

2006 VARIETAL RECOMMENDATION

Ledger

WestBred, LLC request that ‘Ledger’ hard red winter wheat be considered for “Variety Recommendation in the State of Montana”.

We move that Ledger be recommended as a hard red winter wheat for Districts 2, 4 and 5.

Ledger is a hard red winter wheat selected from the progeny of the cross [Hatton x (HRW pop x Fortuna, Lew, Rambo)]x MTSF 1142. Application for PVP has been submitted.

Over a 3 year period, 24 station years of data, Ledger has performed as well as the check varieties except Yellowstone (Table 1). The average test weight is greater than the check varieties and similar to Rampart (Table 1). Percent protein is equal to CDC Falcon, Pryor, and Yellowstone, but less than the other check varieties (Table 1). Ledger is a semidwarf variety with its plant height being equal to Pryor and less than all other check varieties except CDC Falcon (Table 2). The average heading date of Ledger is earlier than all of the check varieties (Table 2). Individual location data for the districts that WestBred is requesting recommendation are on Tables 3 through 7.

Disease data from 2005 Kalispell show Ledger to have moderate resistance to stripe rust (Table 7).

Milling and Baking data from MSU 2003-2004 show Ledger to be an acceptable quality wheat with a higher flour yield and low flour ash (Table 5 and 6).

Submitted by Craig Cook, WestBred, LLC

Table 1. 2003-2005 Intrastate Winter Wheat Test : Combined Locations Yield, Test Weight and Protein									
Cultivar/Line	Grain Yield (bushels/acre) ^{1/}			Test Weight (lb/bu)			Protein (%)		
	2005	2004-2005	2003-2005	2005	2004-2005	2003-2005	2005	2004-2005	2003-2005
location-years	8	16	24	8	16	24	8	16	24
CDC Falcon	68.4*	67.9	66.7	59.3	59.9	59.9	12.6	12.9	13.2
Genou	62.6	62.5	61.9	60.0	60.3	60.5	13.2	13.7	14.0
Ledger	69.5*	67.7	65.4	60.7*	60.9	61.2	12.5	13.1	13.5
Neeley	58.0	62.6	63.7	58.2	59.3	59.7	13.3	13.4	13.7
Pryor	68.4*	70.6*	68.9	58.4	59.3	59.3	12.4	12.8	13.2
Rampart	62.7	59.2	57.5	60.9*	60.6	60.7	14.0*	14.4**	14.7**
Yellowstone	78.4**	75.9**	75.0**	59.9	60.0	60.0	12.9	13.2	13.5
Average	66.6	65.6	64.5	59.6	59.8	60.4	12.9	13.3	13.6
LSD (0.05)	13.0	7.9	5.5	2.5	1.5	1.0	0.7	0.5	0.4
C.V.	34.3	29.9	26.2	4.3	3.6	3.0	5.5	5.4	5.0
+ = new for 2005, # = paid entry, R = no Rampart data for 2002, therefore no 4y average.									
** = indicates highest value within a column			^{1/} LSD for Yield based on genotype*environment mean square.						
* = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)									

Table 2. 2003-2005 Intrastate Winter Wheat Test: Combined Locations Winter Survival, Heading Date and Height									
Cultivar/Line	Winter Survival (%)			Heading Date (Julian)			Plant Height (in)		
	2005	2004-2005	2003-2005	2005	2004-2005	2003-2005	2005	2004-2005	2003-2005
location-years	2	6	8	8	15	23	8	16	24
CDC Falcon	86	64	64	162	164	161	32	31	31
Genou	76	56	55	163	162	163	37	35	35
Ledger	69	54	51	162	161	161	34	32	31
Neeley	72	57	58	165	164	164	38	35	35
Pryor	83	61	58	164	163	164	32	31	31
Rampart	64	50	46	163	162	163	38	35	35
Yellowstone	84	60	62	164	163	163	35	34	34
Average	76.0	57.8	58.5	162.8	162.5	161.8	36.0	34.0	34.1
LSD (0.05)	15.9	8.3	7.3	1.1	1.1	0.8	1.5	1.1	0.9
C.V.	10.4	12.6	12.7	0.7	0.9	0.8	4.3	4.7	4.7
+ = new for 2005, # = paid entry, <i>R</i> = no Rampart data for 2002, therefore no 4y average.									
** = 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)									

