGENCE			
Liberty+atrazine+AMS	32 oz+1 pt+3 lb	88	95
POSTEMERGENCE			
Liberty+atrazine+AMS	32 oz+1 pt+3 lb	96	99
EARLY POSTEMERGENCE & POSTEMERGENCE			
Liberty+atrazine+AMS& Liberty+AMS	24 oz+1 pt+3 lb& 24 oz+3 lb	98	99
PREEMERGENCE & POSTEMERGENCE			
Define SC&Liberty+atrazine+AMS	12 oz&32 oz+1 pt+3 lb	98	99
Balance Pro&Liberty+atrazine+AMS	1.5 oz&32 oz+1 pt+3 lb	98	99

Table 2. Herbicide Tolerant Corn Demonstration (Continued . . .)

Treatment	***Rate/A***	***% Yeft 7/14/04***	***% Bdlf 7/14/04***
	CLEARFIELD - Pioneer 36R12		
Check	----	0	0
EARLY POSTEMERGENCE			
Lightning+Marksman+NIS+28% N	1.28 oz+2 pt+.25%+2 qt	98	99
PREEMERGENCE & POSTEMERGENCE			
Outlook&Lightning+Distinct+ NIS+28% N	12 oz&1.28 oz+3 oz+ .25%+2 qt	97	97
	ROUNDUP READY - DeKalb 44-46		
Check	----	0	0
EARLY POSTEMERGENCE			
Roundup UltraMax II+AMS	22 oz+2.5 lb	81	75
POSTEMERGENCE			
Roundup UltraMax II+AMS	22 oz+2.5 lb	94	90
EARLY POSTEMERGENCE & POSTEMERGENCE			
Roundup UltraMax II+AMS& Roundup UltraMax II+AMS	22 oz+2.5 lb& 22 oz+2.5 lb	95	96
PREEMERGENCE & POSTEMERGENCE			
Atrazine&Roundup UltraMax II+AMS	1.5 qt&22 oz+2.5 lb	95	94
Harness&Roundup UltraMax II+AMS	2.3 pt&22 oz+2.5 lb	97	96
Harness&Roundup UltraMax II+AMS	1 pt&22 oz+2.5 lb	99	93
EARLY POSTEMERGENCE			
Harness+Roundup UltraMax II+AMS	2.3 pt+22 oz+2.5 lb	99	89
PREEMERGENCE & POSTEMERGENCE			
Dual II Magnum&Touchdown Total+AMS	1.67 pt&23 oz+2.5 lb	98	87
Keystone LA&Warrant+AMS	1.1 qt&24 oz+2.5 lb	99	98
Outlook&Roundup UltraMax II+AMS	12 oz&22 oz+2.5 lb	98	98
EARLY POSTEMERGENCE			
Outlook+Roundup UltraMax II+AMS	21 oz+11 oz+2.5 lb	99	92
PREEMERGENCE & POSTEMERGENCE			
Cinch ATZ&Roundup UltraMax II+AMS	2 pt&22 oz+2.5 lb	98	99
Outlook&Roundup UltraMax II+ Clarity+NIS+AMS	21 oz&22 oz+ 8 oz+.25%+2.5 lb	98	98
Check	----	0	0

Table 2. Herbicide Tolerant Corn Demonstration (Continued . . .)

Treatment	***Rate/A***	***% Yeft 7/14/04***	***% Bdlf 7/14/04***
EARLY POSTEMERGENCE			
Roundup UltraMax II+Clarity+AMS	22 oz+8 oz+2.5 lb	77	99
Roundup UltraMax II+atrazine+AMS	22 oz+1 qt+2.5 lb	81	99
Roundup UltraMax II+Priority+ NIS+AMS	22 oz+1 oz+ .25%+2.5 lb	86	70
Roundup UltraMax II+Prowl H_2O+ Distinct+AMS	22 oz+2.5 pt+ 3 oz+2.5 lb	94	98
Roundup UltraMax II+Basis+ Atrazine+AMS	22 oz+.5 oz+ 3 pt+2.5 lb	99	99
Roundup UltraMax II+Aim EW+ Atrazine+AMS	22 oz+.5 oz+ 1 pt+2.5 lb	89	97
Roundup UltraMax II+Resource+AMS	22 oz+4 oz+2.5 lb	81	95
Roundup UltraMax II+Callisto+AMS	22 oz+3 oz+2.5 lb	87	96
Roundup UltraMax II+2,4-D amine+AMS	22 oz+.5 pt+2.5 lb	82	76
CoStarr+NIS+AMS	3.5 pt+.25%+2.5 lb	77	82
Buccaneer Plus+Volley+ Atrazine+AMS	32 oz+1.5 pt+ 1 pt+2.5 lb	99	99

Table 3. Glyphosate Programs in Corn

RCB; 4 reps
Planting Date: 5/3/04
Variety: DK 44-46
PRE: 5/3/04
EPOST: 6/17/04; Corn V3, 5"; Yeft 1-4 lf, 1-4"; Wimu 3-6"; Colq 1-2"; Rrpw 1-3"
POST: 6/29/04; Corn V5, 10"; Yeft 2-6"; Wimu 6-12"; Colq 2-6"; Rrpw 2-6"
Soil: Clay loam; 4.1% OM; 5.8 pH

Precipitation:

PRE:	1st week	1.49 inches
	2nd week	1.41 inches
EPOST:	1st week	0.15 inches
	2nd week	0.97 inches
POST:	1st week	3.50 inches
	2nd week	0.65 inches

Yeft=Yellow foxtail
Colq=Common lambsquarters
Wimu=Wild mustard
Rrpw=Redroot pigweed

COMMENTS: Evaluation of weed programs on yield. Moderate weed pressure; reduced check yield. Split post or pre/post programs produced the highest yields. Data points to the critical nature of early weed competition. Low test weight due to immature crop.

Treatment	Rate/A	% Yeft 7/14/04	% Colq 7/14/04	% Wimu 7/14/04	% Yeft 7/28/04	% Rrpw 7/28/04	% Yeft 9/7/04	% Colq 9/7/04	Yield bu/A
Check	----	0	0	0	0	0	0	0	40
EARLY POSTEMERGENCE									
Roundup UltraMax II + AMS	22 oz + 2.5 lb	95	95	99	92	95	90	92	107
POSTEMERGENCE									
Roundup UltraMax II + AMS	22 oz + 2.5 lb	97	95	98	97	98	93	92	100
EARLY POSTEMERGENCE & POSTEMERGENCE									
Roundup UltraMax II + AMS& Roundup UltraMax II + AMS	22 oz + 2.5 lb& 22 oz + 2.5 lb	97	97	99	95	97	91	93	124
PREEMERGENCE & POSTEMERGENCE									
Harness Xtra& Roundup UltraMax II + AMS	3 pt& 22 oz + 2.5 lb	99	98	99	99	99	97	98	120
LSD (.05)		*1*	*2*	*1*	*2*	*2*	*2*	*2*	*13*

Table 4. Glyphosate Tankmixes - Antagonism

RCB; 4 reps
Planting Date: 5/3/04
Variety: DeKalb DKC 44-46
POST: 6/17/04; Corn V3, 5"; Yeft 1-4 lf, 1-4"; Colq 1-2"
POST1: 6/29/04; Corn V5, 12"
Soil: Clay loam; 4.1% OM; 5.8 pH

Yeft=Yellow foxtail

Precipitation:

POST:	1st week	0.15 inches
	2nd week	0.97 inches
POST1:	1st week	3.50 inches
	2nd week	0.65 inches

VCRR=Visual Crop Response Rating (0=no injury; 100=complete kill)

Colq=Common lambsquarter

COMMENTS: Uniform test site. Evaluation of tank-mix partners with glyphosate. Data gives no indication of antagonistic response for grass or broadleaves. Atrazine mixes tended to increase late season control; most tank-mixes gave slight increase in late lambsquarter control. Yields similar for treatment; most doubled check yields.

