



Phil L. Bruckner, Professor
Department of Plant Sciences & Plant Pathology
Montana State University
Bozeman, MT 59715-3140
bruckner@montana.edu
PHONE 406-994-5127, FAX 406-994-1848

MEMORANDUM

TO: Wheat Cultivar Release & Recommendation Committee

FROM: Phil Bruckner, Winter wheat breeder

DATE: January 9, 2007

RE: Motion to add Hyalite to Montana Winter Wheat Recommended Variety list

The following motion and supporting documentation is presented for consideration at the 2007 Cultivar Release and Recommendation Meeting in Bozeman:

Motion: That Hyalite hard white winter wheat be recommended for production in districts 2-5.

Description: Hyalite is a high-yielding, medium maturity, conventional-height hard white CLEARFIELD® winter wheat cultivar developed and released by MAES in 2005 and exclusively licensed to Westbred LLC. On the basis of limited field observations under natural infection in Montana, Hyalite is resistant to stem rust and very susceptible to stripe rust (Table 1). Based on seven Montana crop tolerance trials, tolerance of Hyalite to imazamox is equivalent to that of Above and MT1159CL.

Based on composite grain samples from 2003 and 2004 (n=9), milling and bread baking characteristics of Hyalite (data not shown) are similar to those of Neeley with exception that Brabender Automat flour extraction of Hyalite (674 g kg^{-1}) was significantly higher ($P < 0.05$) than that of Neeley (659 g kg^{-1}) and flour ash of Hyalite (3.6 g kg^{-1}) was lower than that of Neeley (3.8 g kg^{-1}). Hyalite and Neeley were similar for mixograph tolerance (4.6 and 5.0, respectively), bake water absorption (717 and 711 g kg^{-1} , respectively), bake mixing time (6.5 and 7.4 min, respectively) and loaf volume (1051 and 1055 cc, respectively). Like parental lines NuWest and NuSky, Hyalite has a moderately low level of polyphenol oxidase (PPO) and has good Chinese noodle brightness and noodle color stability. In 2005 quality evaluation (n=4), Hyalite was statistically equivalent ($P > 0.05$) to NuWest and NuSky hard white wheat for single kernel characterization system (SKCS) hardness index (79.7), Brabender Automat flour extraction (696 g kg^{-1}), flour ash content (3.7 g kg^{-1}), mixograph tolerance (3.8), bake water absorption (711 g kg^{-1}), bake mixing time (6.2 min), loaf volume (991 cc), Chinese raw noodle brightness at 0 hr ($L^* = 86.6$) and 24 hr ($L^* = 78.9$), and noodle color stability ($L^*_{0 \text{ hr}} - L^*_{24 \text{ hr}} = 7.7$).

Table 1. Stripe rust of selected cultivars in Bozeman & Kalispell, MT in 2005 & 2006.

Data collected by Qingwu Xue/Robert Stougaard & W. Grey.

Exp3501 Intrastate Test	BZN DR%	KAL DR%	DR%	Bzn&Kal	Kal DR%	BZN DR%	AVERAGE	OVERALL
STRIPE RUST	2006	2006	2006	2006	2005	2005	2005-06	2005 &/or 2006
Yellowstone	0.0	5.0	2.5	R	5.0	5	3.8	r
Promontory	5.0	3.0	4.0	R	3.0	5	4.0	r
Jagalene	5.0	4.0	4.5	R	3.3	10	5.6	r
Bynum (CL)	3.3	6.7	5.0	R	5.0	20	8.8	r
Rampart	1.7	5.0	3.4	R	6.7	24	9.4	r
Jerry	5.0	18.3	11.7	MR	11.7	15	12.5	mr
Vanguard	13.3	6.7	10.0	MR	13.3	24	14.3	mr
MT1159CL (CL)	25.0	10.0	17.5	MR	5.0	20	15.0	mr
Ledger	8.3	16.7	12.5	MR	10.0	44	19.8	mr
Wahoo	18.3	43.3	30.8	S	11.7	30	25.8	s
Norris (CL)	20.0	50.0	35.0	S	30.0	46	36.5	s
Pryor	26.7	11.7	19.2	MR	63.3	46	36.9	s
Rocky	3.3	53.3	28.3	S	60.0	40	39.2	s
CDC Falcon	28.3	43.3	35.8	S	63.3	44	44.7	vs
Genou	15.0	60.0	37.5	S	46.7	70	47.9	vs
Tiber	18.3	50.0	34.2	S	70.0	64	50.6	vs
Morgan	35.0	60.0	47.5	VS	78.3	54	56.8	vs
Hyalite (CL, HWW)	51.7	53.3	52.5	VS	63.3	66	58.6	vs
NuSky (HWW)	41.7	70.0	55.9	VS	70.0	64	61.4	vs
NuWest (HWW)	46.7	80.0	63.4	VS	66.7	64	64.4	vs
BigSky	53.3	80.0	66.7	VS	85.0	56	68.6	vs
Neeley	48.3	73.3	60.8	VS	93.3	76	72.7	vs

Table 2. 2003-2006 Intrastate Winter Wheat Test (Exp. 35): Combined Locations Yield, Test Weight and Protein