Cultivar/Line	Grain Yield (bushels/acre) ^{1/}			Test Weight (lb/bu)			Protein (%)		
	2005	2004-2005	2003-2005	2005	2004-2005	2003-2005	2005	2004-2005	2003-2005
		2 yr	3 yr		2 yr	3 yr		2 yr	3 yr
CDC Falcon	98.6	111.4	109.0*	57.4	60.3	59.4	14.7	13.3	13.3
Genou	93.7	102.9	99.5	60.1	61.8	61.1	15.4	14.2	14.4*
# Ledger	111.0	114.9	109.6*	61.1	62.7*	61.8*	13.7	13.3	13.3
Neeley	103.2	115.8	109.5*	59.9	61.8	60.9	15.1	13.8	14.2*
# Pryor	96.6	117.1	111.4*	57.2	60.2	58.9	14.9	13.4	13.6
R Rampart	96.2	96.4	90.5	60.5	61.8	61.0	15.9	14.9	14.9*
Yellowstone	113.1*	121.2	118.4**	59.0	60.8	59.9	14.4	13.5	13.7
Average	103.7	111.0	106.1	59.4	61.2	60.8	14.5	13.6	13.9
LSD (0.05)	9.3	ns	15.0	0.7	1.7	1.1		ns	0.8
C.V.	5.3	16.8	15.0	0.6	1.3	1.1		4.1	3.6
+ = new for 2005, # = paid entry, <i>R</i> = no Rampart data for 2002, therefore no 4y average.									
** = indicates highest value within a column ^{1/} LSD for Yield based on genotype*environment mean square.									
* = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)									

Table 4. 2003-2005 Intrastate Winter Wheat Test (Exp. 3518): Conrad Yield, Test Weight and Protein									
Cultivar/Line	Grain Yield (bushels/acre) ^{1/}			Test Weight (lb/bu)			Protein (%)		
	2005	2004-2005	2003-2005	2005	2004-2005	2003-2005	2005	2004-2005	2003-2005
		2 yr	3 yr		2 yr	3 yr		2 yr	3 yr
CDC Falcon	84.4	78.2	75.1*	63.6	63.7*	63.4	12.7	12.7	12.9
Genou	86.0	77.3	71.1*	64.5	63.6	62.8	12.3	12.6	13.0
# Ledger	84.3	80.4	76.9*	64.2	64.0*	63.9	13.1	12.5	12.8
Neeley	82.4	76.4	72.3*	62.2	62.5	62.1	13.2	12.7	13.0
# Pryor	96.9*	84.5*	76.8*	64.3	62.9	61.9	12.1	12.0	12.4
Rampart	69.9	64.9	62.5	63.2	62.9	62.5	14.5	14.4**	14.5**
Yellowstone	92.4*	81.4	78.1**	62.0	61.3	61.4	13.0	12.9	13.0
Average	84.3	78.0	72.6	62.7	62.3	62.6	13.3	12.7	13.1
LSD (0.05)	10.4	9.9	7.7		1.7	1.2		1.1	0.8
C.V.	7.2	10.8	11.2		1.4	1.2		4.1	3.8
+ = new for 2005, # = paid entry		^{1/} LSD for Yield based on genotype*environment mean square.							
** = 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)									

Cultivar/Line	Grain Yield (bushels/acre) ^{1/}			Test Weight (lb/bu)			Protein (%)			SawFly cutting %
	2005	2004-2005	2003-2005	2005	2004-2005	2003-2005	2005	2004-2005	2003-2005	2005
		2 yr	3 yr		2 yr	3 yr		2 yr	3 yr	
CDC Falcon	63.7*	65.8*	54.0*	60.7	60.4	60.3	11.4	12.0	13.2	30.5
Genou	62.7*	66.3*	53.7*	60.3	59.9	60.3	12.3	12.9	14.0	17.9
# Ledger	64.5*	67.4*	55.7*	61.7*	61.3*	61.2*	11.7	12.6	13.5	26.4
Neeley	50.9	60.1*	46.8	61.1*	60.0	60.4	14.0	14.0	14.5*	49.2
# Pryor	64.3*	68.3*	58.1**	59.1	59.0	60.0	13.0	13.3	14.0	10.0
Rampart	59.2	61.9*	52.0*	60.3	59.9	60.3	13.7	14.7	15.1*	7.7
Yellowstone	59.2	64.5*	53.1*	59.5	59.0	59.3	12.7	13.9	14.5*	43.4
Average	55.9	60.7	50.5	60.2	59.7	60.5	12.9	13.3	14.1	32.3
LSD (0.05)	12.4	9.8	6.5	1.4	1.6	1.4		ns	1.1	20.7
C.V.	12.6	13.8	13.6	1.3	1.3	1.4		6.8	4.9	36.4
+ = new for 2005, # = paid entry		^{1/} LSD for Yield based on genotype*environment mean square.								
** = 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)										