Treatment	Rate/A	% Yeft 7/14/04	% Colq 7/14/04	% VCRR Root 9/7/04	% Yeft 9/7/04	% Colq 9/7/04	Yield bu/A
Check	----	0	0	0	0	0	69
POSTEMERGENCE							
Roundup UltraMax II+AMS	22 oz+2.5 lb	91	92	0	91	82	142
Roundup UltraMax II+ Atrazine+AMS	22 oz+ 3 pt+2.5 lb	98	98	0	97	98	148
Roundup UltraMax II+ Distinct + AMS	22 oz+ 6 oz + 2.5lb	93	94	0	91	86	136

Roundup UltraMax II+ Yukon+AMS	22 oz+ 4 oz+2.5 lb	92	96	0	90	96	137
Roundup UltraMax II+ 2,4-D ester+AMS	22 oz+ 1 pt+2.5 lb	92	95	0	85	86	132
Roundup UltraMax II+ Permit+ atrazine+AMS	22 oz+ .67 oz+ 1.5 pt+2.5 lb	94	97	0	95	97	141
Roundup UltraMax II+ Northstar+AMS	22 oz+ 5 oz+2.5 lb	93	96	0	95	91	146
Roundup UltraMax II+ Callisto+AMS	22 oz+ 3 oz+2.5 lb	90	96	0	89	96	143
POSTEMERGENCE & POSTEMERGENCE1							
Roundup UltraMax II+AMS& Roundup UltraMax II+AMS	22 oz+2.5 lb& 22 oz+2.5	94	92	0	90	85	140
LSD (.04)		*3*	*2*	*0*	*3*	*4*	*16*

Table 5. Glyphosate Tankmixes - Injury

RCB; 4 reps
4-6 IN: 6/17/04; Corn V3, 5"
12-16 IN: 6/29/04; Corn V5, 12"
Soil: Clay loam; 4-1% OM, 5.8 pH

Precipitation:

4-6 INCH:	1st week	0.15 inches
	2nd week	0.97 inches
12-16 INCH:	1st week	3.50 inches
	2nd week	0.65 inches

VCRR=Visual Crop Response Rating
(O=no injury; 100=complete kill)

COMMENTS: Objective to evaluate crop response to tank-mix partners with glyphosate. Essentially weed free. Treatments applied at early and late crop stage. Rate and timing had little effect on crop response in the test. Visual crop response on treatment did not affect yield. Tank-mixes would be suggested at low rates and at early timing in field use.

Treatment	***Rate/A***	***% VCRR 7/14/04***	***% VCRR Root 9/7/04***	***Yield bu/A***
Check	----	0	0	125
4-6 INCH:				
Roundup UltraMax II+Clarity+AMS	22 oz+4 oz+2.5 lb	6	0	126
Roundup UltraMax II+Clarity+AMS	22 oz+8 oz+2.5 lb	4	0	133
Roundup UltraMax II+Clarity+AMS	22 oz+12 oz+2.5 lb	6	8	127
Roundup UltraMax II+Callisto+AMS	22 oz+3 oz+2.5 lb	1	0	140
Roundup UltraMax II+Distinct+AMS	22 oz+4 oz+2.5 lb	6	0	127
12-16 INCH:				
Roundup UltraMax II+Clarity+AMS	22 oz+4 oz+2.5 lb	4	1	134
Roundup UltraMax II+Clarity+AMS	22 oz+8 oz+2.5 lb	5	1	123
Roundup UltraMax II+Clarity+AMS	22 oz+12 oz+2.5 lb	9	8	127
Roundup UltraMax II+Callisto+AMS	22 oz+3 oz+2.5 lb	9	0	127
Roundup UltraMax II+Distinct+AMS	22 oz+4 oz+2.5 lb	5	1	136
LSD (.05)	*NS*	*3*	*14*	

Table 6. Glyphosate Residue in Corn

RCB; 4 reps
2-3 LEAF: 6/3/04; Corn 2-3 lf, 3"
4-5 LEAF: 6/17/04; Corn 4-5 lf, 5"
6-7 LEAF: 6/29/04; Corn 6-7 lf, 12"
Soil: Clay loam; 4.1% OM; 5.8 pH

VCRR=Visual Crop Response Rating
(O=no injury; 100=complete kill)

Precipitation:

2-3 LEAF:	1st week	1.49 inches
	2nd week	1.41 inches
4-5 LEAF:	1st week	0.15 inches
	2nd week	0.97 inches
6-7 LEAF:	1st week	3.50 inches
	2nd week	0.65 inches

Comments: Objective to demonstrate corn response to low concentrations of glyphosate applied at three timings to simulate exposure from application errors. Exposure at early timing tended to have less injury than late timing. Lowest exposure at early timing resulted in minimal visual response and little yield reduction.

Treatment	***Rate/A***	***% VCRR Stand 7/14/04***	***% VCRR Red/Chlorosis 7/14/04***	***% VCRR 9/7/04***	***Yield bu/A***
Check	----	0	0	0	100
2-3 LEAF:					
Roundup UltraMax II+AMS	.6875 oz+2.5 lb	8	0	0	96
Roundup UltraMax II+AMS	1.375 oz+2.5 lb	24	4	20	76
Roundup UltraMax II+AMS	2.75 oz+2.5 lb	50	9	43	41
4-5 LEAF:					
Roundup UltraMax II+AMS	.6875 oz+2.5 lb	40	28	38	51
Roundup UltraMax II+AMS	1.375 oz+2.5 lb	75	83	50	23
Roundup UltraMax II+AMS	2.75 oz+2.5 lb	96	97	88	2
6-7 LEAF:					
Roundup UltraMax II+AMS	.6875 oz+2.5 lb	53	44	60	36
Roundup UltraMax II+AMS	1.375 oz+2.5 lb	87	94	83	2
Roundup UltraMax II+AMS	2.75 oz+2.5 lb	98	98	96	0
LSD (.05)		*7*	*6*	*12*	*15*

Table 7. Priority/Steadfast Combinations in Corn

RCB; 4 reps
Planting Date: 5/3/04
Variety: DeKalb DKC 44-46
EPOST: 6/3/04; Corn V2-3; Yeft 1-3L, .5-2";
Wibw 1-2 lf; Colq .5-1.5"
Soil: Silty clay loam; 3.2% OM; 5.9 pH

Precipitation:

EPOST:	1st week	1.49 inches
	2nd week	1.41 inches

Yeft=Yellow foxtail
Colq=Common lambsquarter

COMMENTS: Heavy foxtail pressure. Foxtail emergence delayed; some late flush. No adverse crop response noted. Yield data suggests severe weed competition. Atrazine in the combinations tended to improve late lambsquarter and foxtail control. Very good early season control.

