

**PROJECT TITLE:** Evaluation of regional spring wheat, durum, and oat yield trials - 1997

**PROJECT LEADER:**

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**OBJECTIVE:** To evaluate new and introduced lines and cultivars of spring wheat, durum, and oats developed by Universities, the USDA-ARS, and private seed companies, and to determine adaptability of those lines and varieties to conditions in eastern Montana.

**MATERIALS AND METHODS:** Soil type is a Williams loam. The experimental site was fallow in 1996, planted to safflower in 1995, and planted to small grain plots in 1994. All trials had three replications. Plots were 10 ft long and four rows wide with one ft between rows. All rows were harvested with a plot combine for yield, test weight, and grain protein determinations.

Residual soil N was 112 lb/acre to three feet and residual soil P was 46.5 ppm to six inches. Liquid N (28-0-0) was applied at a rate of 20 lb/acre. Soil moisture was good at planting, but the site suffered from dry conditions until early July. Above normal precipitation fell during July, causing secondary tillering. Early varieties did not yield as well in general because rains came to late for them, while late maturing varieties yielded surprisingly well.

**RESULTS:**

**Uniform Regional Hard Red Spring Wheat yield trial:** The Uniform Regional Hard Red Spring wheat yield trial is conducted in cooperation with Dr. R.H. Busch of the University of Minnesota, St. Paul. Dr. G. Hareland of North Dakota State University, Fargo, tests quality of each line and variety. Thirty-four experimental lines and varieties of hard red spring wheat were tested under dryland conditions (Table 1). Minnesota line MN93413 yielded most followed by North Dakota lines ND695 and ND691. Average yield was 41.0 bu/acre. Five-year summaries for yield, test weight, and protein are shown in Tables 2 through 4.

**Uniform Regional Durum yield trial:** The Uniform Regional Durum yield trial is conducted in cooperation with Dr. E.M. Elias, North Dakota State University, Fargo. Dr. G. Hareland of North Dakota State University, Fargo, tests quality of each line and variety. Thirty-two experimental lines and varieties were tested under dryland conditions (Table 9). North Dakota line D931114 had the highest yield, followed by Ben and North Dakota line D91080. Average yield was 34.3 bu/acre. Five-year summaries for yield, test weight, and protein are shown in Tables 6 through 8.

**Uniform Regional Oat yield trial:** The Uniform Regional Oat trial is conducted in cooperation with Dr. D. M. Wesenberg of the USDA-ARS National Small Grain Facility, Aberdeen, ID. Thirty experimental lines and varieties were tested (Table 9). North Dakota line ND860416, and Idaho line 87AB5125 yielded most. Average yield was 121.4 bu/acre. Five-year summaries for yield, test weight, and protein are shown in Tables 10 through 12.

**SUMMARY:** The uniform regional yield trials are conducted at many sites in several states across the western USA, and have been in place since the 1930's. These trials provide important information about experimental lines from state breeding programs, private companies, and the USDA-ARS breeding programs. New varieties are released based on data from these trials.

**FUTURE PLANS:** New and existing varieties and experimental lines of spring wheat, durum and oat will continue to be tested under dryland conditions at the Eastern Agricultural Research Center, so that breeders can release improved varieties and producers can have information on varieties that are adapted to this area. A durum selection and breeding program has been established at EARC in cooperation with the durum breeder from NDSU for development of new varieties adapted to irrigated and dryland conditions in eastern Montana and western North Dakota. New and existing varieties and experimental lines of winter wheat are now being tested under dryland conditions at the Williston Research Center in cooperation with the winter wheat breeder from MSU.

Table 1. Agronomic data obtained from a Uniform Regional hard red spring wheat yield trial grown under dryland fallow conditions at the Eastern Agricultural Research Center, Sidney, MT.

