

Project Title: 2013 Intra-State Winter Wheat Variety Performance

Project Leader: P. L. Bruckner Plant Science Bozeman, MT

Project Personnel:

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Objectives:

To evaluate new and existing winter wheat lines and varieties in dryland under various growing conditions in Montana and Western North Dakota.

Results:

The 2013 Intrastate Winter Wheat Evaluation nursery was grown at Bozeman, Havre, Huntley, Conrad (hailed out), Kalispell, Moccasin, and Sidney, Montana and Williston, North Dakota. Crop year precipitation, relative long term averages, was variable across the state. The fall and winter were generally dry with good May-June.

The overall mean yield, across the eight harvested locations, was 74.4 bushels per acre with NWARC and WTARC having the high mean yields at 91.5 and 90.0 bu/a, respectively. Only eight released (named) cultivars ranked in the top 25 of the 49 entries for yield across seven locations (Table 1). Test weight overall means ranged from 61.1 to 57.5 lbs/bu. Jagalene continued being the high test weight entry (Table 2). The mean heading date had a 9 day range, the same as 2012, McGill and Art being the earliest to head at day158.2 (Table 3). There was an 8.5 inch range, the same as 2012, in the eight location mean height between 31.1" Carter to 37.4" Jerry (Table 4). Solid stem cultivars Bearpaw, Bynum, Decade, and Rampart, ranked at the top for grain protein and the seven location mean was 12.9% (Table 5). Lodging occurred at NARC and NWARC with inconsistency for relative lodging of some entries lodging across the two locations (Table 6). Good winter survival pressure was experienced at both Sidney and Williston with a only a 24.3% overall survival rate. Jerry had the high survival rating at 50.7%. Of thirteen entries evaluated for stem solidness, at four locations, Warhorse, Rampart, and two lines scored >22 out a possible 25 (Table 6).

Summary:

The development of improved winter wheat lines and cultivars continues with improvements in yield, disease resistance and tolerance advances, combined with improved stem solidness to combat sawfly. New challenges arrive or former pest mutate to circumvent the remedies developed to thwart their damage and renew their attack on winter wheat and other crop species.

Future Plans: The intra-state winter wheat trial is not a component of the research center's "umbrella" project. This information is presented here for the convenience of the Mt Wheat & Barley Committee and the growers who generate the MWBC check-off dollars.

Table 1. 2013 Intrastate Winter Wheat Test (Exp. 35): Multi-Location Yield (bu/a)

Cultivar/Line	Bozeman LAT	Havre LAT	Sidney Hailed	Williston RCB	Kalispell LAT	Moccasin LAT	Huntley LAT	Conrad LAT	7 Loc Avg.
lattice efficiency	184%	245%	out		102%	120%	114%	265%	
