

Project Title: Off-Station spring wheat variety performance trials in Central Montana – CARC

Project Leader: Jed Eberly Assistant Professor

Project Personnel: Luther Talbert MAES spring wheat breeder, Bozeman
Hwa-young Heo MAES Res. Assoc. spring wheat breeder, Bozeman
Eva Magnuson Research Associate, CARC Moccasin
Jenni Hammontree Research Assistant, CARC Moccasin

Cooperators: Chuck Davis Geraldine
Andy and Ron Long Highwood
Richard Barber Denton

Objectives:

Identify top performing spring wheat cultivars in central Montana.

Methods:

Spring wheat variety performance trials were conducted on chemical fallow or minimal tillage during 2019 at Moccasin, Geraldine, Denton, and Highwood. Trials consisted of both named varieties of spring wheat and additional experimental lines. Each variety was seeded in three 5 row, 5 x 16-foot plots in a randomized experimental design. Starter fertilizer, 20-30-20-10 NPKS, was applied at seeding at a rate of 50 lb/ac. Broadleaf and grass weeds were controlled with a burndown of glyphosate at 1.25 pt/ac prior to planting. Seeding dates were April 17 at Moccasin, April 19, at Highwood, and May 4 at Denton. All plots were trimmed to a harvest length of approximately 12 feet and harvested with a small plot combine. Plots were harvested on August 9 at Moccasin, August 16 at Denton, and August 22 at Highwood.

Results:

The Central Agricultural Research Center received 5.58 inches of precipitation in April and May alone, or 1.72 inches above normal. Above normal snowpack and wetter-than-average spring conditions delayed planting of some 2019 spring crops. The 2019 average annual air temperature (41°F) was 1.8°F below the 108-yr average and 3.1°F below the 30-yr average. Annual precipitation (18.45 in) was 3.1 inches over the 110-yr average and 3.85 inches over the 30-yr average. The maximum air temperature at 92°F on 23 July and 3 August, two of only three days in the 2019 crop year when temperatures surpassed 90°F.

Table 1 shows the average height, yield, and test weight for the named varieties tested at the Moccasin location. The average yield for the spring wheat trial at Moccasin in 2019 was 51.4 bu/ac. Differences in grain yield were not significant across the varieties ($p > 0.05$). The average heading date was 5 July with the earliest varieties heading on 3 July. Average protein was 13.9% with Duclair, Egan, and Fortuna among the top performers at 14.6%. Average yield for all varieties at Denton was 38.2 bu/ac (Table 2). The top yielding varieties were Vida (44.8 bu/ac), Lanning (43.7 bu/ac), NS Presser CLP (41.9 bu/ac), Duclair (41.7 bu/ac), MS Barracuda (41.3), Reeder (40.5 bu/ac). Average protein was 13.4% and differences in protein were not significant between varieties. Average yield for varieties at Geraldine was 47.9 bu/ac, a dramatic drop from last year's average of 71.2 bu/ac (Table 3). This could be due to the sawfly damage observed at this location. The top yielding variety at Geraldine was Vida at 55.0 bu/ac. Average protein at Geraldine was 13.3%. Top varieties for protein were Egan (14.7%), and SY Soren (14.0%). Average yield for all varieties at Highwood was 43.4 bu/ac (Table 4). No statistically significant difference was observed between varieties ($p = 0.3150$).

Summary:

Cooler and wetter conditions contributed to high average yields but resulted in a later than usual harvest. Average yield for spring wheat at Moccasin in 2019 was 51.4 bu/ac. Varietal differences in yield were not detected ($P > 0.05$). Average yields were 38.3 bu/ac at Denton, 47.9 bu/ac at Geraldine, and 43.4 bu/ac at Highwood. Average protein was 14.2% and differences in protein was not significant among varieties.

Funding Summary:

An expenditure summary will be provided by OSP. No additional grant support was provided for this project.

MWBC FY 2020 Grant Submission Plans:

A request for continuing this project was submitted for funding consideration for the next fiscal year. Funding was awarded. Thank you!

Table 1: Spring wheat variety trial at Moccasin, MT.

