Small Grain Variety Performance Trials
San Luis Valley Research Center
Center, Colorado, 2006

Merlin A. Dillon, Area Extension Agent, Agronomy
SLV Research Center, 0249 E. Road 9N, Center, CO 81125

Summary

Each year small grain variety performance tests are conducted at the San Luis Valley Research Center to identify varieties of wheat, barley, oats and canola that are productive and adapted for commercial production in the San Luis Valley. Irrigation wells at the Research Center produced adequate water this year; no problem. However, yields of wheat, barley, and oats were fairly poor because of a lingering soil problem in the area planted to grain plots this year.

The 2006 season can be characterized very warm until July; then rainy and heavy dews during July and August. Heading dates were early again. Grain yields in the soft white spring (SWS) wheat trial were below recent yields, 123 bu/acre. Grain yields in the hard red spring (HRS) and durum wheat trial were very poor, averaging 38.5 bu/acre. Grain yields in the barley trial were good, but lower than last year; averaging 137 bu/acre. The oat variety performance trial produced fairly poor yields, averaging only 125 bu/acre.

Introduction and Objectives

Small grain trials include wheat, barley and oats have been produced in the San Luis Valley for many years. Oat acreage has greatly declined from historically highs; however, oats are grown on 27,000 acres in 2004, mostly harvested for hay or for alfalfa cover crop seedings. Wheat and barley are still very important Valley crops, although acreage varies depending on the wheat price and maybe irrigation reductions because of the drought. Wheat acreage has generally ranged from 23,000 to 34,000; the acreage depending on price. Drought has reduced wheat acreage to only 10,500 harvested acres in 2004. Malt barley acreage is dominated by Coors contracts with a small acreage of other malt barley or feed barley varieties. Wheat types also vary with demand and grower preferences. Durum acreage is increased this year because of the contract price. SWS acreage varies with price; the dominant market being in Denver. HRS acreage also varies and the winter wheat acreage is very small. The objective of this research was to evaluate variety and experimental lines performance under high-yield center pivot conditions in the San Luis Valley.

Materials and Methods

These field research studies were conducted at the San Luis Valley Research Center or sometimes on neighboring farms. All wheat, barley, and oat trials this year were located at the Research Center whereas the canola trial was on Worley Seed about 6 miles away. The trials were conducted as a randomized complete block design with four replications. This means all varieties were planted on the same day, irrigated and otherwise treated the same all season and all plots were also harvested the same. Each variety is planted four times in randomized location. Plots are planted to 35 foot lengths and trimmed at harvest to about 30 foot. Nine rows are planted in 8-inch rows which make a plot 6 feet wide. Unless the plots are severely lodged, only the middle 7 rows (4.7 feet) are harvested with the Hege combine.

Entry fees are solicited for privately owned varieties. Wheat yields are corrected to 12% moisture and 60 lbs/bushel. For barley, yields are corrected to 48 lbs/bushel and oats are corrected to 38 lbs/bushel. Canola is reported as pounds per acre dry matter. Wheat protein and hardness are determined by the wheat breeding program at Colorado State University. Malt barley protein and screenings are tested at the Coors Brewing Co. office in Monte Vista.

On the following pages each trial results is printed in a table. 2006 results are then followed by tables for 2- or more years averages.

Table 1. 2006 Soft White Spring Wheat Variety Performance Trial at Center[1]. Merlin A. Dillon, Area Extension Agronomist.

