

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

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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 27 percent of the 2011-2015 statewide cereal production totals (43 percent for winter wheat and 23 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 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 durum variety performance trials were conducted on chemical fallow in 2016 in three northern Montana counties.

Dryland Spring Durum Trials:

- |   |            |
|---|------------|
| 1. Cederberg Farm, Blaine County          | 13-36N-25E |
| 2. Flansaas/Lumsden Farm, Phillips County | 24-35N-29E |
| 3. Kammerzell Farm, Liberty County        | 13-31N-05E |

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 17 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. 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.

### **Results:**

Please note that research trial 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.

Cropping environments in 2016 started out below average to marginal with warmer early spring temperatures and

lower than normal precipitation across north central Montana followed by heavy rainfall resulting in delayed spring seeding in many areas. Higher than normal rainfall was experienced at Turner and Loring resulting in good to excellent durum yields for growers who were able to seed their crops in a timely manner. The Chester area went into the fall and started out early spring dryer than normal, however, spring rains were frequent. Timely precipitation encouraged growth for good yield potential, however, stripe rust was prevalent in the cereal trials, limiting yield and quality of the spring wheat and durum.

At Havre, annual growing season precipitation (9/1/15 through 8/31/16) was 18.86 inches, 6.84 inches higher than the average for all years since 1916. April 1 through July 31 precipitation was 12.24 inches or 177 percent of the 101-year average. Heat units expressed as "Growing Degree Days" (GDD, base 50) from May through July totaled 1201, or 93 percent of the average for the last 66 years (1951-2016). The last spring frost was on May 14 and the first fall frost of 2016 was on September 13, resulting in 122 frost-free days. The minimum winter temperature was -15 degrees F on December 26, 2015. Overall, the 2015-2016 average crop year temperatures mirrored the long-term average. The April through July growing season saw an average daily temperature of 57.6 degrees F, similar to historical temperatures. July and August average temperatures were one degree F lower than long-term averages with the high for 2016 recorded on July 23 at 96 degrees F. There were 13 days with temperatures 90 degrees F or above, with no days over 100 degrees F.

Following a summer of timely rainfall, the durum trial yields at Turner averaged nearly 39 bu/ac (Table 1). 'Divide' was the highest yielding entry at nearly 50 bu/ac. No other entry in the trial produced a yield statistically equal to that of Divide. Test weight of all entries averaged 59 lb/bu, while protein averaged 14 percent. Sawfly cutting was nonexistent in the durum trial at Turner. Stand percent, plant height, yield, test weight, moisture, protein, falling number and sawfly data for the 2016 Turner dryland durum trial are 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 three years of data is necessary to be included in comparable average calculation. Nine-year comparable averages (2007-2016) for durum seed yield and test weight at Turner are summarized in Table 2, while nine-year comparable averages for sawfly cutting are summarized in Table 3.

Loring spring durum yields averaged nearly 39 bu/ac (Table 4). 'Carpio' was the highest yielding entry at over 47 bu/ac and only one experimental line yielded the same, statistically. MSU release 'Silver' and NDSU release 'Tioga' produced the highest protein at 16 and 15.6 percent, respectively. Sawfly cutting was nonexistent in the durum trial at Loring. Stand percent, plant height, yield, moisture, test weight, protein, falling number and sawfly cutting data, for the 2016 Loring dryland spring durum trial, are summarized in Table 4. Six-year comparable averages for spring durum seed yield and test weight at Loring are summarized in Table 5, while six-year comparable averages for sawfly cutting are summarized in Table 6.

In 2014, an off-station spring durum trial was established near Chester. The lack of timely rainfall events coupled with extreme stripe rust disease pressure resulted in spring durum yields averaging just over 26 bu/ac (Table 7). 'MT112219' was the highest yielding entry at nearly 33 bu/ac, with no other entry producing a seed yield statistically equal. Sawfly cutting in the small plot scenario was minimal in 2016. Stand percent, plant height, yield, test weight, moisture, protein, falling number and sawfly cutting data for the 2016 Chester dryland spring durum trial are summarized in Table 7. Three-year comparable averages for spring durum seed yield and test weight at Chester are summarized in Table 8, while three-year comparable averages for sawfly cutting are summarized in Table 9.

