



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 and Jim Berg, Winter wheat breeders

DATE: January 9, 2013

RE: Proposal for cultivar release of MT08172

The following motion and supporting documentation is presented for consideration at the 2013 MAES Cultivar Release and Recommendation Meeting in Bozeman:

Motion: That MT08172 hard red winter wheat be approved for release in 2013, that MT08172 be named ‘Colter’, and that Colter be recommended for production in districts 2, 3, 4, and 5.

Pedigree: MT9982*2/BZ9W96-895. MT9982 is a sib selection of Yellowstone. BZ9W96-895 is an unreleased advanced breeding line from Westbred of unknown pedigree (selected from a male-sterile population).

Recommendation: Protected MAES Public Release (F.2.b).

Name: To be named ‘Colter’ for John Colter, a member of the 1804-6 Lewis & Clark expedition, who later explored the Yellowstone caldera, completed his famous “run”, and is considered by some to be the first mountain man.

Selection history: MT08172 originated from a single topcross made in the greenhouse in 2001. The F1 population was grown at Fort Ellis in 2002. F2, F3, F4, and F5 bulk populations were grown at Fort Ellis, Williston, Williston, and Bozeman from 2003 to 2006, respectively, using a modified bulk breeding method, with mass selection for survival, reduced plant height, favorable head morphology, and kernel plumpness. 136 heads which were selected from the F5 population in 2006 were grown as F6 headrows at Fort Ellis in 2007. Headrow 01X251E5 was selected based on evaluation of visual criteria for uniformity, productivity, and acceptable agronomic type and harvested in bulk. 01X251E5 was designated MT08172 and subsequently tested in the 2008 Preliminary B yield trial at Bozeman which hailed out, and the 2009 Preliminary B yield trial at Bozeman and Moccasin (2 location years, LY). MT08172 was later tested in the Advanced trial in 2010 (5 LY), in the Montana Intrastate trial in 2011 and 2012 (15 LY), and in the Off-station nursery in 2012 (17 LY). Quality has been evaluated in multi-location Montana trials since 2009. Currently MT08172 is an entry in the 2013 USDA Northern Regional Performance Nursery (NRPN) planted at approximately 20 sites across the Northern Great Plains.

Description: Colter is an awned, white-glumed, high-yielding hard red winter wheat. Colter is similar to Yellowstone for grain yield (LY=39, Table 1) and most agronomic traits with exception that Colter is about 0.5

lb/bu higher for grain volume weight than Yellowstone (Table 2) and has superior stem rust resistance relative to Yellowstone. Colter is moderately resistant to prevalent races of stem rust including UG99 (Tmp or Red Chief) and stripe rust, but susceptible to leaf rust. Colter is medium to late in maturity, 172 d heading from 1 January, similar to Yellowstone but about 2.5 days later than CDC Falcon and 4 days later than Jagalene (Table 2). MT08172 (32.7 inches, n=40) is similar in height to Yellowstone and taller than CDC Falcon and Jagalene.

Table 1. Yield of MT08172 vs. 3 checks, 2009-12.

Variety	Districts							All Locations
	1 Kalispell	2 Bozeman ^{1/}	3 Huntley ^{2/}	4 Moccasin ^{3/}	5 Conrad ^{4/}	5 Havre ^{5/}	6- Sidney & Williston	
location-years	2	6	9	8	6	4	4	39
MT08172	108.6**	76.1*	64.3	49.9	76.0**	55.9	58.5	65.8**
Yellowstone	96.8*	78.5**	66.0	47.7	73.8*	52.1	60.3	64.9*
Jagalene	66.6	67.2	62.9	46.6	66.2	47.2	51.9	58.2
CDC Falcon	45.6	61.0	62.9	45.6	70.9*	49.7	61.3	57.9
LSD (0.05)	23.4	10.8	ns	ns	7.0	ns	ns	3.8

2/ = includes 2009 Preliminary A, 2010 Advanced, 2011-2012 Intrastate Tests, and 2012 Off Station tests

3/ includes data from Dry Creek, Willow Creek

4/ includes data from Forsyth, Fort Smith, Hardin area, Molt, Rapelje

5/ includes data from Belt, Denton, Geraldine, Winifred

6/ includes data from Choteau, Cut Bank, The Knees, Shelby

7/ includes data from North Havre, Loma, Turner

Table 2. Agronomic characteristics of MT08172 vs. 3 checks, 2009-2012.