Variety	Grain Yield [2]	Bushel Weight	Heading Date [4]	Grain Moisture	Plant Height	Grain Protein
	bu/ac	lbs/bu	(June)	%	in.	%
IDO 599	139.7 a[3]	59.0	20.3	13.3	36.9	9.0
IDO 632	139.0 a	57.7	17.0	14.1	30.9	9.6
Alturas	131.1 ab	60.4	23.5	12.3	33.9	9.8
IDO 645	121.4 bc	60.6	23.0	12.4	35.4	11.3
IDO 629wxy	119.3 bc	59.7	26.5	12.9	35.4	10.0
IDO 630wxy	114.5 bc	59.1	25.0	13.2	32.4	10.7
Centennial	113.2 c	61.0	20.3	11.8	30.9	9.8
IDO 563	107.5 c	59.8	15.5	13.4	31.2	10.5
Trial Average	**123.2**	**59.7**	**21.4**	**12.9**	**33.4**	**10.1**
LSD, 10%	**9.8**	**0.81**	**1.28**	**1.93**	**2.86**	**1.06**
CV, %	**6.56**	**1.12**	**4.9**	**7.0**	**4.0**	**8.65**

[1] San Luis Valley Research Center, Center, CO.
[2] Grain yield based on 60 lbs/bushel and 12 % moisture.
[3] Tukey's Test: yields followed by the same letters are not statistically different.
[4] Days after June 1.

Site Information:
Date Planted: April 5
Irrigation: center pivot
Herbicide: Bronate, 1 pt/acre
Nitrogen: 100 lb/ac + 30 lb/ac fertigation
Previous Crop: Potatoes
Date Harvested: August 29
Seed Rate: 120 lbs/acre
Row Spacing: 8-inch
Plot Size: 6 ft. x 35'; 9 rows planted 8 inches apart

Comments:

Vegetative growth this year was fairly good; but without the usual plant lodging. Some kind of soil problem carried over from this same area in 2004. In spite of this, yields were good and the yield variability was low (CV=6.56%). Grain yield was less than for several years; it averaged only 123.2 bu/acre. Grain yields were still much better than hard wheat or oats. Even though the yields were only fair, the statistics were good and yield differences were found. ($LSD_{.10}$ was 9.8 bu/acre.)

Wet weather caused some Xanthomonas (bacterial) leaf blight; however, the bushel weight still averaged almost 60 lbs/bu. Plant height was good; heading dates were a little earlier than usual. Grain moisture was high for some varieties.

With more vigorous vegetative growth; however, some of these lines may show weaker straw and lodge more than Centennial. Lodging would reduce the harvested yield since these trials are harvested standing. Centennial is still the recommended soft white variety.

IDO599, IDO632 and Alturas comprised the top yield group this year. IDO 599 and Alturas were also in the top yield group last year. In the only trial that had some lodging, Alturas lodged more than Centennial. We need some larger scale trials on these new varieties from Idaho.

Table 2. 2-Year Averages (2005-06), Soft white spring wheat variety performance trial at Center [1].

Variety	Grain Yield	Bushel Weight	Heading Date [3]	Plant Height	Grain Protein
	bu/ac	lbs/bu	(June)	in.	%
IDO599	156.0	60.6	22.1	37.5	9.7
Alturas	151.2	61.5	25.8	35.4	9.6
IDO563	138.4	60.9	19.4	34.2	10.1
IDO630w	135.2	60.1	27.2	34.2	9.9
Centennial	132.9	62.4	22.6	32.1	10.1
Trial Average	**143.8**	**61.0**	**23.6**	**34.9**	**10.0**

[1] San Luis Valley Research Center, Center, CO. Grain yield based on 60 lbs/bushel and 12 % moisture.
[3] Days after June 1.

Comments:

The last two years' trials have not been kind to Centennial; other varieties have yielded higher. But other varieties may not have some good characteristics that we want. Most other varieties are taller than Centennial and likely would lodge more. Somehow we need to test their lodging resistance in the field. Making the plots lodge is not hard; excessive lodging will cause it. But, finding meaningful yield data and lodging data is hard to do on the same plots.

Table 3. 4-Year Averages (2003-06), Soft white spring wheat variety performance trial at Center [1].