### **Summary:**

This work has been strongly supported by producers near each of the locations, and by the Northern Agricultural Research Center Advisory Council, so it was decided to conduct the research with no funding source identified in 2016. The Loring location is entering its twenty-second 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 have been outstanding through the years with 2016 marking 33 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.

**Funding Summary:**

Alternative funding sources were used to conduct off-station durum trials during 2016, as there was no grant support.

**Grant Submission Plans:**

It is planned to submit this project for funding consideration to the Montana Wheat and Barley Committee for calendar year 2017.

**Recognition:**

This research would not have been possible without the assistance of the following summertime hourly employees: Kasee Clark, Kyla McNamara, Nicole Parsons and John Perodin.

**TABLE 1. Dryland Fallow Spring Durum Cultivar Evaluation Nursery Grown Off-Station at the Leon Cederberg Farm, Turner. Northern Agricultural Research Center. Havre, Montana. 2016. (Exp# 16-9851-DUR)**

ID	PEDIGREE/SELECTION	STAND %	PLNT HT Inches	1/	TEST WT Lbs/Bu	MOISTURE %	2/	3/	4/
				YIELD Bu/Ac			PROTEIN %	FN seconds	SAWFLY %
Alkabo	NDSU	89.7	31.2	36.3	60.2	9.8	13.4	332	0.0
Alzada	NDSU	98.4	25.7	39.3	58.9	9.8	13.8	366	0.0
Carpio	NDSU	84.4	29.8	43.1	59.8	10.3	14.5	344	0.0
Divide	NDSU	94.6	32.6	<b>49.7</b>	60.1	10.1	14.6	347	0.0
Grenora	NDSU	88.7	29.4	36.8	58.3	9.9	14.7	340	0.0
Joppa	NDSU	84.6	29.6	31.0	59.4	9.9	14.3	336	0.0
Mountrail	NDSU	91.3	29.1	41.7	59.3	9.7	14.0	345	0.0
Silver	MSU	97.1	25.4	38.2	58.4	9.7	15.0	346	0.0
Tioga	NDSU	92.0	31.4	43.7	60.3	9.9	15.0	341	0.0
MT101717	CC4	92.6	25.8	41.3	60.5	9.8	13.7	369	0.0
MT101694	CC4	91.0	30.3	33.1	59.9	9.9	13.9	324	0.0
MT112434	Alzada x Cimmyt5	93.1	22.1	32.6	56.4	9.6	14.4	362	0.0
MT112444	Alzada x Cimmyt5	97.1	24.6	37.0	57.4	9.6	13.5	367	0.0
MT112463	Alzada x Cimmyt8	92.0	25.6	33.5	56.4	9.6	14.0	349	0.0
MT112219	MT06541 x Syrian 7	79.6	24.8	44.7	61.6	10.0	13.4	351	0.0
EXPERIMENTAL MEANS		91.1	27.8	38.8	59.1	9.8	14.1	348.0	0.0
LSD (0.05)		12.5	2.7	4.7	1.3	0.2	0.6	6.7	-
C.V.%		8.2	5.8	7.3	1.3	1.5	2.7	1.1	-
P-VALUE (Varieties)		0.1984	<.0001	<.0001	<.0001	0.0002	<.0001	<.0001	-

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.