+ MT1138	89.8	65.8		66.4*	130.4*	72.1**	67.8	99.6*	84.6**
+ MTCL1131	90.1	71.6		69.8*	120.5	71.2*	63.0	103.2*	84.2*
Yellowstone	94.5*	66.9		70.5*	124.2*	66.4	65.4	95.8*	83.4*
Colter	87.8	63.7		76.0*	129.8*	59.8	66.8	94.5*	82.6*
d MT1091	86.3	68.5		78.2**	112.7	67.8*	64.6	97.7*	82.3*
MT0978	90.9*	74.6		61.5*	125.0*	61.6	67.8	94.1*	82.2*
+ MT1117	84.2	67.9		59.7*	131.1*	70.1*	64.2	94.9*	81.7*
MT1090	91.5*	66.6		74.7*	111.8	67.4*	66.4	90.8	81.3*
MTW08168	92.7*	71.4		62.5*	121.5	62.9	59.2	98.4*	81.2*
+ MT1108	87.3	70.4		61.8*	122.8	68.3*	62.5	94.6*	81.1*
d Curlew	97.2*	73.6		50.8	122.5	55.0	71.0*	89.8	80.0*
Promontory	94.0*	65.9		46.6	138.5**	56.3	65.9	92.1	79.9*
+ MT1113	92.3*	67.3		58.6*	112.6	65.7	72.0*	89.7	79.7*
MT1078	97.6*	74.1		39.0	106.6	60.7	75.2*	104.2**	79.6*
d MT1105	88.6	67.2		60.5*	104.1	70.7*	68.0	96.7*	79.4*
d MT1156	89.8	69.5		63.3*	112.3	62.7	67.6	90.9	79.4*
+ d MT1102	91.6*	70.8		60.6*	106.4	64.3	63.2	98.1*	79.3*
SY Clearstone 2CL	81.8	74.8		50.2	117.8	71.0*	63.9	95.2*	79.2*
MTS1024	91.3*	72.1		47.7	117.1	62.2	72.2*	90.1	79.0*
+ MT1143	93.8*	71.5		52.0	105.5	63.5	68.8	95.9*	78.7*
# SY Wolf	97.8**	71.5		53.4	115.2	56.4	64.6	91.2	78.6*
d MT10116	86.3	69.4		58.1*	109.2	61.1	70.0	95.5*	78.5*
d MT1092	86.6	65.6		48.5	114.8	67.9*	67.2	96.6*	78.2*
# d Art	93.8*	60.9		24.6	123.2*	68.1*	72.6*	101.9*	77.9*
Jagalene	96.8*	62.4		43.4	107.8	61.8	75.1*	94.9*	77.5*
+ Cowboy	90.5*	82.7**		53.2	71.3	61.6	77.1**	97.8*	76.3*
Warhorse	87.7	70.0		54.3	115.4	60.2	62.7	79.6	75.7*
d Overland	89.4	69.6		44.3	79.9	69.6*	75.3*	98.0*	75.2*
d Robidoux	90.2*	60.7		40.5	120.7	58.1	65.6	89.1	75.0*
+ d MT1137	84.4	62.3		67.4*	72.6	67.4*	62.5	94.5*	73.0*
WB-Quake	76.7	71.2		59.5*	110.3	58.6	55.8	77.7	72.8*
+ MTS0826-63	80.5	70.0		49.4	107.0	47.6	63.1	84.6	71.7*
# Radiant	74.9	65.7		52.2	114.0	44.6	59.4	81.4	70.3
Judee	81.8	72.7		37.4	106.6	48.3	61.8	78.8	69.6
Decade	89.0	67.4		57.1*	42.4	61.3	71.2*	89.4	68.3
d Norris (CL)	85.8	64.8		60.1*	73.0	52.8	62.0	79.8	68.3
Ledger	79.0	63.4		43.9	99.3	48.9	60.3	82.7	68.2
McGill	83.9	62.1		36.1	77.3	66.2	62.0	88.3	68.0
# Broadview	78.3	69.1		52.8	61.3	54.7	65.9	89.8	67.4
CDC Falcon	80.2	58.2		45.8	76.6	59.2	67.1	83.8	67.3
d Accipiter	74.9	64.7		63.0*	64.1	52.7	62.1	84.3	66.5
# d WB-Matlock	76.1	68.6		37.8	59.8	58.8	64.4	88.9	64.9
Jerry	79.0	63.6		65.2*	43.0	58.6	61.4	80.8	64.5
Rampart	74.3	66.7		49.9	85.9	45.2	53.5	75.6	64.4
d Bynum (CL)	81.4	69.2		41.8	85.8	38.5	55.2	75.6	63.9
Genou	78.4	70.6		52.0	57.4	47.3	56.8	74.7	62.5
Bearpaw	82.7	68.7		48.5	31.1	58.2	61.9	82.5	61.9
Carter	82.7	61.3		50.9	26.9	57.3	64.7	89.8	61.9
d MTS0832	75.7	74.2		62.9*	18.9	55.6	62.6	74.9	60.7
Average	86.4	68.2		54.4	91.5	60.1	65.3	90.0	74.4
LSD (0.05)	7.5	6.7		21.7	15.6	5.7	6.9	10.7	13.0
C. V. (%)	4.9	5.5		24.6	9.6	5.4	7.0	6.7	16.6
P-value (Varieties)	<.0001	<.0001		0.0010	<.0001	<.0001	<.0001	<.0001	<.0001

