

**Title:** Northcentral Montana Off-Station Spring Durum Variety Performance Evaluations

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**Cooperators:** Max Cederberg, Landowner, Turner  
Pete Lumsden & John Flansaas, Landowners, Loring  
Kurt Kammerzell, Landowner, Chester

### **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 over 28 percent of the 2016-2020 statewide cereal production totals (43 percent for winter wheat, 28 percent for spring wheat and 21 percent for durum). 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 are provided reliable, unbiased, up-to-date information to make comparisons among improved durum varieties. This report provides producers in northcentral Montana the information necessary to select varieties best suited for their specific area and growing conditions.

### **Methods:**

Standard off-station durum variety performance trials were conducted on chemical fallow or minimal tillage during 2021 in three northern Montana counties.

Dryland Spring Durum Trials:

- |   |               |
|---|---------------|
| 1. Cederberg Farm, Blaine County          | S13-T36N-R25E |
| 2. Flansaas/Lumsden Farm, Phillips County | S24-T35N-R29E |
| 3. Kammerzell Farm, Liberty County        | S12-T31N-R5E  |

All three durum trials consisted of 15 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 approximately 17 feet with a three-point rototiller. Plant height was measured from the soil surface to the top of the head, excluding awns, and percent sawfly cutting was visually estimated for each plot immediately prior to harvest. A 'Wintersteiger' small 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. Protein, test weight and moisture content were determined using a Foss Infratec 1241 near infrared analyzer. Falling number was determined using a Perten FN1700 according to the FGIS Directive 9180.38. Other variables specific to each individual trial are listed with the current year data tables.

Please note that research trial seed yield results recorded under wheat stem sawfly pressure are likely much higher than a producer should expect. Small plot variety trials are managed to assess maximum yield potential and are harvested in such a way that all stems and heads are picked up by the combine, regardless of lodging or cutting due to sawfly. Pickup guards coupled with an extremely slow ground speed and exceptionally low cutting height help researchers collect all heads in order to assess seed yield potential. If you are a producer in a wheat stem sawfly environment, although hollow stemmed varieties may be high yielding in research trials in your area, we strongly recommend against growing those hollow stemmed varieties. Please be aware that if you seed hollow stemmed varieties with sawfly present, you are only creating a breeding ground for future generations of sawfly in your area and not helping combat the pest population.

**Results:**

Durum seed yields at Turner averaged just under 11 bu/ac (Table 1). 'ND Riveland' was the highest yielding entry at just over 15 bu/ac. Carpio (14.0 bu/ac) and 'ND Grano' (13.6 bu/ac) were the only other entries to produce yields statistically equal to that of ND Riveland. Test weights averaged just over 57 lb/bu, with the breeding line MTD18313 being the heaviest at 60 lb/bu. Protein averaged 16.2 percent and sawfly cutting was minimal. Plant height, yield, test weight, protein, falling number and sawfly data for the 2021 Turner dryland durum trial are summarized in Table 1.

Comparable averages are calculated using a standard 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 three years of data is necessary to be included in the comparable average calculation. Nine-year comparable averages (2012-2021) for durum seed yield and test weight at Turner are summarized in Table 2, while nine-year comparable averages for protein content and wheat stem sawfly cutting are summarized in Table 3.

Loring spring durum yields averaged just under 26 bu/ac (Table 4), doubling the yield achieved at Turner. Montana State University breeding line MTD18348 was the highest yielding entry at just over 29 bu/ac with ND-Grano and breeding line MTD18313 yielding the same, statistically. 'CDC Vivid' produced the highest protein at 16.9 percent, while the trial average was 16 percent. Sawfly cutting was nearly nonexistent in the durum trial at Loring. Plant height, yield, moisture, test weight, protein, falling number and sawfly cutting data, for the 2021 Loring dryland spring durum trial, are summarized in Table 4. Nine-year comparable averages for spring durum seed yield and test weight at Loring are summarized in Table 5, while nine-year comparable averages for protein content and wheat stem sawfly cutting are summarized in Table 6.

Durum seed yields at Chester averaged just under 24 bu/ac, while test weights averaged just over 56 lb/bu (Table 7). Montana State University breeding line MTD18313 was the highest yielding entry at over 28 bu/ac, with no other entry matching it statistically. Sawfly cutting in the small plot scenario was minimal in 2021, averaging just over three percent. Falling numbers are extremely low at Chester in 2021, for all entries, due to a late harvest occurring in early September, following a substantial rain event in mid-August. Plant height, yield, test weight, protein, falling number and sawfly cutting data for the 2021 Chester dryland spring durum trial are summarized in Table 7. Eight-year comparable averages for spring durum seed yield and test weight at Chester are summarized in Table 8, while eight-year comparable averages for protein content and sawfly cutting are summarized in Table 9.

**Summary:**

Cropping environments for 2021 started out cooler and drier than average quickly turning to warmer and drier than normal, with many spring seeded crops showing drought stress by late May to early June. Timely rainfall was spotty during the mid- to latter part of May, all the way through harvest, creating significant negative impacts on regional seed yields and test weights. Turner received below average rainfall throughout the season, while the Loring site received several timely and significant precipitation events that led to nearly double the seed yield of Turner. The Chester area also started the season with adequate soil moisture, but fell into the same hot, dry weather pattern of most of northcentral Montana. The Turner and Chester sites were all seeded into chemical fallow and the Loring location was seeded into chemical fallow ground that had been minimally tilled to eliminate potential weed issues.

This work has been strongly supported by producers near each of the off-station 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 twenty-seventh 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 are quite different. Cooperator and producer support in the Big Flat area has been outstanding through the years with 2021 marking 38 years at the present Turner site. The Chester location was reestablished in 2014 following a prolonged absence of uniform off-station spring cereal testing in Liberty County.