Treatment	Rate/A	% Yeft 6/17/04	% Colq 6/17/04	% Yeft 7/14/04	% Colq 7/14/04	% Yeft 9/16/04	% Colq 9/16/04	Yield bu/A
Check	----	0	0	0	0	0	0	40
EARLY POSTEMERGENCE								
Steadfast+Priority+ NIS+AMS	.75 oz+1 oz+ .25%+2 lb	92	98	68	85	61	68	114
Steadfast+Priority+ COC+AMS	.75 oz+1 oz+ 1%+2 lb	93	98	68	84	61	76	104
Steadfast+Priority+ Atrazine+NIS+AMS	.75 oz+1 oz+ 1 pt+.25%+2 lb	96	98	79	96	78	95	121
Steadfast+Priority+ Atrazine+COC+AMS	.75 oz+1 oz+ 1 pt+1%+2 lb	97	98	80	96	80	95	122
Steadfast+Priority+ Clarity+NIS+AMS	.75 oz+1 oz+ 4 oz+.25%+2 lb	93	98	73	91	69	93	108
Steadfast+Priority+ Clarity+COC+AMS	.75 oz+1 oz+ 4 oz+1%+2 lb	93	98	72	93	68	91	110
LSD (.05)		*3*	*0*	*11*	*4*	*10*	*7*	*24*

Table 8. Weed Control in Corn

RCB; 4 reps
Planting Date: 5/3/04
Variety: DeKalb DKC 44-46
POST: 6/3/04; Corn V2-3; Yeft 1-3 lf, .5-1"; Wibw 1-2 lf; Colq .5-1.5"

Precipitation:
POST: 1st week 1.49 inches
2nd week 1.41 inches
Yeft=Yellow foxtail
Wibw=Wild buckwheat
Colq=Common lambsquarters

COMMENTS: Uniform site. Moderate weed pressure. Evaluation of herbicide tank-mixes with Buccaneer (glyphosate) and conventional one-pass comparisons. Initial application at early weed stages provided good foxtail control. Late evaluations indicate considerable additional yellow foxtail and lambsquarter emergence; residual effects of treatments apparent. Buccaneer and Volley (acetochlor) and/or atrazine and Steadfast/Priority (carfentrazone+halosulfuron)/Volley were the most consistent treatments across all weeds.

Treatment	Rate/A	% Yeft 6/17/04	% Wibw 6/17/04	% Yeft 7/14/04	% Colq 7/14/04	% Yeft 9/16/04	% Colq 9/16/04
Check	----	0	0	0	0	0	0
POSTEMERGENCE							
Buccaneer	32 oz	87	96	49	53	50	73
Buccaneer+ Premier 90+ AMS	32 oz+ .5%+ 8.5 lb/100 gal	87	97	54	63	53	81
Buccaneer+ One-Ap XL	32 oz+ 9 lb/100 gal	86	96	53	60	53	70
Buccaneer Plus+ Volley+ Gardian Plus	32 oz+ 2 pt+ 2.5%	98	98	89	89	88	85
Buccaneer Plus+ Atrazine+ Gardian Plus	32 oz+ 1.5 pt+ 2.5%	96	98	74	93	65	91
Buccaneer Plus+	32 oz+						

Volley+atrazine+ Gardian Plus	1.5 pt+1 pt+ 2.5%	98	98	87	95	81	92
Buccaneer Plus+ Gardian Plus	32 oz+ .5%	86	96	56	64	53	68
Buccaneer Plus+Exp	32 oz+.5%	89	95	57	64	53	73
Option+Priority+ COC+AMS	1.5 oz+1 oz+ 1%+2 lb	83	96	53	67	53	71
Steadfast+Priority+ COC+AMS	.75 oz+1 oz+ 1%+2 lb	90	97	61	63	58	70
Steadfast+Priority+ Atrazine+ COC+AMS	.75 oz+.5 oz+ 1 pt+ 1%+2 lb	95	98	75	92	68	94
Steadfast+Priority+ Volley+ COC+AMS	.75 oz+.5 oz+ 1.5 pt+ 1%+2 lb	97	98	86	93	82	85
LSD (.05)		*3*	*1*	*6*	*9*	*6*	*10*

Table 9. Soybean Herbicide Demonstration

Demonstration
Planting Date: 5/21/04
Variety: Asgrow AG1401
PPI/PRE: 5/21/04
EPOST: 6/17/04; Soybean 1-3 tri; Yft 1-2 lf, 1-2"; Colq 1-3"; Wimu 2-4"
POST: 6/29/04; Soybean 2-3 tri, 4-5"; Yeft 1-3 lf, 2-4"; Colq 4-6"; Wimu 4-10"
Soil: Clay loam; 3.9% OM; 6.2 pH

Precipitation:

PPI/PRE:	1st week	0.63 inches
	2nd week	2.52 inches
EPOST:	1st week	0.15 inches
	2nd week	0.97 inches
POST:	1st week	3.50 inches
	2nd week	0.65 inches

Yeft=Yellow foxtail
Colq=Common lambsquarters
Wimu=Wild mustard

COMMENTS: Demonstration comparison. Moderate foxtail and heavy lambsquarter pressure. Several treatments provided excellent lambsquarter control including Authority, Sencor, Valor, Boundary, Pursuit+Flexstar, and Gauntlet. Most broadleaf products controlled mustard.

Treatment	***Rate/A***	***% Yeft 7/28/04***	***% Colq 7/28/04***	***% Wimu 7/28/04***
Check	----	0	0	0
PREPLANT INCORPORATED				
Treflan	2 pt	88	84	0
Sonalan	3 pt	84	92	0
Prowl H_2O	2.75 pt	80	85	0
Treflan+Authority	1.5 pt+5.3 oz	82	98	0
Treflan+Sencor	1.5 pt+5 oz	80	91	70
PREEMERGENCE				
Boundary	2.5 pt	95	99	99
Outlook+Valor+Python	16 oz+2 oz+1 oz	93	99	99
Lasso+Authority	1.5 qt+4 oz	87	98	86