+ = new for 2013, # = paid entry

d = cultivars/lines dropped for 2014 test

** = 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)

Table 2. 2013 Intrastate Winter Wheat Test (Exp. 35): Multi-Location Test Weight (lb/bu)

Cultivar/Line	Bozeman LAT	Havre LAT	Sidney Hailed	Williston RCB	Kalispell bulk	Moccasin RCB	Huntley bulk	Conrad LAT	7 Loc Avg.	6 Loc Avg.
lattice efficiency	162%	120%	out					144%		no KS
Jagalene	62.6**	59.8*		59.0	59.0	62.0**	62.5	62.5*	61.1**	61.4**
+ d MT1137	60.3	60.1*		59.0	54.2	61.5*	59.9	62.7**	59.7*	60.6*
d Overland	62.4*	58.2		57.7	53.1	60.7*	62.3	61.8*	59.5*	60.5*
Promontory	61.6	59.4*		59.8*	62.8	60.3	61.2	60.9	60.9*	60.5*
+ MT1113	60.9	59.6*		59.6*	60.5	60.8*	60.1	60.8	60.3*	60.3
d Bynum (CL)	62.1*	58.6		58.7	59.3	60.5	60.1	60.5	60.0*	60.1
# SY Wolf	61.4	58.2		58.3	59.3	61.0*	60.0	61.4*	59.9*	60.1
# d WB-Matlock	59.9	59.0		58.6	50.1	60.0	61.2	61.6*	58.6	60.1
+ MT1117	59.8	59.8*		59.9*	61.2	60.3	59.2	60.7	60.1*	60.0
+ MTS0826-63	60.8	58.4		60.2**	61.0	59.6	60.6	60.3	60.1*	60.0
d Norris (CL)	61.0	59.5*		59.2*	55.7	60.9*	60.2	59.3	59.4*	60.0
# d Art	61.4	58.1		58.9	59.5	59.8	60.2	60.9	59.8*	59.9
Genou	60.9	59.1		59.5*	49.9	59.2	60.3	60.1	58.4	59.9
Judee	59.8	60.1**		60.1*	57.4	58.7	59.8	60.4	59.5*	59.8
Ledger	60.6	58.7		59.3*	58.3	59.5	59.7	60.7	59.5*	59.8
d MT1156	60.3	59.1		59.8*	59.5	60.4	58.6	60.4	59.7*	59.8
Carter	60.8	58.0		58.6	46.5	59.1	60.7	60.7	57.8	59.7
MTW08168	59.4	60.0*		59.6*	58.3	59.8	59.0	60.4	59.5*	59.7
d MT1092	59.4	59.6*		59.5*	58.8	60.2	59.2	59.6	59.5*	59.6
Rampart	60.4	57.9		58.4	58.0	60.4	59.9	60.7	59.4*	59.6
Colter	59.1	59.4*		58.4	59.9	59.9	59.0	60.7	59.5*	59.4
MT0978	59.0	59.5*		58.9	57.1	59.8	58.6	60.7	59.1*	59.4
+ MT1108	59.5	59.0		59.0	58.9	60.1	58.8	60.2	59.4*	59.4
WB-Quake	60.0	58.2		58.9	60.0	58.9	59.6	60.7	59.5*	59.4
Bearpaw	60.1	57.8		58.9	38.2	59.2	58.6	60.9	56.2	59.3
+ Cowboy	59.8	59.3*		59.9*	51.5	57.1	60.1	59.7	58.2	59.3
# Radiant	59.1	59.1		59.0	61.5	58.8	58.9	60.6	59.6*	59.3
d Robidoux	61.6	58.6		58.7	58.4	57.7	59.8	59.2	59.1*	59.3
d MT10116	59.4	59.3*		58.9	58.7	59.5	58.3	59.5	59.1*	59.2
+ d MT1102	59.6	59.5*		58.8	56.0	58.9	58.6	59.6	58.7	59.2
+ MT1138	59.2	58.9		59.0	60.3	59.7	58.3	60.3	59.4*	59.2
d MTS0832	59.0	58.4		58.9	43.8	60.4	58.4	60.0	57.0	59.2
Yellowstone	59.4	59.4*		58.0	59.2	59.0	58.4	60.7	59.2*	59.2
Decade	59.8	58.7		58.6	42.6	58.3	58.4	60.8	56.7	59.1
+ MT1143	59.5	58.7		58.6	58.1	58.9	58.8	59.9	58.9*	59.1
+ MTCL1131	60.2	58.2		58.3	59.6	60.2	58.0	59.7	59.2*	59.1
McGill	59.4	58.7		58.9	55.4	58.5	59.7	58.7	58.5	59.0
d MT1105	59.2	58.9		58.7	58.0	59.1	58.1	59.8	58.8*	59.0
d Accipiter	58.1	58.5		58.5	54.8	60.0	58.1	60.0	58.3	58.9
CDC Falcon	58.5	58.7		58.2	56.2	59.4	58.1	59.0	58.3	58.7
d Curlew	59.5	57.9		59.9*	60.1	58.1	58.6	58.2	58.9*	58.7
Jerry	59.0	57.6		57.4	44.6	59.1	60.1	59.2	56.7	58.7
MT1090	59.2	59.1		58.2	57.5	59.2	57.2	59.0	58.5	58.7
Warhorse	59.3	59.1		58.8	60.9	58.6	57.5	58.9	59.0*	58.7
# Broadview	57.9	57.8		58.6	48.8	58.3	58.7	59.7	57.1	58.5
MT1078	58.7	58.0		58.0	53.7	57.1	58.4	59.6	57.6	58.3
d MT1091	58.4	58.6		57.7	55.5	59.4	57.5	57.3	57.8	58.2
SY Clearstone 2CL	57.9	58.5		59.1	59.6	57.3	56.4	57.8	58.1	57.8
MTS1024	57.8	58.0		57.7	57.1	57.1	56.8	58.2	57.5	57.6
Average	59.9	58.8		58.9	56.1	59.4	59.2	60.1	58.9	59.4
LSD (0.05)	0.8	0.9		1.1		1.4		1.7	2.3	0.9
C. V. (%)	0.7	0.9		1.1		1.2		1.7	3.7	1.3
P-value (Varieties)	<.0001	<.0001		<.0001		<.0001		<.0001	0.0049	<.0001

