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MEMORANDUM

TO: Wheat Cultivar Release & Recommendation Committee

FROM: Phil Bruckner and Jim Berg, Winter wheat breeders

DATE: January 8, 2013

RE: Proposal for licensed (F.2.c) cultivar release of MTW0168

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

Motion: That MTW08168 hard white winter wheat be approved for licensed release in 2013.

Pedigree: MTW01168 is a selection from a composite of 2 crosses made to the same F1 population in 2001: 01X225, MTW0047 (Judith/PI262605/3/S86-740)/ 2*MT9982 (Yellowstone sib) and 01X226, MTW0047/MT9982//MT9989 (Judith/Arapahoe).

Recommendation: Exclusive Licensed Release (F.2.c).

Name: To be named by license holder.

Selection history: MTW08168 originated from a two topcrosses made in the greenhouse in 2001. The F1 population was grown at Bozeman 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. 142 heads which were selected from the F5 population in 2006 were grown as F6 headrows at Fort Ellis in 2007. Headrow 01X225E102 was selected based on evaluation of visual criteria for uniformity, productivity, and acceptable agronomic type and harvested in bulk. 01X225E102 was designated MTW08168 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). MTW08168 was later tested in the Advanced trial in 2010 (5 LY), and in the Montana Intrastate trial in 2011 and 2012 (15 LY).

Description: MTW08168 is an awned, white-glumed, high-yielding hard white winter wheat. MTW08168 is similar to Yellowstone for grain yield (LY=22, Table 1) and most agronomic traits with exception that MTW08168 is about 0.5 lb/bu higher for grain volume weight than Yellowstone, heads about 2.5 days later than Yellowstone, and is 1.7 inches taller than Yellowstone (Table 2). Like Yellowstone, MTW08168 is resistant to prevalent races of stripe rust, but susceptible to stem and leaf rust.

Table 1. Yield of MTW08168 and three check cultivars, 2009-2012.

Variety	Districts							All Locations
	1 Kalispell	2 Bozeman	3 Huntley	4 Moccasin	5 Conrad	5 Havre	6- Sidney & Williston	
location-years	2	4	3	4	3	2	4	22
Yellowstone	96.8*	99.6**	74.9	49.1*	102.1	62.6	60.3	76.6*
MTW08168	107.9*	96.8*	72.1	46.9	98.4	64.2	58.3	75.6*
Jagalene	66.6	86.9*	65.7	44.1	92.3	60.3	51.9	66.3
CDC Falcon	45.6	77.1	66.4	43.9	94.6	62.9	61.3	65.0
LSD (0.05)	17.9	14.2	ns	4.6	ns	ns	ns	5.7

1/ = includes 2009 Preliminary B, 2010 Advanced, 2011-2012 Intrastate Tests tests

Table 2. Agronomic characteristics of MTW08168 and three check cultivars, 2009-2012.

Variety	Test weight lb/bu	Winter survival %	Heading date		Plant height in	Lodging %	Protein %	Sawfly cutting %	Stripe rust %	Coleoptile length in
			Julian	Calendar						
location-years	22	2	22		23	2	22	3	4	1
CDC Falcon	59.5	60	169.5	19-Jun	31.7	1	12.2	7	54	2.8
Jagalene	61.5**	33	168.3	17-Jun	33.1	4	12.3	16	40	3.1
MTW08168	60.1	35	174.0	23-Jun	36.6	1	12.2	19	20**	2.6
Yellowstone	59.6	37	171.5	21-Jun	34.9	2	12.2	11	27*	2.5
LSD (0.05)	0.7	ns	0.6		0.9	ns	ns	ns	16	0.2

1/ = includes 2009 Preliminary B, 2010 Advanced, 2011-2012 Intrastate Tests

Table 3. Mill and bake characteristics of MTW08168 and 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
CDC Falcon	0.470	68.8	63.9	10.3	0.42	5.6	60.4	8.7	70.5	1008*
Jagalene	0.468	69.6	68.7**	10.4	0.40**	4.8	60.9	7.4	71.2	1037**
MTW08168	0.153**	72.6	66.9	10.1	0.41*	6.1	61.1	9.8	71.1	968
Yellowstone	0.314	70.8	67.9*	10.3	0.41	7.7	62.4*	12.8	72.8*	1035*
LSD (0.05)	0.118	ns	0.9	ns	0.01	0.6	1.1	1.4	1.2	32

MTW08168 is a low PPO hard white winter wheat cultivar. Based on samples grown in 10 environments, MTW08168 has lower flour yield, a shorter mix time, lower water absorption, and lower loaf volume than Yellowstone (Table 3). MTW08168 has favorable Asian noodle color stability similar to Yellowstone (data not shown). Because mean loaf volume of MTW0168 was low within the small set of check cultivars (Table 3), detailed quality data is show for 2010 (Table 4) and 2011 (Table 5). In comparison to a wider range of cultivars currently in production in Montana (Table 5) MTW08168 exhibits adequate end use quality although loaf

volume is lower than ideal.