Variety/Pedigree	Year of Release	Source	Heading date		Height (in)	Test Weight (lb/bu)	Protein (%)	Grain Yield (bu/ac)			
			cal	jul				2017	2018	2019	3 yr avg
ALUM	2014	WSU	7-Jul	188	31.0	55.5	13.6	29.6	48.3	45.4	41.1
MS Barracuda		Meridian Seeds	3-Jul	184	29.3	57.3	13.2		43.7	56.9	
BRENNAN	2009	Syngenta/AgriPro	4-Jul	185	29.3	<u>58.9</u>	14.1	35.2	39.2	52.2	42.2
MS Camaro		Meridian Seeds	4-Jul	185	29.0	58.5	14.3	33.4	35.8	50.1	39.8
MS Cheville		Meridian Seeds	5-Jul	186	30.0	53.6	13.5	33.8	49.1	47.1	43.3
CHOTEAU	2003	MAES	6-Jul	187	30.3	55.2	13.6	28.3	43.1	47.0	39.5
CORBIN	2006	Westbred, LLC	5-Jul	186	32.3	55.7	13.5	31.1	46.0	48.0	41.7
DUCLAIR	2011	MAES	4-Jul	185	31.7	54.0	14.6	32.1	50.8	48.4	43.8
EGAN	2013	Westbred, LLC	7-Jul	188	31.7	55.9	14.6	32.5	43.5	57.9	44.6
FORTUNA	1966	MAES/NDSU	8-Jul	189	39.3	55.2	14.6	39.5	40.5	43.5	41.2
LANNING	2016	MAES	3-Jul	184	30.0	56.4	13.2	33.8	43.0	56.4	44.4
LCS PRO	2015	LIMAGRAIN	5-Jul	186	35.3	55.2	13.2	30.1	42.7	55.2	42.7
NS PRESSER CLP	2016	MAES	8-Jul	189	31.3	53.7	13.2	32.1	50.7	52.9	45.2
REEDER	1999	NDSU	7-Jul	188	33.0	56.7	14.3	33.0	48.2	49.3	43.5
SY INGMAR	2015	Syngenta/AgriPro	7-Jul	188	31.3	56.4	14.5	33.7	40.7	58.5	44.3
SY SOREN	2011	Syngenta/AgriPro	5-Jul	186	27.7	55.9	14.4	31.2	45.4	52.3	43.0
VIDA	2005	MAES	7-Jul	188	31.7	54.3	13.5	31.1	50.0	55.1	45.4
WB GUNNISON	2011	Westbred, LLC	5-Jul	186	29.0	56.2	13.3	32.7	48.0	48.4	43.0
Average			186	186	31.3	55.6	13.9	32.0	44.5	51.4	
LSD (0.05)			1.5	1.5	2.3	2.5	0.8	N.S.	N.S.	15.0	
CV (%)			0.5	0.5	4.5	2.7	3.7	8.4	11.4	4.5	
P-value			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.3672	0.0570	0.5620	

+ = New for 2019

Bolded and underlined values are the highest mean. Bolded values are not different from the highest value based on the Least Significant Difference (LSD) test

Note: Study averages include experimental lines not listed here.

N.S. = Not Significant

Table 2: Spring wheat variety trial at Denton, MT.

Variety/Pedigree	Year of Release	Source	Height (in)	Test Weight (lb/bu)	Protein (%)	Grain Yield (bu/ac)			
						2017	2018	2019	3 yr avg
ALUM	2014	WSU	26.0	59.2	12.6	18.2	34.1	37.1	29.8
MS Barracuda		Meridian Seeds	26.7	58.3	13.9		29.6	41.3	
BRENNAN	2009	Syngenta/AgriPro	28.0	59.1	14.0	20.5	26.8	32.4	26.6
MS Camaro		Meridian Seeds	27.3	59.1	14.6	26.0	26.3	35.4	29.2
MS Cheville		Meridian Seeds	26.7	57.7	12.3	35.8	34.9	37.8	36.2
CHOTEAU	2003	MAES	26.3	57.6	13.0	20.1	28.3	38.3	28.9
CORBIN	2006	Westbred, LLC	26.7	56.4	13.5	18.2	29.7	34.0	27.3
DUCLAIR	2011	MAES	26.7	58.3	12.2	21.8	29.5	41.7	31.0
EGAN	2013	Westbred, LLC	28.7	58.2	14.7	18.6	25.4	35.4	26.5
FORTUNA	1966	MAES/NDSU	31.7	56.8	13.9	16.9	29.7	31.3	26.0
LANNING	2016	MAES	29.0	58.7	13.0	21.5	29.6	43.7	31.6
LCS PRO	2015	LIMAGRAIN	29.3	58.7	13.0	19.0	30.6	35.5	28.4
NS PRESSER CLP	2016	MAES	27.7	57.8	12.2	16.6	29.7	41.9	29.4
REEDER	1999	NDSU	28.7	59.3	14.9	17.2	27.8	40.5	28.5
SY INGMAR	2015	Syngenta/AgriPro	26.3	59.0	14.4	16.1	18.1	35.0	23.1
SY SOREN	2011	Syngenta/AgriPro	29.0	58.5	14.2	17.5	27.9	38.6	28.0
VIDA	2005	MAES	27.3	57.5	13.3	19.8	<u>31.5</u>	44.8	32.0
WB GUNNISON	2011	Westbred, LLC	28.0	<u>60.1</u>	12.0	19.3	30.5	39.9	29.9
Average			27.8	58.2	13.4	20.0	29.1	38.2	
LSD (0.05)			2.7	1.8	2.3	N.S.	N.S.	7.0	
CV (%)			5.9	1.9	10.6	15.2	14.6	11.2	
P-value			0.0380	0.0090	0.3850	<0.0001	0.0500	0.0390	

+ = New for 2019

Bolded and underlined values are the highest mean. Bolded values are not different from the highest value based on the Least Significant Difference (LSD) test

Note: Study averages include experimental lines not listed here.

N.S. = Not Significant

Table 3: Spring wheat variety trial at Geraldine, MT.