Variety	Grain Yield Bushels per acre					Bushel Weight	Heading Date [3]	Plant Height	Grain Moisture	Grain Protein
	2006	2005	2004	2003	4-Yr	lbs/bu	(June)	in.	%	%
Alturas	107.5	169.3	129.8	137.1	**135.9**	61.2	22.0	35.6	12.5	10.3
IDO563	131.1	171.3	136.8	136.7	**144.0**	60.7	29.5	36.0	11.8	9.9
Centennial	113.2	152.6	135.4	144.9	**136.5**	61.7	25.9	34.1	11.5	10.4
Trial Average	**123.2**	**164.3**	**136.3**	**134.9**	**139.7**	**60.4**	**27.1**	**36.1**	**12.2**	**10.3**

[1] San Luis Valley Research Center, Center, CO. Grain yield based on 60 lbs/bushel and 12 % moisture.
[3] Days after June 1.

Comments:

Yields were much lower in 2006. Centennial yields compared favorably in 2003 and 2004. However, Centennial yielded less than others in 2005 and 2006. Centennial has the best bushel weight, the shortest height and lowest grain moisture. Alturas was very early to head. All varieties had good, low grain protein.

Table 4. Hard spring wheat variety performance trial at Center [1] in 2006.

Merlin A. Dillon, Area Extension Agronomist, SLV Research Center.

Variety	Wheat Type[2]	Grain Yield [3]	Bushel Weight	Heading Date [4]	Grain Moisture	Plant Height	Grain Protein
		bu/ac	lbs/bu	(June)	%	in.	%
Plata	HWS[2]	77.3 a[5]	62.4	30.5	8.9	26.4	12.8
Lochsa	HWS	74.1 ab	60.8	31.3	9.3	32.7	13.6
ID377S	HWS	74.1 ab	62.5	31.3	9.8	32.1	12.7
Jerome	HRS	70.0 abc	62.0	24.8	9.7	29.7	13.7
Oslo	HRS	67.2 abcd	60.6	26.3	9.6	29.4	13.4
IDO578	HWS	66.8 abcd	62.7	29.0	9.4	29.4	13.8
IDO593	HWS	65.1 abcd	60.9	25.3	9.5	28.2	14.2
Lolo	HWS	61.8 abcd	62.0	30.8	9.8	30.3	13.7
Pristine	HWS	59.5 abcd	62.5	23.0	9.8	29.4	14.9
Centennial	SWS	59.1 abcd	61.3	29.5	9.8	27.3	13.4
980127-06	HRS	52.7 bcd	62.2	32.0	10.2	28.8	14.9
Blanca Grande	HWS	49.1 cd	59.7	22.8	10.1	24.0	15.5
Snowcrest	HWS	45.1 d	59.5	21.8	9.8	22.2	15.3
Trial Average		**63.2**	**61.5**	**27.5**	**9.6**	**28.5**	**14.0**
LSD, 10%		**12.1**	**1.22**	**1.54**	**0.44**	**2.87**	**0.85**
CV, %		**16.0**	**1.67**	**4.7**	**3.85**	**8.46**	**0.85**

[1] San Luis Valley Research Center, Center, CO. Grain yield based on 60 lbs/bushel and 12 % moisture.
[2] Wheat Types: SWS is soft white spring; HWS is hard white spring; HRS is hard red spring wheat.
[3] Tukey's Test: yields followed by the same letters are not statistically different.
[4] Days after June 1.

Site Information:
Date Planted: April 24
Irrigation: center pivot
Herbicide: Bronate 1 pt/acre
Nitrogen: 100preplant + 30 lbs/acre fertigation
Previous Crop: potatoes
Date Harvested: September 6
Seed Rate: 120 lbs/acre except durum at 150 lbs/acre
Row Spacing: 8-inch
Plot Size: 6 ft. x 35'; 9 rows planted 8 inches apart

Comments:

Vegetative growth was slow this year beginning from early tillering; caused by some lingering soil problem that was present in 2004. Plants were stunted and poorly tillered. Weed control was poor. Yields were poor, averaging 63.2 bu/acre. Even though yields were poor, it was a good trial statistically; finding yield differences between varieties. Most expected varieties were in the top yield group.