+ = new for 2013, # = paid entry

d = cultivars/lines dropped for 2014 test

** = 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)

Table 3. 2013 Intrastate Winter Wheat Test (Exp. 35): Multi-Location Heading Date (days after Jan 1)

Cultivar/Line	Bozeman LAT	Havre LAT	Sidney LAT	Williston RCB	Kalispell LAT	Moccasin LAT	Huntley RCB	Conrad LAT	8 Loc Avg.
lattice efficiency	159%	136%	102%		109%	115%		115%	
McGill	160.2	161.1	169.8	170.0	154.4	166.8	154.7	161.6	162.3
# d Art	160.1	159.0	170.2	171.0	154.6	167.4	156.0	162.1	162.6
d Robidoux	160.4	160.4	169.4	170.0	154.1	169.1	155.3	162.1	162.6
d Norris (CL)	161.3	160.3	168.0	170.0	155.0	168.2	156.7	163.4	162.9
d Overland	161.3	159.6	168.7	170.0	156.0	167.4	157.0	162.8	162.9
# SY Wolf	162.9	160.4	170.2	170.0	155.4	169.8	156.0	163.4	163.5
Jagalene	162.1	160.5	170.6	170.0	156.9	169.6	156.3	164.2	163.8
Decade	162.4	160.5	168.8	170.0	157.0	169.1	160.3	162.7	163.9
d Bynum (CL)	161.8	160.3	171.1	171.0	157.3	169.7	160.0	163.8	164.4
+ MT1143	162.6	161.6	171.6	171.0	156.2	170.6	160.0	164.9	164.8
CDC Falcon	163.0	162.7	169.6	171.0	158.3	171.1	158.7	165.2	165.0
+ Cowboy	162.1	162.6	172.4	172.0	157.5	171.2	159.0	165.4	165.3
Promontory	164.1	162.0	170.8	171.0	157.0	171.4	160.3	165.7	165.3
Bearpaw	163.8	163.1	171.3	171.0	157.1	170.7	161.0	165.3	165.4
Carter	163.0	162.8	172.4	172.0	157.6	170.4	160.0	167.2	165.7
d Curlew	164.4	163.0	173.3	173.5	158.0	171.4	156.3	166.6	165.8
d MT1105	164.4	162.9	170.6	171.0	158.5	171.1	161.0	166.7	165.8
+ d MT1137	164.0	164.3	170.3	172.0	157.5	170.3	161.3	166.8	165.8
Ledger	163.3	163.1	172.4	172.0	157.3	171.7	161.0	166.7	165.9
Judee	164.0	162.9	173.0	172.0	158.9	171.2	161.0	166.1	166.1
MT1090	164.4	164.0	170.0	172.0	157.8	172.0	161.0	167.7	166.1
Rampart	163.8	163.6	172.6	171.0	158.7	172.5	161.3	166.4	166.2
# Broadview	164.5	163.1	170.8	171.0	160.9	171.8	161.3	167.6	166.4
d MT1091	164.3	164.9	172.4	172.0	158.2	171.1	161.0	167.6	166.4
# d WB-Matlock	164.6	163.0	170.5	173.5	158.8	173.4	160.7	166.9	166.4
Genou	164.3	163.3	173.7	172.0	158.9	172.0	160.7	167.4	166.5
+ MT1138	165.0	164.4	171.8	172.0	158.7	171.4	161.0	167.9	166.5
Jerry	165.8	163.7	169.4	171.0	160.2	171.8	163.3	167.4	166.6
+ MT1108	165.6	164.4	172.7	172.0	158.4	171.4	161.0	168.4	166.7
Yellowstone	164.6	166.2	172.0	171.0	159.8	171.6	161.0	168.2	166.8
MT1078	164.3	164.2	173.7	174.5	158.7	171.7	161.3	166.9	166.9
d MT1092	166.2	165.5	171.2	172.0	159.5	172.6	161.7	167.5	167.0
+ d MT1102	164.6	164.3	173.5	172.0	159.4	170.9	161.7	169.5	167.0
+ MTCL1131	164.5	165.5	172.0	173.5	158.8	172.8	161.0	168.3	167.1
SY Clearstone 2CL	164.6	165.7	171.8	172.0	159.8	174.2	161.3	167.5	167.1
Colter	166.0	165.8	170.7	171.0	160.6	172.3	162.0	169.3	167.2
+ MT1113	165.8	164.6	172.5	172.0	160.1	172.6	161.0	168.8	167.2
Warhorse	164.6	164.3	174.0	173.5	158.3	172.3	161.7	168.9	167.2
+ MT1117	165.4	165.7	172.0	172.0	160.5	173.3	161.3	169.1	167.4
MTS1024	164.9	165.2	174.7	171.0	159.4	172.9	162.0	168.9	167.4
# Radiant	166.0	166.4	170.9	173.5	160.3	174.1	161.3	167.3	167.5
d Accipiter	166.6	166.3	171.9	172.0	161.3	173.6	162.0	168.1	167.7
d MT10116	167.1	165.3	172.9	172.5	161.0	172.7	161.3	169.0	167.7
d MTS0832	167.2	164.2	171.3	172.0	161.0	172.7	164.0	168.8	167.7
MT0978	165.1	164.5	172.9	172.0	160.9	172.9	166.0	169.1	167.9
d MT1156	165.7	165.8	173.8	175.0	160.4	174.2	162.0	168.6	168.2
WB-Quake	166.1	166.1	171.1	173.5	160.8	173.6	166.3	168.9	168.3
+ MTS0826-63	167.6	166.1	172.5	173.5	161.8	175.0	164.0	170.7	168.9
MTW08168	168.5	166.3	172.9	175.0	161.4	176.3	168.0	170.6	169.9
Average	164.3	163.6	171.6	171.8	158.6	171.6	160.7	166.8	166.1
LSD (0.05)	1.2	1.7	2.6	2.6	1.5	1.5	2.7	1.7	1.0
C. V. (%)	0.4	0.6	0.9	0.8	0.5	0.5	1.0	0.6	1.3
P-value (Varieties)	<.0001	<.0001	<.0001	0.0132	<.0001	<.0001	<.0001	<.0001	<.0001

+ = new for 2013, # = paid entry

d = cultivars/lines dropped for 2014 test

** = 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)

Table 4. 2013 Intrastate Winter Wheat Test (Exp. 35): Multi-Location Plant Height (in)

