



RESULTS OF AGRONOMIC AND WEED SCIENCE RESEARCH CONDUCTED IN SOUTH CENTRAL MONTANA – 2016

The Annual Report of the Investigations at and Administration of the
Southern Agricultural Research Center, Huntley, Montana

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- PROJECT TITLE:** Dryland Advanced and Intrastate Winter Wheat Variety Performance Trials near Huntley, Montana. (Exps. 161408 and 163508).
- PROJECT LEADERS:** Kenneth D. Kephart, Agronomist, SARC, Huntley
Kelli Maxwell, Research Associate Agronomy, SARC, Huntley
- PROJECT PERSONNEL:** Phil L. Bruckner, Winter Wheat Breeder, Bozeman
James E. Berg, Research Associate, Bozeman
Tom A. Fischer, Research Specialist and Farm Foreman, SARC, Huntley
David May, Research Associate Agronomy, SARC, Huntley
Janna Kransky, Research Assistant III, SARC, Huntley
- OBJECTIVES:** To provide wheat growers in south central Montana with a reliable, unbiased, up-to-date source of information that will permit valid comparisons among new experimental lines and existing wheat varieties. This information should help winter wheat producers in south central Montana select varieties best suited to their particular area and growing conditions.
- METHODS:** The 2016 dryland Intrastate winter wheat trial had 49 entries while the Advanced winter wheat trial had 36 entries. Both trials were planted using a partially-balanced lattice design with three replications. Test plots in all trials consisted of a 15-foot, 4-row plot with 14-inch row spacing. All rows of each test plot were trimmed 36 inches and harvested using an experimental-plot combine. Recorded grain yields were adjusted to 13% grain moisture content and are reported in bushels per acre based on a 60-pound standard bushel weight. Test weight (pounds per bushel) and percent grain moisture content were obtained for each plot using a Dickey-john GAC 2100 grain analyzer. Grain protein (%) was determined for each entry bulked across replications. Grain protein values were adjusted to 12% grain moisture content. Plant height was measured in inches from the soil surface to the top of the head, excluding the awns if present. Heading date was noted when 50% of the heads in a plot had extended above the flag leaf collar. Heading dates were recorded in Julian days (number of days from January 1) for statistical purposes. Corresponding calendar dates also are presented.
- RESULTS and SUMMARY:** Unusually warm and dry conditions prevailed during the preceding fall and winter months at Huntley (Table 3). Although conditions remained warmer than average during March, April and May of 2016, precipitation also was above average during those months. June growing conditions were much warmer than normal with less than average precipitation.
- Agronomic performance of the cultivars and lines tested in the Intrastate winter wheat trial during 2016 under dryland conditions near Huntley is presented in Table 1. Intrastate yields ranged from 87.7 bu/ac for 'Rampart' to 122.5 bu/ac for 'Avery'. Four cultivars ('Colter', 'Cowboy', 'Northern' and 'Sy Wolf'), and four experimental lines had yields statistically equal to that of the highest yielding entry. Test weights averaged 61.8 lb/bu, with all of the 49 entries having test weights greater than or equal to 60.0 lb/bu. Grain protein averaged 11.4 percent.

Agronomic performance of the Advanced winter wheat cultivars and experimental lines tested during 2016 near Huntley is presented in Table 2. The winter wheat yields ranged from 105.3 bu/ac for 'Decade' to 126.6 bu/ac for 'MT1542'. 'Sy Wolf', 'Yellowstone' and eight experimental lines produced yields between 118.2 and 122.9 bu/ac, statistically equal with that of the highest yielding entry. Test weights averaged 62.3 lb/bu, and 35 of the 36 entries had test weights greater than or equal to 60 lb/bu. Grain protein averaged 11.0 percent.

FUTURE PLANS:

The Intrastate and Advanced Winter Wheat Variety Performance Trials will continue in 2017 at the Southern Agricultural Research Center.