PREEMERGENCE & POSTEMERGENCE				
Prowl H_2O&Pursuit DG+Flexstar+ MSO+28% N	2.25 pt&.72 oz+10 oz+ 1 qt+1 qt	88	99	99
PREEMERGENCE & EARLY POSTEMERGENCE				
Treflan&Aim EW+NIS	2 pt&.25 oz+.25%	0	80	0
PREEMERGENCE & POSTEMERGENCE				
Boundary&Poast Plus+COC	2.5 pt&1.5 pt+1 qt	99	99	99
Valor&Poast Plus+COC	2 oz&1.5 pt+1 qt	99	97	99
Valor&Poast Plus+COC	3 oz&1.5 pt+1 qt	99	96	93
Authority&Assure II+COC	3.5 oz&7 oz+1 qt	99	98	0
Authority&Assure II+COC	5.3 oz&7 oz+1 qt	99	99	30
Gauntlet&Select+COC	7.9 oz&7 oz+1 qt	99	99	98
Valor+Python&Select+COC	2 oz+1 oz&7 oz+1 qt	99	97	99
Valor+FirstRate&Select+COC	3 oz+.6 oz&7 oz+1 qt	99	96	99

Treatment	***Rate/A***	***% Yeft 7/28/04***	***% Colq 7/28/04***	***% Wimu 7/28/04***
EARLY POSTEMERGENCE & POSTEMERGENCE				
Poast Plus+COC& Ultra Blazer+NIS	1.5 pt+1 qt& 1.5 pt+.25%	98	74	99
Poast Plus+COC& Phoenix+COC	1.5 pt+1 qt& .8 pt+1 pt	99	60	98
Poast Plus+COC& Flexstar+MSO+28% N	1.5 pt+1 qt& 16 oz+1 qt+1 qt	98	80	99
Poast Plus+COC& FirstRate+MSO+28% N	1.5 pt+1 qt& .3 oz+1 qt+1 qt	99	52	99
Poast Plus+COC& Harmony GT+NIS	1.5 pt+1 qt& .083 oz+.25%	90	77	98
EARLY POSTEMERGENCE				
FirstRate+Flexstar+Select+ MSO+28% N	.3 oz+10 oz+6 oz+ 1 qt+1 qt	80	84	99
Raptor+MSO+28% N	5 oz+1 qt+1 qt	98	20	98

Table 10. Herbicide Tolerant Soybean Demonstration

Demonstration
Planting Date: 5/21/04
Variety: Asgrow AG1401
PPI/PRE: 5/21/04
EPOST: 6/17/04
POST: 6/29/04; Soybean 2-3 tri, 4-5"; Yeft 1-3 lf, 2-4"; Colq 4-6"; Wimu 4-12"
POST1: 7/14/04; Soybean 4-5 tri; 12"; Yeft 3-4 lf, 6-8"; Colq 6-10"; Wimu 12-20"
Soil: Clay loam; 3.8% OM; 6.2 pH

Precipitation:

PPI/PRE:	1st week	0.63 inches
	2nd week	2.52 inches
EPOST:	1st week	0.15 inches
	2nd week	0.97 inches
POST:	1st week	3.50 inches
	2nd week	0.65 inches
POST1:	1st week	0.24 inches
	2nd week	0.40 inches

Yeft=Yellow foxtail
Colq=Common lambsquarters
Wimu=Wild mustard

COMMENTS: Demonstration of glyphosate and glyphosate tank-mix programs. Moderate to heavy weed pressure. Excellent control. Slight antagonism suggested for certain tank-mixes applied late on larger weeds.

Treatment	***Rate/A***	***% Yeft 7/28/04***	***% Colq 7/28/04***	***% Wimu 7/28/04***
Check	----	0	0	0
EARLY POSTEMERGENCE				
Roundup UltraMax II+AMS	11 oz+2.5 lb	86	88	98
Roundup UltraMax II+AMS	22 oz+2.5 lb	93	96	99
POSTEMERGENCE				
Roundup UltraMax II+AMS	22 oz+2.5 lb	96	99	99

Table 10. Herbicide Tolerant Soybean Demonstration (Continued . . .)

Treatment	***Rate/A***	***% Yeft 7/28/04***	***% Colq 7/28/04***	***% Wimu 7/28/04***
EARLY POSTEMERGENCE & POSTEMERGENCE				
Roundup UltraMax II+AMS& Roundup UltraMax II+AMS	22 oz+2.5 lb& 22 oz+2.5 lb	89	99	99
PREPLANT INCORPORATED & POSTEMERGENCE				
Treflan&Roundup UltraMax II+AMS	1.5 pt&11 oz+2.5 lb	99	99	99
Treflan&Roundup UltraMax II+AMS	1.5 pt&22 oz+2.5 lb	99	99	99
PREEMERGENCE & POSTEMERGENCE				
Prowl H_2O&Extreme+ NIS+AMS	2.25 pt&1.5 qt+ .25%+2.5 lb	87	97	--
Python&GF-1279+AMS	1 oz&24 oz+2.5 lb	98	99	99
Valor&Roundup UltraMax II+AMS	2 oz&22 oz+2.5 lb	98	99	99
Valor+Python& Roundup UltraMax II+AMS	1.5 oz+1 oz& 22 oz+2.5 lb	99	99	99
Valor+FirstRate& Roundup UltraMax II+AMS	1.5 oz+.3 oz& 22 oz+2.5 lb	99	99	99
PREEMERGENCE & POSTEMERGENCE				
Gauntlet&Roundup UltraMax II+AMS	7.9 oz&22 oz+2.5 lb	99	99	99
Authority&Roundup UltraMax II+AMS	2 oz&22 oz+2.5 lb	99	99	97
Authority&Roundup UltraMax II+AMS	4 oz&22 oz+2.5 lb	99	99	96
Axiom&Roundup UltraMax II+AMS	13 oz&22 oz+2.5 lb	97	99	99
Domain&Roundup UltraMax II+AMS	12 oz&22 oz+2.5 lb	96	99	99
Sencor&Roundup UltraMax II+AMS	.5 lb&22 oz+2.5 lb	94	99	99
Boundary&Touchdown Total+AMS	1.5 pt&23 oz+2.5 lb	99	99	99
EARLY POSTEMERGENCE				
Extreme+NIS+AMS	1.5 qt+.25%+2.5 lb	98	99	99
Dual II Magnum+ Roundup UltraMax II+AMS	1.5 pt+ 22 oz+2.5 lb	96	99	99
Lasso+Roundup UltraMax II+AMS	1.5 qt+22 oz+2.5 lb	98	99	99

POSTEMERGENCE				
Exp+FirstRate+AMS	24 oz+.3 oz+2.5 lb	99	99	99
Roundup UltraMax II+Supporrt+AMS	11 oz+.5 oz+2.5 lb	99	98	97
Roundup UltraMax II+Aim EW+AMS	11 oz+.25 oz+2.5 lb	98	96	97
Roundup UltraMax II+Resource+AMS	11 oz+4 oz+2.5 lb	96	95	98
Roundup UltraMax II+Flexstar+AMS	11 oz+8 oz+2.5 lb	94	90	97
Roundup UltraMax II+ Harmony GT XP+AMS	11 oz+ .083 oz+2.5 lb	95	95	99
POSTEMERGENCE1				
Roundup UltraMax II+Resource+AMS	11 oz+4 oz+2.5 lb	98	99	99
Roundup UltraMax II+Flexstar+AMS	11 oz+8 oz+2.5 lb	98	99	98
Roundup UltraMax II+ Harmony GT XP+AMS	22 oz+ .083 oz+2.5 lb	99	99	99
Roundup UltraMax II+AMS	44 oz+2.5 lb	99	99	99