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 (16-9851-DUR)

Seeding Date: May 8, 2016  
 Harvest Date: August 22, 2016  
 Fertility: 125-20-10-10 side banded  
 System: no till  
 Herbicide: none  
 Insecticide: none  
 Previous Crop: Chemical Fallow - Spring Wheat  
 Precipitation: 8.60" 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 Leon Cederberg Farm, Turner. Northern Agricultural Research Center. Havre, Montana. 2007-2016. (Exp# 9851-DUR)**

2/ VARIETY or SELECTION	No. of YEARS TESTED 4/	1/ YIELD (Bushels Per Acre)							TEST WEIGHT (Pounds Per Bushel)								
		2012	2013	3/ 2014	2015	2016	AVE. YEARS TESTED 4/	% of CHECK YIELD 5/	9-YR COMP. AVE. YIELD 6/	2012	2013	3/ 2014	2015	2016	AVE. YEARS TESTED 4/	% of CHECK YIELD 5/	9-YR COMP. AVE. YIELD 6/
DT712 STRONGFIELD (+)	8	24.1	54.3		33.4		30.5	112.0	<b>32.3</b>	60.6	64.1		60.5		59.5	100.0	<b>59.5</b>
D03028 CARPIO (+)	3		56.1		33.0	43.1	44.1	108.4	<b>31.3</b>		64.0		61.2	59.8	61.7	100.7	<b>59.9</b>
Normanno NORMANNO	5	24.6	50.9				31.6	105.6	<b>30.5</b>	59.7	63.1				59.6	99.1	<b>58.9</b>
D97780 GRENORA (+)	9	22.4	53.2		28.8	36.8	29.9	103.6	<b>29.9</b>	60.1	64.2		62.0	58.3	59.4	99.9	<b>59.4</b>
YU894-75 ALZADA (P+)	8	19.5	47.4				39.3	28.8	<b>29.0</b>	60.8	63.5			58.9	59.4	100.2	<b>59.5</b>
D00095 TIOGA (+)	6	21.9	54.1		31.6	43.7	31.2	100.3	<b>29.0</b>	60.4	64.7		62.5	60.3	60.5	100.6	<b>59.8</b>
D901313 MOUNTRAIL (+)	9	22.6	49.5		30.8	41.7	28.9	100.0	<b>28.9</b>	60.1	63.5		60.9	59.3	59.4	100.0	<b>59.4</b>
MT03012 SILVER (+)	9	18.7	45.7		29.9	38.2	28.6	99.1	<b>28.6</b>	60.7	63.9		61.5	58.4	59.2	99.6	<b>59.2</b>
D9715-11 DIVIDE (+)	9	20.4	50.5		27.8	49.7	28.3	98.2	<b>28.3</b>	61.0	64.3		61.7	60.1	59.8	100.6	<b>59.8</b>
D96604 ALKABO (+)	9	24.3	48.9		30.5	36.3	27.8	96.4	<b>27.8</b>	60.9	64.9		62.3	60.2	60.4	101.6	<b>60.4</b>
MEANS (For Entries Listed)		22.0	51.1		30.7	41.1			<b>29.6</b>	60.5	64.0		61.6	59.4			<b>59.6</b>
7/ Growing Season Precipitation (in.)		7.5	n/a	16.4	n/a	8.6	8.8										
Soil PAW (in.) to SD @ Planting		8.9	7.8	8.9	6.3	6.1	7.7										
Total Plant Available Water (in.)		16.4	n/a	25.2	n/a	14.7	16.6										
Soil NO3 (lbs.) to SD at Planting		15	11	65	49	85	68										
SD (Sampling Depth in Inches)		48	48	48	48	48	48										
Fertilizer Applied	(# N)	70	100	100	100	125	85										
	(# P <sub>2</sub> O <sub>5</sub> )	40	20	20	20	20	32										
	(# K <sub>2</sub> O)	25	10	10	10	10	19										
	(# S)	-	-	-	-	10	10										

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 Pending.

3/ No harvest in 2014 due to hail.