**Recognition:**

This research would not have been possible without the assistance of the following seasonal employees: Peyton Brown, Savannah Dawson, Teresa Miller, Kristin Obresley, Treygan Olson, Rhoda Peterson and Ivy Thomas.

**TABLE 1. Dryland Fallow Spring Durum Cultivar Evaluation Nursery Grown Off-Station at the Max Cederberg Farm, Turner. Northern Agricultural Research Center. Havre, Montana. 2021. (Exp# 21-9851-DUR)**

ID	SOURCE	PLNT HT Inches	1/	TEST WT Lbs/Bu	2/	3/	4/
			YIELD Bu/Ac		PROTEIN %	FN Seconds	SAWFLY %
Carpio	NDSU	17.5	<b>14.0</b>	57.3	15.8	348	1.0
CDC-Vivid	CDC	17.0	12.5	58.6	16.4	342	2.3
Divide	NDSU	18.1	11.3	57.1	16.1	336	1.0
Grenora	NDSU	16.7	6.2	55.7	16.0	244	0.7
Joppa	NDSU	18.3	12.0	58.3	15.9	287	2.3
Lustre	MSU	18.2	9.9	56.0	16.8	373	2.3
Mountrail	NDSU	13.1	6.7	56.1	<b>17.4</b>	295	0.3
ND-Grano	NDSU	16.6	<b>13.6</b>	<b>59.1</b>	16.0	347	0.7
ND-Riveland	NDSU	<b>20.9</b>	<b>15.2</b>	58.6	15.5	<b>399</b>	2.3
Tioga	NDSU	18.4	12.3	58.8	16.1	297	2.3
MTD-16001	MSU	<b>19.1</b>	6.8	55.7	16.2	293	1.0
MTD16002	MSU	17.0	9.4	56.9	16.6	319	0.7
MTD18313	MSU	14.4	8.7	<b>60.0</b>	<b>17.1</b>	352	0.7
MTD18348	MSU	<b>21.2</b>	13.0	57.5	16.1	<b>375</b>	1.0
EXPERIMENTAL MEANS		17.5	10.7	57.5	16.2	322.1	1.3
LSD (0.05)		2.7	1.7	1.2	0.7	25.4	2.2
C.V.%		9.3	9.4	1.2	2.4	4.7	102.1
P-VALUE (Varieties)		0.0001	<.0001	<.0001	<.0001	<.0001	0.4230

1/ Volumetric yields are based on plot weights adjusted to uniform 13 percent grain moisture and 60 lbs/bu as the standard test weight for durum.

2/ Protein values are adjusted to 13 percent grain moisture.

3/ FN is the falling number value reported in seconds adjusted to 14 percent flour moisture.

4/ 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 (21-9851-DUR)

Seeding Date: May 5, 2021  
 Harvest Date: August 17, 2021  
 Fertility: 100-20-10-10 side banded  
 System: No Till  
 Herbicide: Vendetta (16oz/ac), Affinity (0.4oz/ac), Discover (12.8oz/ac)  
 Insecticide: none  
 Previous Crop: Chemical Fallow - Durum  
 Precipitation: 3.48" seeding to harvest maturity

**TABLE 2. Nine-Year Yield and Test Weight Summary on Selected Entries from Dryland Fallow Spring Durum Variety Nurseries Grown Off-Station at the Max Cederberg Farm, Turner. Northern Agricultural Research Center. Havre, Montana. 2012-2021. (Exp# 9851-DUR)**