Table 11. Soybean Yield Response - Pre/Post

RCB; 3 reps
Planting Date: 5/21/04
Variety: Asgrow AG1401
PRE: 5/21/04
EPOST: 6/17/04
POST: 6/29/04; Soybean 2-3 tri, 4-5";
Yeft 2-4"; Colq 4-6"; Wimu 4-12"; KOCZ 3-5"
Soil: Clay loam; 3.9% OM; 6.2 pH

Precipitation:

PRE:	1st week	0.63 inches
	2nd week	2.52 inches
EPOST:	1st week	0.15 inches
	2nd week	0.97 inches
POST:	1st week	3.50 inches
	2nd week	0.65 inches

Yeft=Yellow foxtail
Wimu=Wild mustard
KOCZ=Kochia
Colq=Common lambsquarters

COMMENTS: Objective to identify effect of weed programs on soybean yield. Significant weed pressure. Weed control was generally similar. There were no yield differences due to treatment. Suggests soybeans are capable of recovering from early factors affecting growth.

Treatment	***Rate/A***	***% Yeft 7/14/04***	***% Wimu 7/14/04***	***% KOCZ 7/14/04***	***% Yeft 9/7/04***	***% Colq 9/7/04***	***Yield bu/A***
Check	----	0	0	0	0	0	24
EARLY POSTEMERGENCE							
Roundup UltraMax II+AMS	22 oz+2.5 lb	88	99	96	82	92	37
POSTEMERGENCE							
Roundup UltraMax II+AMS	22 oz+2.5 lb	95	99	99	93	96	36
EARLY POSTEMERGENCE & POSTEMERGENCE							
Roundup UltraMax II+AMS& Roundup UltraMax II+AMS	22 oz+2.5 lb& 22 oz+2.5 lb	94	99	99	88	97	37

PREEMERGENCE & POSTEMERGENCE							
Authority&	5.33 oz&						
Roundup UltraMax II+AMS	22 oz+2.5 lb	98	99	99	97	98	37
Authority+Outlook&	5.33 oz+19 oz&						
Roundup UltraMax II+AMS	22 oz+2.5 lb	99	99	98	98	98	36
LSD (.05)		*3*	*0*	*2*	*4*	*3*	*6*

Table 12. Soybean Yield Response - Late Rescue

RCB; 3 reps
Planting Date: 5/21/04
Variety: Asgrow AG1401
EPOST: 6/23/04; Soybeans 2-3 tri, 3-4"
POST: 7/9/04; Soybeans 4-5 tri; 12"
Soil: Clay loam; 3.95 OM; 6.2 pH

Precipitation:

EPOST:	1st week	0.25 inches
	2nd week	3.50 inches
POST:	1st week	0.65 inches
	2nd week	0.11 inches

VCRR=Visual Crop Response Rating
(O=no injury; 100=complete kill)

COMMENTS: Uniform test site. Essentially weed free. Outlook applied preemergence 21 oz/A. Purpose to evaluate crop response to glyphosate tank-mixes applied at early post (normal stage) and late post (past optimum) as might be experienced in late treatment. Very small differences reflected in yield. No treatment crop responses noted at early post. Results suggest crop has adequate tolerance to several tank-mix glyphosate programs.

Treatment	***Rate/A***	***% VCRR Stunt 7/22/04***	***% VCRR Stunt 9/7/04***	***% VCRR Dys Dlay 9/16/04***	***Yield bu/A***
Check	----	0	0	0	34
EARLY POSTEMERGENCE					
Roundup UltraMax II+AMS	44 oz+2.5 lb	0	0	0	37
Roundup UltraMax II+ Harmony GT XP+AMS	22 oz+ .3 oz+2.5 lb	0	0	1	34
Roundup UltraMax II+ Resource+AMS	22 oz+ 4 oz+2.5 lb	0	0	0	34
Roundup UltraMax II+ Flexstar+AMS	22 oz+ 12 oz+2.5 lb	0	2	1	35
Roundup UltraMax II+ Pursuit DG+AMS	22 oz+ 1.44 oz+2.5 lb	0	0	0	37
Roundup UltraMax II+ FirstRate+AMS	22 oz+ .3 oz+2.5 lb	0	0	0	38

POSTEMERGENCE					
Roundup UltraMax II+AMS	44 oz+2.5 lb	0	0	0	36
Roundup UltraMax II+ Harmony GT XP+AMS	22 oz+ .3 oz+2.5 lb	22	12	6	34
Roundup UltraMax II+ Resource+AMS	22 oz+ 4 oz+2.5 lb	0	2	1	35
Roundup UltraMax II+ Flexstar+AMS	22 oz+ 12 oz+2.5 lb	2	0	1	36
Roundup UltraMax II+ Pursuit DG+AMS	22 oz+ 1.44 oz+2.5 lb	0	0	0	35
Roundup UltraMax II+ FirstRate+AMS	22 oz+ .3 oz+2.5 lb	0	0	0	35
LSD (.05)		*2*	*2*	*1*	*3*

Table 13. Volunteer RR Corn Control in Soybeans - Time and Yield

RCB; 3 reps
Planting Date: 5/21/04
Variety: Asgrow AG1401
4-5 INCH: 6/17/04
12-16 INCH: 6/29/04; Soybean 2-3 tri, 4-5" Voco 12-14"
24-36 INCH: 7/9/04; Soybean 4-5 tri, 10-12" Voco 20-28"
Soil: Clay loam; 3.9% OM; 6.2 pH

Precipitation:

4-5 INCH:	1st week	0.15 inches
	2nd week	0.97 inches
12-16 INCH:	1st week	3.50 inches
	2nd week	0.65 inches
24-36 INCH:	1st week	0.65 inches
	2nd week	0.11 inches

Voco=Volunteer corn

COMMENTS: Evaluation of the effect of volunteer corn density and time of removal on soybean yield. Time of removal and density had little effect on control and soybean yield.

			Density - Vol Corn Plants/A					
			X		***2X***		***3X***	
			%	***Yield***	***%***	***Yield***	***%***	***Yield***
Treatment	***Rate/A***	***Timing***	***Vocobu/A***		***Vocobu/A***		***Vocobu/A***	
Check	----	----	0	20	0	13	0	18
Assure II+COC	7 oz+1%	4-5"	99	33	98	29	99	32
Assure II+COC	7 oz+1%	12-16"	99	31	99	29	99	31
Assure II+COC	7 oz+1%	24-36"	98	31	99	29	99	30
LSD (.05)			*1*	*7*	*1*	*7*	*1*	*7*

Table 14. Volunteer Roundup Ready Corn in Soybeans

RCB; 3 reps
Planting Date: 5/21/04
Variety: Asgrow AG1401
6-8": 6/23/04; Soybean 2-3 tri, 3-5"; Voco 8-10"
16-20": 7/9/04; Soybean 4-5 tri, 10-12"; Voco 18-24"

Precipitation:

6-8":	1st week	0.25 inches
	2nd week	3.50 inches
16-20":	1st week	0.65 inches
	2nd week	0.11 inches

Voco=Volunteer corn

COMMENTS: High volunteer corn density. Evaluation of post grass herbicides applied alone with crop oil and in tank-mixes with glyphosate without crop oil at 2 timings. Essentially complete volunteer corn control for all treatments alone with crop oil. Assure II and Exp. provided equivalent control at both timings when applied with glyphosate or alone with crop oil.

