

TITLE: North Central Montana Off-Station Spring Durum Variety Performance Evaluations (NARC, 4W4144).

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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 29.7 percent of the 2007-2011 statewide totals (43 percent for winter wheat and 19 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 wheat 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 2012 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 16 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 rotary mower. 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. Other variables specific to each individual trial are listed with the current year data tables.

RESULTS:

Cropping environments in 2012 were fair across north central Montana. Both the Turner and Loring locations had higher than normal precipitation early in the spring; however, the rainfall was untimely and not spread across critical growth stages. At Havre, annual growing season precipitation (9/1/11 through 8/31/12) was 9.46 inches, 21 percent lower than the average for all years since 1916. April 1 through July 31 precipitation was 7.33 inches or 108 percent of the 97-year average. Heat units expressed as "Growing Degree Days" (GDD, base 50) from May through July totaled 1092, 85 percent of the average for the last 62 years (1951-2012). The last spring frost and first fall frost of 2012 were both later than the 97-year average resulting in 125 frost-free days. The minimum winter temperature was -22 degrees F on January 18. Overall, the growing season was warmer than normal. Crop outlook was initially very good with adequate fallow-stored soil moisture and generally favorable conditions. Spring seeded crop performance in some areas was poorer than expected due to lack of timely precipitation in June followed by steady winds and higher than normal temperatures. The April through July growing season saw an average daily temperature of 58.4 degrees F, 1.2 degrees above normal. July and August average temperatures were 3.5 percent higher than normal with the high for 2012 recorded on July 10, 24, 25 and August 7 at 98 degrees F. There were 29 days with temperatures 90 degrees F or above, with no days over 100 degrees F.

Following a substantially damaging hailstorm during the first week of June and another minor hail event in August, spring durum yields at Turner averaged 22 bu/ac. Experimental line 'MT 06584' was the highest yielding entry at 27.5

bu/ac (Table 1). Publically available varieties 'Alkabo', 'Strongfield', 'Normanno' and 'Westhope' along with experimental line MT05166 produced yields statistically equal to that of MT 06584. Sawfly cutting in the small plot situation ranged from minimal to moderate with 1 percent cutting in Normanno and 27 percent cutting in 'Tioga' and 'Mountrail'.

Loring spring durum yields averaged 25 bu/ac with experimental line MT05183 producing the highest yield at 27.6 bu/ac (Table 2). Alkabo, Tioga, 'Grenora', Normanno, Westhope and 'Silver' produced yields statistically equal to that of MT05183. Sawfly cutting was minimal in the durum at Loring, ranging from 1 to 13 percent.

Stand percent, plant height, yield, moisture, test weight, protein and sawfly cutting data, where appropriate, for the 2012 Cederberg (Turner) and 2012 Flansaas/Lumsden (Loring) dryland spring durum trials are summarized in Tables 1 and 4, respectively.

FUNDING SUMMARY:

Expenditure information for grant index 4W4144 is to be provided by Montana State University, Office of Sponsored Programs. There is no other grant support for this project.

MWBC FY2013 GRANT SUBMISSION PLANS:

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

This work has been strongly supported by producers near each of the locations, and by the Northern Ag 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 eighteenth 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 2012 marking 25 years at the present Turner site.

TABLE 1. Dryland Fallow Spring Durum Cultivar Evaluation Nursery Grown Off-Station at the Leon Cederberg Farm, Turner. Northern Agricultural Research Center. Havre, Montana. 2012. (Exp# 12-9851-DUR)

ENTRY	CULTIVAR or SELECTION	STAND %	PLNT HT Inches	1/ YIELD Bu/Ac	MOISTURE %	TEST WT Lbs/Bu	2/ PROTEIN %	3/ SAWFLY %
1	Alkabo	90.3	23.2	24.3*	8.6	60.9	13.4	20.0
2	Pierce	85.0	23.8	20.3	8.5	60.8	14.1	23.3
3	Tioga	90.0	25.0	21.9	8.4	60.4	14.3	26.7
4	Grenora	92.3	21.4	22.4	8.3	60.1	13.3	21.7
5	Strongfield	91.3	24.4	24.1*	8.4	60.6	14.3	15.0
6	Divide	86.3	22.9	20.4	8.6	61.0	13.8	13.3
7	Alzada	80.3	21.6	19.5	8.3	60.8	13.8	16.7
8	Mountrail	90.3	22.5	22.6	8.4	60.1	13.4	26.7
9	Normanno	93.3	18.4	24.6*	8.4	59.7	13.6	1.0
10	Belfield	79.7	20.6	18.2	8.6	61.2	13.8	18.3
11	Westhope	90.3	22.0	24.8*	8.4	60.8	13.3	13.3
12	Silver (MSU, 2012)	88.7	19.5	18.7	8.3	60.7	14.0	18.3
13	MT06584	89.7	21.0	25.7**	8.6	60.6	13.2	10.0
14	MT05158	82.3	22.0	21.6	8.7	62.8	13.5	10.0
15	MT05166	86.3	21.0	24.8*	8.7	61.5	13.3	3.7
16	MT05183	88.7	21.1	22.6	8.7	61.3	13.6	10.0
EXPERIMENTAL MEANS		87.8	21.9	22.3	8.5	60.8	13.7	15.5
LSD (0.05)		8.1	1.5	2.2	0.2	0.6	-	8.8
C.V. %		5.5	4.0	6.0	1.7	0.6	-	34.1
P-VALUE (Varieties)		0.0	<.0001	<.0001	0.0	<.0001	-	<.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.