Planting date: 28 April 1997 Harvest date: 19 August 1997

Variety	Days to heading <sup>1</sup>	Height, inches	Protein content	Test wt, lb/bu	Yield bu/acre
MN93413	53	20	13.2	57.5	53.0a
ND695	51	18	14.7	60.8	49.3a
ND691	54	21	14.8	59.7	48.8a
MT9433	54	25	14.8	61.0	48.8a
SDM50005	53	20	14.7	59.7	48.4a
NX95-5106	52	17	14.6	59.2	47.5a
T801.93	51	20	14.9	60.0	47.0a
N93-0211	52	19	14.9	60.2	46.9a
SBE0050	51	18	15.4	59.0	45.0
ND694	50	21	15.7	61.0	44.9
SD3219	49	19	15.1	61.7	44.6
B91-0228	51	16	15.4	61.7	44.5
N93-0136	53	17	14.1	60.7	44.4
TX92U231	55	18	15.0	58.5	43.5
WA7802	51	21	14.8	59.7	42.4
MN94200	49	18	14.7	60.0	41.4
N93-0119	51	18	15.7	60.0	41.2
ND704	50	20	15.0	61.2	41.0
MN94055	51	17	15.0	59.5	40.8
SD8108	48	20	14.9	60.9	40.8
Stoa	51	20	15.4	58.3	40.7
SD8119	49	19	15.8	59.7	38.4
Chris,525-1	52	22	16.0	58.8	37.0
Era	52	17	15.2	59.5	36.8
SD3310	48	20	17.1	61.5	36.6
SBF0402	51	19	16.7	60.2	36.4
BW693	48	21	16.2	57.6	35.6
SD3249	48	21	16.5	62.9	35.6
T1052	49	18	16.8	59.9	34.1x
Sharpshooter	49	21	16.0	62.7	33.2x
MT9508	49	20	17.2	60.2	32.9x
Marquis	55	25	15.4	59.9	31.6x
BZ987-31	48	18	16.5	58.7	31.6x
Butte 86	49	19	16.0	60.1	30.4x
mean	50.8	19.5	15.4	60.0	41.0
CV (S/mean)	0.3	5.2	2.8	1.4	9.1
LDS <sub>0.05</sub>	0.8	1.7	0.7	1.4	6.1

<sup>1</sup> Heading date is number of days from planting

Check variety is Stoa with an average yield of 40.7 bu/a.

a indicates significantly greater than check variety, Stoa, at a probability of <0.05

x indicates significantly less than check variety, Stoa, at a probability of <0.05

Table 2. Relative yields of spring wheat varieties as compared to Stoa when grown under dryland fallow conditions in the Uniform Regional Hard Red Spring Wheat trial at EARC, Sidney Montana.

Cultivar	# of years	1993	1994	1995	1996	1997	Ave	as % of Stoa
ND 695	2	--	--	--	46.6	49.3	48.0	114.4
ND 691	2	--	--	--	43.8	48.8	46.3	110.5
ND 694	2	--	--	--	44.6	44.9	44.8	106.8
Era	5	51.9	60.5	39.9	44.8	36.8	46.8	102.4
MT 9433	2	--	--	--	36.5	48.8	42.6	101.8
ND704	1	--	--	--	--	41.0	41.0	100.7
Stoa	5	45.3	58.6	40.7	43.1	40.7	45.7	100.0
Butte 86	5	47.5	62.0	39.3	41.1	30.4	44.1	96.5
Sharpshooter	2	--	--	--	41.6	33.2	37.4	89.3
MT9508	1	--	--	--	--	32.9	32.9	80.8
Chris 525-1	5	34.2	47.5	32.2	33.0	37.0	36.8	80.5
Marquis	5	32.8	47.1	19.7	30.9	31.6	32.4	71.0

NOTE: Average yields in this summary should not be compared to each other since they are not grown in the same years. Compare yields only to the check variety, Stoa.

Table 3. Relative test weights of spring wheat varieties as compared to Stoa when grown under dryland fallow conditions in the Uniform Regional Hard Red Spring Wheat trial at EARC, Sidney Montana.

