

Title: North Central Montana Off-Station Spring Durum Variety Performance Evaluations

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Objectives:

Diverse cropping environments exist within the five-county area most closely served by Northern Agricultural Research Center. Winter wheat, spring wheat, barley, durum and oat production together in the five counties (Blaine, Chouteau, Hill, Liberty and Phillips) represents 31 percent of the 2008-2012 statewide totals (41 percent for winter wheat and 25 percent for spring wheat). Producers are keenly interested in variety performance data generated under local conditions. It is our objective, within budget and other resource limitations, to evaluate small grain variety performance, over time, under conditions representative of specific areas of northern Montana, yet differing from that of the Research Center. Growers in north central Montana are provided reliable, unbiased, up-to-date information to make comparisons among improved spring durum varieties. This report provides producers in north central Montana the information necessary to select varieties best suited for their specific area and growing conditions.

Methods:

Standard off-station variety performance trials were conducted in 2013 on chemical fallow at two locations in two northern Montana counties.

Dryland Spring Durum Trials:

- | | | |
|---|--------------|------------|
| 1. Cederberg Farm, Blaine County | (3NE Turner) | 13-36N-25E |
| 2. Flansaas/Lumsden Farm, Phillips County | (1SW Loring) | 24-35N-29E |

Both trials consisted of 14 entries and were seeded in replicated, 3-row, 22-foot plots on a 12-inch row spacing, utilizing a self-propelled cone seeder with Atom Jet paired row openers. All rows of each plot were trimmed to a harvest length of 16.5 feet with a three-point rototiller. Plant height was measured and percent sawfly cutting was estimated for each plot immediately prior to harvest. A 'Wintersteiger Classic' plot combine, funded in part by Montana Wheat and Barley Committee, was used to harvest each 3-row plot. Seed was cleaned prior to measuring plot weight, test weight and moisture content. Protein content was determined using a Foss Infratec 1241 near infrared analyzer. Other variables specific to each individual trial are listed with the current year data tables.

Results:

Cropping environments in 2013 started out marginal, but with timely precipitation, ended up very good across north central Montana. The Turner and Loring locations went into the fall and started out early spring dryer than normal but then received large amounts of precipitation resulting in very good to excellent spring cereal seed yields.

At Havre, annual growing season precipitation (9/1/12 through 8/31/13) was 18.46 inches, 54 percent higher than the average for all years since 1916. April 1 through July 31 precipitation was 13.28 inches or 194 percent of the 98-year average. Heat units expressed as "Growing Degree Days" (GDD, base 50) from May through July totaled 1221, 95 percent of the average for the last 63 years (1951-2013). The last spring frost was earlier and first fall frost of 2013 was later than the 98-year average resulting in 150 frost-free days. The minimum winter temperature was -25 degrees F on December 25. Overall, the growing season was slightly cooler than normal. The April through July growing season saw an average daily temperature of 57.6 degrees F, only 1 degree below normal. July and August average temperatures were slightly higher than normal with the high for 2013 recorded on August 20 at 94 degrees F. There were 16 days with temperatures 90 degrees F or above, with no days over 100 degrees F.

Following timely rainfall during spring and early summer, spring durum yields at Turner averaged 52 bu/ac, which is 30 bu/ac more than in 2012. Experimental line 'MT 07707' was the highest yielding entry at 60.6 bu/ac (Table 1).

Publically available varieties 'Carpio', 'Strongfield' and 'Tioga' produced yields statistically equal to that of MT 07707. Sawfly cutting in the small plot situation ranged was minimal in 2013, averaging only 2 percent cutting across all lines tested. Stand percent, plant height, yield, test weight, moisture, protein and sawfly cutting data, for the 2013 Turner dryland spring durum trial, is summarized in Table 1.

Comparable averages are calculated using a standard long-term check variety when not all entries are present in a specific trial for all years. Variety means are adjusted by multiplying the actual check mean by the ratio of the individual variety mean compared to the check mean for the same years as tested. All varieties are then directly comparable to each other when in the same nursery. A minimum of 3 years of data is necessary to be included in comparable average calculation. Ten-year comparable averages for spring durum seed yield and test weight at Turner are summarized in Table 2, while ten-year comparable averages for sawfly cutting are summarized in Table 3.