Cultivar/Line	Grain Yield (bushels/acre) ^{1/}				Test Weight (lb/bu)				Protein (%)			
	2006	2005-2006	2004-2006	2003-2006	2006	2005-2006	2004-2006	2003-2006	2006	2005-2006	2004-2006	2003-2006
location-years	8	16	24	32	8	16	24	32	8	16	24	32
Yellowstone	73.1**	74.8**	74.5**	74.2**	61.5	60.7	60.5	60.3	12.5	12.7	13.0	13.3
Wahoo	68.4*	68.3*	67.3	67.5	61.5	59.7	59.7	59.8	12.8	12.9	13.2	13.4
Promontory	64.8	68.1*	67.3	67.3	63.6*	62.7*	62.1*	62.2*	12.3	12.3	12.8	13.1
Jagalene	60.9	67.6	64.9	65.4	63.8**	63.2**	62.8**	62.8**	13.4*	13.2	13.5	13.8
Pryor	65.2	67.0	68.7	68.0	61.6	60.0	60.1	59.9	11.9	12.2	12.5	12.9
CDC Falcon	64.0	65.8	66.4	65.5	62.1	60.7	60.6	60.5	12.0	12.3	12.6	12.9
Norris (CL)	61.1	64.7			62.9*	62.0*			12.8	12.7		
Ledger	60.9	64.5	64.5	64.0	62.6	61.6	61.5	61.5	12.5	12.5	12.9	13.3
Jerry	60.6	64.0	64.7	63.7	61.6	60.3	60.2	60.2	13.1	13.3	13.4	13.7
Rocky	63.5	63.9	64.4	64.7	63.8*	62.6*	62.2*	62.1*	12.7	12.6	12.8	13.1
Hyalite (CL, HWW)	60.6	63.0			62.2	61.0			13.3	13.1		
Genou	60.3	61.6	62.1	61.6	62.3	61.2	61.0	60.9	12.5*	13.4	13.6	13.8
Tiber	62.3	61.3	62.1	61.2	62.4	61.2	61.2	61.2	13.1	13.3	13.6	13.9
Rampart	58.1	60.9	59.5	58.3	62.2	61.6	61.1	61.0	14.1**	14.0**	14.3**	14.5**
Morgan	58.8	60.0	61.5	61.6	61.3	60.0	60.0	60.0	12.6	12.8	13.1	13.3
Bynum (CL)	55.9	59.9			62.5	61.9*			13.9*	13.9*		
Neeley	60.8	59.8	62.4	63.2	61.6	59.9	60.1	60.2	12.3	12.8	13.0	13.3
Vanguard	56.4	59.6	58.9	58.8	62.1	61.4	61.0	61.0	14.1**	13.8*	14.0*	14.3*
BigSky	58.8	57.8	59.9	59.6	62.3	60.7	60.8	60.8	13.4	13.5	13.7	14.0
NuWest (HWW)	57.0	57.7	58.8	59.5	61.2	59.2	59.6	59.9	12.7	12.8	13.0	13.3
NuSky (HWW)	57.4	57.0	59.3	60.3	61.1	59.5	59.8	59.9	13.1	12.8	13.1	13.4
MT1159CL (CL)	52.3	54.4	53.6		60.5	59.7	59.1		13.3	13.1	13.5	
Average	61.9	63.8	63.7	63.7	61.8	60.7	60.4	60.8	12.9	12.8	13.1	13.4
LSD (0.05)	7.3	7.1	5.6	4.4	0.8	1.4	1.1	0.8	0.7	0.5	0.4	0.3
C.V.	20.7	16.1	15.5	14.0	1.4	3.2	3.1	2.7	5.3	5.6	5.5	5.1

Table 3. 2003-2006 Intrastate Winter Wheat Test (Exp. 3501): Combined Locations Heading Date, Height, and Lodging

Cultivar/Line	Heading Date (Julian)				Plant Height (in)				Lodging Score (0-9)	
	2006	2005-2006	2004-2006	2003-2006	2006	2005-2006	2004-2006	2003-2006	2005	2004-2005
location-years	8	16	23	31	8	16	24	32	2	3
Wahoo	151.0	155.4	156.0	156.9	29.9	32.3	31.3	31.8	0.0	0.2
Norris (CL)	151.8	155.6			31.1	34.2			0.0	
Jagalene	152.8	156.4	156.6	156.9	29.7	31.7	30.5	30.6	0.0	0.2
Hyalite (CL, HWW)	152.3	156.6			31.5	33.8			0.0	
Rocky	152.8	157.0	157.6	158.3	32.5	35.7	35.3	35.6	4.2	2.8
Bynum (CL)	154.1	157.7			31.4	34.5			2.5	
CDC Falcon	154.0	157.9	158.8	159.4	26.7	29.4	29.4	29.5	0.0	0.0
Ledger	154.8	158.4	158.8	159.1	28.8	31.3	30.8	30.7	0.0	0.0
Promontory	154.4	158.6	159.1	159.5	31.4	32.9	32.2	32.5	0.1	0.2
Vanguard	154.8	158.9	159.5	160.0	33.3	36.1	35.0	35.2	3.4	2.3
Genou	154.9	159.0	159.7	160.5	33.0	35.2	34.5	34.7	0.8	0.7
BigSky	155.1	159.1	159.9	160.6	34.2	37.1	36.2	36.6	0.1	0.2
Jerry	155.2	159.1	160.0	160.8	34.3	37.3	36.6	36.7	2.1	2.4
Rampart	155.7	159.5	160.0	160.8	32.2	34.9	34.1	34.1	3.9	2.6
Yellowstone	155.5	159.6	160.5	160.8	32.1	33.7	33.5	33.6	0.2	0.1
NuWest (HWW)	155.6	159.7	160.5	161.0	33.0	35.3	34.5	34.6	0.6	0.6
MT1159CL (CL)	156.2	160.0	160.4		29.6	32.1	31.3		0.0	0.3
Pryor	156.9	160.2	161.0	161.9	28.0	30.2	30.3	30.6	0.1	0.1
NuSky (HWW)	156.0	160.5	161.4	161.9	33.7	35.7	35.1	35.2	0.3	1.1
Tiber	156.5	160.6	161.4	162.1	34.7	38.1	37.3	37.5	2.0	1.3
Morgan	157.3	161.3	162.2	162.8	32.4	35.2	34.8	34.7	0.4	1.1
Neeley	157.2	161.3	161.8	162.4	33.0	35.3	34.4	34.8	1.0	0.7
Average	154.6	158.6	159.8	159.9	31.1	33.4	33.0	33.3	0.8	1.1
LSD (0.05)	1.2	0.8	0.8	0.6	1.4	1.1	2.0	0.8	2.2	2.2
C.V.	0.8	0.7	0.8	0.8	4.7	4.6	4.8	4.6	137	140