Cultivar	# of years	1993	1994	1995	1996	1997	Ave	as % of Stoa
Sharpshooter	2	--	--	--	64.0	62.7	63.4	105.9
ND704	1	--	--	--	--	61.2	61.2	105.0
ND 694	2	--	--	--	63.2	61.0	62.1	103.8
ND 695	2	--	--	--	63.2	60.8	62.0	103.7
MT9508	1	--	--	--	--	60.2	60.2	103.3
MT 9433	2	--	--	--	62.2	61.0	61.6	103.0
Butte 86	5	56.5	61.4	61.6	62.2	60.1	60.4	101.6
Marquis	5	57.3	60.2	61.4	61.5	59.9	60.1	101.1
ND 691	2	--	--	--	60.8	59.7	60.2	100.8
Chris 525-1	5	56.7	60.3	61.2	61.6	58.8	59.7	100.5
Era	5	56.7	59.6	60.8	61.3	59.5	59.6	100.3
Stoa	5	56.7	60.0	60.8	61.3	58.3	59.4	100.0

NOTE: Average test weights in this summary should not be compared to each other since they are not grown in the same years. Compare test weights only to the check variety, Stoa.

Table 4. Relative protein contents of spring wheat varieties as compared to Stoa when grown under dryland fallow conditions in the Uniform Regional Hard Red Spring Wheat trial at EARC, Sidney Montana.

Cultivar	# of years	1993	1994	1995	1996	1997	Ave	as % of Stoa
MT9508	1	--	--	--	--	17.2	17.20	111.7
ND 694	2	--	--	--	13.3	15.7	14.50	103.2
Chris 525-1	5	14.2	13.7	14.7	13.3	16.0	14.38	102.6
Sharpshooter	2	--	--	--	12.8	16.0	14.40	102.5
Stoa	5	14.8	13.1	14.1	12.7	15.4	14.02	100.0
Marquis	5	13.0	13.4	15.2	13.0	15.4	14.00	99.9
MT 9433	2	--	--	--	12.8	14.8	13.80	98.2
Butte 86	5	13.2	12.9	14.5	11.9	16.0	13.70	97.7
ND704	1	--	--	--	--	15.0	15.00	97.4
ND 695	2	--	--	--	12.3	14.7	13.50	96.1
ND 691	2	--	--	--	12.2	14.8	13.50	96.1
Era	5	13.0	11.3	13.5	12.2	15.2	13.04	93.0

NOTE: Average protein contents in this summary should not be compared to each other since they are not grown in the same years. Compare protein contents only to the check variety, Stoa.

Table 5. Agronomic data obtained from a Uniform Regional durum yield trial grown under dryland fallow conditions at the Eastern Agricultural Research Center, Sidney, MT.

Planting date: 28 April 1997 Harvest date: 20 August 1997

Variety	Days to heading <sup>1</sup>	Height, inches	Protein content	Test wt, lb/bu	Yield bu/acre
D931114	51	18	14.0	60.5	42.0a
Ben	51	18	14.5	60.9	40.6a
D91080	54	17	14.0	59.8	39.9a
D91066	53	18	14.7	59.7	39.1a
Mindum	55	22	14.4	62.6	38.3a
D89135	52	17	15.3	60.2	37.9
D911526	50	16	15.1	60.3	37.7
D91058	53	17	14.8	59.0	37.7
Medora	51	20	15.5	60.0	37.5
Belzer	53	17	14.2	57.8	36.9
D901313	53	17	14.5	60.0	36.2
D901518	53	18	14.0	60.7	35.9
D901297	53	17	14.6	60.9	35.7
D931011	52	19	14.9	60.3	35.5
D901442	51	17	14.4	61.2	35.1
D921585	52	19	14.1	61.2	35.0
D930503	51	19	14.2	60.4	34.8
D901155	50	18	15.6	61.9	34.8
Vic	51	19	14.8	60.8	34.6
Munich	51	17	15.0	61.2	33.8
Renville	51	18	15.4	61.4	32.5
D931054	49	18	16.2	61.3	31.8
Lloyd	54	17	13.7	59.0	31.2
D921019	53	17	14.8	62.2	31.0
Rugby	51	18	15.4	62.3	31.0
D88303	51	15	14.5	61.5	30.5
D901419	49	17	15.2	61.3	30.3
D901247	51	17	15.3	61.9	30.1
D920078	53	16	14.0	61.9	29.6
D901536	51	17	15.1	61.8	27.6
D920016	50	15	14.1	61.8	26.8x
Monroe	49	18	15.3	60.1	26.5x
mean	51.6	17.6	14.7	60.8	34.3
CV (S/mean)	0.4	6.2	2.3	1.6	9.9
LDS <sub>0.05</sub>	1.0	1.8	0.6	1.6	5.5