Loring spring durum yields averaged 46.9 bu/ac with 'Alzada' producing the highest yield at 52.7 bu/ac (Table 4). 'Alkabo' and Carpio along with other two experimental lines also produced yields statistically equal to that of Alzada. Sawfly cutting was minimal in the durum at Loring, ranging from 0 to 8.3 percent. Stand percent, plant height, yield, moisture, test weight, protein and sawfly cutting data, for the 2013 Loring dryland spring durum trial, are summarized in Table 4. Three-year comparable averages for spring durum seed yield and test weight at Loring are summarized in Table 5, while three-year comparable averages for sawfly cutting are summarized in Table 6.

Summary:

This work has been strongly supported by producers near each of the locations, and by the Northern Agricultural Research Center Advisory Council. With budget and other resources allowing, it is planned to continue off-station cereal variety investigations in the five-county area. The Loring location is entering its nineteenth year, and the cooperator and area producer interest and support has been outstanding. The Turner location is only 32 miles from the Loring site, but growing conditions there are quite different. Cooperator and producer support in the Big Flat area have been outstanding through the years with 2013 marking 26 years at the present Turner site.

Funding Summary:

Expenditure information for grant index 4W4356 is to be provided by Montana State University, Office of Sponsored Programs. There is no other grant support for this project.

MWBC FY2015 Grant Submission Plans:

It is planned to submit this project for funding consideration in the next fiscal year.

TABLE 1. Dryland Fallow Spring Durum Cultivar Evaluation Nursery Grown Off-Station at the Leon Cederberg Farm, Turner. Northern Agricultural Research Center. Havre, Montana. 2013. (Exp# 13-9851-DUR)

ENTRY	CULTIVAR or SELECTION	STAND %	PLNT HT Inches	1/ YIELD Bu/Ac	TEST WT Lbs/Bu	MOISTURE %	2/ PROTEIN %	3/ SAWFLY %
2	Alkabo	98.3	27.4	48.9	64.9	10.6	14.9	7.0
7	Alzada	97.6	25.4	47.4	63.5	10.6	15.1	2.3
3	Carpio	98.6	29.6	56.1	64.0	10.8	14.3	3.7
6	Divide	99.3	29.5	50.5	64.3	10.5	15.1	0.7
5	Grenora	98.0	25.9	53.2	64.2	10.4	15.2	3.7
1	Mountrail	98.0	28.9	49.5	63.5	10.3	15.5	3.7
12	MT05157	97.4	24.0	50.2	66.1	10.1	14.5	0.0
13	MT06578	99.3	25.1	53.0	64.3	10.6	14.3	0.7
11	MT06584	98.0	24.4	52.9	64.6	10.5	14.0	0.0
14	MT07707	98.3	23.5	60.6	63.4	10.6	14.0	0.7
9	Normanno	97.3	24.8	50.9	63.1	9.9	14.9	0.7
10	Silver	98.0	24.4	45.7	63.9	10.1	16.1	2.3
8	Strongfield	99.3	27.3	54.3	64.1	10.6	15.8	0.3
4	Tioga	99.7	31.0	54.1	64.7	10.5	15.1	2.0
EXPERIMENTAL MEANS		98.4	26.5	52.0	64.2	10.4	14.9	2.0
LSD (0.05)		2.9	2.3	6.6	0.6	0.8	0.5	-
C.V.%		1.7	5.1	7.5	0.6	4.4	2.1	-
P-VALUE (Varieties)		0.8198	<.0001	0.0113	<.0001	0.5315	<.0001	-

1/ Volumetric yields are based on plot weights adjusted to uniform 12 percent grain moisture and 60 lbs/bu as the standard test weight for durum.

2/ Protein values are adjusted to 12 percent grain moisture.

3/ Sawfly rating is reported as the percentage of cut stems.

Bold indicates highest value within a column.

Bold indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05).

Management Information (13-9851-SW)

Seeding Date: May 8, 2013

Harvest Date: September 5, 2013

Fertility: 100-20-10 side banded

System: no till

Herbicide: none

Insecticide: none

Previous Crop: Chemical Fallow - Spring Wheat

Precipitation: not available

TABLE 2. Ten-Year Yield and Test Weight Summary on Selected Entries from Dryland Fallow Spring Durum Variety Nurseries Grown Off-Station at the Leon Cederberg Farm, Turner. Northern Agricultural Research Center. Havre, Montana. 2004-2013. (Exp# 9851-DUR)