Table 4. 2003-2006 Intrastate Winter Wheat Test (Exp. 3505): Kalispell (District 1) Yield, Test Weight and Protein

Cultivar/Line	Grain Yield (bushels/acre) ^{1/}				Test Weight (lb/bu)				Protein (%)			
	2006	2005-2006	2004-2006	2003-2006	2006	2005-2006	2004-2006	2003-2006	2006	2005-2006	2004-2006	2003-2006
		2 yr	3 yr	4 yr		2 yr	3 yr	4 yr		2 yr	3 yr	4 yr
Jagalene	58.7	90.3*	98.0*	87.8*	65.8*	64.3	63.9*	64.0*	14.0	13.2	13.4*	13.5*
Rampart	73.9*	83.7*	90.2*	78.3	66.3*	65.1	63.6*	63.2*	13.7	13.2	13.4*	13.6**
Bynum (CL)	59.0	83.5*			66.0*	65.1			14.7	13.9		
Ledger	62.6	76.4*	91.7*	85.4*	65.5	61.9	61.7*	62.1*	11.9	12.4	12.4	12.8*
MT1159CL (CL)	55.1	70.3*	76.0		63.7	61.7	60.9*		13.5	12.7	12.7*	
Vanguard	50.3	70.2*	81.9	74.6	65.6*	64.0	63.0*	62.8*	14.0	13.0	13.2*	13.3*
Tiber	64.0	69.5*	82.5	74.6	65.7*	59.9	60.7*	61.0*	12.8	12.5	12.5*	12.9*
Jerry	57.4	69.4*	81.9	73.3	64.6	60.7	60.4*	60.5*	12.9	12.9	12.9*	13.1*
Genou	67.3	67.9*	81.6	75.7	66.5*	61.0	61.0*	61.5*	12.5	12.6	12.7*	12.8*
Norris (CL)	53.9	67.8*			66.0*	62.6			12.7	12.0		
Wahoo	64.9	66.8*	82.2	79.3	64.5	56.6	57.9*	58.6	12.1	12.5	12.5*	12.7
Yellowstone	77.7*	101.9**	113.8**	103.0**	65.0	63.5	62.7*	62.5*	12.2	12.7	12.5*	12.6
Promontory	71.0*	100.9*	108.4*	95.8*	66.4*	64.0	64.0*	63.8*	12.6	11.9	11.9	12.4
Rocky	61.6	63.8	81.4	75.6	65.9*	63.9	63.3*	63.2*	13.2	13.0	12.9*	13.0*
CDC Falcon	56.9	63.5	81.6	75.1	66.4*	60.4	60.4*	60.4*	11.8	11.7	11.9	12.1
Pryor	71.1*	62.9	81.7	77.2	65.9*	57.8	58.8*	58.9	12.4	12.4	12.2	12.4
Hyalite (CL, HWW)	51.2	58.3			65.0	59.3			12.2	12.3		
Neeley	61.3	44.4	66.9	65.4	65.1	54.5	57.0	58.2	11.9	12.3	12.3	12.6
BigSky	45.0	42.8	62.6	60.8	64.7	55.9	58.1*	59.0*	13.0	13.1	12.9*	13.2*
Morgan	44.3	39.4	60.7	59.5	64.4	56.6	57.8*	58.5	12.8	12.9	12.8*	12.8*
NuSky (HWW)	36.6	31.0	50.5	52.7	62.6	52.7	55.1	57.0	12.0	12.1	12.2	12.3
NuWest (HWW)	37.0	30.8	47.5	50.2	61.5	50.5	53.7	55.6	12.7	13.0	12.8*	12.7
Average	59.6	67.5	80.6	73.7	65.0	60.1	60.0	60.5	12.7	12.4	12.5	12.8
LSD (0.05)	14.9	37.4	27.3	23.5	1.0	ns	6.7	5.3		ns	1.1	0.8
C.V.	15.5	27.3	20.7	22.6	1.0	7.8	6.9	6.3		6.0	5.1	4.4

Table 5. 2003-2006 Intrastate Winter Wheat Test (Exp. 3501): Bozeman (District 2) Yield, Test Weight and Protein