Table 1. 2016 Dryland (Sub-Irrigated) Winter Wheat Intrastate Trial. MSU Southern Agricultural Research Center, Huntley, MT.

Cultivar	Grain ^{1/}	Test	Grain	Grain	Plant	Heading Date	
	Yield	Weight	Moisture	Protein	Height	Julian	Calendar
	- bu/a -	- lb/bu -	- % -	- % -	- inches -		
Avery	122.5**	62.0	11.1	10.6	41.3	154.0	Jun 3
Bearpaw	95.0	61.6	11.1	11.5	39.6	156.0	Jun 5
Brawl CLP	108.8	63.6	11.0	11.4	39.7	150.4	May 30
Broadview	94.4	61.3	11.3	11.2	40.3	156.1	Jun 5
Byrd	108.8	62.0	11.1	10.7	40.5	152.5	Jun 1
BZ9W09-2075	97.7	62.6	10.9	11.7	37.1	155.9	Jun 4
BZ9W09-2212	107.4	61.8	11.4	10.7	39.2	158.1	Jun 7
CDC Falcon	102.6	60.9	10.9	11.3	37.9	154.6	Jun 3
Colter	115.4*	61.7	10.6	11.5	41.3	157.8	Jun 6
Cowboy	116.1*	62.0	11.9	10.4	41.3	154.3	Jun 3
Decade	97.7	61.5	11.1	11.1	39.8	155.0	Jun 4
Freeman	103.7	59.3	10.7	12.2	39.0	152.1	Jun 1
Jerry	89.8	60.7	11.2	12.3	46.3	156.1	Jun 5
Judee	101.7	62.6	11.4	11.3	38.5	157.0	Jun 6
Keldin	113.7	61.6	10.8	11.5	37.0	156.0	Jun 5
Loma (MTS1224)	110.5	62.2	11.1	10.9	38.2	156.9	Jun 5
MT1138	119.6*	61.7	10.8	11.7	41.8	156.7	Jun 5
MT1257	114.0	61.2	11.5	10.7	42.9	156.3	Jun 5
MT1265	112.8	61.3	10.8	11.6	42.0	157.4	Jun 6
MT1332	118.8*	61.8	10.8	11.5	41.1	157.5	Jun 6
MT1348	108.4	61.1	10.7	12.4	40.5	156.1	Jun 5
MT1354	115.2*	62.4	11.2	10.7	41.4	157.5	Jun 6
MT1356	110.5	61.8	11.1	10.9	41.9	156.1	Jun 5
MT1443	111.6	61.8	11.5	11.3	39.4	157.2	Jun 6
MT1444	113.9	61.6	11.4	10.5	41.0	156.1	Jun 5
MT1446	110.4	61.6	11.1	11.8	38.5	157.2	Jun 6
MT1460	108.4	61.7	11.0	11.9	40.6	156.7	Jun 5
MT1465	112.0	62.3	11.0	11.0	37.2	155.9	Jun 4
MT1471	100.0	62.0	10.6	11.9	39.3	154.6	Jun 3
MT1478	107.4	61.3	10.8	11.6	41.5	154.0	Jun 3
MT1488	106.9	62.3	11.2	11.0	39.2	158.1	Jun 7
MTCL1131	113.1	61.7	11.1	11.6	41.7	156.8	Jun 5
MTS1407	101.6	62.3	10.6	12.0	34.9	158.1	Jun 7
MTW1491	114.8*	62.3	11.2	11.0	40.5	157.1	Jun 6
Northern	117.5*	61.8	11.6	11.7	39.9	158.9	Jun 7
PSB13NEDH-14-71	107.6	62.2	11.4	11.3	39.1	153.1	Jun 2
Rampart	87.7	61.9	11.1	12.9	43.7	156.0	Jun 5
SY Clearstone 2CL	112.5	61.3	11.0	11.1	42.4	156.3	Jun 5
SY Monument	113.4	61.1	10.6	11.1	39.7	154.5	Jun 3
SY Sunrise	106.4	62.4	11.0	11.1	33.7	154.0	Jun 3
SY Wolf	117.9*	62.9	11.0	11.7	37.5	154.3	Jun 3