** = indicates highest value within a column.

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

Management Information (12-9851-SW)

Seeding Date: May 4, 2012

Harvest Date: August 27, 2012

Fertility: 70-40-25 side banded

System: no till

Herbicide: none

Insecticide: none

Previous Crop: Chemical Fallow - Durum

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. 2003-2012. (Exp# 9851-SW)

2/ VARIETY or SELECTION		No. of YEARS TESTED 3/	1/ YIELD (Bushels Per Acre)							TEST WEIGHT (Pounds Per Bushel)								
			2008	2009	2010	2011	2012	AVE. for YEARS TESTED 3/	% of CHECK YIELD 4/	10-YR COMP. AVE YIELD 5/	2008	2009	2010	2011	2012	AVE. for YEARS TESTED 3/	% of CHECK TEST WT 4/	10-YR COMP. AVE TEST WT 5/
D901313	MOUNTRAIL (+)	10	15.3	35.4	15.4	26.8	22.6	26.6	100.0	27.8	57.6	60.2	56.0	61.2	60.1	58.6	99.9	58.7
PIERCE	PIERCE (+)	9	14.8	32.9	15.5	26.1	20.3	25.7	100.0	27.8	57.0	60.9	56.7	62.1	60.8	59.5	100.0	58.8
YU894-75	ALZADA (P+)	7	17.1	29.1	28.1	24.4		27.2	114.7	31.9	57.4	60.6	56.2	61.3		58.3	100.5	59.0
ALKABO	ALKABO (+)	7	14.8	31.9	17.3	23.9	24.3	21.9	100.0	27.8	57.4	60.8	57.0	62.7	60.9	59.2	100.0	58.8
DIVIDE	DIVIDE	7	17.2	29.9	14.6	25.2	20.4	20.7	94.8	26.3	57.3	60.0	55.2	61.6	61.0	58.4	98.7	58.0
GRENORA	GRENORA (+)	7	15.4	35.4	24.9	26.6	22.4	24.2	110.6	30.7	56.5	60.6	55.6	61.3	60.1	58.1	98.1	57.6
STRONGFIELD	STRONGFIELD (+)	7	19.4	36.5	27.0	25.5	24.1	25.4	116.3	32.3	57.5	59.9	56.0	60.9	60.6	58.3	98.3	57.8
MT03012	SILVER (++)	7	16.5	33.0	26.2	24.8	18.7	23.6	105.6	29.3	56.9	60.1	55.4	61.0	60.7	58.1	98.0	57.6
DILSE	DILSE (+)	5	12.8	31.2				29.5	100.0	27.8	56.9	60.4				59.2	100.0	58.8
NORMANNO	NORMANNO	4		40.9	33.1	8.7	24.6	26.8	107.0	29.7		59.8	55.8	59.8	59.7	58.8	99.0	58.2
TIOGA	TIOGA	3			9.4	26.7	21.9	19.3	89.5	24.9			52.9	62.2	60.4	58.5	99.0	58.2
MEANS (For Entries Listed)			15.9	33.6	21.1	23.9	22.1			28.8	57.2	60.3	55.7	61.4	60.5			58.3
6/ Grow ing Season Precipitation (in.)			6.6	6.0	10.3	8.3	8.3	7.5										
Soil PAW (in.) to SD @ Planting			8.1	7.8	9.0	7.9	9.4	7.9										
Total Plant Available Water (in.)			14.6	13.8	19.2	16.2	9.4	14.6										
Soil NO3 (lbs.) to SD at Planting			71	94	162	51	12	88										
SD (Sampling Depth in Inches)			48	48	48	48	48	48										
Fertilizer Applied			(# N)	70	70	70	70	70	70									
			(# P ₂ O ₅)	40	40	40	40	40	40									
			(# K ₂ O)	25	25	25	25	25	25									