Treatment	***Rate/A***	***% Voco 7/28/04***	***% Voco 9/7/04***
Check	----	0	0
6-8"			
Poast+COC+AMS	1 pt+1%+2.5 lb	98	96
Assure II+COC+AMS	5 oz+1%+2.5 lb	98	98
Fusilade DX+COC+AMS	6 oz+1%+2.5 lb	99	99
Select+COC+AMS	4 oz+1%+2.5 lb	99	99
Exp.+COC+AMS	8 oz+1%+2.5 lb	99	99
Poast+Roundup UltraMax II+AMS	1 pt+22 oz+2.5 lb	79	83
Assure II+Roundup UltraMax II+AMS	5 oz+22 oz+2.5 lb	94	95
Fusilade DX+Roundup UltraMax II+AMS	6 oz+22 oz+2.5 lb	96	95
Select+Roundup UltraMax II+AMS	4 oz+22 oz+2.5 lb	86	86
Exp.+Roundup UltraMax II+AMS	8 oz+22 oz+2.5 lb	98	99
16-20"			
Poast+COC+AMS	1 pt+1%+2.5 lb	89	89
Assure II+COC+AMS	5 oz+1%+2.5 lb	97	99
Fusilade DX+COC+AMS	6 oz+1%+2.5 lb	97	99
Select+COC+AMS	4 oz+1%+2.5 lb	95	92
Exp.+COC+AMS	8 oz+1%+2.5 lb	97	94
Poast+Roundup UltraMax II+AMS	1 pt+22 oz+2.5 lb	70	63
Assure II+Roundup UltraMax II+AMS	5 oz+22 oz+2.5 lb	98	99
Fusilade DX+Roundup UltraMax II+AMS	6 oz+22 oz+2.5 lb	93	97
Select+Roundup UltraMax II+AMS	4 oz+22 oz+2.5 lb	87	80
Exp.+Roundup UltraMax II+AMS	8 oz+22 oz+2.5 lb	95	89
LSD (.05)		*3*	*6*

Table 15. Weed Control in STS/RR Soybeans

RCB; 3 reps
Variety: RR/STS
Planting Date: 5/21/04
POST: 6/17/04; Soybeans 1-3 tri, 1-3";
Yeft 1-2 lf, 1-2"; KOCZ 1-3"; Wimu 2-4"
Soil: Clay loam; 3.9% OM; 6.2 pH

Precipitation:
POST: 1st week 0.15 inches
2nd week 0.97 inches

VCRR=Visual Crop Response Rating
(0=no injury; 100=complete kill)
Yeft=Yellow foxtail
Wimu=Wild mustard
KOCZ=Kochia

COMMENTS: Initial field trial with Roundup Ready/STS stacked soybean. Heavy broadleaf pressure in plot area. Excellent broadleaf control with all treatments. No adverse visual crop response from low to 3X use rates of SU herbicide in Roundup tank-mix.

Treatment	***Rate/A***	***% VCRR 7/14/04***	***% Yeft 7/14/04***	***% Wimu 7/14/04***	***% KOCZ 7/14/04***	***% VCRR 7/28/04***
Check	----	0	0	0	0	0
POSTEMERGENCE						
Roundup UltraMax II+AMS*	22 oz	0	90	99	99	0
Harmony GT XP+	.083 oz+					
Roundup UltraMax II+AMS*	22 oz	0	85	99	99	0
Harmony GT XP+	.167 oz+					
Roundup UltraMax II+AMS*	22 oz	0	89	99	99	0
Harmony GT XP+	.33 oz+					
Roundup UltraMax II+AMS*	22 oz	0	88	99	99	0
Classic+	.5 oz+					
Roundup UltraMax II+AMS*	22 oz	0	92	99	99	0
Classic+	1 oz+					
Roundup UltraMax II+AMS*	22 oz	0	92	99	99	0
Harmony GT XP+Classic+	.33 oz+1 oz+					
Roundup UltraMax II+AMS*	22 oz	0	92	99	99	0
LSD (.05)		*0*	*3*	*0*	*0*	*0*

* AMS applied at 17 lb/100 gal

Table 16. Volunteer Soybean Control in Corn

Demonstration
Planting Date: 5/26/04
PRE: 5/26/04
POST: 6/29/04; Vosb 2-3 tri
Soil: Clay loam; 3.9% OM; 6.2 pH

Precipitation:

PRE:	1st week	2.71 inches
	2nd week	1.49 inches
POST:	1st week	3.50 inches
	2nd week	0.65 inches

Vosb=Volunteer soybean

COMMENTS: Herbicide evaluation for Roundup Ready volunteer soybean control. Herbicides used at 1/2X and X normal use rates. Preemerge treatments were not effective. Hornet, Steadfast, Distinct, Atrazine + crop oil, and Marksman were most effective based on half rate performance.

Treatment	***Rate/A***	***% Vosb Kill 7/14/04***	***% Vosb Chlorosis 7/14/04***	***% Vosb 9/7/04***
Check	----	0	0	0
PREEMERGENCE				
Atrazine	1 pt	0	0	0
Atrazine	2 pt	0	0	0
Balance Pro	1.25 oz	5	0	10
Balance Pro	2.5 oz	25	5	30
POSTEMERGENCE				
Beacon+COC+28% N	.375 oz+1%+1 qt	5	95	30
Beacon+COC+28% N	.75 oz+1%+1 qt	40	98	50
Hornet WDG+COC+28% N	1.5 oz+.25%+1 qt	35	95	95
Hornet WDG+COC+28% N	3 oz+.25%+1 qt	85	98	98
Steadfast+COC+28% N	.375 oz+1%+1 qt	45	98	80
Steadfast+COC+28% N	.75 oz+1%+1 qt	60	98	90
Clarity	2 oz	5	20	30
Clarity	4 oz	75	90	98
Distinct+NIS+28% N	2 oz+.25%+1 qt	88	97	98
Distinct+NIS+28% N	4 oz+.25%+1 qt	99	99	99
2,4-D amine	8 oz	0	10	20
2,4-D amine	16 oz	0	15	40
2,4-D ester	8 oz	0	20	30
2,4-D ester	16 oz	20	60	70
Atrazine+COC	1 qt+1 qt	99	99	99
Atrazine+COC	2 qt+1 qt	99	99	99
Marksman	2.5 pt	99	99	99
Marksman	5 pt	99	99	99
Callisto+COC+28% N	1.5 oz+1%+2 qt	30	70	35
Callisto+COC+28% N	3 oz+1%+2 qt	45	80	55

Table 17. Herbicide Injury Symptoms in Canola

RCB; 4 reps
Planting Date: 4/13/04
Variety: LL - Invigor 2663
EPOST: 5/18/04; Canola 2-3 lf
POST: 5/26/04; Canola 4 lf, 2-3"
Soil: Clay loam; 4.1% OM; 5.8 pH

Precipitation:

EPOST:	1st week	0.53 inches
	2nd week	2.72 inches
POST:	1st week	2.71 inches
	2nd week	1.49 inches

VCRR=Visual Crop Response Rating
(0=no injury; 100=complete kill)

COMMENTS: Treatments designed to produce crop response symptoms resulting from application errors associated with equipment contamination or non-target movement. Phenoxy and SU exposure produced visual symptoms that persisted into the season; Starane plots were essentially free of symptoms. Considerable experimental variability in yield; visual symptoms did not appear to reduce yield. Starane yields tended to be low; some shattering at harvest as crop was not delayed compared to others. Low level of glyphosate did not appear to have a permanent effect in this test.