<sup>1</sup> Heading date is number of days from planting

Check variety is Renville with an average yield of 32.5 bu/a.

a indicates significantly greater than check variety, Renville, at a probability of <0.05

x indicates significantly less than check variety, Renville, at a probability of <0.05

Table 6. Relative yields of durum varieties as compared to Renville when grown under dryland conditions at the EARC, Sidney, Montana.

Cultivar	# of years	1993	1994	1995	1996	1997 <sup>1</sup>	1997 <sup>2</sup>	Ave	as % of Renville
D91080	3	--	--	52.2	39.6	39.9	--	43.9	105.5
Ben	6	46.8	62.0	48.3	39.5	40.6	34.7	45.3	103.6
Munich	6	48.8	61.8	50.6	39.2	33.8	30.3	44.0	100.8
Renville	6	36.4	66.6	55.3	37.0	32.5	34.7	43.8	100.0
D88303	5	48.1	64.0	45.5	38.0	30.5	--	45.2	99.3
Dressler	2	--	--	--	37.9	--	33.1	35.5	99.0
Belzer	5	35.8	64.2	50.0	35.7	36.9	--	44.5	97.7
Sceptre	4	41.7	59.2	49.2	36.7	--	--	46.7	95.6
Lloyd	5	30.9	62.0	50.9	40.8	31.2	--	43.2	94.7
Rugby	5	38.4	57.7	52.0	36.0	31.0	--	43.0	94.4
Plenty	4	44.5	59.2	43.1	36.7	--	--	45.9	94.0
Voss	1	--	--	--	--	--	32.4	32.4	93.4
Vic	5	31.8	61.6	47.3	37.2	34.6	--	42.5	93.3
Medora	5	31.7	60.4	41.2	37.3	37.5	--	41.6	91.4
Kyle	3	--	58.0	48.3	38.2	--	--	48.2	90.9
Monroe	5	30.6	59.2	45.5	39.7	26.5	--	40.3	88.5
Mindum	5	30.1	55.5	42.0	34.2	38.3	--	40.0	87.8
AC Melita	1	--	--	--	--	--	30.4	30.4	87.6
Cortez	1	--	--	--	--	--	25.4	25.4	73.2

NOTE: Average yields in this summary should not be compared to each other since they are not grown in the same years. Compare yields only to the check variety, Renville.

<sup>1</sup>Uniform regional durum trial

<sup>2</sup>Commercial dryland durum trial

Table 7. Relative test weights of durum varieties as compared to Renville when grown under dryland conditions at the EARC, Sidney, Montana.