Table 4. 2010 Advanced Winter Wheat Nursery Mill & Bake (Exp. 14)

Location: Means Across 4 Locations

	Variety	Class	PPO	Single kernel hardness	Wheat Protein, % (12% m.b.)	Flour Yield, %	Flour Protein, % (14% m.b.)	Wheat Ash, %	Flour Ash, %	Mixing Tolerance	Mixing Time, min	Mixing Water Absorption, %	Bake Mixing Time, min	Bake Water Absorption, %	Loaf Volume	Crumb Grain Score
1	Genou	HRW		64.4	13.5**	70.3**	11.7**	1.58	0.40	3.3	4.5	65.2	12.2	74.9	1078*	8.0
2	Yellowstone	HRW		63.5	12.7	68.4	11.0	1.64	0.41	4.3	7.3	65.9*	13.2	75.6*	1081*	8.0
3	CDC Falcon	HRW		58.6	12.8	64.8	10.7	1.60	0.41	3.3	5.3	63.4	9.6	73.2	1024	7.5
4	Jagalene	HRW		60.3	13.1*	69.7*	11.3*	1.60	0.40	2.3	4.4	64.7	7.5	74.9	1100*	7.3
8	MTW08168	HWW		65.4	12.6	67.1	10.6	1.64	0.40	4.3	5.5	63.6	10.3	73.8	990	7.5
Average				64.9	12.8	68.2	11.0	1.61	0.40	3.9	5.6	64.7	10.4	74.4	1068	7.5
LSD (0.05)				4.5	0.5	1.0	0.5	ns	0.01	0.9	0.9	1.3	2.3	1.6	50	ns
C.V.				4.8	2.7	1.0	2.9	3.2	1.6	16.6	10.7	1.4	15.2	1.5	3.3	7.2
P-Value				<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.0513

Table 5. 2011 Means across 4 locations (Exp. 35) Intrastate Winter Wheat Nursery - Mill & Bake and Data

VARIETY	Class	PPO	Single Kernel Hardness	Wheat protein, % (12 m.b.)	Flour Yield %	Flour Protein%(14% m.b.)	Wheat Ash, %	Flour Ash, %	Tolerance	Mixograph		Test Bake		
										Mixing Time Min	Water Absorption%	Mixing Time Min	Water Absorption%	Loaf Volume
Bearpaw	HRW	0.249	83.9	10.8	67.3*	9.2	1.47*	0.40*	4.5	4.8	56.9	7.8	67.6	878
CDC Falcon	HRW	0.314	79.2	11.0	61.2	9.3	1.59	0.42	4.5	5.9	57.2	8.3	67.8	956*
Decade	HRW	0.256	82.2	11.2	65.0	9.6	1.56	0.40*	5.3	7.8	60.0*	14.2	70.7**	938
Genou	HRW	0.274	82.9	11.0	65.2	9.7	1.52	0.40*	4.3	6.3	59.5*	12.1	69.7*	951*
Jagalene	HRW	0.276	79.9	10.3	66.1	8.8	1.50	0.40*	4.0	5.3	55.9	7.9	66.5	933
Judee	HRW	0.251	81.5	10.8	63.7	9.2	1.59	0.39*	4.5	6.2	55.9	8.0	66.0	964*
Ledger	HRW	0.313	76.5	10.6	68.6**	9.0	1.51	0.38*	4.0	6.0	56.6	8.0	66.6	943
MTW08168	HWW	0.099*	79.7	10.9	65.0	9.3	1.54	0.41	4.3	6.3	58.4	8.7	68.5	918
Promontory	HRW	0.083**	78.9	10.4	67.9*	8.8	1.40**	0.40*	4.0	5.6	55.9	6.6	67.1	916
Rampart	HRW	0.252	86.8	11.9**	67.5*	10.4**	1.58	0.39*	4.3	6.1	59.7*	12.7	70.4*	1010**
Yellowstone	HRW	0.193	78.2	10.8	65.7	9.2	1.52	0.41	4.5	7.9	59.0*	12.5	70.2*	975*
Average		0.239	81.2	10.9	65.2	9.2	1.54	0.40	4.0	5.8	57.3	8.6	67.5	935
LSD (0.05)		0.044	6.7	0.6	1.6	0.6	0.09	0.02	0.9	1.2	1.6	2.0	1.7	65
C.V.		13.2	5.9	3.9	1.7	4.4	4.1	3.3	16.7	14.1	1.9	16.8	1.8	4.9
P-Value		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.0015	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001

Purification/seed stocks: Purification and increase of MTW08168 was initiated in 2011 when 120 F5-derived

F10 headrows were grown at Bozeman with selection for visual uniformity, retaining 86 linerows which were bulked as a source of breeder seed. Breeder seed of MTW08168 was increased at the Bozeman Post Farm in 2012 (~16 bushels of breeder seed on inventory). Foundation seed of MTW08168 is planted at Bozeman (2.2 A) for potential 2013 harvest.

In summary, MTW08168 is a high yielding hard white winter wheat line with yield potential and agronomic characteristics similar to Yellowstone. MTW08168 has low PPO and quality characteristics within an acceptable range for commercial production.