

**Project Title:** Off-station winter wheat cultivar evaluations for the Western Golden Triangle area of Montana

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**Personnel:** John H. Miller, Research Associate and Julie Prewett, Research Assistant WTARC, Conrad, MT, and Phil Bruckner and Jim Berg, MSU PSPP., Bozeman, MT.

**Cooperators:** Bradley Farms, north of Cut Bank, MT  
Brian Aklestad, north of Devon, MT  
Aaron Killion, east of Brady, MT  
Inbody Farms, northeast of Choteau, MT

**Objectives:** There are diverse cropping environments within the area served by Western Triangle Agricultural Research Center. Each off station location has its own unique environment and soils. Producers in the various locations are interested in variety performance in the local area. To this end the objective is to evaluate winter wheat varieties under the local conditions with respect to yield, test weight, plant height, and seed protein. The environmental conditions at the off station nurseries can vary greatly from those at WTARC. The research center strives to provide growers of the western triangle area unbiased information of various winter wheat varieties.

**Methods:** Off station winter wheat nurseries consist of 25 entries replicated three times, seeded with a four row plot seeder on one foot spacing. All plots were planted on no-till chemical fallow. Plots were trimmed, measured for length, and then harvested with a Hege 140 plot combine. Winter wheat seed was cleaned prior to collecting data. Orange wheat blossom midge pheromone traps were installed at each off station plot.

**Results:** Off station plots were harvested at Choteau, Cut Bank, Devon, and the 'Knees'. Data for Choteau and Devon are not presented as the stands were very poor. The data are presented in Tables 1 thru 3, with soil test results presented in Table 4.

The soils were generally dry at the surface when seeding winter wheat during the fall of 2014. The precipitation in September and October was below the 29 average, with a cooler September and a warmer October. With a much cooler November than normal.

Overall, the crop year temperature where close to the 29 year average at the research center with the exception of 2.5 inches less moisture than the 29 year average. The winter temperature was close to average, with the exception of November being 8 degrees cooler than usual. With March being 7 degrees warmer than the normal. Also June was 4.6 degrees warmer compared to the 29 year average.

Soil temperatures at the station under chemical fallow stubble stayed under 40 degrees at a depth of eight inches until mid-April. May was cool and wet. Early in June we received 0.95 inches,

then it warmed up and remained dry for about 30 days, during that time the winter wheat was running out of water as it was heading. July had normal amounts of rain.

Grain yields at the 'Knees' were 4.8 bu/ac higher and test weights were 1.0 lb/bu lower than the four year average. Protein at the 'Knees' were slightly lower to the four year average. Plots at Cut Bank did well with the winter weather not disrupting the growth cycle. There is no long term table for Cut Bank as the plot has been destroyed by hail and one spray accident the last three of 5 years. The plots in Devon and Choteau had very poor stands and the data was not conclusive to give adequate information for this year.

Top yielders at the 'Knees' include Montana State University experimental line MT1138, SY Wolf, Montana State University experimental line MTS1224 at 78.1, 72.5, and 71.6 bu/ac. At Cut Bank, the top yielding wheat's were WB3768, Montana State University experimental lines MT1257 and new Montana State University release Northern (2015) with yields of 65.1, 64.0, and 63.6 bu/ac.

Insignificant amount of adult of orange wheat blossom midge were found at the off station locations.

**Summary:** The data from the off station plots is supported by the local producers and advisory committee as well as the seed industry. It is planned to continue the off station variety plots at the same locations as the environmental conditions at each location is unique to the western triangle area. No insect incidence or damage was noticed in any of the varieties.

These data should be used for comparative purposes rather than using absolute numbers. Statistics are used to indicate that treatment or variety differences are really different and are not different due to chance or error. The least significant difference (LSD) and coefficient of variability (CV) values are useful in comparing treatment or variety differences. The LSD value represents the smallest difference between two treatments at a given probably level. The LSD at  $p=0.05$  or 5 % probability level is usually the statistic reported, and it means that the odds are 19 to 1 that treatment differences by the amount of the LSD are truly different. The CV value measures the variability of the experiment or variety trial, and a CV greater than 15 % indicates a high degree of variability and less accuracy.