Cultivar	# of years	1993	1994	1995	1996	1997 <sup>1</sup>	1997 <sup>2</sup>	Ave	as % of Renville
Voss	1	--	--	--	--	--	62.4	62.4	103.0
Mindum	5	58.2	62.4	63.8	64.3	62.6	--	62.3	102.1
Ben	6	58.7	63.0	62.7	62.8	60.9	62.2	61.7	101.3
Rugby	5	57.7	62.1	62.7	63.3	62.3	--	61.6	101.0
Vic	5	57.1	62.4	62.6	63.2	60.8	--	61.2	100.4
Munich	6	57.2	63.2	62.2	61.9	61.2	60.6	61.0	100.2
D88303	5	58.2	61.7	61.7	62.5	61.5	--	61.1	100.2
Renville	6	57.5	61.4	62.3	62.3	61.4	60.6	60.9	100.0
Medora	5	56.9	61.7	62.3	63.9	60.0	--	61.0	100.0
Dressler	2	--	--	--	62.2	--	60.6	61.4	99.9
Cortez	1	--	--	--	--	--	60.5	60.5	99.8
D91080	3	--	--	62.8	62.4	59.8	--	61.7	99.5
Kyle	3	--	60.6	62.5	62.0	--	--	61.7	99.5
Plenty	4	57.2	61.0	62.0	61.9	--	--	60.5	99.4
Monroe	5	56.4	61.1	62.0	63.0	60.1	--	60.5	99.2
Sceptre	4	56.2	61.3	61.2	62.9	--	--	60.4	99.2
AC Melita	1	--	--	--	--	--	60.0	60.0	99.0
Belzer	5	54.2	61.5	61.7	61.1	57.8	--	59.3	97.2
Lloyd	5	53.7	59.2	61.0	61.7	59.0	--	58.9	96.6

NOTE: Average test weights in this summary should not be compared to each other since they are not grown in the same years. Compare test weights only to the check variety, Renville.

<sup>1</sup>Uniform regional durum trial

<sup>2</sup>Commercial dryland durum trial

Table 8. Relative protein contents of durum varieties as compared to Renville when grown under dryland conditions at the EARC, Sidney, Montana.

Cultivar	# of years	1993	1994	1995	1996	1997 <sup>1</sup>	1997 <sup>2</sup>	Ave	as % of Renville
Kyle	3	--	12.4	16.3	12.0	--	--	13.57	108.8
Plenty	4	13.8	11.8	15.8	12.6	--	--	13.50	106.9
Monroe	5	13.4	12.2	16.2	12.0	15.3	--	13.82	104.9
Rugby	5	13.3	12.7	15.2	12.2	15.4	--	13.76	104.4
Vic	5	13.7	12.4	14.9	12.8	14.8	--	13.72	104.1
Medora	5	13.8	12.5	14.4	11.8	15.5	--	13.60	103.2
Munich	6	14.3	11.6	13.7	12.2	15.1	15.2	13.68	101.2
Ben	6	13.9	11.8	14.2	12.7	14.5	14.6	13.62	100.7
Belzer	5	14.3	11.3	14.1	12.4	14.2	--	13.26	100.6
Sceptre	4	13.4	11.4	14.4	11.5	--	--	12.68	100.4
Renville	6	13.1	11.2	13.8	12.4	15.4	15.2	13.52	100.0
D88303	5	14.4	11.0	13.9	12.1	14.5	--	13.18	100.0
Lloyd	5	13.9	12.4	15.1	10.4	13.7	--	13.10	99.4
Dressler	2	--	--	--	12.2	--	15.2	13.70	99.3
Mindum	5	13.7	11.0	14.8	11.2	14.4	--	13.02	98.8
Cortez	1	--	--	--	--	--	15.0	15.00	98.7
AC Melita	1	--	--	--	--	--	14.5	14.50	95.4
D91080	3	--	--	14.8	10.8	14.0	--	13.20	95.2
Voss	1	--	--	--	--	--	14.4	14.40	94.7

NOTE: Average protein contents in this summary should not be compared to each other since they are not grown in the same years. Compare only to the check variety, Renville.

<sup>1</sup>Uniform regional durum trial

<sup>2</sup>Commercial dryland durum trial

Table 9. Agronomic data obtained from a dryland Uniform Regional oat yield trial grown under dryland fallow conditions at the Eastern Agricultural Research Center, Sidney, MT.

