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MEMORANDUM

FROM: Phil Bruckner, Winter wheat breeder

DATE: January 3, 2018

RE: Release of MT1465 hard red winter wheat (cross ID 06X272cE54)

Pedigree: MT1465 = F2 composite of five single cross populations:

06X272 Yellowstone/MT0684 (composite of 5 single crosses made to XNH1881)
06X276 Yellowstone/MT06102 (composite of 2 single crosses made to W94-137)
06X278 Yellowstone/MT06110 (SD93528/MT9409)
06X282 Yellowstone/MT06123 (2174/MT9440//BigSky)
06X285 Yellowstone/ 98X168-1 (MTS9720//PI191303/Elkhorn)

Recommendation: Public, protected **Name:** To be determined

Selection history: MTF1465 is a hard red winter wheat line developed for grain production in Montana. MT1465 derives from selection in a diverse composite cross comprised of five experimental lines all crossed to high-yielding cultivar, Yellowstone in 2006

Following the 2006 crosses, these are steps in development of MT1465:

2007gh	Individual F1 populations grown in PGC and harvested in bulk.
2008FE	F2 space-plant population derived from 5 cross composite grown, bulk of selected heads advanced.
2009W	F3 bulk population grown at Williston, bulk of heads selected from surviving plants advanced.
2010NARC	F4 bulk population grown at Havre, bulk of selected heads advanced.
2011Post	F5 bulk population grown at Bozeman, head rows grown, 102 heads selected.
2012FE	F6 headrow set grown at Fort Ellis., 20 siblings selected.
2013-Multi	20 F7 siblings evaluated in single-rep Observation A nursery at three locations. Line 06X272cE54 was selected, harvested in bulk, and designated MT1465.
2014-Multi	MT1465 (F8) tested in Preliminary A trials at four locations. Milling & baking quality evaluation initiated.
2015-Multi	MT1465 (F9) tested in Advanced trials at five sites. M&P heads selected.
2016-Multi	MT1465 (F10) tested in Montana Intrastate trials at nine locations. 126 F9:10 headrows evaluated for phenotypic uniformity, harvested individually, and bulked as Breeder seed.
2017-Multi	MT1465 tested in multi-location Intrastate, and Off-station trials.
2017Post	MTF1465 Breeder seed increased

General performance and characteristics: MT1465 is a short (*Rht1-B1b*), awned hard red winter wheat line developed for grain production. MTF1465 has been tested in Montana grain trials since 2014. Milling and baking quality has been evaluated from 2014 to 2016. MT1465 was also tested in the 2017 USDA Northern Regional Performance Nursery (NRPN).

Table 1. Yield of MT1465 vs. a set of varieties, 2016-2017^{1/}

Variety	Districts							All Locations
	1 Kalispell	2 Bozeman	3 Huntley ^{2/}	4 Moccasin ^{3/}	5 Conrad ^{4/}	5 Havre ^{5/}	6- Sidney & Williston	
location-years	1	2	7	7	6	6	3	32
Keldin	101.1	91.6	83.0	64.6	83.4	59.0	54.6	73.0
SY Monument	127.0	96.1	81.8	62.2	83.2	56.4	57.0	73.0
MT1465	135.0	96.4	83.5	61.2	77.4	55.7	50.1	71.5
SY Wolf	98.6	79.2	82.6	63.4	79.0	54.6	56.1	70.3
Northern	133.7	87.3	77.5	58.0	77.0	55.7	48.6	68.7
Decade	18.5	46.9	69.6	58.2	70.7	52.7	52.6	59.5
LSD (0.05)	10.2	14.7	7.4	4.2	4.7	ns	ns	4.8

1/ = 2016-17 Intrastate and 2017 Off Station tests

In Montana Intrastate and Off-station yield trials in 2016 and 2017 (32 location-years), MT1465 showed high grain yield potential similar to Keldin, SY Monument, SY Wolf, and Northern (Table 1). Because of a seed packaging error involving Yellowstone in 2017 trials, Yellowstone and MT1465 could not be directly compared in this data set. In Montana Preliminary, Advanced, and Intrastate grain trials from 2014 to 2016, (18LY), MT1465 and Yellowstone were similar in grain yield (Table 2). In these trials MT1465 headed significantly earlier, was significantly shorter, and had significantly higher test weight and grain protein than Yellowstone (Table 2).

Table 2. Performance of MT1465 and Yellowstone in Montana Preliminary, Advanced, and Intrastate grain trials, 2014-2016.