Cultivar/Line	Grain Yield (bushels/acre) ^{1/}				Test Weight (lb/bu)				Protein (%)			
	2006	2005-2006	2004-2006	2003-2006	2006	2005-2006	2004-2006	2003-2006	2006	2005-2006	2004-2006	2003-2006
		2 yr	3 yr	4 yr		2 yr	3 yr	4 yr		2 yr	3 yr	4 yr
Yellowstone	99.4*	106.3	114.4**	113.2**	62.2	60.6	61.2	60.5	11.4	12.9	12.8	13.1
Wahoo	91.3	102.3	108.8*	107.1*	61.7	59.8	60.5	59.7	11.4	12.9	12.8	13.1
Promontory	92.8	100.3	110.8*	109.5*	65.2**	63.7**	64.2**	63.4**	11.0	12.1	12.0	12.4
Rocky	85.7	95.2	101.5*	100.2	63.8	62.3*	62.9*	62.3	10.6	12.5	12.4	12.9
Jagalene	79.1	94.8	97.5	99.0	64.8*	63.5*	63.8*	63.3*	12.0	13.1*	13.4*	13.6*
Jerry	88.7	92.9	101.7*	99.8	62.0	60.4	61.1	60.4	11.1	12.9	12.8	13.2
Norris (CL)	77.4	92.3			63.6	62.5*			11.1	12.5		
Hyalite (CL, HWW)	70.5	91.6			61.7	61.1			11.5	13.0*		
Ledger	70.3	90.7	99.7*	99.2	62.7	61.9	62.7	62.1	11.1	12.4	12.5	12.8
Tiber	83.7	89.2	98.2*	97.5	63.7	62.4*	62.9*	62.1	11.6	13.4*	13.3*	13.8*
Rampart	80.4	88.3	92.0	90.0	63.2	61.9	62.3	61.5	12.0	14.0*	13.9*	14.2*
CDC Falcon	77.5	88.1	98.9*	99.7	61.7	59.6	60.7	60.0	10.9	12.8	12.5	12.7
Pryor	79.5	88.1	103.5*	102.8*	61.1	59.2	60.5	59.5	11.1	13.0*	12.6	13.0
Morgan	74.5	86.9	95.1	94.2	61.8	60.4	60.9	60.3	10.2	12.3	12.5	12.9
Neeley	69.9	86.6	100.4*	99.6	62.3	61.1	62.0	61.3	10.5	12.8	12.7	13.3
Bynum (CL)	74.9	85.4			63.2	62.1*			11.9	13.8*		
Vanguard	75.2	85.1	91.2	90.9	62.7	61.8	62.2	61.6	12.2	14.1**	14.0**	14.3**
Genou	71.1	82.4	92.9	92.2	62.8	61.5	62.1	61.5	11.4	13.4*	13.3*	13.7*
NuWest (HWW)	64.5	81.2	93.4	94.8	60.7	60.0	60.9	60.3	9.9	12.3	12.5	13.0
NuSky (HWW)	65.8	80.6	99.1*	98.2	61.2	60.2	60.9	60.4	11.1	13.0*	13.0	13.4
MT1159CL (CL)	68.2	78.7	82.1		60.5	59.5	60.1		11.6	12.9	13.0	
BigSky	62.1	78.1	89.9	90.9	62.6	61.2	62.0	61.3	11.1	13.0*	13.1*	13.6*
Average	79.5	91.3	99.7	99.1	62.3	60.8	61.4	61.1	11.2	12.8	12.8	13.2
LSD (0.05)	6.9	ns	16.8	12.9	0.6	1.7	1.4	0.9		1.1	0.9	0.7
C.V.	5.2	9.3	10.3	9.2	0.6	1.4	1.4	1.1		4.1	4.3	3.9

Table 6. 2003-2006 Intrastate Winter Wheat Test (Exp. 3508): Huntley (District 3) Yield, Test Weight and Protein