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. 2003-2012. (Exp# 9851-SW)

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/
			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012			
NORMANNO	NORMANNO	4							0.7	2.3	1.0	1.0	1.3	5.7	1.3
STRONGFLD	STRONGFIELD (+)	7				16.7	10.0	2.3	10.0	13.3	10.0	15.0	11.0	45.0	10.1
YU894-75	ALZADA (P+)	8			10.0	20.0	6.7	2.3	8.3	8.3	15.0	16.7	10.9	46.4	10.4
MT03012	SILVER (++)	7				11.7	11.7	2.3	5.7	18.3	18.3	18.3	12.3	50.3	11.3
DIVIDE	DIVIDE	7				26.7	13.3	3.7	5.0	18.3	16.7	13.3	13.9	56.5	12.7
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
DILSE	DILSE (+)	5		30.0	15.0	50.0		8.3	15.0				23.7	100.0	22.5
D901313	MOUNTRAIL (+)	10	5.0	31.7	16.7	48.3	25.0	10.0	8.3	21.7	31.7	26.7	22.5	100.0	22.5
ALKABO	ALKABO (+)	7				48.3	25.0	15.0	8.7	21.7	46.7	20.0	26.5	108.0	24.3
GRENORA	GRENORA (+)	7				50.0	33.3	11.7	15.0	25.0	38.3	21.7	27.9	113.6	25.6
TIOGA	TIOGA	3								21.7	23.3	26.7	23.9	179.2	40.3
MEANS (For Entries Listed)			5.0	28.9	15.4	35.0	18.3	7.1	8.8	17.4	23.4				18.4
5/ Grow ing Season Precipitation (in.)			3.1	13.7	9.7	2.5	7.0	6.6	6.0	10.3	8.3	8.3	7.5		
Soil PAW (in.) to SD @ Planting			7.0	7.4	8.0	8.8	5.8	8.1	7.8	9.0	7.9	9.4	7.9		
Total Plant Available Water (in.)			10.1	21.1	17.7	11.3	12.8	14.6	13.8	19.2	16.2	9.4	14.6		
Soil NO3 (lbs.) to SD at Planting			160	104	84	64	81	71	94	162	51	12	88		
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	70	70		
			(# P ₂ O ₅)	40	40	40	40	40	40	40	40	40	40		
			(# K ₂ O)	25	25	25	25	25	25	25	25	25	25		

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. 2012. (Exp# 12-9855-DUR)

ENTRY	CULTIVAR or SELECTION	STAND %	PLNT HT Inches	1/ YIELD Bu/Ac	MOISTURE %	TEST WT Lbs/Bu	2/ PROTEIN %	3/ SAWFLY %
1	Alkabo	91.0	22.3	26.9*	7.9	60.7	14.1	8.3
2	Pierce	91.4	21.7	21.3	7.9	61.0	14.7	13.3
3	Tioga	83.4	24.1	26.2*	8.0	60.8	15.2	10.0
4	Grenora	89.0	21.2	25.7*	7.8	59.5	14.6	8.3
5	Strongfield	90.0	22.7	24.2	8.0	60.3	14.7	3.7
6	Divide	86.1	22.5	24.1	8.1	60.9	14.9	3.7
7	Alzada	83.0	20.6	24.0	8.0	60.5	14.2	5.0
8	Mountrail	88.4	21.1	24.7	7.8	59.1	14.4	11.7
9	Normanno	91.1	18.6	26.7*	7.9	59.3	14.9	1.0
10	Belfield	85.8	19.7	22.2	8.1	60.8	14.5	3.7
11	Westhope	92.7	21.1	25.7*	8.0	60.5	15.1	3.7
12	Silver (MSU, 2012)	89.7	20.0	25.8*	8.0	60.4	14.5	3.7
13	MT06584	90.3	19.7	24.1	8.0	60.1	14.3	1.0
14	MT05158	90.3	20.5	24.1	8.2	62.6	14.1	1.0
15	MT05166	89.7	20.3	22.9	8.1	61.3	14.2	1.0
16	MT05183	87.0	19.3	27.6**	8.0	61.1	14.5	1.0
EXPERIMENTAL MEANS		88.7	21.0	24.8	8.0	60.6	14.5	5.0
LSD (0.05)		9.5	1.6	2.1	0.2	0.7	-	4.8
C.V.%		6.4	4.5	5.0	1.3	0.7	-	57.5
P-VALUE (Varieties)		0.7	<.0001	<.0001	0.0	<.0001	-	<.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.

** = indicates highest value within a column.

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

Management Information (12-9855-SW)

Seeding Date: May 4, 2012

Harvest Date: August 27, 2012

Fertility: 70-40-25 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: not available