T158	111.4	62.4	11.0	10.6	38.5	149.9	May 29
Warhorse	101.8	61.9	11.8	11.6	38.5	156.2	Jun 5
WB3768	111.7	62.2	11.0	11.7	41.9	159.2	Jun 8
WB4059CLP	96.6	61.4	10.9	11.6	35.7	151.2	May 31
WB4614	108.3	62.1	11.0	10.5	38.9	155.7	Jun 4
WB4623CLP	102.5	63.0	11.2	12.2	37.8	156.5	Jun 5
WB-Quake	95.3	62.0	11.1	11.4	38.5	158.1	Jun 7
Yellowstone	110.2	61.5	10.9	12.1	40.3	157.1	Jun 6
Average	107.9	61.8	11.1	11.4	39.8	155.8	Jun 4
PLSD (p=0.05)	7.8	0.7	0.9	1.0	1.7	1.6	
CV%	4.2	0.7	4.9	4.9	2.5	0.6	
Lattice RE%	113	100	100	114	109	107	

1/ Grain yields are based on a 60-pound per bushel standard bushel weight and adjusted to 13% grain moisture content.

2/ Adjusted means provided for Lattice RE% values equal to or greater than 105%.

Table 2. 2016 Dryland (Sub-Irrigated) Winter Wheat Advanced Trial. MSU Southern Agricultural Research Center, Huntley, MT.

Cultivar	Grain ^{1/} Yield - bu/a -	Test Weight - lb/bu -	Grain Moisture - % -	Grain Protein - % -	Plant Height - inches -	Heading Date	
						Julian	Calendar
Decade	105.3	61.6	10.9	11.1	41.2	155.0	155.0
Judee	105.7	62.6	10.8	10.9	39.9	156.7	156.7
MT1507	122.9*	62.3	10.6	10.9	40.3	156.3	156.3
MT1514	120.0*	62.5	10.6	11.4	43.7	155.3	155.3
MT1519	115.0	61.6	10.4	11.4	38.7	155.7	155.7
MT1521	106.5	64.5	10.9	11.1	39.0	157.3	157.3
MT1536	111.7	61.1	10.4	11.1	40.2	154.0	154.0
MT1540	122.7*	59.9	11.3	10.6	41.8	156.3	156.3
MT1542	126.6**	62.5	10.7	10.8	42.0	157.0	157.0
MT1547	120.6*	62.4	10.3	10.8	39.5	156.0	156.0
MT1549	107.0	62.8	10.7	11.9	38.7	156.7	156.7
MT1551	111.6	62.7	10.5	11.4	41.7	156.0	156.0
MT1561	119.1*	61.7	10.7	10.7	44.3	158.0	158.0
MT1563	124.3*	62.3	10.5	10.5	43.0	156.3	156.3
MT1564	116.3	62.8	10.6	11.0	41.3	153.0	153.0
MT1565	119.3*	61.8	10.8	10.7	39.2	155.7	155.7
MT1569	109.3	62.1	10.1	11.6	41.7	156.0	156.0
MTCL1502	115.5	62.0	10.7	10.1	40.2	155.7	155.7
MTCL1503	117.2	62.8	10.3	11.4	42.2	155.7	155.7
MTF1559	107.1	60.1	10.4	10.6	45.7	160.0	160.0
MTS1571	108.4	62.4	10.7	11.2	43.0	157.0	157.0
MTS1572	113.2	62.3	11.2	10.9	40.2	155.7	155.7
MTS1573	115.8	62.5	11.0	11.0	40.5	156.3	156.3
MTS1574	110.8	62.0	10.5	10.7	39.1	157.7	157.7
MTS1580	106.4	61.2	10.6	11.8	40.2	155.3	155.3
MTS1582	112.7	62.1	10.9	10.2	38.6	157.3	157.3
MTS1583	115.9	62.4	11.0	10.6	38.8	158.3	158.3
MTS1584	111.5	62.2	11.1	10.5	37.7	157.7	157.7
MTS1588	114.3	62.8	10.5	11.4	36.5	157.7	157.7
MTS1589	118.2*	63.5	10.7	10.9	36.4	157.0	157.0
MTS1596	108.7	63.5	10.7	11.2	39.6	156.3	156.3
MTW1525	106.3	63.8	10.6	11.5	39.9	157.7	157.7
MTW1544	116.4	63.4	10.6	11.1	42.0	156.3	156.3
SY Wolf	119.3*	63.2	10.4	11.4	40.1	154.3	154.3
Warhorse	107.9	62.4	10.5	12.1	41.4	157.7	157.7
Yellowstone	118.8*	61.7	10.3	11.1	42.0	156.7	156.7
Average	114.1	62.3	10.7	11.0	40.6	156.4	156.4
PLSD (p=0.05)	8.9	1.4	0.6	0.9	2.2	1.1	
CV%	4.4	1.4	3.5	5.0	3.3	0.4	
Lattice RE% ^{2/}	222	100	100	100	100	104	