Cultivar/Line	Grain Yield (bushels/acre) ^{1/}			Test Weight (lb/bu)			Protein (%)		
	2005	2004-2005	2003-2005	2005	2004-2005	2003-2005	2005	2004-2005	2003-2005
		2 yr	3 yr		2 yr	3 yr		2 yr	3 yr
CDC Falcon	39.0	47.1*	45.4*	54.9	56.5	55.9	16.2	15.2	15.4
Genou	33.9	42.9	40.5	55.5	57.0	55.9	17.2	15.5	16.0
# Ledger	40.5	47.7*	46.9*	58.2	59.1*	58.3	15.2	14.8	15.1
Neeley	35.2	44.1	42.8	53.5	55.6	55.3	16.6	15.1	15.1
# Pryor	42.5	50.9*	49.0*	54.2	56.6	56.1	17.5	15.6	15.5
R Rampart	34.9	40.4	40.4	56.1	56.2	56.5	18.4	16.2	16.2
Yellowstone	46.5*	53.6**	51.1**	56.2	57.9	56.6	15.5	14.6	14.9
Average	39.0	45.4	44.3	55.9	57.1	56.9	16.2	15.0	15.2
LSD (0.05)	4.2	7.3	6.0	1.8	2.3	1.6		ns	ns
C.V.	6.4	13.7	14.4	1.6	2.0	1.7		5.0	4.7
+ = new for 2005, # = paid entry, R = no Rampart data for 2002, therefore no 4y average.									
** = indicates highest value within a column			^{1/} LSD for Yield based on genotype*environment mean square.						
* = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)									

Table 7. 2005 Intrastate Winter Wheat Test (Exp. 3505): Kalispell											
Cultivar/Line	Grain Yield (bushels/acre) ^{1/}			Test Weight (lb/bu)			Protein (%)			Stripe Rust %	
	2005	2004-2005	2003-2005	2005	2004-2005	2003-2005	2005	2004-2005	2003-2005	RCB	RCB
		2 yr	3 yr		2 yr	3 yr		2 yr	3 yr	6/9/05	6/23/05
CDC Falcon	70.0	92.9*	78.6	54.3	57.5	58.4	11.5	11.9	12.1	6.7	63.3
Genou	68.4	88.5	78.6	55.5	58.3	59.8	12.7	12.9	12.9*	1.7	46.7
Ledger	90.1	106.7*	91.3*	58.2	59.8	60.9	12.9	12.7	13.1*	0.0	10.0
Neeley	27.4	68.6	67.2	43.8	53.0	55.9	12.7	12.5	12.8*	81.7	93.3
Pryor	54.7	86.5	79.7*	49.7	55.3	56.6	12.3	12.1	12.4	45.0	63.3
Rampart	93.4	97.5*	81.1*	63.8	62.2	62.1	12.6	13.3	13.5**	0.0	6.7
Yellowstone	126.0*	131.7**	111.3**	61.9	61.6	61.6	13.1	12.7	12.8*	0.0	5.0
Average	78.1	93.4	80.3	55.9	58.0	59.4	12.3	12.5	12.8	7.8	37.9
LSD (0.05)	10.9	41.8	32.2		ns	ns		ns	0.9	8.7	15.4
C.V.	13.7	38.3	42.4		8.6	7.2		5.2	4.5	68.4	25.1