Wet, humid and cool conditions caused some Xanthomonas (bacterial) leaf blight; however, bushel weights were excellent averaging 61.5 lbs/bushel. Plant heights were short, averaging only 28.5 inches instead of normal 36-40 inches. Heading dates were a little earlier than normal, especially considering the April 24 planting date. The grain was very dry at harvest.

Table 5. 2006 Irrigated Spring Barley Variety Performance Trial at Center[1].
Merlin A. Dillon, Area Extension Agent, Agronomy.

Variety	Source	Grain Yield [2]	Bushel Weight	Heading Date[4]	Grain Moisture	Plant Height	Plant Lodging	Grain Protein	Grain Color	Grain[5] Screen
		bu/ac	lbs/bu	(June)	%	inches	%	%		%
Ab 11720	ARS	167.0 a[3]	52.9	27.0	12.8	33.3	0	9.1	37.8	1.3
Ab 11993	ARS	166.5 a	52.2	27.0	12.7	37.5	11.3	10.1	37.8	1.0
Eslick	Mont.St.	151.7 ab	51.9	23.8	12.7	36.0	6.3	9.8	41.8	1.0
Mt 960101	Mont.St.	151.5 ab	52.4	29.5	12.7	38.1	0	10.0	37.3	1.0
01ST-1587	ARS-Br	149.4 ab	50.3	24.8	12.1	31.8	0	9.3	34.8	1.0
Legacy	Cargill	149.1 ab	49.7	22.3	12.2	39.9	1.3	9.6	39.5	1.1
01ST-1758	ARS-Br	148.3 ab	51.6	26.5	12.5	30.9	0	9.2	33.5	1.0
Ab13449	ARS	147.3 ab	50.1	19.8	14.6	35.7	0	9.6	26.5	1.0
WA15279-00	Wash.St.	144.5 ab	52.1	27.3	12.7	30.3	0	8.9	41.8	1.1
Haxby	Mont.St.	140.3 ab	52.7	22.8	12.4	35.7	0	10.0	34.3	0.7
Stellar	Cargill	137.8 ab	49.0	22.5	12.2	37.5	0	9.9	35.5	2.2
WA10701-99	Wash.St.	137.4 ab	51.0	23.5	13.1	34.2	7.5	10.1	46.5	1.0
Mt 970116	Mont.St.	137.3 ab	52.6	25.5	13.1	37.8	0	10.1	44.3	0.8
CDC Copeland	Cargill	137.2 b	50.4	29.8	13.9	40.5	0	10.1	55.5	0.8
Comarque	ColoSeed	134.3 bc	52.8	31.3	14.0	31.2	0	9.7	41.8	0.8
Moravian 69	Coors	133.4 bc	49.9	32.5	13.1	30.0	0	9.2	35.5	1.7
C 84	Coors	133.0 bc	51.1	30.8	12.6	30.6	0	10.3	37.3	1.1
Farmington	Wash.St.	129.4 bc	51.3	31.8	13.5	30.9	0	10.3	29.8	1.0
AC Metcalfe	Cargill	128.1 bc	51.9	26.0	12.6	37.2	0	10.5	49.0	1.0
C 92	Coors	128.0 bc	48.7	31.0	13.4	28.5	0	10.4	40.0	0.9
ID1550 LP	ARS-Br	126.1 bc	46.7	23.8	14.0	37.2	0	9.6	37.5	2.0
Burton	ARS-Br	125.8 bc	52.2	29.8	12.6	34.5	0	9.3	43.3	0.9
AC Newdale	Cargill	124.3 bc	49.8	29.0	13.2	34.8	0	10.7	43.5	1.3
Robust	Cargill	123.2 bc	50.1	22.3	12.4	40.2	0	10.3	36.3	1.7
Tradition	Cargill	121.5 bc	49.4	23.3	12.2	38.1	0	10.5	40.0	1.3
CDC Kendall	Cargill	120.9 bc	51.2	29.8	12.6	37.5	0	10.9	39.8	1.4
Harrington	Cargill	120.3 bc	51.1	29.8	13.9	37.2	0	9.4	49.5	1.5
Rawson	Cargill	119.2 bc	48.5	23.3	15.2	36.0	2.5	11.3	49.3	0.8
Trial Average		136.7	51.2	27.3	13.0	34.6	0.91	9.9	39.4	1.45
LSD, 10%[6]		14.1	0.75	1.83	0.94	2.57	3.9	0.46	3.28	2.88
CV, %		8.9	1.26	5.70	6.14	6.31	363	3.91	7.05	170