Cultivar/Line	Bozeman LAT	Havre LAT	Sidney RCB	Williston RCB	Kalispell LAT	Moccasin LAT	Huntley RCB	Conrad LAT	8 Loc Avg.
lattice efficiency	129%	227%			113%	103%		151%	
Carter	32.6	27.2	26.8	24.0	36.8	30.0	30.6	31.1	29.9
# SY Wolf	33.0	28.6	29.3	26.5	39.5	30.1	30.7	30.6	31.0
MTS1024	33.6	28.6	26.9	26.5	37.9	28.8	33.4	33.4	31.1
CDC Falcon	33.3	28.3	28.9	25.0	38.9	31.1	31.5	32.3	31.2
# d Art	33.8	28.6	26.4	23.5	41.3	32.6	31.2	34.1	31.4
Bearpaw	33.9	28.3	27.8	26.0	40.2	33.4	31.5	33.8	31.9
Ledger	34.1	28.8	29.1	26.0	40.8	31.1	32.5	32.7	31.9
+ MT1143	33.6	29.2	28.7	26.0	39.4	33.2	33.2	32.5	32.0
d Robidoux	34.7	29.2	29.2	24.0	41.7	31.2	31.8	34.0	32.0
Jagalene	34.5	29.5	28.0	26.5	41.0	32.9	31.6	34.4	32.3
MT1078	34.3	29.8	27.0	25.0	40.4	32.1	35.2	34.5	32.3
+ d MT1102	33.4	29.9	29.2	27.5	40.6	32.5	32.8	33.2	32.4
Warhorse	35.7	30.4	28.1	26.5	39.1	30.7	34.8	34.2	32.4
d MT10116	35.8	30.5	26.9	27.5	41.3	30.0	33.0	35.1	32.5
# Broadview	34.8	30.0	29.0	27.5	38.8	32.3	33.9	34.4	32.6
+ Cowboy	35.5	30.4	29.9	25.0	40.1	31.5	33.4	35.7	32.7
Judee	35.5	30.6	29.4	26.0	39.0	32.8	34.5	34.6	32.8
Decade	34.3	30.8	31.9	27.5	39.4	33.1	32.5	33.4	32.9
d MT1156	34.6	28.7	31.4	28.5	41.7	31.0	33.9	34.8	33.1
MT0978	34.4	30.2	29.4	28.5	42.2	32.2	33.3	35.0	33.2
d Accipiter	36.4	29.8	32.3	27.0	39.4	32.6	33.6	35.3	33.3
McGill	35.9	29.2	29.8	29.0	43.0	33.3	33.0	34.3	33.4
+ MT1108	35.9	30.3	31.8	27.0	41.9	32.3	33.6	34.5	33.4
+ d MT1137	35.5	29.0	31.2	29.5	41.7	33.5	32.6	34.5	33.4
WB-Quake	35.2	29.7	31.6	28.5	42.0	32.6	32.9	34.7	33.4
d MT1105	35.6	31.3	31.5	29.0	42.2	32.5	33.3	33.7	33.6
d Overland	36.3	29.9	29.6	26.5	44.8	33.1	33.3	35.3	33.6
+ MT1117	35.9	29.9	29.7	27.5	43.3	32.7	34.9	35.9	33.7
Colter	35.6	30.5	30.6	30.5	42.5	31.6	35.5	35.1	34.0
d MT1092	38.0	31.5	32.3	25.5	42.7	32.3	34.9	35.8	34.1
+ MT1113	36.5	31.4	29.1	29.5	43.2	33.7	34.5	35.4	34.2
d MT1091	35.9	30.8	32.8	31.0	41.7	32.1	34.5	35.6	34.3
Promontory	36.8	31.8	29.3	29.5	43.1	33.8	35.2	35.2	34.3
SY Clearstone 2CL	35.3	32.6	31.1	27.0	43.7	34.6	35.1	35.9	34.4
Yellowstone	36.6	30.7	30.3	31.5	43.9	33.6	34.7	34.5	34.5
+ MT1138	36.6	32.7	32.2	30.0	44.1	33.3	32.7	35.9	34.7
MT1090	36.0	31.0	32.2	31.5	43.2	34.7	34.3	35.6	34.8
d Norris (CL)	37.3	30.6	29.1	28.5	46.5	35.3	34.1	36.6	34.8
# d WB-Matlock	37.1	31.8	30.4	25.5	45.5	34.8	35.9	37.4	34.8
+ MTS0826-63	36.7	31.0	33.1	31.5	39.7	34.6	34.8	38.2	35.0
# Radiant	37.0	30.4	35.2	30.0	43.5	32.3	36.3	36.6	35.2
+ MTCL1131	37.1	31.8	31.8	30.0	44.5	34.3	35.7	37.4	35.3
d MTS0832	39.4	33.3	32.3	31.0	42.4	32.7	34.0	37.3	35.3
d Bynum (CL)	38.0	32.3	30.9	31.0	44.6	35.2	36.5	37.2	35.7
Rampart	39.2	32.2	31.9	32.5	41.8	34.9	37.0	37.7	35.9
Genou	38.6	32.3	31.9	31.0	44.8	35.5	36.6	37.2	36.0
d Curlew	39.0	33.1	32.4	31.0	43.7	34.1	38.0	39.3	36.3
MTW08168	39.8	33.9	32.3	31.0	45.2	33.4	38.8	37.7	36.5
Jerry	42.2	32.8	35.0	32.0	48.5	34.5	39.1	39.3	37.9
Average	35.9	30.5	30.3	28.1	42.0	32.8	34.1	35.1	33.6
LSD (0.05)	1.3	2.3	3.3	4.3	2.1	2.4	2.0	1.4	1.2
C. V. (%)	2.1	4.2	6.8	7.7	2.9	4.4	3.6	2.3	3.5
P-value (Varieties)	<.0001	<.0001	<.0001	0.0011	<.0001	<.0001	<.0001	<.0001	<.0001

+ = new for 2013, # = paid entry

d = cultivars/lines dropped for 2014 test

** = 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)

Table 5. 2013 Intrastate Winter Wheat Test (Exp. 35): Multi-Location Grain Protein (%)