Cultivar/Line	Grain Yield (bushels/acre) ^{1/}				Test Weight (lb/bu)				Protein (%)			
	2006	2005-2006	2004-2006	2003-2006	2006	2005-2006	2004-2006	2003-2006	2006	2005-2006	2004-2006	2003-2006
		2 yr	3 yr	4 yr		2 yr	3 yr	4 yr		2 yr	3 yr	4 yr
Wahoo	91.5*	83.5**	57.0	67.7	60.1	59.2	59.0	59.2	13.1	12.1*	14.2	14.2
Yellowstone	91.4*	82.8*	59.1	70.9	61.0	60.3	59.9	60.0	12.9	12.6*	13.4	13.9
Jagalene	90.9*	82.2*	56.3	71.2	62.4*	62.4*	59.6	60.6	13.4	12.0*	14.0	13.9
Promontory	84.5	78.1*	53.2	64.7	63.2*	63.1**	59.8	60.6	12.4	11.3	13.3	13.7
Pryor	77.7	77.7*	56.7	64.0	60.5	60.6	60.2	60.0	11.6	10.5	12.3	12.9
CDC Falcon	82.0	77.3*	54.9	61.6	60.5	60.2	59.6	59.4	11.5	11.8	13.2	13.4
Hyalite (CL, HWW)	86.1	76.8*			61.5	61.3*			12.8	11.8		
Ledger	82.0	74.1	51.0	60.7	62.3*	61.1	60.0	60.3	12.8	12.5*	14.0	14.1
Norris (CL)	81.0	74.0			61.3	61.1			13.5	12.7*		
Morgan	79.3	73.6	52.2	59.3	60.4	60.6	60.0	60.0	13.4	12.5*	13.7	13.8
Genou	85.4	72.7	52.0	60.8	62.9*	61.2*	61.0	61.4	14.6	13.7**	15.1	14.9
Rocky	77.1	71.0	49.3	62.8	62.7*	61.8*	60.7	61.3	14.4	12.5*	14.1	14.1
NuWest (HWW)	76.9	70.8	51.7	59.8	60.4	60.2	60.6	60.7	13.7	12.5*	13.7	14.0
Jerry	76.0	70.4	49.7	59.1	60.9	60.2	59.8	60.1	14.2	12.9*	14.1	14.2
Neeley	72.0	69.9	50.2	61.4	59.9	60.7	59.9	60.0	13.5	12.3*	13.6	14.0
Vanguard	78.0	69.7	48.7	57.9	62.1*	61.1	60.3	60.8	14.7	13.3*	14.7	15.0
Bynum (CL)	82.2	69.1			63.0*	61.7*			13.3	12.7*		
Tiber	79.2	69.0	50.2	56.7	62.3*	61.4*	60.8	61.3	13.1	13.3*	14.3	14.4
BigSky	78.6	68.2	49.0	57.7	61.3	60.8	60.3	60.6	14.4	13.0*	14.4	14.5
Rampart	77.8	67.6	48.8	56.8	62.2*	61.5*	61.2	61.4	15.3	13.5*	14.5	14.8
MT1159CL (CL)	76.4	66.4	45.5		61.5	59.7	56.6		13.4	12.7*	14.3	
NuSky (HWW)	71.0	66.3	48.3	58.5	59.0	59.8	60.3	60.6	15.2	13.4*	14.1	13.9
Average	82.0	74.6	52.6	62.4	61.1	60.7	59.8	60.4	13.4	12.3	13.8	14.0
LSD (0.05)	10.9	8.2	ns	ns	1.8	1.9	ns	ns		1.7	ns	ns
C.V.	7.6	5.4	9.3	10.1	1.6	1.6	3.1	2.6		7.0	6.9	7.2

Table 7. 2003-2006 Intrastate Winter Wheat Test (Exp. 3507): Moccasin (District 4) Yield, Test Weight and Protein

Cultivar/Line	Grain Yield (bushels/acre) ^{1/}				Test Weight (lb/bu)				Protein (%)			
	2006	2005-2006	2004-2006	2003-2006	2006	2005-2006	2004-2006	2003-2006	2006	2005-2006	2004-2006	2003-2006
		2 yr	3 yr	4 yr		2 yr	3 yr	4 yr		2 yr	3 yr	4 yr
Yellowstone	59.9	53.2	55.5**	53.2**	60.8	59.2	59.3	58.0	11.8	13.7	13.6	14.1
Pryor	61.4	52.0	54.4*	52.1*	63.2*	58.3	58.5	57.7	10.2	13.9	13.8	14.2
Neeley	64.2*	49.7	51.0*	48.3*	61.5	57.8	57.7	57.0	11.1	13.9	13.7	14.1
Promontory	55.1	49.0	51.8*	50.7*	62.9	60.5*	60.1*	59.3	12.4	14.6	14.2	14.6
NuSky (HWW)	57.7	47.9	49.7*	46.7	62.1	60.0	59.5	58.4	11.3	12.9	13.1	13.7
NuWest (HWW)	55.5	47.0	46.8	46.2	61.9	59.7	59.5	59.0	12.2	14.0	14.1	14.1
Ledger	53.3	46.9	49.5*	48.4*	62.9	60.8*	60.5*	59.6	12.5	13.9	14.0	14.4
BigSky	58.9	46.7	47.6	43.9	62.6	59.6	59.0	57.9	12.4	14.8	14.3	14.9
Norris (CL)	52.5	46.6			63.0	60.3*			12.4	14.3		
Jagalene	49.1	46.5	47.1	48.3*	64.2**	62.0**	61.6**	61.1**	12.4	13.6	13.5	13.8
Morgan	55.2	46.5	48.2	46.1	61.8	59.0	58.7	58.0	11.8	13.7	13.6	13.8
CDC Falcon	53.8	46.4	49.4*	47.6*	63.3*	58.9	58.6	57.7	11.6	13.9	14.0	14.5
Jerry	53.7	46.3	48.2	46.8	61.3	57.9	57.8	57.1	12.2	15.1	14.5	14.9
Rocky	53.9	45.8	47.5	46.5	63.6*	61.5*	60.8*	59.7	12.5	13.9	13.7	14.3
Wahoo	49.3	45.8	46.8	45.7	62.8	58.8	58.6	57.4	12.1	15.0	14.8	15.1
Tiber	55.6	45.4	46.8	44.6	61.6	59.1	58.9	58.3	12.3	14.4	14.3	14.5
Hyalite (CL, HWW)	46.8	44.2			63.2*	59.9			13.0	14.7		
Genou	51.9	42.9	45.9	43.3	63.1	59.1	58.8	57.6	11.6	14.4	14.2	14.9
Vanguard	48.3	40.2	41.3	40.3	61.7	59.7	58.5	57.8	12.8	14.9	14.5	15.1
Rampart	44.9	39.9	41.9	41.5	61.9	59.3	58.3	58.0	13.4	15.9	15.3	15.5
MT1159CL (CL)	45.6	39.6	42.5		60.2	58.4	58.1		13.4	14.8	14.2	
Bynum (CL)	43.4	37.7			61.3	60.3*			14.0	15.3		
Average	53.9	46.6	48.3	47.1	62.0	59.2	58.8	58.3	12.1	14.1	14.0	14.4
LSD (0.05)	6.8	ns	6.8	6.2	1.0	1.9	1.5	1.4		ns	ns	ns
C.V.	7.8	10.4	8.6	9.4	0.8	1.5	1.6	1.6		6.1	5.6	5.1