2/ VARIETY or SELECTION	No. of YEARS TESTED 3/	1/ YIELD (Bushels Per Acre)					TEST WEIGHT (Pounds Per Bushel)					9-YR COMP. AVE. YIELD 5/	9-YR COMP. AVE. TEST WT 5/					
		2017	2018	2019	2020	2021	AVE. YEARS TESTED 3/	% of CHECK YIELD 4/	2017	2018	2019			2020	2021	AVE. YEARS TESTED 3/	% of CHECK TEST WT 4/	
CDC Precision	CDC PRECISION (P+)	3	19.3	43.3	43.2		35.3	111.6	<b>35.9</b>	60.7	61.9	59.8		60.8	101.7	<b>60.7</b>		
D03028	CARPIO (+)	8	16.9	38.6	39.4	44.1	14.0	35.7	106.7	<b>34.4</b>	59.0	60.8	59.0	57.7	57.3	59.9	100.3	<b>59.9</b>
NDSU	ND-GRANO (+)	3			42.9	44.4	13.6	33.6	106.6	<b>34.4</b>			59.3	58.7	59.1	59.0	102.2	<b>61.0</b>
D00095	TIOGA (+)	9	17.7	40.8	39.5	40.8	12.3	33.6	104.3	<b>33.6</b>	61.3	62.0	59.2	58.2	58.8	60.8	101.9	<b>60.8</b>
NDSU	ND-RIVELAND (+)	3			36.9	45.3	15.2	32.5	102.9	<b>33.1</b>			59.5	58.1	58.6	58.8	101.7	<b>60.7</b>
CDC Fortitude	CDC FORTITUDE (P+)	4	17.5	39.0	39.7	44.6		35.2	101.6	<b>32.7</b>	59.3	61.1	58.5	58.1		59.3	99.8	<b>59.6</b>
D9715-11	DIVIDE (+)	9	15.3	34.4	40.7	40.4	11.3	32.3	100.1	<b>32.3</b>	60.6	61.4	59.8	58.6	57.1	60.5	101.4	<b>60.5</b>
D901313	MOUNTRAIL (+)	9	15.5	35.2	44.1	43.9	6.7	32.2	100.0	<b>32.2</b>	59.7	60.6	59.1	58.1	56.1	59.7	100.0	<b>59.7</b>
D97780	GRENORA (+)	9	17.0	39.2	41.3	44.8	6.2	32.2	100.0	<b>32.2</b>	59.4	61.1	59.2	58.6	55.7	59.8	100.2	<b>59.8</b>
CDC Dynamic	CDC DYNAMIC (P+)	4	20.0	38.1	38.6	40.6		34.3	98.9	<b>31.9</b>	59.8	60.0	58.7	57.7		59.1	99.5	<b>59.4</b>
D04581	JOPPA (+)	7	19.2	39.3	38.9	44.2	12.0	30.7	98.6	<b>31.8</b>	60.0	61.8	59.9	58.7	58.3	60.1	101.7	<b>60.7</b>
CDC Vivid	CDC VIVID (P+)	5	16.6	38.2	36.4	38.7	12.5	28.5	98.0	<b>31.6</b>	60.5	60.7	59.2	57.8	58.6	59.4	101.1	<b>60.4</b>
MTD16005	LUSTRE (+)	4		37.6	36.2	43.0	9.9	31.7	97.6	<b>31.4</b>		60.3	58.4	57.0	56.0	57.9	99.0	<b>59.1</b>
D96604	ALKABO (+)	7	15.9	35.1	40.2			33.0	96.6	<b>31.1</b>	60.8	61.5	59.7			61.5	101.7	<b>60.7</b>
YU894-75	ALZADA (P+)	7	13.7	33.0	31.4	45.6		32.8	91.1	<b>29.3</b>	60.8	61.1	59.8	57.5		60.3	100.5	<b>60.0</b>
MEANS (For Entries Listed)			17.0	37.8	39.3	43.1	11.4			<b>32.5</b>	60.2	61.1	59.3	58.1	57.6			<b>60.2</b>
6/ Growing Season Precipitation (in.)			2.3	4.0	3.0	5.5	3.5	6.3										
Soil PAW (in.) to SD @ Planting			n/a	n/a	6.3	n/a	n/a	7.4										
Total Plant Available Water (in.)			n/a	n/a	9.3	n/a	n/a	16.4										
Soil NO3 (lbs.) to SD at Planting			n/a	n/a	n/a	n/a	n/a	45										
SD (Sampling Depth in Inches)			n/a	n/a	19	n/a	n/a	43										
Fertilizer Applied																		
(# N)			100	100	100	100	100	100										
(# P2O5)			20	20	20	20	20	20										
(# K2O)			10	10	10	10	10	10										
(# S)			0	10	10	10	10	5										

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 Pending.

3/ Only the most recent 5 years are shown, but summary calculations include all years noted. No harvest in 2014 due to hail.

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

5/ 9-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 = 9-Yr average yield or test weight for the check variety Mountrail.

6/ Seeding to 14 days prior to harvest maturity.

**TABLE 3. Nine-Year Protein and Sawfly Summary on Selected Entries from Dryland Fallow Spring Durum Variety Nurseries Grown Off-Station at the Max Cederberg Farm, Turner. Northern Agricultural Research Center. Havre, Montana. 2012-2021. (Exp# 9851-DUR)**

2/ VARIETY or SELECTION	No. of YEARS TESTED 3/	1/ PROTEIN % (Adjusted to 13% grain moisture)					SAWFLY RATING (% of cut and lodged stems)					9-YR COMP. AVE PROTEIN 5/	9-YR COMP. AVE SAWFLY 5/						
		2017	2018	2019	2020	2021	AVE. for YEARS TESTED 3/	% of CHECK PROTEIN 4/	2017	2018	2019			2020	2021	AVE. for YEARS TESTED 3/	% of CHECK SAWFLY 4/		
CDC Dynamic	CDC DYNAMIC (P+)	4	17.6	17.6	16.3	16.8	17.1	109.3	<b>16.7</b>	0.0	0.3	0.0	0.0	0.1	20.0	<b>0.7</b>			
D9715-11	DIVIDE (+)	9	16.4	16.4	15.0	15.6	16.1	15.3	100.2	<b>15.3</b>	0.7	0.7	0.0	0.7	1.0	1.9	52.6	<b>1.9</b>	
CDC Fortitude	CDC FORTITUDE (P+)	4	17.3	16.9	16.3	16.5	16.8	107.5	<b>16.4</b>	0.0	0.7	0.3	0.0	0.3	60.0	<b>2.2</b>			
YU894-75	ALZADA (P+)	7	16.1	16.1	14.5	15.1	14.9	99.3	<b>15.1</b>	0.3	0.3	0.3	0.3	2.9	63.5	<b>2.3</b>			
CDC Precision	CDC PRECISION (P+)	3	16.9	17.0	16.0		16.6	105.4	<b>16.1</b>	0.3	0.3	0.0		0.2	66.7	<b>2.4</b>			
D97780	GRENORA (+)	9	15.9	16.0	14.9	15.2	16.0	15.0	98.7	<b>15.0</b>	0.0	0.0	0.3	0.7	0.7	3.0	83.5	<b>3.0</b>	
D96604	ALKABO (+)	7	15.9	15.9	14.9		14.6	97.9	<b>14.9</b>	0.0	1.0	0.3		4.0	90.4	<b>3.2</b>			
D901313	MOUNTRAIL (+)	9	16.2	16.0	15.1	15.1	17.4	15.2	100.0	<b>15.2</b>	0.3	0.7	0.0	0.7	0.3	3.6	100.0	<b>3.6</b>	
D00095	TIOGA (+)	9	15.9	16.0	15.4	15.5	16.1	15.3	100.6	<b>15.3</b>	0.7	0.7	1.0	0.3	2.3	3.7	104.1	<b>3.7</b>	
D03028	CARPIO (+)	8	16.3	15.6	14.9	15.3	15.8	15.1	97.5	<b>14.9</b>	0.0	0.7	0.3	0.7	1.0	0.8	111.8	<b>4.0</b>	
D04581	JOPPA (+)	7	16.2	16.2	15.2	15.2	15.9	15.3	99.1	<b>15.1</b>	0.3	0.7	0.7	0.3	2.3	0.6	216.5	<b>7.8</b>	
MTD16005	LUSTRE (+)	4		16.6	15.7	16.4	16.8	16.4	102.8	<b>15.7</b>		0.3	0.0	1.0	2.3	0.9	219.8	<b>7.9</b>	
CDC Vivid	CDC VIVID (P+)	5	16.9	16.6	15.8	16.7	16.4	16.5	103.1	<b>15.7</b>	0.7	1.0	0.3	0.7	2.3	1.0	250.0	<b>9.0</b>	
NDSU	ND-GRANO (+)	3			15.3	15.6	16.0	15.6	98.3	<b>15.0</b>				1.0	1.0	0.9	266.9	<b>9.6</b>	
NDSU	ND-RIVELAND (+)	3			15.3	16.0	15.5	15.6	98.3	<b>15.0</b>				0.3	0.7	2.3	1.1	333.7	<b>12.0</b>
MEANS (For Entries Listed)			16.5	16.4	15.4	15.8	16.2			<b>15.4</b>	0.3	0.6	0.3	0.5	1.5			<b>4.9</b>	
6/ Growing Season Precipitation (in.)			2.3	4.0	3.0	5.5	3.5	6.3											
Soil PAW (in.) to SD @ Planting			n/a	n/a	6.3	n/a	n/a	7.4											
Total Plant Available Water (in.)			n/a	n/a	9.3	n/a	n/a	16.4											
Soil NO3 (lbs.) to SD at Planting			n/a	n/a	n/a	n/a	n/a	45											
SD (Sampling Depth in Inches)			n/a	n/a	19	n/a	n/a	43											
Fertilizer Applied			(# N)	100	100	100	100	100	100										
			(# P2O5)	20	20	20	20	20	22										
			(# K2O)	10	10	10	10	10	12										
			(# S)	0	10	10	10	10	5										