Variety	Test weight	Winter survival	Heading date		Plant height	Lodging %	Protein %	Sawfly cutting %	Stripe rust %	Coleoptile length in
	lb/bu	%	Julian	Calendar	in		%	%	%	in
location-years	39	2	22		40	2	39	6	4	1
CDC Falcon	58.5	60	169.5	19-Jun	30.1	1	13.0*	23**	54	2.8
Jagalene	61.1**	33	168.3	17-Jun	31.4	6	12.8	31	40*	3.1
MT08172	59.0	37	172.1	21-Jun	32.7	8	13.2**	28*	25**	2.7
Yellowstone	58.5	37	171.5	21-Jun	32.8	7	13.1*	27*	27*	2.5
LSD (0.05)	0.5	ns	0.6		0.6	ns	0.3	5	16	0.2

2/ = includes 2009 Preliminary A, 2010 Advanced, 2011-2012 Intrastate Tests, and 2012 Off Station tests

MT08172 has excellent milling and bread baking quality similar to Yellowstone. In summary, MT08172 has low polyphenol oxidase, intermediate flour yield and flour protein level, and strong dough mixing characteristics with relatively long mixing time, high bake water absorption, and high loaf volume (Table 3).

Table 3. Mill and bake characteristics of MT081872 and 3 checks: combined 2009 Preliminary B, 2010 Advanced, and 2011 Intrastate data.

Variety	PPO ^{1/}	Kernel hardness	Flour yield %	Flour protein %	Flour Ash %	Mixograph mix time min	Mixograph absorption %	Baking mix time min	Baking absorption %	Loaf volume cc
location-years	10	10	10	10	10	10	10	10	10	10
CDC Falcon	0.470	68.8	63.9	10.3	0.42	5.6	60.4	8.7	70.5	1008*
MT08172	0.368	71.7	67.8	10.5	0.41*	8.3	63.3**	14.5	73.9**	1018*
Yellowstone	0.314	70.8	67.9*	10.3	0.41	7.7	62.4*	12.8	72.8*	1035*
Jagalene	0.468	69.6	68.7**	10.4	0.40**	4.8	60.9	7.4	71.2	1037**
LSD (0.05)	0.118	ns	0.9	ns	0.01	0.6	1.1	1.4	1.2	32

Disease resistance: MT08172 is resistant to stripe rust (similar resistance to Yellowstone) based on 2011 & 2012 Montana field evaluations at Kalispell and Bozeman, MT and evaluation by Xingming Chen at Pullman and MT Vernon, WA in 2011 & 2012. MT08172 was moderately resistant to stem rust compared to a susceptible reaction in Yellowstone at Fort Ellis in 2008, 2009, and 2011, and in 2009 seedling testing under controlled conditions by Mareike Johnston. Based on seedling testing by Yue Jin in 2010 for resistance to race TTKSK (UG99) at the Cereal Disease Laboratory, MT08172 tentatively carries Tmp or Red Chief genes effective against stem rust race TTKSK.

Purification/seed stocks: Purification and increase of MT08172 was initiated in 2011 when 120 F5-derived F10 headrows were grown at Bozeman with selection for visual uniformity, retaining 91 linerows which were bulked as a source of breeder seed. Breeder seed of MT08172 was increased at the Bozeman Post Farm in 2012 (Fig. 1). Foundation seed of Colter is planted at Moccasin (17 A) for 2013 harvest.

Fig. 1. MT08172 breeder seed increase at Bozeman, MT in 2012.



In summary, Colter is a high-yielding HRW winter wheat line similar in grain yield and most agronomic and end-use quality characteristics to Yellowstone, currently the predominant winter wheat cultivar in Montana. Genetic improvements of Colter over Yellowstone are improved test weight and stem rust resistance.