Treatment	***Rate/A***	***% VCRR Stand Red 8/31/04***	***% VCRR 8/31/04***	***Yield lbs/A***
Check	----	0	0	1841
EARLY POSTEMERGENCE				
Roundup UltraMax II+AMS	1.5 oz+.125 lb	0	10	1873
POSTEMERGENCE				
Roundup UltraMax II+AMS	1.5 oz+.125 lb	0	20	1949
EARLY POSTEMERGENCE				
2,4-D ester	1 oz	29	30	1741
POSTEMERGENCE				
2,4-D ester	1 oz	50	43	1558
EARLY POSTEMERGENCE				
Harmony GT XP+NIS	.025 oz+.05%	0	15	2205
POSTEMERGENCE				
Harmony GT XP+NIS	.025 oz+.05%	0	18	2147
EARLY POSTEMERGENCE				
Starane	.5 oz	0	0	1254
POSTEMERGENCE				
Starane	.5 oz	0	4	1667
LSD (.05)		*6*	*8*	*566*

Table 18. Weed Control in Canola

RCB; 4 reps
Planting Date: 4/13/04
Variety: Roundup Ready - DeKalb DKL 34-55
Clearfield - HyLite 243
Liberty Link - Invigor 2663
SPPI: 4/13/04
EPOST: 5/18/04; Canola 2-3 lf;
Yeft 1 lf; Wimu 2"
POST: 5/26/04; Canola 4 lf, 2-3";
Wimu 4-6"

Precipitation:

SPPI:	1st week	1.91 inches
	2nd week	0.11 inches
EPOST:	1st week	0.53 inches
	2nd week	2.72 inches
POST:	1st week	2.71 inches
	2nd week	1.49 inches

Wimu=Wild mustard
Wibw=Wild buckwheat

COMMENTS: Evaluation of broadleaf weed control in conventional and herbicide resistant systems. Clearfield, Roundup Ready, and Liberty Link programs provided excellent weed control, not provided in conventional treatments.

Treatment	***Rate/A***	***% Wimu 8/31/04***	***% Wibw 8/31/04***
CHECK	----	0	0
Shallow Preplant Incorporated			
Treflan	1.5 pt	0	0
Treflan	3 pt	0	0
Shallow Preplant Incorporated & Postemergence			
Treflan&Stinger	1.5 pt+.33 pt	48	0
Postemergence			
Stinger	.33 pt	35	0
Stinger	.67 pt	38	0
Select+COC	5 oz+1%	0	0
Select+COC	10 oz+1%	0	0
CHECK - ROUNDUP READY	----	0	0
Early Postemergence			
Roundup UltraMax II+AMS	21 oz+2.5 lb	98	91
Postemergence			
Roundup UltraMax II+AMS	21 oz+2.5 lb	98	93
Early Postemergence & Postemergence			
Roundup UltraMax II+AMS& Roundup UltraMax II+AMS	21 oz+2.5 lb& 21 oz+2.5 lb	98	97
Postemergence			
Roundup UltraMax II+AMS	42 oz+2.5 lb	98	95

Table 18. Weed Control in Canola (Continued . . .)

Treatment	***Rate/A***	***% Wimu 8/31/04***	***% Wibw 8/31/04***
CHECK - CLEARFIELD	—	0	0
Early Postemergence			
Beyond+COC	4 oz+1%	98	98
Postemergence			
Beyond+COC	4 oz+1%	98	97
Beyond+COC	8 oz+1%	98	94
CHECK - LIBERTY LINK	—	0	0
Early Postemergence			
Liberty+AMS	34 oz+3 lb	98	98
Postemergence			
Liberty+AMS	34 oz+3 lb	98	97
Liberty+AMS	68 oz+3 lb	98	96
LSD (.05)		*3*	*3*

Table 19. Field Pea Weed Control

RCB; 2 reps
Planting Date: 4/13/04
Variety: Toledo
PPI/PRE: 4/13/04
POST: 5/26/04; Field pea 4-5"; Yeft 1-3 lf, 2-4"; Wioa 4 lf, 4"; Wimu 4-6"
Soil: Clay loam; 4.1% OM; 5.8 pH

Precipitation:

PPI/PRE:	1st week	1.91 inches
	2nd week	0.11 inches
POST:	1st week	2.71 inches
	2nd week	1.49 inches

Wioa=Wild oat
Wimu=Wild mustard
Wibw=Wild buckwheat

COMMENTS: Heavy weed pressure. Treatment strengths apparent. Excellent wild oat control choices. Pursuit, Raptor, Basagran, and Thistrol provided very good broadleaf control.

Treatment	***Rate/A***	***% Wioa 7/22/04***	***% Wimu 7/22/04***	***% Wibw 7/22/04***
Check	----	0	0	0
PREPLANT INCORPORATED				
Dual II Magnum	2 pt	15	78	25
Prowl H_2O	2.17 pt	20	55	80
Treflan	1.5 pt	20	0	83
Sonalan	2 pt	35	0	83

PREEMERGENCE				
Outlook	21 oz	5	50	30
Spartan	5.33 oz	0	15	80
Sencor	.5 lb	15	90	65
Pursuit DG	1.08 oz	90	95	97
POSTEMERGENCE				
Pursuit DG+NIS	1.08 oz+.25%	87	95	97
Raptor+NIS	4 oz+.25%	97	98	98
Raptor+Basagran+NIS	4 oz+2 pt+.25%	80	98	98
Poast+BasagraN+COC	1.5 pt+2 pt+1 pt	83	95	85
Assure II+COC	7 oz+1 pt	98	0	0
Select+COC	7 oz+1 pt	98	0	0
Thistrol	4 pt	10	88	88
Peas/Oats	----	90	90	90
LSD (.05)		*15*	*5*	*7*

Table 20. Broadleaf Control in Spring Wheat

RCB; 3 reps
POST: 5/27/04; Wheat 4 lf, 5-7"; KOCZ 1-3"
Soil: Clay loam; 4.1% OM; 5.8 pH

Precipitation:
POST: 1st week 2.60 inches
2nd week 1.49 inches
KOCZ=Kochia

COMMENTS: Evaluation of kochia control in spring wheat. Excellent performance comparisons. Starane, Clarity, and Bronate treatments provided excellent control with no adverse visual crop response. Data suggests nearly 50% of the kochia population is likely ALS resistant.