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 Pending.

3/ Only the most recent 5 years are shown, but summary calculations include all years noted. No harvest in 2014 due to hail.

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

5/ 9-Yr Comparable Average = (x/y) \* z where x = average protein or saw fly rating of a given entry for years tested, y = average protein or saw fly rating for Mountrail for the same years, and z = 9-Yr average protein or saw fly rating for the check variety Mountrail.

6/ 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. 2021. (Exp# 21-9855-DUR)**

ID	SOURCE	PLNT HT Inches	1/ YIELD Bu/Ac	TEST WT Lbs/Bu	2/ PROTEIN %	3/ FN Seconds	4/ SAWFLY %
Carpio	NDSU	21.6	27.0	58.7	15.5	429	<b>1.0</b>
CDC-Vivid	CDC	22.1	23.9	59.5	<b>16.9</b>	<b>457</b>	8.3
Divide	NDSU	21.3	22.9	59.6	16.0	406	8.3
Grenora	NDSU	20.8	26.3	58.9	15.6	390	8.3
Joppa	NDSU	22.3	24.7	59.9	15.9	429	<b>2.3</b>
Lustre	MSU	21.7	24.1	58.0	16.3	<b>471</b>	<b>3.7</b>
Mountrail	NDSU	20.3	26.6	58.4	16.2	415	<b>2.3</b>
ND-Grano	NDSU	20.9	<b>27.3</b>	59.8	16.3	443	<b>2.3</b>
ND-Riveland	NDSU	<b>23.2</b>	24.8	59.1	16.0	<b>467</b>	<b>1.0</b>
Tioga	NDSU	<b>23.1</b>	25.5	59.6	16.1	395	<b>2.3</b>
MTD-16001	MSU	19.9	23.7	59.4	15.9	440	<b>2.3</b>
MTD16002	MSU	<b>23.8</b>	22.8	59.4	16.1	<b>460</b>	<b>3.7</b>
MTD18313	MSU	19.9	<b>28.1</b>	<b>62.0</b>	15.8	<b>461</b>	<b>3.7</b>
MTD18348	MSU	21.9	<b>29.3</b>	59.1	15.5	<b>463</b>	<b>2.3</b>
EXPERIMENTAL MEANS		21.5	25.7	59.4	16.0	436.9	3.7
LSD (0.05)		1.6	2.0	0.4	0.3	18.9	3.5
C.V.%		4.5	4.7	0.4	1.2	2.6	57.0
P-VALUE (Varieties)		<.0001	<.0001	<.0001	<.0001	<.0001	0.0005

1/ Volumetric yields are based on plot weights adjusted to uniform 13 percent grain moisture and 60 lbs/bu as the standard test weight for durum.

2/ Protein values are adjusted to 13 percent grain moisture.

3/ FN is the falling number value reported in seconds adjusted to 14 percent flour moisture.

4/ 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 (21-9855-DUR)

Seeding Date: May 4, 2021  
 Harvest Date: August 17, 2021  
 Fertility: 100-20-10-10 side banded  
 System: Minimum Till  
 Herbicide: OpenSky (16 oz/ac)  
 Insecticide: none  
 Previous Crop: Chemical Fallow - Spring Wheat  
 Precipitation: 5.79" seeding to harvest maturity