**Funding Summary:** Office of the Sponsored Programs will provide expenditure information. No other grants support this project.

MWBC FY2016 Grant Submission Plans: A similar project will be proposed for FY 2016. The continuation of on and off-station variety trials help elucidate researchers and farmers which varieties are better suited for that particular region in Montana.

Table 1. Off-station Winter Wheat variety trial located north of Cut Bank, MT.  
Glacier county. Western Triangle Ag. Research Center. 2015.

Variety or ID	Yield bu/ac	Test Wt lb/bu	Plant Height inches	Protein %
WB3768	65.1	60.5	30.4	12.5
MT1257	64.0	59.8	30.3	12.4
Northern (MT0978)	63.6	60.8	28.0	12.8
MT1265	63.1	60.8	29.3	12.5
Yellowstone	63.5	59.7	30.0	12.5
MT1296	61.4	61.1	29.0	12.1
SY Wolf	59.5	60.5	27.3	12.6
Genou	58.7	58.8	32.0	12.7
Colter	58.2	59.9	28.0	12.5
MTS0826-63	57.9	59.4	28.0	12.7
MT1117	57.2	60.8	30.7	12.6
Bearpaw	57.3	58.4	28.3	12.4
MT1138	56.0	59.6	29.7	12.2
Jerry	55.9	59.1	29.0	12.2
Decade	55.7	59.7	27.3	12.8
MTS1224	55.6	60.2	25.3	12.3
MT1078	54.3	59.1	26.3	11.8
Broadview	54.1	58.4	26.0	11.6
CDC Falcon	53.6	58.3	27.7	12.6
Judee	52.9	61.2	26.0	12.6
SY Clearstone 2CL	50.0	60.0	29.0	12.9
MTCS1204	47.6	60.1	30.7	12.5
WB-Quake	47.4	59.9	27.7	12.1
Rampart	40.7	59.8	26.3	13.2
Warhorse	34.1	60.1	27.3	12.7
Mean	55.5	59.9	28.4	12.5
LSD (.05)	10.9	0.9	3.4	ns
C.V.(%)	9.9	0.9	7.1	3.8
P-Value	<0.0001	<0.0001	0.0167	0.2462

Cooperator and Location: Bradley Farms, northern Glacier county.

Planted 10/7/2014 on chem-fallow. Harvested 8/24/2015.

Fertilizer, actual lbs/ac: 11-22.5-0 with seed at planting, topdressed with 163-0-20 on 3/9/2015. Sprayed with Huskie at 11 oz/ac and Axial XL at 16.4 oz/ac on 6/4/2015.

Precipitation: 4.20 inches

\*\* = Solid stem sawfly-resistant (solid stem score of 19 or higher). \* = Less preferred by sawfly (behavioral preference) in small plots. Conducted by MSU Western Triangle Ag. Research Center.

Table 2. Off-station Winter Wheat variety trial located near the Knees, Chouteau County, Western Triangle Ag. Research Center, 2015.