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

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 3. Nine-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. 2007-2016. (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 4/	9-YR COMP. AVE. SWFLY 5/
			2007	2008	2009	2010	2011	2012	2013	3/ 2014	2015			
Normanno	NORMANNO	5			0.7	2.3	1.0	1.0	0.7			1.1	6.2	<b>0.9</b>
YU894-75	ALZADA (P+)	8	6.7	2.3	8.3	8.3	15.0	16.7	2.3		0.0	7.5	47.0	<b>6.6</b>
DT712	STRONGFIELD (+)	8	10.0	2.3	10.0	13.3	10.0	15.0	0.3		0.0	7.6	48.0	<b>6.8</b>
D9715-11	DIVIDE (+)	9	13.3	3.7	5.0	18.3	16.7	13.3	0.7		0.0	7.9	55.9	<b>7.9</b>
MT03012	SILVER (+)	9	11.7	2.3	5.7	18.3	18.3	18.3	2.3		0.0	8.6	60.6	<b>8.6</b>
D00095	TIOGA (+)	6				21.7	23.3	26.7	2.0		0.0	12.3	88.0	<b>12.4</b>
D901313	MOUNTRAIL (+)	9	25.0	10.0	8.3	21.7	31.7	26.7	3.7		0.0	14.1	100.0	<b>14.1</b>
D03028	CARPIO (+)	3							3.7		0.0	1.2	100.0	<b>14.1</b>
D96604	ALKABO (+)	9	25.0	15.0	8.7	21.7	46.7	20.0	7.0		0.0	16.0	113.4	<b>16.0</b>
D97780	GRENORA (+)	9	33.3	11.7	15.0	25.0	38.3	21.7	3.7		0.0	16.5	117.1	<b>16.5</b>
MEANS (For Entries Listed)			17.9	6.8	7.7	16.7	22.3	17.7	2.6		0.0			<b>10.4</b>
6/ Grow ing Season Precipitation (in.)			7.0	6.6	6.0	10.3	8.3	7.5	n/a	16.4	n/a	8.6	8.8	
Soil PAW (in.) to SD @ Planting			5.8	8.1	7.8	9.0	7.9	8.9	7.8	8.9	6.3	6.1	7.7	
Total Plant Available Water (in.)			12.8	14.6	13.8	19.2	16.2	16.4	n/a	25.2	n/a	14.7	16.6	
Soil NO3 (lbs.) to SD at Planting			81	n/a	94	162	51	15	11	65	49	85	68	
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	100	100	100	125	85	
(# P <sub>2</sub> O <sub>5</sub> )			40	40	40	40	40	40	20	20	20	20	32	
(# K <sub>2</sub> O)			25	25	25	25	25	25	10	10	10	10	19	
(# S)			-	-	-	-	-	-	-	-	-	10	10	

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 Pending.

3/ No harvest in 2014 due to hail.

4/ Percent of Mountrail cut 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 saw fly rating of a given entry for years tested, y = average saw fly rating for Mountrail for the same years, and z = 9-Yr average 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 Flansaa-Lumsden Farm, Loring. Northern Agricultural Research Center. Havre, Montana. 2016. (Exp# 16-9855-DUR)**

ENTRY	CULTIVAR or SELECTION	STAND %	PLNT HT Inches	1/	TEST WT Lbs/Bu	2/	3/	4/	
				YIELD Bu/Ac		MOISTURE %	PROTEIN %	FN seconds	SAWFLY %
Alkabo	NDSU	95.6	27.0	34.7	60.6	11.2	14.1	338	0.0
Alzada	NDSU	97.7	25.7	39.4	59.3	11.3	15.3	313	0.0
Carpio	NDSU	97.0	31.1	<b>47.6</b>	61.0	11.8	14.8	319	0.0
Divide	NDSU	96.7	29.0	42.2	59.9	11.3	15.4	318	0.0
Grenora	NDSU	97.7	28.2	36.5	59.3	11.2	15.3	342	0.0
Joppa	NDSU	96.3	30.8	37.6	60.1	11.6	14.4	312	0.0
Mountrail	NDSU	95.3	28.5	38.6	59.3	11.2	15.1	320	0.0
Silver	MSU	96.0	25.3	40.4	59.4	11.3	16.0	319	0.0
Tioga	NDSU	97.3	32.5	41.3	60.9	11.3	15.6	294	0.0
MT101694	CC4	96.7	29.4	36.9	59.8	11.5	14.6	284	0.0
MT101717	CC4	94.0	20.6	33.4	61.7	11.4	14.2	340	0.0
MT112219	MT06541 x Syrian 7	98.3	24.8	35.3	61.0	11.3	14.7	297	0.0
MT112434	Alzada x Cimmyt5	99.0	22.7	30.1	58.3	11.2	14.8	348	0.0
MT112444	Alzada x Cimmyt5	99.3	25.4	<b>44.5</b>	59.7	11.1	14.1	352	0.0
MT112463	Alzada x Cimmyt8	99.0	26.4	42.2	58.6	11.1	14.0	310	0.0
EXPERIMENTAL MEANS		97.1	27.2	38.7	59.9	11.3	14.8	320.4	0.0
LSD (0.05)		3.8	2.6	5.3	0.6	0.2	0.5	17.4	-
C.V.%		2.3	5.8	8.2	0.6	0.9	2.0	3.2	-
P-VALUE (Varieties)		0.2465	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	-