**TABLE 5. Nine-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. 2012-2021. (Exp# 9855-DUR)**

2/ VARIETY or SELECTION	No. of YEARS TESTED 3/	1/ YIELD (Bushels Per Acre)							TEST WEIGHT (Pounds Per Bushel)									
		2016	2017 4/	2018	2019	2020	2021	AVE. for YEARS TESTED 3/	% of CHECK YIELD 5/	9-YR COMP. AVE. YIELD 6/	2016	2017 4/	2018	2019	2020	2021	AVE. for YEARS TESTED 3/	% of CHECK TEST WT 5/
NDSU ND-GRANO (+)	3			51.3	52.5	27.3	43.7	105.5	<b>40.6</b>				58.9	61.2	59.8	60.0	101.2	<b>60.2</b>
D03028 CARPIO (+)	8	47.6		31.7	47.2	48.3	27.0	41.6	103.6	<b>39.8</b>	61.0	61.2	58.4	60.4	58.7	59.9	100.7	<b>59.9</b>
NDSU ND-RIVELAND (+)	3			50.1	52.3	24.8	42.4	102.3	<b>39.3</b>				58.5	60.5	59.1	59.4	100.2	<b>59.6</b>
D00095 TIOGA (+)	9	41.3		32.4	48.7	46.7	25.5	38.8	101.1	<b>38.9</b>	60.9	61.7	58.7	61.1	59.6	60.2	101.2	<b>60.2</b>
D96604 ALKABO (+)	7	34.7		29.1	55.8			39.4	100.9	<b>38.8</b>	60.6	61.9	59.4			60.5	101.6	<b>60.4</b>
D901313 MOUNTRAIL (+)	9	38.6		35.6	51.4	46.3	26.6	38.4	100.0	<b>38.4</b>	59.3	60.6	59.0	60.4	58.4	59.5	100.0	<b>59.5</b>
YU894-75 ALZADA (P+)	7	39.4		31.3	48.2	38.8		39.4	99.8	<b>38.4</b>	59.3	61.3	59.3	60.3		59.7	100.4	<b>59.7</b>
CDC Vivid CDC VIVID (P+)	4			32.8	54.9	45.8	23.9	39.4	98.5	<b>37.9</b>		61.5	59.3	60.0	59.5	60.1	100.8	<b>59.9</b>
D9715-11 DIVIDE (+)	9	42.2		32.7	55.4	41.0	22.9	37.7	98.1	<b>37.7</b>	59.9	61.1	58.3	60.0	59.6	60.0	100.9	<b>60.0</b>
D97780 GRE Nora (+)	9	36.5		29.9	50.2	43.2	26.3	37.2	96.7	<b>37.2</b>	59.3	61.2	58.1	60.5	58.9	59.4	99.9	<b>59.4</b>
D04581 JOPPA (+)	7	37.6		27.1	47.3	46.8	24.7	38.0	96.1	<b>37.0</b>	60.1	61.9	59.4	61.2	59.9	60.1	101.4	<b>60.3</b>
CDC Fortitude CDC FORTITUDE (P+)	3			35.2	50.0	41.6		42.3	95.1	<b>36.6</b>		60.8	58.4	59.6		59.6	99.4	<b>59.1</b>
MTD16005 LUSTRE (+)	4			32.0	51.0	42.6	24.1	37.4	93.6	<b>36.0</b>		60.4	58.4	59.2	58.0	59.0	99.0	<b>58.9</b>
CDC Dynamic CDC DYNAMIC (P+)	3			23.3	51.1	44.3		39.6	89.0	<b>34.2</b>		60.4	58.1	59.4		59.3	98.9	<b>58.8</b>
MEANS (For Entries Listed)		39.7		31.1	50.9	45.4	25.3			<b>37.9</b>	60.1	61.2	58.7	60.3	59.2			<b>59.7</b>
7/ Growing Season Precipitation (in.)		7.2	n/a	n/a	8.8	n/a	5.8	7.6										
Soil PAW (in.) to SD @ Planting		3.7	n/a	n/a	6.2	8.9	8.63	7.8										
Total Plant Available Water (in.)		10.9	n/a	n/a	15.0	n/a	14.4	15.0										
Soil NO3 (lbs.) to SD at Planting		25	n/a	n/a	n/a	23.0	36.0	37										
SD (Sampling Depth in Inches)		24	n/a	n/a	33.0	48.0	48.0	43										
Fertilizer Applied		125	125	100	100	100	100	102										
	(# N)	20	20	20	20	20	20	22										
	(# P <sub>2</sub> O <sub>5</sub> )	10	10	10	10	10	10	12										
	(# K <sub>2</sub> O)	10	10	10	10	10	10	6										
	(# S)																	

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 Pending.

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

4/ No Harvest in 2017 due to hail.

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

6/ 9-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 = 9-Yr average yield or test weight for the check variety Mountrail.

7/ Seeding to 14 days prior to harvest maturity.