2/ VARIETY or SELECTION		No. of YEARS TESTED 3/	1/ YIELD (Bushels Per Acre)					AVE. for YEARS TESTED 3/	% of CHECK YIELD 4/	10-YR COMP. AVE. YIELD 5/	TEST WEIGHT (Pounds Per Bushel)					AVE. for YEARS TESTED 3/	% of CHECK TEST WT 4/	10-YR COMP. AVE. TEST WT 5/
			2009	2010	2011	2012	2013				2009	2010	2011	2012	2013			
STRONGFIELD	STRONGFIELD (+)	8	36.5	27.0	25.5	24.1	54.3	29.0	112.7	33.1	59.9	56.0	60.9	60.6	64.1	59.0	100.2	59.3
GRENORA	GRENORA (+)	8	35.4	24.9	26.6	22.4	53.2	27.8	108.0	31.7	60.6	55.6	61.3	60.1	64.2	58.9	100.0	59.1
YU894-75	ALZADA (P+)	9	29.1	28.1	24.4	19.5	47.4	28.6	105.8	31.0	60.6	56.2	61.3	60.8	63.5	59.1	100.5	59.4
NORMANNO	NORMANNO	5	40.9	33.1	8.7	24.6	50.9	31.6	105.6	31.0	59.8	55.8	59.8	59.7	63.1	59.6	99.1	58.6
MT03012	Silver (++) (MSU, 2012)	7	33.0	26.2	24.8	18.7	45.7	26.4	102.3	30.0	60.1	55.4	61.0	60.7	63.9	58.8	99.9	59.1
D901313	MOUNTRAIL (+)	10	35.4	15.4	26.8	22.6	49.5	29.4	100.0	29.4	60.2	56.0	61.2	60.1	63.5	59.1	100.0	59.1
TIOGA	TIOGA	4		9.4	26.7	21.9	54.1	28.0	98.1	28.8		52.9	62.2	60.4	64.7	60.0	99.8	59.0
ALKABO	ALKABO (+)	8	31.9	17.3	23.9	24.3	48.9	25.2	98.0	28.8	60.8	57.0	62.7	60.9	64.9	60.0	101.8	60.2
PIERCE	PIERCE (+)	9	32.9	15.5	26.1	20.3		25.7	94.9	27.9	60.9	56.7	62.1	60.8		59.5	101.4	60.0
DIVIDE	DIVIDE	8	29.9	14.6	25.2	20.4	50.5	24.5	94.9	27.9	60.0	55.2	61.6	61.0	64.3	59.2	100.5	59.5
DILSE	DILSE (+)	5	31.2					29.5	93.9	27.6	60.4					59.2	100.0	59.1
MEANS (For Entries Listed)			33.6	21.1	23.9	21.9	50.5			29.7	60.3	55.7	61.4	60.5	64.0			59.3
6/ Growing Season Precipitation (in.)			6.0	10.3	8.3	8.3	n/a	8.0										
Soil PAW (in.) to SD @ Planting			7.8	9.0	7.9	9.4	7.8	8.0										
Total Plant Available Water (in.)			13.8	19.2	16.2	9.4	n/a	15.1										
Soil NO3 (lbs.) to SD at Planting			94	162	51	12	11	73										
SD (Sampling Depth in Inches)			48	48	48	48	48	48										
Fertilizer Applied																		
			(# N)	70	70	70	70	100	73									
			(# P ₂ O ₅)	40	40	40	40	20	38									
			(# K ₂ O)	25	25	25	25	10	24									

Check Variety is Mountrail.

1/ See MCES Bulletin 1093 or the Plant Sciences & Plant Pathology website at <http://plantsciences.montana.edu/> for evaluation of other important variety performance characteristics to include protein, quality, disease resistance, etc. before making cultivar selection decisions.

2/ P = Private Variety, + = Protected Variety, ++ = PVP Title 5 or Title 5 Pending.

3/ Only the most recent 5 years are shown, but summary calculations include all years noted.

4/ Percent of Mountrail yield or test weight for the same data years as those in which a given entry was tested.

5/ 10-Yr Comparable Average = (x/y) * z where x = average yield or test weight of a given entry for years tested, y = average yield or test weight for Mountrail for the same years, and z = 10-Yr average yield or test weight for the check variety Mountrail.

6/ Seeding to 14 days prior to harvest maturity.