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.

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 (16-9855-DUR)

Seeding Date: May 7, 2016  
 Harvest Date: August 24, 2016  
 Fertility: 125-20-10-10 side banded  
 System: no till  
 Herbicide: pending  
 Insecticide: pending  
 Previous Crop: Chemical Fallow - Spring Wheat  
 Precipitation: 7.23" seeding to harvest maturity

**TABLE 5. Six-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. 2011-2016. (Exp# 9855-DUR)**

2/ VARIETY or SELECTION	No. of YEARS TESTED	1/ YIELD (Bushels Per Acre)								TEST WEIGHT (Pounds Per Bushel)							
		2012	2013	2014	2015	2016	AVE. for YEARS TESTED	% of CHECK YIELD 3/	6-YR COMP. AVE. YIELD 4/	2012	2013	2014	2015	2016	AVE. for YEARS TESTED	% of CHECK TEST WT 3/	6-YR COMP. AVE. TEST WT 4/
D03028 CARPIO (+)	4		47.8	39.0	44.3	47.6	44.7	110.7	<b>39.6</b>		62.1	56.7	61.0	61.0	60.2	101.3	<b>60.2</b>
YU894-75 ALZADA (P+)	5	24.0	52.7	41.1		39.4	37.1	108.4	<b>38.8</b>	60.5	60.7	56.8		59.3	59.7	100.4	<b>59.7</b>
D00095 TIOGA (+)	6	26.2	46.2	37.7	44.9	41.3	37.7	105.4	<b>37.7</b>	60.8	61.9	56.0	61.1	60.9	60.4	101.4	<b>60.4</b>
D04581 JOPPA (++)	3			39.4	43.0	37.6	40.0	104.8	<b>37.5</b>			56.9	61.1	60.1	59.4	101.4	<b>59.7</b>
DT712 STRONGFIELD (+)	5	24.2	44.4	40.5	41.8		36.3	103.1	<b>36.9</b>	60.3	62.0	56.4	60.5		60.1	100.8	<b>60.1</b>
MT03012 SILVER (+)	6	25.8	45.2	38.6	39.7	40.4	36.8	102.9	<b>36.8</b>	60.4	61.6	56.7	60.2	59.4	59.8	100.2	<b>59.8</b>
D96604 ALKABO (+)	6	26.9	50.0	39.2	39.9	34.7	36.7	102.7	<b>36.7</b>	60.7	62.4	56.8	61.3	60.6	60.7	101.9	<b>60.7</b>
D9715-11 DIVIDE (+)	6	24.1	42.5	39.8	38.6	42.2	35.9	100.3	<b>35.9</b>	60.9	62.0	57.7	60.6	59.9	60.5	101.4	<b>60.5</b>
D901313 MOUNTRAIL (+)	6	24.7	44.9	34.8	43.2	38.6	35.8	100.0	<b>35.8</b>	59.1	61.2	56.7	60.4	59.3	59.6	100.0	<b>59.6</b>
D97780 GRE Nora (+)	6	25.7	43.4	39.0	40.2	36.5	35.4	98.9	<b>35.4</b>	59.5	60.5	56.2	60.5	59.3	59.6	99.9	<b>59.6</b>
MEANS (For Entries Listed)		25.2	46.3	38.9	41.8	39.8			<b>37.1</b>	60.3	61.6	56.7	60.7	60.0			<b>60.0</b>
5/ Growing Season Precipitation (in.)		n/a	9.5	5.6	8.9	7.2	7.8										
Soil PAW (in.) to SD @ Planting		8.8	8.8	8.9	8.2	3.7	7.6										
Total Plant Available Water (in.)		n/a	18.3	14.5	17.2	10.9	15.2										
Soil NO3 (lbs.) to SD at Planting		34	34	64	41	25	41										
SD (Sampling Depth in Inches)		48	48	48	48	24	44										
Fertilizer Applied	(# N)	70	100	100	100	125	94										
	(# P <sub>2</sub> O <sub>5</sub> )	40	20	20	20	20	27										
	(# K <sub>2</sub> O)	25	10	10	10	10	15										
	(# S)	-	-	-	-	10	10										