Planting date: 28 April 1997 Harvest date: 18 August 1997

Variety	Days to heading <sup>1</sup>	Height, inches	Protein content	Test wt, lb/bu	Yield bu/acre
ND860416	53	28	12.6	33.7	141.6a
87AB5125	54	25	12.5	32.2	136.9a
ABSP 9-2	53	25	12.6	35.0	134.4a
Whitestone	54	24	12.9	33.5	131.7a
82AB248	54	21	12.8	30.8	131.4a
Celcia	55	28	12.5	32.3	131.0a
91AB406	53	22	13.2	32.7	130.4a
86AB664	53	23	12.3	32.5	129.7a
84AB825	54	23	13.2	31.8	129.0a
IAH613-3	51	24	12.9	32.0	128.8a
Derby	53	28	12.8	33.0	127.8a
Powell	54	23	13.6	32.0	127.5a
89AB4088	51	23	14.4	34.8	127.4a
90AB1322	53	20	13.2	32.7	127.0a
ABSP19-9	54	23	13.7	34.2	124.8a
CDC Boyer	54	29	13.2	31.0	121.2
Monida	54	22	13.1	33.2	120.7
Ajay	52	18	14.0	33.0	119.4
Newdak	49	25	13.6	32.2	118.7
CDC Pacer	52	25	13.0	33.7	118.6
Monida reselection	52	23	13.2	34.3	118.0
Cayuse	53	23	13.0	30.8	115.9
91AB502	49	20	13.4	33.0	109.7
Otana	53	26	13.7	34.8	108.9
89AB6153	49	20	13.8	35.2	107.8
Prairie	49	22	13.4	32.2	106.3
87AB4983	50	18	13.5	33.0	105.7
Ogle	49	19	13.6	30.8	105.6
89AB1545	48	22	13.7	34.7	105.4
Rio Grande	51	19	13.8	32.0	101.7
mean	52.1	23.1	13.2	32.9	121.4
CV (S/mean)	0.3	7.4	2.9	2.5	7.8
LDS <sub>0.05</sub>	0.7	2.8	0.6	1.3	15.5

<sup>1</sup> Heading date is number of days from planting

Check variety is Otana with an average yield of 108.9 bu/a.

a indicates significantly greater than check variety, Otana, at a probability of <0.05

Table 10. Relative yields of oat varieties as compared to Otana when grown under dryland fallow conditions at the EARC, Sidney, Montana.

Cultivar	# of years	1993	1994	1995	1996	1997	Ave	as % of Otana
Border	4	99.5	145.0	126.4	74.2	--	111.3	113.6
Monida	5	100.8	131.1	129.4	84.2	120.7	113.2	113.1
CDC Boyer	1	--	--	--	--	121.2	121.2	111.3
ND860416	5	93.6	120.1	116.4	85.0	141.6	111.3	111.2
Whitestone	4	--	125.4	124.2	73.3	131.7	113.6	110.4
Powell	5	96.7	126.2	119.2	81.3	127.5	110.2	110.0
CDC Pacer	1	--	--	--	--	118.6	118.6	108.9
Celsia	3	--	--	110.6	76.1	131.0	105.9	107.2
Rio Grande	5	102.0	129.6	119.5	76.4	101.7	105.8	105.7
Appaloosa	4	89.0	122.4	124.1	78.2	--	103.4	105.6
Ajay	5	101.7	126.9	105.4	74.8	119.4	105.6	105.5
Prairie	3	--	--	115.1	80.7	106.3	100.7	101.9
Cayuse	5	91.1	109.2	113.8	79.1	115.9	101.8	101.7
Newdak	5	86.6	116.3	116.6	69.6	118.7	101.6	101.4
Otana	5	88.9	115.4	114.1	73.4	108.9	100.1	100.0
Derby	5	90.9	89.6	95.4	82.6	127.8	97.3	97.1
Ogle	5	89.6	112.6	104.9	71.1	105.6	96.8	96.6
Park	4	76.5	102.0	113.8	78.0	--	92.6	94.5

NOTE: Average yields in this summary should not be compared to each other since they are not grown in the same years. Compare yields only to the check variety.