Cultivar/Line	Bozeman bulk	Havre bulk	Sidney Hailed out	Williston bulk	Kalispell bulk	Moccasin bulk	Huntley bulk	Conrad bulk	7 Loc Avg.
lattice efficiency									
Bearpaw	14.5	12.8		12.4	16.4	13.1	14.7	13.4	13.9**
d Bynum (CL)	15.2	13.3		13.7	13.3	13.5	15.4	13.2	13.9**
Decade	15.2	13.5		12.2	15.3	12.7	14.8	12.6	13.8*
Rampart	15.7	13.0		12.4	13.4	12.9	15.1	13.9	13.8*
+ MTS0826-63	15.4	12.4		12.4	13.6	13.2	15.2	13.8	13.7*
Carter	14.2	12.5		11.4	15.4	12.9	14.8	13.4	13.5*
d MTS0832	15.3	11.7		10.8	16.5	11.7	14.9	13.2	13.4*
Genou	15.1	11.9		11.4	13.7	12.7	14.6	13.9	13.3*
+ d MT1102	14.5	12.1		12.6	13.4	12.7	14.3	13.5	13.3*
Warhorse	14.4	12.3		11.4	13.1	12.9	15.3	13.4	13.3*
# d Art	15.0	12.8		12.5	12.6	12.3	13.9	13.0	13.2
# Broadview	14.8	12.1		12.2	13.1	12.4	14.7	13.3	13.2
WB-Quake	15.1	11.5		13.3	12.6	12.0	14.7	13.2	13.2
Colter	14.9	12.6		11.7	13.1	12.3	14.1	13.1	13.1
d Curlew	14.1	12.4		12.6	13.1	11.9	14.1	13.8	13.1
Judee	15.6	12.1		11.5	12.2	12.7	14.9	12.9	13.1
d MT1091	14.2	12.0		13.1	13.1	11.7	14.2	13.2	13.1
d MT1156	14.0	12.3		12.3	12.5	12.6	14.7	13.5	13.1
CDC Falcon	14.7	11.9		11.2	12.4	13.0	14.6	12.9	13.0
MT0978	14.7	12.3		11.2	13.1	12.3	14.5	13.2	13.0
d Norris (CL)	14.1	12.6		11.7	13.4	12.3	13.9	12.9	13.0
# SY Wolf	14.4	12.7		11.7	13.4	11.8	14.5	12.6	13.0
# d WB-Matlock	14.6	13.3		10.1	13.7	12.5	13.9	13.0	13.0
d Accipiter	14.9	12.2		11.1	12.1	12.2	14.8	12.8	12.9
Jerry	14.5	12.3		11.9	13.6	11.6	13.9	12.8	12.9
d MT10116	14.6	12.3		10.9	12.4	12.4	14.1	13.8	12.9
# Radiant	14.6	11.9		11.9	12.5	12.4	14.2	12.5	12.9
MT1090	14.6	12.3		10.5	12.3	12.2	14.3	13.5	12.8
SY Clearstone 2CL	14.9	12.1		10.6	12.0	12.6	14.2	13.1	12.8
+ MT1113	14.1	12.2		11.4	11.9	12.2	13.4	14.0	12.7
+ MT1138	14.4	12.2		11.9	12.4	11.1	14.2	13.0	12.7
Yellowstone	14.1	11.9		11.8	12.4	12.2	13.8	12.7	12.7
d MT1105	14.5	12.1		10.6	12.3	11.6	13.8	13.2	12.6
+ MT1117	15.0	11.7		11.3	11.7	11.7	14.1	13.0	12.6
+ d MT1137	14.2	12.1		10.4	12.9	11.8	13.8	12.7	12.6
MTS1024	14.2	11.0		10.9	12.6	12.1	13.6	13.5	12.6
MTW08168	15.0	12.1		10.7	11.8	11.8	14.2	12.9	12.6
Jagalene	13.7	12.3		11.4	12.9	11.2	13.6	12.7	12.5
Ledger	13.8	11.6		12.3	11.8	12.1	13.9	11.9	12.5
MT1078	13.4	11.6		10.5	13.6	12.2	13.8	12.4	12.5
d MT1092	14.0	12.2		11.7	11.4	12.3	13.7	12.2	12.5
+ MTCL1131	14.7	11.7		10.9	12.0	11.7	14.3	12.4	12.5
d Overland	13.8	12.1		12.6	12.9	11.4	12.8	11.8	12.5
+ Cowboy	13.9	10.8		10.5	12.7	12.5	13.0	12.7	12.3
+ MT1108	14.6	11.3		10.0	11.7	11.5	14.1	12.6	12.3
+ MT1143	13.6	11.5		9.4	12.8	11.8	13.6	13.0	12.2
Promontory	13.4	11.3		11.0	11.9	12.3	13.4	12.3	12.2
d Robidoux	13.8	11.4		10.5	12.0	12.1	13.5	12.4	12.2
McGill	14.3	11.2		10.2	11.8	11.5	13.0	12.4	12.1
Average	14.5	12.1		11.5	12.9	12.2	14.2	13.0	12.9
LSD (0.05)									0.6
C. V. (%)									4.6
P-value (Varieties)									<.0001

+ = new for 2013, # = paid entry

d = cultivars/lines dropped for 2014 test

** = indicates highest value within a column

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

Table 6. 2013 Intrastate Winter Wheat Test (Exp. 35): Multi-Location Lodging %

Cultivar/Line	Have LAT	Kalispell RCB	2 Loc Avg.
lattice efficiency	105%		
+ MT1143	0	0	0
# Radiant	0	0	0
d MT1092	0	0	0
SY Clearstone 2CL	0	0	0
Yellowstone	1	0	0
d MT10116	0	1	0
+ MT1138	1	0	0
# SY Wolf	1	0	1
+ MT1113	0	1	1
d MT1091	2	0	1
+ MTCL1131	2	1	1
d Norris (CL)	3	0	1
CDC Falcon	3	1	2
Decade	4	0	2
MT1078	5	0	2
d MT1105	3	1	2
+ d MT1137	5	0	3
Colter	5	0	3
+ MT1117	0	6	3
MTS1024	8	0	4
Jagalene	8	1	4
MT1090	8	1	5
d Overland	10	0	5
McGill	12	0	6
d Accipiter	11	2	6
# d Art	10	2	6
+ MT1108	12	3	8
Promontory	15	0	8
+ d MT1102	15	0	8
Jerry	14	5	10
d MTS0832	14	7	11
Ledger	22	0	11
d Robidoux	11	15	13
# d WB-Matlock	25	0	13
Carter	27	0	14
# Broadview	30	0	15
MT0978	4	26	15
Bearpaw	19	16	17
WB-Quake	29	7	18
d MT1156	7	31	19
+ Cowboy	39	0	19
Warhorse	9	34	21
Judee	12	31	22
MTW08168	16	47	31
d Curlew	33	34	34
+ MTS0826-63	16	54	35
Genou	41	39	40
d Bynum (CL)	22	66	44
Rampart	27	75	51
Average	11.3	10.3	10.9
LSD (0.05)	15.1	27.5	24.7
C. V. (%)	78.5	162.6	112.7
P-value (Varieties)	<.0001	<.0001	0.0061