[1] Trial conducted at the San Luis Valley Research Center, 0249 E Road 9 North, Center, CO.
[2] Yield based on 48 lbs/bu and 12% moisture.
[3] Yields followed by the same letter (Tukey's Test) are in the same statistical yield group.
[4] Days after June 1.
[5] Grain screenings: the percent that falls through 6/64 inch screen.
[6] Means must differ more than LSD or one variety is likely not superior.

Important Note: Crop growth was affected by a residual soil problem; this same area was affected when grain was grown here two years ago; variability was higher than last year. Seven plots in one corner of the trial were the most affected; plot yields were discarded.

(Malt Barley Info, Continued, next page)

Site Information:

Soil Type: Norte gravelly sandy loam **Irrigation:** center pivot irrigation = ET.

Previous Crop: potatoes **Herbicide:** Bronate at 1.6 pt/acre mostly missed plot area
Planted: April 17 **Harvest:** August 24
Fertilizer: Nitrogen; 80 #/ac dry preplant + 30 #/ac fertigation

Comments:

** Cargill Malt entered 6 unknown varieties in this trial; results are not shown**.**
** Grain yields were fairly good, ranging from 101- 167 bu/acre. Yields were lower and statistical precision was not quite as good as last year; indicated by the CV = 8.9%. LSD at 10% was 14.4 bu/acre.
** Plots were weedy as the chemigation started after passing the barley plot area.
** Color readings may be skewed by maturity; early maturing varieties stayed in the field longer after maturity. Data may be of some interest. Many rains, showers and heavy dew reduced color this year; it ranged from 26-60 and averaged only 39 compared to 68 last year. Three varieties were noted with a whiter color when working samples: Tradition, Rawson and ID1550.
** Heading dates were later because planting was later this year; heading varied from June 20 - July 3.
** Plant height varies from 28 - 41 inches, about the same as last year..
** Lodging was low considering the height of some entries; higher nitrogen rates would have increased plant lodging and impacted yield of some taller entries.
** Protein was low ranging from 9.1 - 11.3%. Higher protein was associated with lower yielding entries.
** Screening % was very low.

Variety Comments:

18 varieties made up the top yield group this year with a top yield almost as high as last year. The top yield (Ab11720 6-row) was 167 bu/acre and the average of all varieties was 137 bu/acre. Varieties that have yielded very well in both 2005 and 2006 include: Eslick, Mt 960101, 01ST1758, and Ab13449. Mt960101 has been named as Kraft, in honor of its intended use in microbreweries. Ab11720, so new it was harvested out of the greenhouse in Arizona prior to planting, produced the top yield.

Since Moravian 69 has shown to be prone to sprouting damage, it is interesting that C84 compares very well here. Yields are equal, C84 had better bushel weight, headed earlier by 2 days, lower grain moisture, slightly taller, and higher protein by 0.9%.

.

Table 8. Oat variety performance trial at Center[1] in 2006.
Merlin A. Dillon, Area Extension Agent, Agronomy, SLV Research Center.