**TABLE 6. Nine-Year Protein and 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. 2012-2021. (Exp# 9855-DUR)**

2/ VARIETY or SELECTION	No. of YEARS TESTED 3/	1/ PROTEIN % (Adjusted to 13% grain moisture)							SAWFLY RATING (% of cut and lodged stems)										
		2016	2017	2018	2019	2020	2021	AVE. for YEARS TESTED 3/	% of CHECK PROTEIN 5/	9-YR COMP. AVE. PROTEIN 6/	2016	2017	2018	2019	2020	2021	AVE. for YEARS TESTED 3/	% of CHECK SAWFLY 5/	9-YR COMP. AVE. SAWFLY 6/
CDC Fortitude	CDC FORTITUDE (P+)	3		16.7	14.5	15.9		15.7	106.5	<b>16.0</b>			0.3	0.0	0.0		0.1	25.0	<b>0.6</b>
YU894-75	ALZADA (P+)	7	15.3	15.6	13.4	15.2		14.9	99.4	<b>15.0</b>	0.0		0.3	0.0	0.7		1.1	38.7	<b>1.0</b>
D03028	CARPIO (+)	8	14.8	15.0	14.3	14.4	15.5	14.8	98.1	<b>14.8</b>	0.0		0.3	0.0	0.7	1.0	0.6	41.2	<b>1.1</b>
NDSU	ND-RIVELAND (+)	3			14.2	14.3	16.0	14.8	99.0	<b>14.9</b>				0.0	0.7	1.0	0.6	50.0	<b>1.3</b>
CDC Dynamic	CDC DYNAMIC (P+)	3		17.5	14.9	16.1		16.2	109.6	<b>16.5</b>			0.7	0.0	0.3		0.3	75.1	<b>1.9</b>
D9715-11	DIVIDE (+)	9	15.4	15.7	14.0	15.4	16.0	15.3	101.7	<b>15.3</b>	0.0		0.0	0.0	0.3	8.3	2.0	78.2	<b>2.0</b>
NDSU	ND-GRANO (+)	3			13.8	14.6	16.3	14.9	99.6	<b>15.0</b>				0.0	0.3	2.3	0.9	80.0	<b>2.0</b>
D96604	ALKABO (+)	7	14.1	15.2	13.3			14.4	96.8	<b>14.6</b>	0.0		0.0	0.0			2.5	89.8	<b>2.3</b>
D04581	JOPPA (+)	7	14.4	16.3	13.9	14.2	15.9	14.9	99.2	<b>14.9</b>	0.0		0.3	0.0	0.7	2.3	0.6	92.3	<b>2.4</b>
D901313	MOUNTRAIL (+)	9	15.1	15.6	13.6	15.1	16.2	15.0	100.0	<b>15.0</b>	0.0		0.3	0.0	1.0	2.3	2.6	100.0	<b>2.6</b>
D97780	GRE Nora (+)	9	15.3	15.9	14.1	15.0	15.6	15.1	100.4	<b>15.1</b>	0.0		0.7	0.0	0.7	8.3	2.8	108.7	<b>2.8</b>
D00095	TIOGA (+)	9	15.6	16.2	14.4	14.7	16.1	15.5	103.2	<b>15.5</b>	0.0		2.0	0.0	0.7	2.3	2.8	110.1	<b>2.8</b>
MTD16005	LUSTRE (+)	4		16.3	14.0	15.3	16.3	15.5	102.5	<b>15.4</b>			0.3	0.0	0.3	3.7	1.1	118.1	<b>3.0</b>
CDC Vivid	CDC VIVID (P+)	4		15.9	14.1	15.2	16.9	15.5	102.6	<b>15.4</b>			0.7	0.0	0.3	8.3	2.3	254.5	<b>6.5</b>
MEANS (For Entries Listed)			15.0	16.0	14.0	15.0	16.1			<b>15.2</b>	0.0			0.0	0.5	4.0			<b>2.3</b>
7/ Growing Season Precipitation (in.)			7.2	n/a	n/a	8.8	n/a	5.8	7.6										
Soil PAW (in.) to SD @ Planting			3.7	n/a	n/a	6.2	8.9	8.63	7.8										
Total Plant Available Water (in.)			10.9	n/a	n/a	15.0	n/a	14.4	15.0										
Soil NO3 (lbs.) to SD at Planting			25	n/a	n/a	n/a	23.0	36.0	37										
SD (Sampling Depth in Inches)			24	n/a	n/a	33.0	48.0	48.0	43										
Fertilizer Applied																			
		(# N)	125	125	100	100	100	100	102										
		(# P <sub>2</sub> O <sub>5</sub> )	20	20	20	20	20	20	22										
		(# K <sub>2</sub> O)	10	10	10	10	10	10	12										
		(# S)	10	10	10	10	10	10	6										

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 Pending.

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

4/ No Harvest in 2017 due to hail.

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

6/ 9-Yr Comparable Average = (x/y) \* z where x = average protein or saw fly rating of a given entry for years tested, y = average protein or saw fly rating for Mountrail for the same years, and z = 9-Yr average protein or saw fly rating for the check variety Mountrail.

7/ Seeding to 14 days prior to harvest maturity.



**TABLE 7. Dryland Fallow Spring Durum Cultivar Evaluation Nursery Grown Off-Station at the Kammerzell Farm, Chester. Northern Agricultural Research Center. Havre, Montana. 2021. (Exp# 21-9853-DUR)**

ENTRY	SOURCE	PLNT HT Inches	1/ YIELD Bu/Ac	TEST WT Lbs/Bu	2/ PROTEIN %	3/ FN Seconds	4/ SAWFLY %
Carpio	NDSU	24.1	23.2	54.4	17.1	201	<b>0.7</b>
CDC-Vivid	CDC	22.9	25.2	56.7	17.0	143	2.3
Divide	NDSU	25.2	24.6	56.3	16.7	209	<b>1.0</b>
Grenora	NDSU	22.7	26.9	55.0	16.3	107	3.7
Joppa	NDSU	24.0	22.4	56.4	16.9	163	5.3
Lustre	MSU	25.2	21.1	55.0	<b>17.6</b>	186	<b>1.0</b>
Mountrail	NDSU	23.0	22.3	55.4	17.1	189	5.3
ND-Grano	NDSU	22.2	22.1	56.1	16.8	169	10.0
ND-Riveland	NDSU	24.5	24.0	56.8	16.9	224	<b>1.0</b>
Tioga	NDSU	<b>25.7</b>	20.2	56.1	17.4	92	5.3
MTD-16001	MSU	24.3	26.9	56.1	16.4	206	<b>1.0</b>
MTD16002	MSU	23.9	18.7	55.5	17.6	203	<b>1.0</b>
MTD18313	MSU	20.6	<b>28.4</b>	<b>58.7</b>	16.4	<b>242</b>	<b>1.0</b>
MTD18348	MSU	25.0	26.3	57.4	16.2	150	2.3
EXPERIMENTAL MEANS		23.8	23.8	56.1	16.9	171.0	3.3
LSD (0.05)		1.6	237.0	0.1	0.4	24.4	4.2
C.V.%		3.7	6.3	0.6	1.2	8.0	74.9
P-VALUE (Varieties)		<.0001	<.0001	<.0001	<.0001	<.0001	0.0010

1/ Volumetric yields are based on plot weights adjusted to uniform 13 percent grain moisture and 60 lbs/bu as the standard test weight for durum.