TABLE 3. Ten-Year Sawfly Summary on Selected Entries from Dryland Fallow Spring Durum Variety Nurseries Grown Off-Station at the Leon Cederberg Farm, Turner. Northern Agricultural Research Center. Havre, Montana. 2004-2013. (Exp# 9851-DUR)

2/ VARIETY or SELECTION		No. of YEARS TESTED	1/ SAWFLY RATING (% of cut and lodged stems)										AVE. for YEARS TESTED	% of CHECK SWFLY 3/	10-YR COMP. AVE. SWFLY 4/
			2004	2005	2006	2007	2008	2009	2010	2011	2012	2013			
NORMANNO	NORMANNO	5						0.7	2.3	1.0	1.0	0.7	1.1	6.2	1.4
STRONGFLD	STRONGFIELD (+)	8			16.7	10.0	2.3	10.0	13.3	10.0	15.0	0.3	9.7	44.3	10.0
YU894-75	ALZADA (P+)	9		10.0	20.0	6.7	2.3	8.3	8.3	15.0	16.7	2.3	10.0	46.7	10.5
MT03012	Silver (MSU, 2012)	8			11.7	11.7	2.3	5.7	18.3	18.3	18.3	2.3	11.1	50.6	11.4
DIVIDE	DIVIDE	8			26.7	13.3	3.7	5.0	18.3	16.7	13.3	0.7	12.2	55.7	12.5
TIOGA	TIOGA	4							21.7	23.3	26.7	2.0	18.4	88.0	19.8
PIERCE	PIERCE (+)	9	25.0	20.0	43.3	21.7	8.3	11.7	23.3	33.3	23.3		23.3	95.5	21.5
D901313	MOUNTRAIL (+)	10	31.7	16.7	48.3	25.0	10.0	8.3	21.7	31.7	26.7	3.7	22.4	100.0	22.4
DILSE	DILSE (+)	5	30.0	15.0	50.0		8.3	15.0					23.7	102.9	23.2
ALKABO	ALKABO (+)	8			48.3	25.0	15.0	8.7	21.7	46.7	20.0	7.0	24.0	109.7	24.7
GRENORA	GRENORA (+)	8			50.0	33.3	11.7	15.0	25.0	38.3	21.7	3.7	24.8	113.3	25.5
MEANS (For Entries Listed)			28.9	15.4	35.0	18.3	7.1	8.8	17.4	23.4	18.3	2.5			16.6
5/ Grow ing Season Precipitation (in.)			13.7	9.7	2.5	7.0	6.6	6.0	10.3	8.3	8.3	n/a	8.0		
Soil PAW (in.) to SD @ Planting			7.4	8.0	8.8	5.8	8.1	7.8	9.0	7.9	9.4	7.8	8.0		
Total Plant Available Water (in.)			21.1	17.7	11.3	12.8	14.6	13.8	19.2	16.2	9.4	n/a	15.1		
Soil NO3 (lbs.) to SD at Planting			104	84	64	81	71	94	162	51	12	11	73		
SD (Sampling Depth in Inches)			48	48	48	48	48	48	48	48	48	48	48		
Fertilizer Applied															
			(# N)	70	70	70	70	70	70	70	70	100	73		
			(# P ₂ O ₅)	40	40	40	40	40	40	40	40	20	38		
			(# K ₂ O)	25	25	25	25	25	25	25	25	10	24		

Long-term check variety is Mountrail.

1/ See MCES Bulletin 1093 or the Plant Sciences & Plant Pathology website at <http://plantsciences.montana.edu/> for evaluation of other important variety performance characteristics to include protein, quality, disease resistance, etc. before making cultivar selection decisions.

2/ P = Private Variety, + = Protected Variety, ++ = PVP Title 5 or Title 5 Pending.

3/ Percent of Mountrail cut for the same data years as those in which a given entry was tested.

4/ 10-Yr Comparable Average = (x/y) * z where x = average saw fly rating of a given entry for years tested, y = average saw fly rating for Mountrail for the same years, and z = 10-Yr average saw fly rating for the check variety Mountrail.

5/ Seeding to 14 days prior to harvest maturity.