Variety/Pedigree	Year of Release	Source	Height (in)	Test Weight (lb/bu)	Protein (%)	Grain Yield (bu/ac)		
						2018	2019	2 yr avg
ALUM	2014	WSU	30.0	<u>61.9</u>	12.7	67.2	47.1	57.2
MS Barracuda		Meridian Seeds	27.0	60.3	13.1	70.0	47.6	58.8
BRENNAN	2009	Syngenta/AgriPro	29.0	<u>61.9</u>	14.0	67.0	48.0	57.5
MS Camaro		Meridian Seeds	28.0	<u>62.3</u>	13.7	62.8	46.2	54.5
MS Cheville		Meridian Seeds	28.0	60.3	12.3	79.5	50.7	65.1
CHOTEAU	2003	MAES	29.0	60.1	13.4	79.1	46.6	62.9
CORBIN	2006	Westbred, LLC	28.7	59.8	13.5	76.8	45.4	61.1
DUCLAIR	2011	MAES	29.0	59.9	12.9	70.6	47.0	58.8
EGAN	2013	Westbred, LLC	31.3	59.3	<u>14.7</u>	68.1	48.8	58.5
FORTUNA	1966	MAES/NDSU	35.0	60.9	13.5	59.1	41.7	50.4
LANNING	2016	MAES	29.0	59.9	13.1	70.6	49.8	60.2
LCS PRO	2015	LIMAGRAIN	31.0	59.8	13.2	73.2	47.2	60.2
NS PRESSER CLP	2016	MAES	31.0	58.7	12.3	72.7	46.9	59.8
REEDER	1999	NDSU	31.3	60.8	13.5	71.3	48.7	60.0
SY INGMAR	2015	Syngenta/AgriPro	28.7	61.8	13.6	67.2	48.7	58.0
SY SOREN	2011	Syngenta/AgriPro	28.3	60.2	14.0	73.9	48.4	61.2
VIDA	2005	MAES	29.3	60.3	12.2	<u>82.0</u>	<u>55.0</u>	68.5
WB GUNNISON	2011	Westbred, LLC	28.0	61.3	12.8		43.3	43.3
Average			29.8	60.3	13.3	71.2	47.9	
LSD (0.05)			1.2	1.0	0.9	10.5	4.5	
CV (%)			2.6	1.0	4.1	9.0	5.7	
P-value			<0.0001	<0.0001	<0.0001	0.0050	0.0005	

+ = New for 2019

Bolded and underlined values are the highest mean. Bolded values are not different from the highest value based on the Least Significant Difference (LSD) test

Note: Study averages include experimental lines not listed here.

N.S. = Not Significant

Table 4: Spring wheat variety trial at Highwood MT

Variety/Pedigree	Year of Release	Source	Height (in)	Test Weight (lb/bu)	Protein (%)	Grain Yield (bu/ac)			
						2017	2018	2019	3 yr avg
ALUM	2014	WSU	23.7	61.5	14.2	37.7	39.7	42.5	40.0
BRENNAN	2009	Syngenta/AgriPro	23.3	62.6	15.3	27.6	32.9	40.0	33.5
CHOTEAU	2003	MAES	24.3	63.1	13.9	37.7	39.8	40.1	39.2
CORBIN	2006	Westbred, LLC	23.3	61.8	14.5	28.6	37.2	46.4	37.4
DUCLAIR	2011	MAES	22.0	62.5	14.5	32.0	35.1	41.6	36.2
EGAN	2013	Westbred, LLC	22.7	61.6	14.0	37.5	39.9	51.9	43.1
FORTUNA	1966	MAES/NDSU	23.7	61.9	13.7	30.1	35.0	43.6	36.2
LANNING	2016	MAES	24.7	62.5	14.1	<u>40.3</u>	37.0	45.0	40.8
LCS PRO	2015	LIMAGRAIN	23.0	62.5	14.2	31.2	42.1	42.5	38.6
NS PRESSER CLP	2016	MAES	22.3	62.6	14.5	34.7	40.8	43.9	39.8
REEDER	1999	NDSU	26.3	62.0	14.3	37.0	44.7	36.9	39.5
SY INGMAR	2015	Syngenta/AgriPro	23.7	62.6	14.0	37.8	44.8	44.4	42.3
SY SOREN	2011	Syngenta/AgriPro	24.7	62.8	14.4	34.2	24.3	43.7	34.1
VIDA	2005	MAES	24.0	62.5	14.2	34.9	36.7	44.5	38.7
WB GUNNISON	2011	Westbred, LLC	22.7	63.0	14.5	29.7	25.7	42.7	32.7
Average			23.7	62.3	14.2	32.5	34.9	43.4	
LSD (0.05)			2.8	1.7	1.2	7.0	N.S.	9.3	
CV (%)			7.2	1.6	5.1	13.1	24.0	12.9	
P-value			0.4710	0.5310	0.4190	<0.0001	0.0580	0.3150	

+ = New for 2019

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Note: Study averages include experimental lines not listed here.

N.S. = Not Significant