+ = new for 2013, # = paid entry

d = cultivars/lines dropped for 2014 test

** = indicates highest value within a column

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

Table 7. 2013 Intrastate Winter Wheat Test (Exp. 35): Multi-Location Winter Survival %

Cultivar/Line	Sidney LAT	Williston RCB	2 Loc Avg.
lattice efficiency	115%		
Jerry	54.7**	46.7*	50.7**
+ MTCL1131	40.3*	48.3**	44.3*
# Radiant	52.0*	30.0*	41.0*
Colter	34.7	43.3*	39.0*
d MT1091	36.8	40.0*	38.4*
d Accipiter	37.4	38.3*	37.9*
Decade	45.7*	28.3	37.0*
MTW08168	38.3*	35.0*	36.7*
+ MT1108	48.0*	25.0	36.5*
MT1090	42.3*	30.0*	36.2*
CDC Falcon	34.3	31.7*	33.0
# d WB-Matlock	46.0*	20.0	33.0
d MTS0832	25.8	38.3*	32.1
+ d MT1137	23.9	40.0*	32.0
d MT1156	31.2	31.7*	31.5
d MT1105	33.7	28.3	31.0
Yellowstone	21.8	36.7*	29.3
+ MT1117	37.4	20.0	28.7
# Broadview	24.6	31.7*	28.2
MT0978	27.2	28.3	27.8
d MT1092	30.6	21.7	26.2
+ MT1113	22.9	26.7	24.8
+ MT1138	21.2	26.7	24.0
+ MTS0826-63	21.3	26.7	24.0
Warhorse	13.5	33.3*	23.4
WB-Quake	16.3	28.3	22.3
+ d MT1102	19.1	25.0	22.1
SY Clearstone 2CL	21.7	21.7	21.7
d Norris (CL)	18.2	23.3	20.8
d Overland	20.4	20.0	20.2
Bearpaw	18.0	21.7	19.9
Jagalene	19.7	18.3	19.0
# SY Wolf	13.6	23.3	18.5
+ MT1143	11.9	23.3	17.6
d MT10116	13.1	21.7	17.4
Rampart	10.6	21.7	16.2
Carter	10.5	20.0	15.3
d Robidoux	11.5	16.7	14.1
McGill	7.6	20.0	13.8
+ Cowboy	11.9	15.0	13.5
d Curlew	10.9	15.0	13.0
Genou	6.7	16.7	11.7
Judee	10.0	13.3	11.7
d Bynum (CL)	3.8	18.3	11.1
Promontory	9.1	12.0	10.6
Ledger	8.3	12.0	10.2
MTS1024	4.0	10.0	7.0
MT1078	6.4	6.7	6.6
# d Art	4.8	6.7	5.8
Average	23.1	25.3	24.2
LSD (0.05)	17.2	19.8	14.6
C. V. (%)	43.0	48.3	30.0
P-value (Varieties)	<.0001	0.0025	<.0001

+ = new for 2013, # = paid entry

d = cultivars/lines dropped for 2014 test

** = indicates highest value within a column

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

Table 8. 2013 Intrastate Winter Wheat Test (Exp. 35): Multi-Location Stem Solidness (5-25)

Cultivar/Line		Bozeman	Have	Moccasin	Conrad	4 Loc Avg.
MTS0832	92X73E70/MTW9911	20.7*	24.1**	23.5*	24.7**	23.3**
+ MTS0826-63	MT9524/G15048//Rampart	22.6*	22.2*	23.8**	24.2*	23.2*
Warhorse	(MTS0808) Montana, 2013	23.4**	22.6*	22.2*	22.6	22.7*
Rampart	Montana, 1996	20.3	23.1*	21.8*	23.5*	22.2*
Bearpaw	Montana, 2011	20.1	22.0*	20.3	22.8	21.3
Genou	Montana, 2004	19.3	23.1*	19.8	21.5	20.9
Judee	Montana, 2011	18.6	22.5*	20.2	22.3	20.9
Bynum (CL)	Montana/WestBred, 2005	20.3	20.3	20.3	20.1	20.3
WB-Quake	WestBred, 2011	19.9	20.9	17.8	21.1	19.9
MTS1024	MT02113*4/MTS0359	16.1	17.3	15.2	18.9	16.9
Carter	WestBred, 2006	10.6	14.8	13.8	14.3	13.4
Ledger	WestBred, 2004	8.1	11.2	9.3	10.0	9.7
CDC Falcon	Sask/WestBred, 1999	6.1	7.8	7.0	7.1	7.0
Average		17.4	19.4	18.1	19.5	18.6
LSD (0.05)		3.1	2.3	2.5	1.7	1.2
C. V. (%)		10.5	7.0	8.1	5.0	7.8
P-value (Varieties)		<.0001	<.0001	<.0001	<.0001	<.0001
% stems with tunneling		none	4.1	none	1.5	

Locations were significant ($P = <.0001$), there was no significant Entry x Location Interaction ($P = <.0874$)

+ = new for 2013, # = paid entry

** = indicates highest value within a column

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

Table 9. 2013 Intrastate Winter Wheat Test: Stripe Rust Evaluations - Kalispell, MT; Pullman, WA; and Mt. Vernon, WA + Fort Ellis Stem Rust evaluations