Table 11. Relative test weights of oat varieties as compared to Otana when grown under dryland fallow conditions at the EARC, Sidney, Montana.

Cultivar	# of years	1993	1994	1995	1996	1997	Ave	as % of Otana
Otana	5	38.3	43.3	38.2	36.7	34.8	38.3	100.0
Derby	5	37.2	43.0	38.0	34.9	33.0	37.2	97.3
Monida	5	37.0	42.3	37.8	35.4	33.2	37.1	97.1
CDC Pacer	1	--	--	--	--	33.7	33.7	96.8
Whitestone	4	--	43.0	38.2	32.5	33.5	36.8	96.1
ND860416	5	34.5	41.8	37.3	36.4	33.7	36.7	96.0
Ogle	5	37.2	42.3	36.8	32.9	30.8	36.0	94.1
Ajay	5	36.8	38.7	36.8	33.8	33.0	35.8	93.6
Newdak	5	35.8	41.3	35.5	34.2	32.2	35.8	93.6
Rio Grande	5	36.0	41.8	36.8	31.8	32.0	35.7	93.3
Park	4	34.7	42.3	35.8	32.9	--	36.4	93.1
Celsia	3	--	--	36.5	32.7	32.3	33.8	92.5
Prairie	3	--	--	36.3	32.6	32.2	33.7	92.2
Border	4	35.5	39.0	36.2	31.1	--	35.4	90.6
Powell	5	32.8	39.5	36.2	30.4	32.0	34.2	89.3
CDC Boyer	1	--	--	--	--	31.0	31.0	89.1
Cayuse	5	33.5	40.5	35.3	29.6	30.8	33.9	88.7
Appaloosa	4	34.5	39.0	36.2	27.8	--	34.4	87.9

NOTE: Average test weights in this summary should not be compared to each other since they are not grown in the same years. Compare test weights only to the check variety.

Table 12. Relative protein contents of oat varieties as compared to Otana when grown under dryland fallow conditions at the EARC, Sidney, Montana.

Cultivar	# of years	1993	1994	1995	1996	1997	Ave	as % of Otana
Park	4	11.9	11.4	14.7	10.3	--	12.08	104.1
Ajay	5	12.3	11.4	14.3	10.5	14.0	12.50	104.0
Newdak	5	11.4	11.3	14.0	10.0	13.8	12.10	100.7
Otana	5	11.9	10.9	14.3	9.3	13.7	12.02	100.0
Prairie	3	--	--	14.2	9.7	13.4	12.43	100.0
Border	4	11.4	11.1	13.3	10.4	--	11.55	99.6
Rio Grande	5	10.4	11.2	13.5	10.2	13.8	11.82	98.3
CDC Boyer	1	--	--	--	--	13.2	13.20	96.4
Ogle	5	10.6	11.1	14.0	8.5	13.6	11.56	96.2
Derby	5	11.1	10.9	13.8	9.0	12.8	11.52	95.8
Cayuse	5	11.4	10.4	13.1	9.7	13.0	11.52	95.8
Whitestone	4	--	10.5	13.1	9.4	12.9	11.48	95.2
CDC Pacer	1	--	--	--	--	13.0	13.00	94.9
ND860416	5	11.1	10.4	13.6	9.0	12.6	11.34	94.3
Appaloosa	4	10.6	10.2	13.3	9.5	--	10.90	94.0
Celsia	3	--	--	13.2	9.2	12.5	11.63	93.6
Monida	5	10.8	9.5	13.4	9.0	13.1	11.16	92.8
Powell	5	10.4	9.4	12.7	9.3	13.6	11.08	92.2

NOTE: Average protein contents in this summary should not be compared to each other since they are not grown in the same years. Compare protein contents only to the check variety.