Table 8. 2003-2006 Intrastate Winter Wheat Test (Exp. 3502): Havre (District 5) Yield, Test Weight and Protein

Cultivar/Line	Grain Yield (bushels/acre) ^{1/}				Test Weight (lb/bu)				Protein (%)			
	2006	2005-2006	2004-2006	2003-2006	2006	2005-2006	2004-2006	2003-2006	2006	2005-2006	2004-2006	2003-2006
		2 yr	3 yr	4 yr		2 yr	3 yr	4 yr		2 yr	3 yr	4 yr
CDC Falcon	60.9*	61.2	64.4	55.5*	62.9	61.8	61.2	60.9	12.4	11.9	12.1	13.0
Ledger	52.1	60.7	63.0	55.3*	63.4	62.6	62.0	61.8	12.0	11.9	12.4	13.1
Pryor	58.6	59.4	64.5	57.7**	62.4	60.8	60.1	60.6	13.2	13.1*	13.3*	13.8
Yellowstone	63.7*	58.9	62.7	54.8*	62.2	60.9	60.0	60.0	13.4	13.1*	13.7*	14.3*
Genou	55.9	58.3	61.6	53.8*	62.6	61.5	60.8	60.9	13.9	13.1*	13.2*	14.0*
Vanguard	52.4	57.6	58.8	52.2	62.6	61.7	60.9	61.0	14.5	13.5*	13.8*	14.3*
NuWest (HWW)	57.5	57.0	59.2	50.1	63.2	62.0	61.3	61.1	13.4	13.1*	13.1	13.9
Bynum (CL)	48.3	56.8			63.1	62.3			14.0	14.0*		
Rocky	62.5*	55.8	61.9	53.9*	65.7**	63.9**	63.2**	62.9**	12.3	12.3	12.0	12.8
Rampart	49.7	55.6	58.1	51.2	62.4	61.4	60.7	60.8	14.3	14.0*	14.6**	14.9**
Wahoo	66.9**	54.9	60.2	53.1*	62.3	60.6	60.2	60.3	13.4	12.7	12.6	13.3
Jagalene	49.9	54.7	59.0	50.4	64.2	63.4*	63.2**	62.6*	13.4	13.1*	13.3*	13.9
Tiber	57.0	54.7	57.3	49.7	62.5	61.7	61.1	61.3	13.8	13.3*	13.6*	14.2*
Norris (CL)	56.4	53.9			63.9	63.1*			12.4	11.9		
Hyalite (CL, HWW)	50.8	53.7			63.1	62.1			14.0	13.3*		
Neeley	54.4	53.7	57.6	50.8	62.0	61.6	60.6	60.8	12.4	13.2*	13.5*	14.0*
NuSky (HWW)	55.8	53.2	56.4	49.4	62.6	61.0	60.2	60.4	14.2	13.0*	13.5*	14.2*
Jerry	55.5	52.8	56.2	48.5	62.1	60.8	60.1	60.1	13.0	13.5*	13.1	14.0*
BigSky	59.1	52.4	57.0	49.7	63.1	61.7	60.8	60.9	14.0	14.2**	14.5*	14.9**
Morgan	57.3	51.0	53.9	46.8	61.8	60.2	59.5	59.7	13.3	13.8*	13.9*	14.6*
MT1159CL (CL)	45.4	48.5	52.3		61.5	60.6	59.8		12.6	12.5	13.1	
Promontory	53.8	45.4	51.9	46.5	63.9	62.8*	62.2*	62.0*	12.1	12.6	13.0	13.5
Average	53.9	55.8	58.9	52.0	62.5	61.4	60.6	61.0	13.3	13.0	13.3	13.9
LSD (0.05)	7.5	ns	ns	5.4	1.0	1.2	1.2	1.0		1.4	1.4	1.0
C.V.	7.7	9.7	8.8	7.4	1.0	1.0	1.2	1.2		5.4	6.5	5.0

Table 9. 2003-2006 Intrastate Winter Wheat Test (Exp. 3518): Conrad (District 5) Yield, Test Weight and Protein