Cultivar/Line	Pedigree	Stem Rust	Moccasin	Stripe Rust								
		Ft. Ellis	Leaf	Kalispell		Pullman, WA		MT. Vernon, WA				
		0-4 4 = worst	yellowing 0-5, 5=best	14-Jun LAT	16-Jul RCB	Milk IT ^{1/} %		Stem elong. IT ^{1/} %		Heading/flowering IT ^{1/} %		
+= new for 2012, # = paid entry												
		16-Jul	111%	104%		26-Jun		1-May		4-Jun		
d	Accipiter	Saskatchewan, 2008	-	3.2	35	100	3	20	8	60	8	60
#	d Art	AgriPro, 2007	-	3.7	2	83	8	40	8	60	5	30
	Bearpaw	Montana, 2011	-	3.3	31	100	5	40	8	60	8	50
#	Broadview	Alberta, 2009	-	3.4	20	100	8	40	8	45	8	90
d	Bynum (CL)	Montana/WestBred, 2005	-	3.9	4	100	5	30	5	30	5	20
	Carter	WestBred, 2006	-	3.4	37	100	8	60	8	45	8	70
	CDC Falcon	Sask/WestBred, 1999	1	3.8	21	100	5	30	8	80	8	30
	Colter	(MT08172) Montana, 2013	-	4.0	0	40	8	20	5	25	5	5
+	Cowboy	Wyoming/Colorado, 2012 (CO05032)	-	3.7	15	100	5	40	8	60	8	80
d	Curlew	Utah, 2009	-	3.9	4	64	3	10	8	50	5	30
	Decade	Montana/North Dakota, 2010	-	3.3	15	100	5	30	8	60	8	100
	Genou	Montana, 2004	3	3.6	28	100	8	60	8	60	8	80
	Jagalene	AgriPro, 2002	-	3.6	9	55	8	60	8	80	8	60
	Jerry	North Dakota, 2001	-	3.4	18	100	8	60	8	20	8	85
	Judee	Montana, 2011	-	4.1	8	30	3	10	8	60	5	20
	Ledger	WestBred, 2004	-	3.8	6	100	8	40	8	80	5	40
	McGill	Nebraska, 2010	-	3.3	32	100	8	40	8	60	5	60
	MT0978	MT9982/MTW0072/NW97S151	-	4.3	3	27	3	10	5	35	5	15
d	MT10116	Yellowstone*3/KS96WGRC40	2	4.4	13	85	5	30	8	45	5	15
	MT1078	MT02113*4/MTS0359	1	3.4	7	95	3	20	5	35	5	25
	MT1090	Reeder/6*Yellowstone	2	4.5	8	80	5	20	5	30	5	10
d	MT1091	Reeder/6*Yellowstone	2	4.6	6	90	5	30	8	35	5	15
d	MT1092	MT9982*2/Outlook	4	4.9	3	87	8	30
+	d MT1102	MT9982*4/MTS0222	1	4.3	4	90	3	20	5	30	5	10
d	MT1105	Yellowstone*4//MT9982/MTS0222	2	5.0	5	91	8	30	8	35	5	20
+	MT1108	Yellowstone*3//MT9982/MTS0222	3	4.7	3	92	5	30	5	35	5	20
+	MT1113	Yellowstone*4/KS96WGRC40 (Lr41)	2	4.5	1	76	5	30	8	60	5	25
+	MT1117	Yellowstone*3/KS96WGRC40	2	4.8	2	23	5	20	5	25	3	5
+	d MT1137	Endurance/MT02136//Yellowstone	3	5.0	26	100	5	20	8	45	5	40
+	MT1138	W99-194/2*Yellowstone	2	4.7	2	48	3	10	5	30	3	20
+	MT1143	MT9982/PI572290//MT0557	1	3.9	5	98	3	10	5	30	5	15
d	MT1156	MTR00118/MT0241//CDC Falcon	1	4.7	4	20	3	10	8	45	5	15
+	MTCL1131	Yellowstone*4/3/MTCL01158/CDC T	2	4.5	3	37	3	5	5	35	5	10
+	MTS0826-63	MT9524/G15048//Rampart	-	3.3	4	52	3	10	3	15	2	25
d	MTS0832	92X73E70/MTW9911	3	4.4	55	100	8	40	8	60	5	70
	MTS1024	MT02113*4/MTS0359	3	3.1	9	93	5	30	5	40	5	20
	MTW08168	MTW0047/2*MT9982	1	4.5	4	70	5	50	5	40	5	10
d	Norris (CL)	Montana/WestBred, 2005	-	5.0	13	100	8	40	8	80	8	60
d	Overland	Nebraska, 2007	-	4.1	11	100	5	40	8	80	8	70
	Promontory	Utah, 1990	2	3.7	3	74	3	10	8	80	8	60
#	Radiant	Alberta, 2002 (Meridian Seeds)	2	4.3	10	43	5	20	8	80	8	30
	Rampart	Montana, 1996	-	4.0	3	98	5	40	5	80	5	25
d	Robidoux	Nebraska, 2010	-	3.7	5	67	3	10	5	80	5	35
	SY Clearstone 2CL	Montana/Syngenta, 2012	-	4.5	6	85	8	20	8	30	5	20
#	SY Wolf	Syngenta (AgriPro), 2010	1	4.1	1	32	5	40	5	50	5	60
	Warhorse	(MTS0808) Montana, 2013	-	3.9	1	32	3	10	5	30	5	10
#	d WB-Matlock	WestBred, 2010 (previously tested in	-	3.9	29	100	8	30	8	50	8	95
	WB-Quake	WestBred, 2011	-	4.3	3	60	5	20	5	80	5	15
	Yellowstone	Montana 2005	4	4.5	3	76	5	20	8	20	5	20
Average				4.1	11.0	77.4	28		50		37	
LSD (0.05)				0.9	14.8	17.7						

1/ Infection Type (IT) was recorded based on the 0-9 scale with ITs 8 and 9 combined as 8 (the most susceptible reaction) in field data. Generally IT 0-3 are considered resistant, 4-6 intermediate, and 7-9 susceptible. Heterogenous reactions of an entry were indicated by two or more ITs separated by "," for most plants with the first IT and few plants with the second IT or connected with "-" for entries containing plants with continuous ITs.
d = cultivars/lines dropped for 2014 test

** = 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)