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 Pending.

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

5/ 6-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 = 6-Yr average yield or test weight for the check variety Mountrail.

5/ Seeding to 14 days prior to harvest maturity.



**TABLE 6. Six-Year Sawfly Summary on Selected Entries from Dryland Fallow Spring Durum Variety Nurseries Grown Off-Station at the Flanssas-Lumsden Farm, Loring, Northern Agricultural Research Center, Havre, Montana. 2011-2016. (Exp# 9855-DUR)**

2/ VARIETY or SELECTION	No. of YEARS TESTED 3/	1/ SAWFLY RATING (% of cut and lodged stems)								6-YR COMP. AVE SWFLY 4/
		2011	2012	2013	2014	2015	2016	AVE. for YEARS TESTED 3/	% of CHECK SWFLY 3/	
D03028 CARPIO (+)	4			2.3	0.3	0.0	0.0	0.7	26.1	<b>2.1</b>
DT712 STRONGFIELD (+)	5	8.3	3.7	0.7	0.3	0.0		2.6	33.0	<b>2.6</b>
YU894-75 ALZADA (P+)	5	10.0	5.0	1.0	1.0		0.0	3.4	34.6	<b>2.7</b>
D9715-11 DIVIDE (+)	6	13.3	3.7	5.0	0.7	0.0	0.0	3.8	47.9	<b>3.8</b>
MT03012 SILVER (+)	6	15.0	3.7	3.7	1.0	0.0	0.0	3.9	49.4	<b>3.9</b>
D04581 JOPPA (++)	3				0.7	0.0	0.0	0.2	66.7	<b>5.2</b>
D97780 GRENORA (+)	6	20.0	8.3	6.7	0.3	0.0	0.0	5.9	74.9	<b>5.9</b>
D901313 MOUNTRAIL (+)	6	20.0	11.7	7.0	0.7	0.0	0.0	6.6	83.3	<b>6.6</b>
D96604 ALKABO (+)	6	23.3	8.3	8.3	1.0	0.0	0.0	6.8	86.8	<b>6.8</b>
D00095 TIOGA (+)	6	25.0	10.0	8.3	2.0	0.0	0.0	7.6	96.0	<b>7.6</b>
MEANS (For Entries Listed)		16.9	6.8	4.8	0.8	0.0	0.0			<b>4.7</b>
5/ Growing Season Precipitation (in.)		n/a	n/a	9.5	5.6	8.9	7.2	7.8		
Soil PAW (in.) to SD @ Planting		7.1	8.8	8.8	8.9	8.2	3.7	7.6		
Total Plant Available Water (in.)		n/a	n/a	18.3	14.5	17.2	10.9	15.2		
Soil NO3 (lbs.) to SD at Planting		50	34	34	64	41	25	41		
SD (Sampling Depth in Inches)		48	48	48	48	48	24	44		
Fertilizer Applied	(# N)	70	70	100	100	100	125	94		
	(# P <sub>2</sub> O <sub>5</sub> )	40	40	20	20	20	20	27		
	(# K <sub>2</sub> O)	25	25	10	10	10	10	15		
	(# S)	-	-	-	-	-	10	10		

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 Pending.