Cultivar/Line	Grain Yield (bushels/acre) ^{1/}				Test Weight (lb/bu)				Protein (%)			
	2006	2005-2006	2004-2006	2003-2006	2006	2005-2006	2004-2006	2003-2006	2006	2005-2006	2004-2006	2003-2006
		2 yr	3 yr	4 yr		2 yr	3 yr	4 yr		2 yr	3 yr	4 yr
Pryor	84.7*	90.8*	84.1*	79.3*	63.9	64.1*	63.2*	62.4	11.4	11.8	11.8	12.2
Yellowstone	83.7*	88.1*	82.5*	79.7**	62.2	62.1	61.6	61.6	12.4	12.7	12.7	12.9
Norris (CL)	84.0*	87.4*			63.0	63.2*			13.4	13.2		
Wahoo	80.3*	84.6*	80.1*	77.5*	62.6	62.5	62.5	62.4	13.2	13.3	13.1	13.2
Hyalite (CL, HWW)	82.6*	84.1*			63.2	63.0			13.5	13.9		
Promontory	76.3	83.9*	78.6	73.7*	63.6	63.9*	63.7*	63.8*	12.3	12.5	12.6	12.7
CDC Falcon	80.4*	82.4*	78.9	75.4*	63.7	63.7*	63.7*	63.5	12.4	12.6	12.6	12.8
Genou	77.0	81.5	77.6	72.9	63.5	64.0*	63.6*	63.0	13.6	13.0	12.9	13.2
Ledger	78.1	81.2	79.9	76.5*	63.7	64.0*	63.9*	63.9*	13.6	13.4	12.9	13.0
Rocky	76.5	80.7	79.2	76.2*	63.9	64.2*	64.0*	64.1*	13.3	13.0	12.3	12.7
Neeley	76.5	79.5	76.9	73.7*	63.2	62.7	62.7	62.4	12.5	12.9	12.6	12.9
BigSky	75.6	79.3	79.0	73.4*	63.2	63.1*	63.0	62.7	13.6	13.7	13.2	13.6
Jagalene	70.3	76.5	74.0	72.0	64.7	64.7**	64.8**	64.8**	13.5	13.8	13.6	13.8
NuSky (HWW)	65.7	75.2	73.4	70.9	62.4	62.1	61.7	61.5	12.5	12.7	12.5	12.9
NuWest (HWW)	65.5	74.7	74.0	71.0	62.3	61.6	61.1	61.2	13.0	13.6	12.9	13.1
Tiber	69.4	74.4	71.2	67.9	63.0	63.0	62.7	62.5	13.1	13.2	13.2	13.5
Bynum (CL)	70.9	72.6			62.7	63.1			14.9	15.1**		
Morgan	60.2	71.8	71.0	68.6	62.7	62.8	62.7	62.1	13.0	13.1	12.5	12.9
MT1159CL (CL)	70.6	70.7	67.2		61.1	61.4	60.7		13.5	13.5	13.4	
Rampart	71.1	70.5	68.0	66.2	64.4	63.8*	63.4*	63.0	14.5	14.5*	14.4**	14.5**
Vanguard	68.0	70.1	68.6	67.6	62.8	62.4	62.5	62.6	14.2	14.4*	13.8*	13.8*
Jerry	54.1	65.8	67.5	65.8	62.0	62.1	62.2	61.9	13.3	13.6	13.2	13.5
Average	75.8	80.4	76.9	73.5	62.8	62.8	62.5	62.7	13.1	13.1	12.8	13.1
LSD (0.05)	9.5	9.8	8.5	6.7		1.7	1.7	1.1		0.7	0.8	0.7
C.V.	7.7	6.0	6.8	6.5		1.3	1.6	1.3		2.7	4.0	3.7

Table 10. 2003-2006 Intrastate Winter Wheat Test (Exp. 3503): Sidney (District 6) Yield, Test Weight and Protein

Cultivar/Line	Grain Yield (bushels/acre) ^{1/}				Test Weight (lb/bu)				Protein (%)			
	2006	2005-2006	2004-2006	2003-2006	2006	2005-2006	2004-2006	2003-2006	2006	2005-2006	2004-2006	2003-2006
		2 yr	3 yr	4 yr		2 yr	3 yr	4 yr		2 yr	3 yr	4 yr
Pryor	57.8*	57.5**	61.1**	63.3*	60.9	61.1	60.8	61.0	11.3	9.7	11.0	11.0
Jerry	57.8*	56.9*	57.4*	59.9*	61.0	60.9	60.5	60.9	14.4	12.0*	12.6*	12.8*
CDC Falcon	61.7*	56.8*	56.7*	59.0*	61.5	61.8	61.0	61.6	11.7	10.8	11.8	11.6
Wahoo	58.2*	56.1*	55.4*	58.6	61.0	60.6	60.0	60.6	13.9	11.6*	12.3*	12.3
Morgan	59.1*	55.1*	55.8*	60.0*	60.9	61.6	60.6	61.0	11.8	10.3	11.7	11.8
Yellowstone	56.9	54.8*	59.2*	64.1**	60.6	60.8	60.3	60.7	12.0	10.7	11.7	11.6
NuSky (HWW)	57.2*	54.2*	53.7	57.5	60.6	60.9	60.6	61.0	14.6	12.3*	12.9*	12.8*
NuWest (HWW)	52.9	51.6*	53.2	56.1	60.3	60.9	60.5	60.9	12.7	10.5	11.8	12.0
Neeley	55.8	51.3*	53.5	57.5	60.9	61.5	61.0	61.5	12.2	11.0	11.8	11.8
BigSky	51.1	49.7*	51.5	54.0	61.7	62.8*	62.2*	62.5	13.2	11.3	12.5*	12.5
Rocky	51.1	49.3	52.8	57.0	62.4*	62.0	61.6	62.1	12.6	10.6	11.5	11.5
Hyalite (CL, HWW)	53.1	48.5			61.0	61.3			14.7	12.0*		
Norris (CL)	52.1	48.3			62.0	62.2*			13.5	11.6*		
Jagalene	47.8	47.4	46.3	50.3	63.4**	63.5**	62.9**	63.4**	14.1	13.0**	13.4**	13.6*
Genou	52.5	46.8	47.4	50.9	61.2	61.8	61.0	61.4	15.0	12.1*	13.0*	12.8*
Promontory	51.6	45.5	49.6	55.8	61.9	62.4*	61.8*	62.6	12.0	10.9	12.0	12.2
Ledger	48.1	43.5	43.7	46.2	61.6	61.2	61.1	61.9	12.6	10.9	12.0	12.3
Tiber	49.5	43.0	47.3	50.8	61.0	61.8	61.5	61.9	13.3	12.1*	13.0*	13.2*
Rampart	45.2	42.6	44.4	46.0	60.3	61.1	60.6	61.0	13.3	12.0*	13.1*	13.6*
Vanguard	48.6	42.5	42.4	46.0	60.8	61.4	61.0	61.2	14.8	12.4*	13.2*	13.7**
Bynum (CL)	43.4	36.8			60.7	61.0			13.3	12.1*		
MT1159CL (CL)	41.7	30.8	35.3		57.9	58.5	58.6		13.3	12.3*	13.1*	
Average	51.8	48.6	51.1	55.0	60.7	61.0	60.5	61.4	13.0	11.3	12.2	12.3
LSD (0.05)	6.1	7.8	7.1	5.1	1.1	1.4	1.2	0.7		1.7	1.2	1.0
C.V.	6.7	7.9	8.4	6.6	1.1	1.1	1.2	0.9		7.2	6.2	5.6