Treatment	***Rate/A***	***% KOCZ 8/19/04***
Check	----	0
POSTEMERGENCE		
2,4-D ester	.5 pt	50
Salvo	.8 pt	72
Hi-Dep	1 pt	65
Starane+Salvo	1.33 pt	97
Starane+Sword	1.33 pt	97
Clarity+MCPA amine	2 oz+.5 pt	80
Clarity+MCPA amine	4 oz+.5 pt	94
Starane+2,4-D ester	.67 pt+.5 pt	98
Starane+2,4-D ester	.33 pt+.5 pt	97
Starane+Curtail M	8.15 oz+29 oz	98
Starane+Bronate Advanced	.33 pt+.6 pt	98
Bronate Advanced	.8 pt	98
Bronate Advanced	1.2 pt	98
Bronate Advanced+Clarity	.6 pt+1 oz	98
Harmony GT XP+NIS	.5 oz+.25%	47
Harmony GT XP+Starane+2,4-D ester+NIS	.3 oz+.33 pt+.5 pt+.25%	98

Harmony GT XP+Aim EW+2,4-D ester+NIS	.3 oz+.5 oz+.5 pt+.25%	98
Aim EW+Clarity+NIS+28% N	.5 oz+1 oz+.25%+1 qt	97
Ally XP+Express XP+Harmony GT XP+NIS	.075 oz+.075 oz+.15 oz+.25%	47
LSD (.05)		*6*

Table 21. Oat Herbicide Tolerance

RCB; 3 reps
Planting Date: 4/13/04
Variety: Jerry
POST: 5/27/04; Oat Tillered-3 lf; 5-6"
POST1: 6/17/04; Oat Eboot
Soil: Clay loam; 4.1% OM; 5.8 pH

Precipitation:

POST:	1st week	2.60 inches
	2nd week	1.49 inches
POST1:	1st week	0.15 inches
	2nd week	0.97 inches

VCRR=Visual Crop Response
(0=no injury, 100=complete kill)

COMMENTS: Evaluation of oat response to herbicides. Treatments at X and 2X normal rates. Phenoxy early visual injury. New/experimental Starane, Aim, or Callisto caused no early visual response. Postemergence 2,4-D and late postemergence treatments significantly decreased yield.

Treatment	***Rate/A***	***% VCRR Blasted 7/22/04***	***Yield bu/A***
Check	----	0	162
POSTEMERGENCE			
2,4-D amine	1 pt	10	142
2,4-D amine	2 pt	22	140
2,4-D ester	1 pt	20	131
2,4-D ester	2 pt	30	115
MCPA amine	1 pt	0	158
MCPA amine	2 pt	0	153
MCPA ester	1 pt	0	156
Bronate Advanced	.8 pt	0	172
Bronate Advanced	1.6 pt	0	171
Clarity+MCPA amine	3 oz+.5 pt	0	172
Clarity+MCPA amine	6 oz+.5 pt	0	162
Starane+LI-700	.67 pt+.25%	0	166
Starane+LI-700	1.33 pt+.25%	0	174
Starane+Curtail M	8.15 oz+29 oz	0	167
Starane+Curtail M	16.3 oz+58 oz	0	159
Aim EW+NIS	.5 oz+.25%	0	165
Aim EW+NIS	1 oz+.25%	0	157
Callisto+COC+28% N	2 oz+1%+2 qt	0	162
Harmony GT+NIS	.3 oz+.25%	0	162
Stampede CM+COC	1 pt+1 pt	0	164
Stampede CM+COC	2 pt+1 pt	0	151
POSTEMERGENCE 1			
MCPA amine	2 pt	0	137
Bronate Advanced	.8 pt	0	136
LSD (.05)		*1*	*20*

Soybean Breeding Summary

Project Leader: Roy Scott
Supporting: Steve Stein, Matt Caron, Curt Reese

In 2004 we tested both conventional and Roundup Ready soybean breeding lines at Northeast Research Farm (NRF). We tested advanced (tested for at least 2 years) and new (tested for the first time) Roundup Ready group 0-I lines at NRF in 2004. We also tested lines in the Northern Uniform Regional Trials and Uniform Quality Traits Trials. These trials were grown in replicated two or four-row plots with 14-foot rows, and 30-inch row spacing. We will report on the advanced group I Roundup Ready lines and new group 0 and I Roundup Ready lines in this summary. The wet spring, combined with the August cold weather, delayed development and maturity of some trials. After statistical analyses we determined that the data from severely affected trials were not useful for selection.

Advanced Lines:

The mean yields of 120 advanced group I lines tested were 34.2 bushels per acre (bu/a) at NRF, with a range of 20-45 bu/a. The same group of lines tested at Aurora farm near Brookings, averaged 35 bu/a yield, with a range of 27-41 bu/a. When tested at Arlington SD, these lines averaged 31 bu/a, with a range of 18-46 bu/a. In this group, 5 lines that ranked among the top 21% at NRF also ranked in the top 21% at the Aurora site, and 7 ranked in the top 21% at Arlington. This indicated that some lines were consistently high yielding, and may warrant continuation in the breeding program as potential varieties. Mean yields of these 120 lines were relatively similar at the 3 locations. At the time of this reporting, protein and oil concentrations were still being determined.

New Lines:

Among the group of new lines, we tested 170 group 0 in 2 separate tests, and 360 group 1 in 4 separate tests. These trials were also conducted at Aurora Farm. In one group 0 test, mean yields were 31 bu/a at NRF (range 15-41 bu/a), and 35 bu/a at Aurora (range 21-45 bu/a). In the other group 0 test, mean yields were 34 bu/a at NRF with ranges of 24-47 bu/a, and at Aurora 33 bu/a with ranges of 22-34 bu/a. In one group 0 test, 9 of the lines among the top 25 lines at NRF, also were among the top 25 at Aurora. In the other test, 12 lines that ranked among the top 25 lines at NRF, also were among the top 25 at Aurora. Mean yields across all group 1 trials ranged from a low of 26 bu/a at NRF to a high of 35 bu/a at Aurora. Differences in mean yields between NRF and Aurora were 0, 7, 7, and 8 bu/a, with Aurora being higher than NRF. Among the 4 yield trials, ranges at NRF were 24-43, 19-39, 16-40, and 20-38 bu/a. At Aurora, these ranges were 26-41, 28-46, 23-42, and 23-41 bu/a.

In test one, 17 of the lines among the top 25 lines at NRF, were also included among the top 25 lines at Aurora. In test two and three, 12 lines were included, and in test four, 15 lines were included. This indicated that, although mean yields were lower at NRF than Aurora in these tests, high yielding lines were consistent at both locations.

We had some poor tests at every site in 2004, the data from which will not be useful for selection. We recorded other useful data, such as maturity, plant height and lodging. Protein and oil data also will be analyzed. We had good data on most Roundup Ready trials, and will make selections for continuation in 2005. The NRF continues to be a key site for selection of group 0 and I soybeans.