Table 8. 2003 Intrastate WW Mill and Bake

Location: Means Across Locations																
SAMPLE#	VARIETY	PEDIGREE	CLASS	Flour Yields %	Flour Protein%(14%(m.b))	Flour color				Mixograph				Test Bake		
						L*brightness	A*green-red	B*blue-yellow	Four Ash %	Type	Tolerance	Mixing time (Mins)	Water Absorbion%	Mixing Time Min	Water Absoptioin%	Loaf Volume
14	CDCFalcon	Sask/WPB	HRW	63.08	12.58	90.16	-1.198	9.97	0.40		3.75	4.35	62.68	7.00	72.50	1101
21	Genou	MTS92015//Vanguard/Norstar	HRW	65.23	13.73	90.44	-1.540	10.53	0.39		4.25	5.00	64.30	10.18	75.13	1139
16	Ledger	WPB	HRW	67.28	12.55	90.17	-1.573	11.32	0.37		3.00	4.13	61.73	6.08	71.93	1091
1	Neeley	Idaho	HRW	64.08	12.78	90.01	-1.528	11.56	0.36		4.75	4.93	62.20	7.95	73.90	1077
15	Pryor	WPB	HRW	65.28	12.58	89.97	-1.283	10.51	0.38		3.00	3.53	62.03	4.83	71.48	1079
2	Rampart	Montana	HRW	65.00	13.68	90.15	-1.848	12.25	0.39		3.50	4.43	62.65	8.05	73.35	1065
20	Yellowstone	Promontory/Judith	HRW	65.35	12.70	89.75	-1.203	10.92	0.41		5.00	7.40	62.30	12.28	75.25	1122
				60.3	11.78	89.55	-1.93	9.29	0.34		2.75	2.6	59.63	2.85	69.45	965
				65.02	12.7	90.16	-1.49	11.09	0.37		4.17	4.65	62.24	7.32	73.24	1077
				69.05	13.73	91.07	-1.15	13.34	0.41		5.5	7.4	64.3	12.28	77.48	1152

Table 9. 2004 Intrastate Winter Wheat Nursery 3501**Location: Means Across Locations**

Sample No.	Variety	Pedigree	Class	Single Kernel Hardness	Wheat Protein, % (12% m.b.)	Flour						Mixograph			Test Bake						
						Flour Yield, %	Flour Protein, % (14% m.b.)	L* Brightness	a* Green - Red	b* Blue - Yellow	Wheat Ash, %	Flour Ash, %	Type	Tolerance	Mixing Time, min	Water Absorption, %	Mixing Time, min	Water Absorption, %	Loaf Volume	Crumb Grain Score	
7	CDC Falcon	Sask/WPB	HRW	65	12.4	65.8	11.0	90.5	-1.05	7.84	1.33	0.38		3.8	4.7	58.5	8.0	69.3	1025	3.5	
19	Genou	Mt	HRW	76	12.9	68.5	12.0	90.7	-1.41	8.47	1.31	0.35		4.5	4.7	60.5	9.6	70.6	1055	3.5	
14	Ledger	WPB	HRW	66	12.7	70.9	11.2	90.4	-1.51	9.45	1.44	0.34		4.0	4.1	59.4	6.2	69.7	1044	4.0	
2	Neeley	Idaho	HRW	72	13.0	66.2	11.1	90.3	-1.41	9.62	1.39	0.36		5.3	4.5	59.0	7.1	70.0	984	3.5	
13	Pryor	WPB	HRW	75	12.5	68.1	11.0	90.1	-1.35	9.05	1.33	0.38		3.0	3.2	58.5	4.6	68.3	981	3.3	
1	Rampart	Montana	HRW	73	14.5	68.4	12.9	90.1	-1.58	9.92	1.39	0.38		4.3	4.8	62.6	9.6	73.0	1133	3.5	
21	Yellowstone	Promontory/Judith	HRW	76	13.4	68.8	11.6	90.1	-1.13	8.81	1.45	0.38		5.5	6.7	61.3	11.6	72.8	1079	3.5	
		<i>Means Across Locat</i>	<i>MIN</i>	65	11.9	65.8	10.4	89.9	-1.84	7.52	1.27	0.32		3	3.2	57.7	4.3	68.3	948	3	
		<i>Means Across Locat</i>	<i>MAX</i>	77	14.5	70.9	12.9	90.9	-1.05	10.8	1.52	0.42		6	6.8	62.6	13.1	73.3	1133	4	
		<i>Means Across Locat</i>	<i>AVE</i>	72	13	68.3	11.3	90.4	-1.39	9.09	1.41	0.37		4.5	4.7	59.9	7.5	70.6	1026	3.6	