Table 11. 2003-2006 Intrastate Winter Wheat Test (Exp. 3504): Williston (District 6) Yield, Test Weight and Protein

Cultivar/Line	Grain Yield (bushels/acre) ^{1/}				Test Weight (lb/bu)				Protein (%)			
	2006	2005-2006	2004-2006	2003-2006	2006	2005-2006	2004-2006	2003-2006	2006	2005-2006	2004-2006	2003-2006
		2 yr	3 yr	4 yr		2 yr	3 yr	4 yr		2 yr	3 yr	4 yr
Jerry	43.5**	57.3**	54.7*	56.1*	57.9	59.6	59.8	60.4	13.6	13.8	13.7	13.8
Morgan	40.6*	55.9*	55.3**	58.4**	57.0	59.3	59.5	60.0	14.6	14.1*	14.1	13.9
Yellowstone	37.9*	53.0*	48.5*	54.4*	56.7	58.4	58.7	59.6	14.0	13.4	13.4	13.6
Wahoo	39.3*	52.4*	47.9*	50.8	57.2	59.3	59.3	60.0	13.2	13.3	13.2	13.5
CDC Falcon	36.6*	51.0*	46.3	49.9	57.3	59.5	59.7	60.4	13.6	13.0	12.9	13.0
Rocky	39.5*	49.9	41.8	45.7	60.3*	61.4*	61.1	61.7	13.0	13.2	13.2	13.3
Jagalene	36.0*	48.7	40.9	44.3	60.8**	62.1**	62.3**	62.9**	14.5	13.6	13.7	14.0
NuWest (HWW)	37.2*	48.6	44.3	47.5	57.9	59.3	59.5	60.1	14.1	13.5	13.5	13.7
NuSky (HWW)	40.1*	47.6	43.5	48.6	58.0	59.4	59.8	60.3	13.7	13.2	13.4	13.7
Pryor	32.3	47.5	43.5	47.8	56.0	58.3	58.5	59.1	14.2	13.2	13.4	13.4
Norris (CL)	35.0	47.2			60.0*	61.5*			13.4	13.3		
Hyalite (CL, HWW)	34.4	46.7			58.9	60.4			14.6	13.9		
BigSky	35.0	45.8	42.2	46.6	58.5	60.5	60.7	61.3	15.2	14.8*	14.9*	15.0*
Tiber	34.4	45.3	43.5	47.7	58.2	60.4	60.7	61.2	14.4	14.3*	14.4*	14.5
Neeley	29.7	43.8	42.6	49.2	57.5	59.4	59.7	60.4	14.4	14.1*	14.0	13.9
Ledger	30.3	42.5	37.5	40.3	58.1	59.8	60.0	60.7	13.8	13.0	13.2	13.6
Promontory	32.3	42.1	34.2	41.5	60.5*	61.4*	61.2*	62.2*	13.2	12.9	13.1	13.3
Vanguard	27.5	41.4	38.6	41.4	57.4	59.2	59.6	60.1	15.3	14.8*	14.8*	14.9*
Genou	26.0	40.6	37.6	43.0	56.7	59.4	59.6	60.2	15.5	14.6*	14.6*	14.6*
Rampart	24.7	39.0	32.7	36.4	56.6	58.8	58.9	59.5	16.0	15.2**	15.1**	15.2**
Bynum (CL)	25.2	37.8			58.2	60.0			15.3	14.9*		
MT1159CL (CL)	16.0	30.8	28.3		56.4	58.2	58.1		15.2	13.8	14.0	
Average	33.3	45.8	41.8	46.6	57.5	59.3	59.4	60.5	14.2	13.6	13.7	13.8
LSD (0.05)	7.7	6.8	7.9	6.7	1.9	1.4	1.1	0.8		1.1	0.7	0.7
C.V.	13.3	7.3	11.6	10.2	1.7	1.2	1.1	0.9		3.8	3.3	3.4