2/ Protein values are adjusted to 13 percent grain moisture.

3/ FN is the falling number value reported in seconds adjusted to 14 percent flour moisture.

4/ 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 (21-9853-DUR)

Seeding Date: April 17, 2021  
 Harvest Date: September 2, 2021  
 Fertility: 100-20-10 side banded  
 System: No Till  
 Herbicide: none  
 Insecticide: none  
 Previous Crop: Chemical Fallow - Spring Wheat  
 Precipitation: n/a

**TABLE 8. Eight-Year Yield and Test Weight Summary on Selected Entries from Dryland Fallow Spring Durum Variety Nurseries Grown Off-Station at the Kammerzell Farm, Chester. Northern Agricultural Research Center. Havre, Montana. 2014-2021. (Exp# 9853-DUR)**

2/ VARIETY or SELECTION	No. of YEARS TESTED 3/	1/ YIELD (Bushels Per Acre)					TEST WEIGHT (Pounds Per Bushel)					8-YR COMP. AVE YIELD 5/	AVE. for YEARS TESTED 3/	% of CHECK YIELD 4/	8-YR COMP. AVE TEST WT 5/			
		2017	2018	2019	2020	2021	2017	2018	2019	2020	2021							
YU894-75	ALZADA (P+)	6	31.9	33.9	60.7	52.3		40.5	108.1	<b>36.4</b>	57.7	54.4	58.8	55.8	55.1	100.1	<b>55.3</b>	
D97780	GRENORA (+)	8	33.1	29.6	57.1	50.7	26.9	34.0	101.1	<b>34.0</b>	57.0	56.0	58.3	56.7	55.0	55.7	100.7	<b>55.7</b>
D901313	MOUNTRAIL (+)	8	33.9	30.0	53.6	51.2	22.3	33.6	100.0	<b>33.6</b>	56.6	55.0	57.7	55.3	55.4	55.3	100.0	<b>55.3</b>
D96604	ALKABO (+)	6	27.5	30.1	54.9			32.1	98.4	<b>33.1</b>	57.9	57.1	59.0			56.7	102.6	<b>56.7</b>
D00095	TIOGA (+)	8	30.7	30.9	54.3	46.3	20.2	33.1	98.3	<b>33.1</b>	59.5	57.2	57.7	56.4	56.1	56.4	102.2	<b>56.4</b>
CDC Precision	CDC PRECISION (P+)	3	29.0	34.8	51.1			38.3	97.7	<b>32.8</b>	59.5	58.0	57.6			58.3	103.3	<b>57.1</b>
D9715-11	DIVIDE (+)	8	29.9	28.4	52.0	45.4	24.6	32.4	96.4	<b>32.4</b>	58.7	57.8	58.4	56.4	56.3	56.4	102.0	<b>56.4</b>
NDSU	ND-RIVELAND (+)	3			50.8	47.0	24.0	40.6	95.9	<b>32.2</b>			57.0	56.1	56.8	56.6	100.9	<b>55.8</b>
CDC Fortitude	CDC FORTITUDE (P+)	4	31.3	29.6	53.2	47.8		40.5	95.9	<b>32.2</b>	57.1	55.8	56.9	55.3		56.3	100.2	<b>55.4</b>
D04581	JOPPA (+)	8	29.9	24.7	51.0	48.5	22.4	32.1	95.5	<b>32.1</b>	58.2	56.4	58.4	56.7	56.4	56.1	101.5	<b>56.1</b>
CDC Dynamic	CDC DYNAMIC (P+)	4	28.1	27.3	54.0	46.7		39.0	92.5	<b>31.1</b>	57.1	55.9	56.8	54.7		56.1	99.9	<b>55.2</b>
NDSU	ND-GRANO (+)	3			49.8	45.6	22.1	39.1	92.4	<b>31.1</b>			57.3	55.7	56.1	56.4	100.4	<b>55.5</b>
MTD16005	LUSTRE (+)	4		25.2	51.3	47.5	21.1	36.3	92.4	<b>31.1</b>		55.5	56.6	54.6	55.0	55.5	99.3	<b>54.8</b>
CDC Vivid	CDC VIVID (P+)	5	26.1	31.0	49.8	44.1	25.2	35.3	92.3	<b>31.0</b>	57.6	56.8	57.0	55.3	56.7	56.7	101.2	<b>55.9</b>
D03028	CARPIO (+)	8	26.6	27.0	48.3	42.5	23.2	30.8	91.6	<b>30.8</b>	56.9	55.3	57.1	53.9	54.4	55.2	100.0	<b>55.2</b>
MEANS (For Entries Listed)			29.8	29.4	52.8	47.4	23.2			<b>32.5</b>	57.8	56.3	57.6	55.6	55.8			<b>55.8</b>
6/ Growing Season Precipitation (in.)			2.8	n/a	n/a	n/a	n/a	5.3										
Soil PAW (in.) to SD @ Planting			n/a	n/a	n/a	n/a	12.7	12.1										
Total Plant Available Water (in.)			n/a	n/a	n/a	n/a	n/a	14.8										
Soil NO3 (lbs.) to SD at Planting			n/a	n/a	n/a	n/a	197	235										
SD (Sampling Depth in Inches)			n/a	n/a	n/a	n/a	48	48										
Fertilizer Applied																		
			(# N)	100	100	100	100	100	103									
			(# P <sub>2</sub> O <sub>5</sub> )	20	20	20	20	20	20									
			(# K <sub>2</sub> O)	10	10	10	10	10	10									
			(# S)	10	10	10	10	10	8									

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 Pending.