1/ Grain yields are based on a 60 pound per bushel standard bushel weight and adjusted to 13% grain moisture content.

2/ Adjusted means provided for Lattice RE% values equal to or greater than 105%.

Table 3. Summary of climatic data by months for the 2015-2016 cropping year (September-August) compared to averages for the period of record from 1911 to 2015 at the Southern Agricultural Research Center near Huntley, Montana.

Precipitation (inches)	Total	2015				2016								Year
		Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	
Current Year (2015-2016)		0.26	1.97	0.50	0.50	0.25	0.11	1.30	1.41	2.49	0.86	0.46	1.57	11.68
Average (1911-2015)		1.31	1.08	0.63	0.60	0.56	0.47	0.79	1.36	2.20	2.33	1.15	0.96	13.44
Difference		-1.05	+0.89	-0.13	-0.10	-0.31	-0.36	+0.51	+0.05	+0.29	-1.47	-0.69	+0.61	-1.76
<u>Mean Temperature (°F)</u>													<u>Average</u>	
Current Year (2015-2016)		62.8	51.2	34.0	24.4	25.3	38.3	41.4	48.6	55.1	68.5	71.2	68.3	49.2
Average (1911-2015)		58.1	47.0	33.7	24.0	21.0	25.7	34.2	45.6	55.0	63.4	70.8	68.8	45.6
Difference		+4.7	+4.2	+0.3	+0.4	+4.3	+12.6	+7.2	+3.0	+0.1	+5.1	+0.4	-0.5	+3.6

Last Killing Frost in Spring^{1/} 2016..... 32 °F on May 14, 2016
Average (1911-2015) May 17

First Killing Frost in the Fall^{1/} 2016..... 30 °F on Oct 6, 2016
Average (1911-2015) September 19

Frost-free Period 2016..... 145 days
Average (1911-2015) 125 days

Growing Degree Days (Base 50)^{2/} 2016..... 2,223 GDD (°F)
Average (1911-2015) 2,009 GDD (°F)

Growing Degree Days (Base Corn)^{2/} 2016..... 2,227 GDD (°F)
Average (1911-2015) 2,219 GDD (°F)

Maximum Summer Temperature 99 °F on Sep 1, 2016

Minimum Winter Temperature -11 °F on Dec 26, 2015

1/ 32 °F is considered a killing frost. Average last and first killing frost dates are calculated on a 50% probability of a minimum temperature occurring below the threshold temperature of 32.5 °F based on observations from 1911 to 2015.

2/ Growing degree days calculated from temperatures observed during the frost free period from May 14 through October 6, 2016, and for the same 145-day interval from the period of record of 1911 to 2015.