TABLE 4. Dryland Fallow Spring Durum Cultivar Evaluation Nursery Grown Off-Station at the Flansaas-Lumsden Farm, Loring. Northern Agricultural Research Center. Havre, Montana. 2013. (Exp# 13-9855-DUR)

ENTRY	CULTIVAR or SELECTION	STAND %	PLNT HT Inches	1/ YIELD Bu/Ac	TEST WT Lbs/Bu	MOISTURE %	2/ PROTEIN %	3/ SAWFLY %
2	Alkabo	97.5	30.7	50.0	62.4	9.4	15.5	8.3
7	Alzada	99.4	27.1	52.7	60.7	9.6	16.1	1.0
3	Carpio	98.1	31.2	47.8	62.1	9.3	15.9	2.3
6	Divide	97.8	32.1	42.5	62.0	9.3	16.7	5.0
5	Grenora	99.4	28.9	43.4	60.5	9.6	16.6	6.7
1	Mountrail	98.8	29.9	44.9	61.2	9.3	16.1	7.0
12	MT05157	98.8	24.9	47.0	64.5	9.4	15.4	0.0
13	MT06578	99.1	24.3	48.2	60.0	9.5	16.5	0.3
11	MT06584	100.0	24.4	48.3	59.4	9.5	16.6	0.7
14	MT07707	98.5	25.1	50.3	60.1	9.3	15.3	0.0
9	Normanno	97.5	23.3	45.3	59.6	9.5	16.5	0.3
10	Silver	97.8	26.6	45.2	61.6	9.7	16.6	3.7
8	Strongfield	99.4	30.5	44.4	62.0	9.3	16.4	0.7
4	Tioga	98.5	33.9	46.2	61.9	9.3	16.5	8.3
EXPERIMENTAL MEANS		98.6	28.1	46.9	61.3	9.4	16.2	3.2
LSD (0.05)		2.2	3.3	4.9	1.5	0.7	0.8	-
C.V.%		1.3	6.9	6.2	1.4	4.4	3.1	-
P-VALUE (Varieties)		0.4501	<.0001	0.0103	<.0001	0.9698	0.0130	-

1/ Volumetric yields are based on plot weights adjusted to uniform 12 percent grain moisture and 60 lbs/bu as the standard test weight for durum.

2/ Protein values are adjusted to 12 percent grain moisture.

3/ Sawfly rating is reported as the percentage of cut stems.

Bold indicates highest value within a column.

Bold indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05).

Management Information (13-9855-SW)

Seeding Date: May 8, 2013

Harvest Date: September 4, 2013

Fertility: 100-20-10 side banded

System: no till

Herbicide: Axial, 16.4 oz/ac; Brox-M, 16 oz/ac

Insecticide: none

Previous Crop: Chemical Fallow - Spring Wheat

Precipitation: 9.03"

TABLE 5. Three-Year Yield and Test Weight Summary on Selected Entries from Dryland Fallow Spring Durum Variety Nurseries Grown Off-Station at the Flansaas/Lumsden Farm, Loring. Northern Agricultural Research Center. Havre, Montana. 2011-2013. (Exp# 9855-DUR)

2/ VARIETY or SELECTION		No. of YEARS TESTED	1/ YIELD (Bushels Per Acre)					AVE. for YEARS TESTED	% of CHECK YIELD 3/	3-YR COMP. AVE. YIELD 4/	TEST WEIGHT (Pounds Per Bushel)					AVE. for YEARS TESTED	% of CHECK TEST WT 3/	3-YR COMP. AVE. TEST WT 4/
			2011	2012	2013	2014	2015				2011	2012	2013	2014	2015			
ALKABO	ALKABO (+)	3	29.7	26.9	50.0			35.5	108.8	35.5	62.5	60.7	62.4			61.9	102.4	61.9
ALZADA	ALZADA (P+)	3	28.5	24.0	52.7			35.0	107.4	35.0	61.4	60.5	60.7			60.8	100.7	60.8
TIOGA	TIOGA	3	29.9	26.2	46.2			34.1	104.5	34.1	62.0	60.8	61.9			61.6	101.9	61.6
SILVER	SILVER (P+)	3	31.0	25.8	45.2			34.0	104.2	34.0	60.1	60.4	61.6			60.7	100.5	60.7
STRONGFIELD	STRONGFIELD (+)	3	30.6	24.2	44.4			33.0	101.2	33.0	61.5	60.3	62.0			61.3	101.4	61.3
MOUNTRAIL	MOUNTRAIL (+)	3	28.4	24.7	44.9			32.6	100.0	32.6	60.9	59.1	61.2			60.4	100.0	60.4
GRENORA	GRENORA (+)	3	27.6	25.7	43.4			32.2	98.7	32.2	61.3	59.5	60.5			60.4	100.0	60.4
DIVIDE	DIVIDE	3	27.9	24.1	42.5			31.5	96.5	31.5	61.7	60.9	62.0			61.5	101.8	61.5
NORMANNO	NORMANNO	3	11.5	26.7	45.3			27.8	85.3	27.8	60.3	59.3	59.6			59.7	98.8	59.7
MEANS (For Entries Listed)			27.2	25.4	46.1					32.9	61.3	60.2	61.3					60.9
5/ Growing Season Precipitation (in.)			n/a	n/a	9.0			9.0										
Soil PAW (in.) to SD @ Planting			7.06	8.8	8.8			8.2										
Total Plant Available Water (in.)			2.6	8.8	5.8			5.8										
Soil NO3 (lbs.) to SD at Planting			50.0	34.0	34.0			39										
SD (Sampling Depth in Inches)			48.0	48.0	48.0			48										
Fertilizer Applied																		
			(# N)	70	70	100		80										
			(# P ₂ O ₅)	40	40	20		33										
			(# K ₂ O)	25	25	10		20										