Variety	Grain Yield [2]	Grain Moisture	Heading Date [4]	Plant Height	Forage Yield

	bu/ac [3]	lbs/bu	(June)	inches	T/acre
Maverick	155.9 a	17.0	26.3	44.7	4.4
Monida	150.8 ab	16.0	29.0	51.0	3.9
Ab11136	132.5 ab	19.6	38.0	47.7	-
Ab12770	131.6 ab	16.5	26.3	48.3	-
Ab10971	125.6 b	18.0	27.8	46.2	-
Monico	93.0 c	17.9	21.3	47.4	4.6
Ab8081	85.8 c	21.9	27.5	46.8	-
Test Average	**125.0**	**18.1**	**28.0**	**47.4**	**4.3**
LSD $_{10\%}$	**26.6**	**3.1**	**1.19**	**2.4**	**N S**
C.V. %	**10.2**	**14.0**	**3.5**	**4.2**	**17.8**

[1] Trial conducted at SLV Research Center, 0249 E Road 9North, Center, CO
[2] Tukey's Test; yields followed by the same letter are not statistically different.
[3] Yield based on 38 lbs/bu and 12% moisture.
[4] Date 50% of the plants headed; days after June 1.

Site Information:
Date Planted: April 6
Irrigation: center pivot
Herbicide: Bronate @ 1.6 pt/ac*
Previous Crop: Potatoes
Date Harvested: August
Seed Rate: 80 lbs/ac
Nitrogen: 50 lbs/acre preplant + 30 lb/ac sprinkler
* Plots were missed by this center pivot application.

Comments: Yields were not exceptionally high this year. The same soil problem affecting barley and wheat trials affected this one also. The variability in the trial was high resulting in a high LSD and CV. Variety yield differences were statistically significant. Four varieties made up the top yield group: Maverick, Monida, and experimentals Ab11136 & Ab12170. The poor showing for Monico cannot be explained; it produced low yield in each of the four replications.

Brassica/Camelina Variety Trial Cooperator
In Cooperation with University of Nebraska Panhandle Research and Extension Center

Canola Variety Performance Trial, 2006. Randomized, replicated On-Farm trial located on Worley Seed Farm, 6 N on Rio Grande County Road 5 E.
Merlin Dillon, Area Extension Agent, Agronomy, San Luis Valley Research Center, Center, CO.

Hail Reduced Oilseed Yields by about 50%!!!

Variety		Grain Yield [1]	Bushel Weight	Bloom Date [2]	Plant Lodging	Oil Content
		lbs/ac	lbs/bu	(July)	%	%
DKL 34-55	9	1652	50.4	5.8	18.8	44.8
905 RR Hyclass	5	1618	51.8	10.5	2.5	46.6
SW Patriot RR	8	1610	50.3	15.5	16.3	47.5
SW Titan RR	6	1534	50.5	11.8	33.8	47.2
431 RR Hyclass	2	1500	51.1	9.0	0.0	46.2
DKL 52-10	11	1440	50.3	12.0	1.3	47.5
Hyola 357 Mag	1	1403	51.5	15.5	11.3	48.2
SW Marksman	7	1354	50.0	8.5	17.5	47.9
DKL 38-25	10	1331	51.0	11.0	5.0	46.7
712 RR Hyclass	4	1265	49.5	11.8	16.3	46.7
767 SWRR Hyclass	3	1154	50.6	13.5	11.3	46.2
Trial Average		**1442**	**50.5**	**11.3**	**12.2**	**46.9**
LSD, 10%		**243**	**0.6**	**1.3**	**18.1**	**0.69**
CV %		**14.0**	**1.0**	**9.7**	**124**	**1.23**

[1] Yield corrected for moisture; dry matter per acre.
[2] Days after July 1.

Site Information:
Trial Location: Rio Grande County Roads 6N & 4E.
Previous Crop: Potato
Date Planted: May 12
Date Harvested: September 25
Irrigation: center pivot
Seed Rate: 7 lbs/acre
Herbicide: Roundup preplant
Row Spacing: 8-inch
Nitrogen: _____ lbs/acre
Plot Size: 6 ft. x 25ft; 9 rows planted 8 inches apart
Hail: Hailstorm about Labor Day knocked pods to the ground before harvest.

Comments: Excellent growing conditions produced healthy, tall plants and good yield potential. The growers field in which this trial was planted was not hail damaged and produced about 2900 lbs/acre. Hail shortly after Labor Day reduced plot yields here about 50%.