Variety or ID	Yield bu/ac	Test Wt. lb/bu	Plant Height inches	Lodging %	Protein %
MT1138	77.1	58.6	34.3	17.7	10.5
MTS1224	73.2	58.7	32.7	6.7	11.5
Colter	72.1	59.1	36.3	15.3	10.4
SY Wolf	71.7	60.8	32.3	6.7	10.1
MT1257	71.1	58.2	34.3	19.5	11.0
MT1078	70.1	57.1	33.0	9.7	11.1
Northern (MT0978)	70.0	59.3	32.3	23.6	11.4
Decade	69.5	59.2	33.7	4.8	10.2
SY Clearstone	69.5	57.8	35.7	23.1	10.5
WB3768	69.5	59.4	37.0	14.8	10.9
MTS0826-63	69.4	59.6	36.7	16.0	11.3
Yellowstone	68.8	58.6	33.7	23.2	11.0
Warhorse	68.7	59.3	31.3	9.1	11.1
MTCS1204	67.3	60.4	33.3	14.5	11.6
MT1117	65.8	59.8	34.0	11.6	10.7
Broadview	65.5	58.7	33.3	18.2	10.6
MT1286	65.4	59.6	34.3	19.6	11.0
Bearpaw	63.6	58.7	33.3	16.1	11.2
MT1265	62.4	58.5	35.0	18.3	10.6
Judee	59.7	60.0	30.3	13.8	11.6
CDC Falcon	59.0	58.0	31.7	19.7	11.4
Genou	58.0	59.9	36.3	23.4	10.4
Jerry	55.7	58.5	35.7	32.4	11.0
WB Quake	55.0	58.9	31.3	10.8	12.1
Rampart	52.8	60.1	35.0	13.1	11.8
Mean	66.6	59.1	33.9	16.1	11.0
LSD (.05)	10.5	0.7	2.7	11.2	ns
C.V. (%)	8.9	0.7	4.8	39.8	5.9
P-Value	0.0012	<0.0001	0.0002	0.0026	0.1078

Cooperator and Location: Aaron Killion, western Chouteau County.

Planted 10/1/ 2014 on chem-fallow. Harvested 8/6/15.

Fertilizer, actual lbs/ac: 11-22-0 with seed at planting, 105-0-20 broadcast while planting. Spring topdressing took place on 3/5/2015 with 65-0-0. For fertilizer rates a yield goal of 70 bu/a was used.

Pre-plant sprayed with Olympus @ 0.6 oz/ac on 10/1/2015. Precipitation: 1.75

Conducted by MSU Western Triangle Ag. Research Center.

Table 3. Five-year means, Winter Wheat varieties, Knees area, western Chouteau County. 2011-2015.

Variety Or ID	**	5-Year Mean			
		Yield bu/a	Test weight lbs/bu	Plant Height inches	Protein %
Northern (MT0978)		68.9	60.1	30.4	12.9
Yellowstone		65.7	59.4	31.9	12.9
Colter		64.9	59.9	31.7	12.5
SY Clearstone 2CL		64.2	58.8	33.2	12.8
Decade		62.6	60.7	30.6	12.9
Warhorse	**	62.4	60.5	29.2	12.6
CDC Falcon		58.4	60.3	28.1	13.0
Judee		57.5	61.0	28.4	13.3
WB-Quake	**	56.7	60.3	29.4	12.9
Jerry	**	53.4	59.3	32.8	13.0
Bearpaw	**	53.1	60.0	29.5	13.0
Rampart	**	50.9	60.5	31.7	13.4
Genou	**	49.9	60.5	32.3	13.0
Mean		58.6	60.1	30.7	12.9

\*\* = Solid stem sawfly-resistant (solid stem score of 19 or higher).

Cooperator and Location: Aaron Killion, western Chouteau County.

Conducted by MSU Western Triangle Ag. Research Center.

Table 4. Soil test values for off-station and on-station plots, 2015.

Location	N (lbs/ac) <sup>1</sup>	Olsen-P (ppm)	K (ppm)	pH	OM (%)	EC (mmhos/cm)
Cut Bank	8.3	21	355	7.7	2.1	0.61
Devon	11.4	11	388	7.2	1.1	0.33
Knees	23.3	11	652	8.1	2.8	0.69
Choteau	67.6	10	664	8.1	2.9	0.59
WTARC	15.1	17	375	7.8	2.4	0.47

<sup>1</sup>Nitrogen soil samples were to a depth of four feet in one foot increments. All other soil tests were for zero to six inches in depth.

WTARC- Western Triangle Ag. Research Center