Check Variety is Mountrail.

1/ See MCES Bulletin 1093 or the Plant Sciences & Plant Pathology website at <http://plantsciences.montana.edu/> for evaluation of other important variety performance characteristics to include protein, quality, disease resistance, etc. before making cultivar selection decisions.

2/ P = Private Variety, + = Protected Variety, ++ = PVP Title 5 or Title 5 Pending.

3/ Percent of Mountrail saw fly rating for the same data years as those in which a given entry was tested.

4/ 3-Yr Comparable Average = (x/y) * z where x = average saw fly rating of a given entry for years tested, y = saw fly rating for Mountrail for the same years, and z = 3-Yr saw fly rating for the check variety Mountrail.

5/ Seeding to 14 days prior to harvest maturity.

TABLE 6. Three-Year Sawfly Summary on Selected Entries from Dryland Fallow Spring Durum Variety Nurseries Grown Off-Station at the Flansaas-Lumsden Farm, Loring, Northern Agricultural Research Center. Havre, Montana. 2011-2013. (Exp# 9855-DUR)

2/ VARIETY or SELECTION		No. of YEARS TESTED 3/	1/ SAWFLY RATING (% of cut and lodged stems)										AVE. for YEARS TESTED	% of CHECK SWFLY 3/	3-YR COMP. AVE SWFLY 4/
			2011	2012	2013	2014	2015	2016	2017	2018	2019	2020			
NORMANNO	NORMANNO	3	0.3	1.0	0.3								0.5	4.2	0.5
STRONGFLD	STRONGFIELD (+)	3	8.3	3.7	0.7								4.2	32.7	4.2
YU894-75	ALZADA (P+)	3	10.0	5.0	1.0								5.3	41.4	5.3
DIVIDE	DIVIDE	3	13.3	3.7	5.0								7.3	56.8	7.3
MT03012	SILVER (P+)	3	15.0	3.7	3.7								7.4	57.8	7.4
GRENORA	GRENORA (+)	3	20.0	8.3	6.7								11.7	90.5	11.7
D901313	MOUNTRAIL (+)	3	20.0	11.7	7.0								12.9	100.0	12.9
ALKABO	ALKABO (+)	3	23.3	8.3	8.3								13.3	103.4	13.3
TIOGA	TIOGA	3	25.0	10.0	8.3								14.4	112.1	14.4
MEANS (For Entries Listed)			15.0	6.1	4.6										8.6
5/ Growing Season Precipitation (in.)			n/a	n/a	9.0								9.0		
Soil PAW (in.) to SD @ Planting			7.1	8.8	8.8								8.2		
Total Plant Available Water (in.)			2.6	8.8	5.8								5.8		
Soil NO3 (lbs.) to SD at Planting			50	34	34								39		
SD (Sampling Depth in Inches)			48	48	48								48		
Fertilizer Applied															
			(# N)	70	70	100							80		
			(# P ₂ O ₅)	40	40	20							33		
			(# K ₂ O)	25	25	10							20		

Check variety is Mountrail.

1/ See MCES Bulletin 1093 or the Plant Sciences & Plant Pathology website at <http://plantsciences.montana.edu/> for evaluation of other important variety performance characteristics to include protein, quality, disease resistance, etc. before making cultivar selection decisions.

2/ P = Private Variety, + = Protected Variety, ++ = PVP Title 5 or Title 5 Pending.

3/ Percent of Mountrail saw fly rating for the same data years as those in which a given entry was tested.

4/ 3-Yr Comparable Average = (x/y) * z where x = average saw fly rating of a given entry for years tested, y = saw fly rating for Mountrail for the same years, and z = 3-Yr saw fly rating for the check variety Mountrail.

5/ Seeding to 14 days prior to harvest maturity.