3/ Only the most recent 5 years show n, 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/ 8-Yr Comparable Average = (x/y) \* z where x = average yield or test weight rating for Mountrail for the same years, and z = 8-Yr average yield or test weight for the check variety Mountrail.

6/ Seeding to 14 days prior to harvest maturity.

**TABLE 9. Eight-Year Protein and Sawfly Summary on Selected Entries from Dryland Fallow Spring Durum Variety Nurseries Grown Off-Station at the Kammerzell Farm, Chester. Northern Agricultural Research Center. Havre, Montana. 2014-2021. (Exp# 9853-DUR)**

2/ VARIETY or SELECTION	No. of YEARS TESTED 3/	1/ PROTEIN % (Adjusted to 13% grain moisture)					SAWFLY RATING (% of cut and lodged stems)					AVE. for YEARS TESTED 3/	% of CHECK SAWFLY 4/	8-YR COMP. AVE PROTEIN 5/	8-YR COMP. AVE SAWFLY 5/			
		2017	2018	2019	2020	2021	2017	2018	2019	2020	2021							
CDC Dynamic	CDC DYNAMIC (P+)	4	18.3	18.6	18.1	19.5	18.6	108.2	<b>19.0</b>	0.0	0.0	1.0	0.7	1.0	0.4	13.0	<b>0.6</b>	
D9715-11	DIVIDE (+)	8	17.3	16.6	15.8	17.3	16.7	17.2	97.6	<b>17.2</b>	0.0	0.5	5.0	0.7	1.0	1.1	22.7	<b>1.1</b>
D03028	CARPIO (+)	8	17.6	17.4	16.6	17.9	17.1	17.5	99.7	<b>17.5</b>	0.3	0.3	6.7	0.3	0.7	1.2	24.0	<b>1.2</b>
YU894-75	ALZADA (P+)	6	17.5	16.8	15.7	16.9		17.1	97.6	<b>17.2</b>	0.3	1.8	2.3	1.0	1.4	24.4	<b>1.2</b>	
MTD16005	LUSTRE (+)	4		18.0	16.9	18.0	17.6	17.6	102.7	<b>18.1</b>		0.2	3.7	0.7	1.0	1.4	30.3	<b>1.5</b>
D97780	GRENORA (+)	8	17.1	17.5	15.7	17.1	16.3	16.9	95.8	<b>16.9</b>	0.7	0.3	7.0	2.0	3.7	1.8	36.9	<b>1.8</b>
CDC Vivid	CDC VIVID (P+)	5	17.8	18.1	17.3	19.2	17.0	17.9	104.0	<b>18.3</b>	0.0	0.3	5.0	0.3	2.3	1.6	44.0	<b>2.1</b>
CDC Precision	CDC PRECISION (P+)	3	18.0	18.0	17.2			17.7	104.9	<b>18.5</b>	0.3	0.2	5.0			1.8	45.2	<b>2.2</b>
CDC Fortitude	CDC FORTITUDE (P+)	4	17.9	18.0	17.1	18.9		18.0	104.6	<b>18.4</b>	0.3	0.2	5.3	0.0		1.5	45.5	<b>2.2</b>
D96604	ALKABO (+)	6	17.3	17.1	15.7			17.1	96.9	<b>17.1</b>	1.0	0.5	11.7			2.8	51.3	<b>2.5</b>
D04581	JOPPA (+)	8	16.8	17.1	16.1	17.1	16.9	17.3	98.1	<b>17.3</b>	0.7	0.7	13.3	1.0	5.3	3.1	63.5	<b>3.1</b>
D00095	TIOGA (+)	8	17.4	18.2	16.7	18.3	17.4	17.8	101.2	<b>17.8</b>	0.7	0.2	10.0	1.0	5.3	3.1	64.8	<b>3.1</b>
NDSU	ND-RIVELAND (+)	3			16.7	17.8	16.9	17.1	100.9	<b>17.8</b>			11.7	1.0	1.0	4.6	77.5	<b>3.8</b>
NDSU	ND-GRANO (+)	3			16.4	18.9	16.8	17.4	102.4	<b>18.0</b>			6.7	1.0	10.0	5.9	100.0	<b>4.9</b>
D901313	MOUNTRAIL (+)	8	17.3	17.7	15.8	18.0	17.1	17.6	100.0	<b>17.6</b>	0.0	0.5	11.7	0.7	5.3	4.9	100.0	<b>4.9</b>
MEANS (For Entries Listed)			17.5	17.6	16.5	18.1	17.0			<b>17.8</b>	0.4	0.4	7.1	0.8	3.6			<b>2.4</b>
6/ Growing Season Precipitation (in.)			2.8	n/a	n/a	n/a	n/a	5.3										
Soil PAW (in.) to SD @ Planting			n/a	n/a	n/a	n/a	12.7	12.1										
Total Plant Available Water (in.)			n/a	n/a	n/a	n/a	n/a	14.8										
Soil NO3 (lbs.) to SD at Planting			n/a	n/a	n/a	n/a	197	235										
SD (Sampling Depth in Inches)			n/a	n/a	n/a	n/a	48	48										
Fertilizer Applied																		
			(# N)	100	100	100	100	100	103									
			(# P <sub>2</sub> O <sub>5</sub> )	20	20	20	20	20	20									
			(# K <sub>2</sub> O)	10	10	10	10	10	10									
			(# S)	10	10	10	10	10	8									

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 Pending.

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

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

5/ 8-Yr Comparable Average = (x/y) \* z where x = average protein or saw fly rating for Mountrail for the same years, and z = 8-Yr average protein or saw fly rating for the check variety Mountrail.

6/ Seeding to 14 days prior to harvest maturity.