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

4/ 6-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 = 6-Yr saw fly rating for the check variety Mountrail.

5/ 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. 2016. (Exp# 16-9853-DUR)**

ENTRY	CULTIVAR or SELECTION	STAND %	PLNT HT Inches	1/	TEST WT Lbs/Bu	MOISTURE %	2/	3/	4/
				YIELD Bu/Ac			PROTEIN %	FN seconds	SAWFLY %
Alkabo	NDSU	96.3	32.1	21.3	53.2	9.4	17.8	343	1.0
Alzada	NDSU	97.1	28.0	28.3	50.2	9.2	18.4	395	2.3
Carpio	NDSU	98.0	33.6	24.6	52.8	9.4	17.9	342	0.0
Divide	NDSU	97.0	30.4	24.9	51.6	9.4	17.9	342	0.3
Grenora	NDSU	96.7	30.8	25.4	50.6	9.4	17.7	340	0.3
Joppa	NDSU	93.7	34.0	24.4	51.3	9.3	18.2	323	1.0
Mountrail	NDSU	98.4	33.5	24.0	51.3	9.1	18.6	332	0.7
Silver	MSU	96.3	26.8	29.0	50.3	9.3	18.3	338	1.0
Tioga	NDSU	97.7	29.3	27.4	52.0	9.5	17.1	349	5.0
MT101717	CC4	96.3	26.4	28.6	53.5	9.4	16.9	361	1.0
MT101694	CC4	98.6	32.6	26.7	52.3	9.4	16.9	334	5.0
MT112434	Alzada x Cimmyt5	97.0	33.5	29.0	52.3	9.4	18.0	342	0.0
MT112444	Alzada x Cimmyt5	98.6	28.5	24.9	48.3	9.2	17.9	357	1.0
MT112463	Alzada x Cimmyt8	95.1	27.4	25.4	50.1	9.1	17.7	344	1.7
MT112219	MT06541 x Syrian 7	94.9	25.9	<b>32.7</b>	53.9	9.3	17.0	363	0.0
EXPERIMENTAL MEANS		96.8	30.2	26.4	51.6	9.3	17.8	346.9	1.4
LSD (0.05)		3.4	2.3	3.5	1.1	0.1	0.4	13.5	1.7
C.V.%		2.1	4.5	8.0	1.2	0.7	1.2	2.3	74.7
P-VALUE (Varieties)		0.1967	<.0001	0.0001	<.0001	<.0001	<.0001	<.0001	<.0001

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.

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 (16-9853-DUR)

Seeding Date: May 5, 2016

Harvest Date: August 23, 2016

Fertility: 125-20-10-10 side banded

System: no till

Herbicide: none

Insecticide: none

Previous Crop: Chemical Fallow - Spring Wheat

Precipitation: 8.28" seeding to harvest maturity

**TABLE 8. Three-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. 2014-2016. (Exp# 9853-DUR)**

2/ VARIETY or SELECTION		No. of YEARS TESTED	1/ YIELD (Bushels Per Acre)						TEST WEIGHT (Pounds Per Bushel)									
			2014	2015	2016	2017	2018	AVE. for YEARS TESTED	% of CHECK YIELD 3/	3-YR COMP. AVE. YIELD 4/	2014	2015	2016	2017	2018	AVE. for YEARS TESTED	% of CHECK TEST WT 3/	3-YR COMP. AVE. TEST WT 4/
MT03012	SILVER (+)	3	33.7	24.1	29.0			29.0	111.4	<b>29.0</b>	53.7	56.0	50.3			53.3	98.8	<b>53.3</b>
D00095	TIOGA (+)	3	33.0	21.5	27.4			27.3	105.0	<b>27.3</b>	55.0	57.6	52.0			54.9	101.6	<b>54.9</b>
D04581	JOPPA (++)	3	33.4	22.7	24.4			26.8	103.2	<b>26.8</b>	53.4	57.9	51.3			54.2	100.4	<b>54.2</b>
D96604	ALKABO (+)	3	37.0	21.7	21.3			26.7	102.6	<b>26.7</b>	55.1	57.8	53.2			55.4	102.5	<b>55.4</b>
D9715-11	DIVIDE (+)	3	34.1	20.0	24.9			26.3	101.2	<b>26.3</b>	53.7	57.8	51.6			54.4	100.7	<b>54.4</b>
D03028	CARPIO (+)	3	34.6	19.4	24.6			26.2	100.7	<b>26.2</b>	55.0	56.6	52.8			54.8	101.4	<b>54.8</b>
D901313	MOUNTRAIL (+)	3	31.8	22.2	24.0			26.0	100.0	<b>26.0</b>	54.5	56.2	51.3			54.0	100.0	<b>54.0</b>
D97780	GRENORA (+)	3	27.3	21.9	25.4			24.8	95.6	<b>24.8</b>	54.1	57.6	50.6			54.1	100.2	<b>54.1</b>

MEANS (For Entries Listed) 33.1 21.7 26.6 54.3 57.2 54.4

5/ Growing Season Precipitation (in.)	n/a	5.0	8.3	6.6
Soil PAW (in.) to SD @ Planting	13.7	9.8	n/a	11.7
Total Plant Available Water (in.)	n/a	14.8	n/a	14.8
Soil NO3 (lbs.) to SD at Planting	257	251	n/a	254.0
SD (Sampling Depth in Inches)	48	48	48	48.0
Fertilizer Applied	(# N)	100	100	125
	(# P <sub>2</sub> O <sub>5</sub> )	20	20	20
	(# K <sub>2</sub> O)	10	10	10
Check Variety is Mountrail.	(# S)	-	-	10

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/ 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 9. Three-Year 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. 2014-2016. (Exp# 9853-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/
		2014	2015	2016	2017	2018			
D97780 GRENORA (+)	3	0.3	0.0	0.3			0.2	18.2	<b>0.2</b>
D03028 CARPIO (+)	3	1.0	0.0	0.0			0.3	27.3	<b>0.3</b>
D9715-11 DIVIDE (+)	3	0.7	0.7	0.3			0.6	45.5	<b>0.6</b>
MT03012 SILVER (+)	3	1.0	0.7	1.0			0.9	72.7	<b>0.9</b>
D96604 ALKABO (+)	3	2.3	0.3	1.0			1.2	100.0	<b>1.2</b>
D04581 JOPPA (++)	3	2.3	0.3	1.0			1.2	100.0	<b>1.2</b>
D00095 TIOGA (+)	3	1.0	2.0	5.0			2.7	218.2	<b>2.7</b>
D901313 MOUNTRAIL (+)	3	20.0	0.0	0.7			6.9	563.7	<b>6.9</b>
MEANS (For Entries Listed)		3.6	0.5						<b>1.8</b>
5/ Growing Season Precipitation (in.)			n/a	5.0	8.3		6.6		
Soil PAW (in.) to SD @ Planting			13.7	9.8	n/a		11.7		
Total Plant Available Water (in.)			n/a	14.8	n/a		14.8		
Soil NO3 (lbs.) to SD at Planting			257	251	n/a		254.0		
SD (Sampling Depth in Inches)			48	48	48		48.0		
Fertilizer Applied									
	(# N)		100	100	125		108.3		
	(# P <sub>2</sub> O <sub>5</sub> )		20	20	20		20.0		
	(# K <sub>2</sub> O)		10	10	10		10.0		
	(# S)		-	-	10		10.0		

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/ 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.