Year & Trial	# Loc.	Line/check	Grain yield Bu/A	Test weight Lb/bu	Plant height inch	Heading date Days from Jan. 1	Stripe rust % severity	Grain protein %
2014 Prel.	4	Yellowstone	94.5	60.1	35.6	166.3	-	12.8
		MT1465	96.4	61.0	32.5	164.1	-	13.1
		5%lsd	12.5	1.3	2.4	1.6	-	0.7
2015 Adv.	5	Yellowstone	64.3	58.7	34.2	158.8	3	12.3
		MT1465	65.7	58.9	31.3	158.2	1	12.3
		5%lsd	8.4	1.2	1.2	1.0	6	0.7
2016 Intra.	9	Yellowstone	85.1	60.0	37.1	156.0	51	10.8
		MT1465	87.7	60.7	33.9	155.9	22	11.1
		5%lsd	13.5	1.9	1.2	1.1	31	0.7
Combined	18	Yellowstone	81.4	59.9	35.8	159.3	-	11.6
		MT1465	83.5	60.4	32.9	158.7	-	12.0
P[means equal by 1 tail, paired t test]			0.208	0.030	<0.001	0.027	-	0.043

Variety	Test	Winter	Heading date		Plant	Lodging	Protein	Saw fly	Stripe	Coleoptile
	weight	survival			height	%		cutting	rust	length
	lb/bu	%	Julian	Calendar	in		%	%	%	in
location-years	32	1	15		30	5	31	4	4	1
Decade	60.0	62	155.2	4-Jun	30.2	34	12.1	36	75	2.9
Keldin	61.0	29	155.8	5-Jun	30.6	42	11.7	47	45	2.8
MT1465	60.8	46	155.7	5-Jun	29.8	36	11.9	43	14	2.8
Northern	60.1	37	158.0	7-Jun	30.3	40	12.3	34	20	2.6
SY Monument	59.6	49	154.4	3-Jun	30.4	34	11.2	49	11	3.1
SY Wolf	61.7	37	153.9	3-Jun	30.0	39	11.9	40	27	3.1
LSD (0.05)	0.6	16	0.7		0.6	ns	0.2	ns	14	0.2

^{1/} = 2016-17 Intrastate and 2017 Off Station tests

In the 2016-17 data set, MT1465 had lower test weight than SY Wolf, similar test weight to Keldin, and greater test weight than Northern, Decade, and SY Monument (Table 3). MT1465 headed later than SY Wolf and SY Monument, similarly to Decade and Keldin, and earlier than Northern (Table 3). MT1465 was slightly shorter than Keldin and similar to other check cultivars. MT1465 was significantly lower than Northern for grain protein and showed excellent stripe rust resistance similar to Northern and SY Monument (Table 3).

In milling and baking quality evaluations over ten environments (Table 4), MT1465 showed excellent end-use qualities comparable to Decade and parental cultivar, Yellowstone.

Combined Preliminary A Tests (2014), Advanced (2015) and 2016 Intrastate Tests											
Variety	PPO ^{1/}	Kernel hardness	Flour			Mixograph			Baking		
			yield	protein	Ash	tolerance	mix time	absorption	mix time	absorption	volume
			%	%	%	(1-6)	min	%	min	%	cc
location-years	10	10	10	10	10	10	10	10	10	10	10
Decade	0.251	72.3	70.0	11.1	0.41	4.2	7.6	65.3	21.0	75.5	992
MT1465	0.230	70.5	71.6	11.6	0.41	3.3	5.9	65.4	14.0	75.2	1061
Yellowstone	0.209	74.4	69.4	11.2	0.42	3.5	8.0	64.9	15.9	75.7	1032
LSD (0.05)	0.037	ns	0.9	0.4	0.01	0.5	1.5	ns	4.7	ns	40

Disease resistance: Stripe rust ratings in Montana and Washington state are attached in Tables 5 to 8. Montana data in 2015 and particularly 2016 (Tables 5 and 6) show a trend towards improved stripe rust resistance in MT1465 relative to Yellowstone. Dr. Xianming Chen, USDA Pullman also tested MT1465 in Washington from 2014 to 2017, summarizing the stripe rust data in Table 8. Dr. Chens interpretation of that data and MT1465 stripe rust reaction follows (emphasis added) in two places:

MT1465 wheat was tested in the Montana Winter Wheat Nursery for reactions to natural infections of *Puccinia striiformis* f. sp. *tritici* in Pullman and Mount Vernon, Washington from 2014 to 2017 and also at two more locations in Walla Walla and Lind, Washington in the Great Plains Hard Wheat Nursery in 2017. **Across the locations and over the years, MT1465 had highly resistant reaction with infection type (IT) 2 to moderate resistant reaction (IT 5) with severity 5-20%. The resistance in MT1465 was either similar or significantly higher than that of Yellowstone.** In contrast, the susceptible check (PS279) was highly susceptible (IT 8, severity 80-100%) in the late growth season.

In the seedling tests at the low temperature cycle (4-20°C), MT1465 was highly resistant (IT 2) to races PSTv-14 and PSTv-51 (except few susceptible plants) and moderately resistant (IT 5) to races PSTv-14, PSTv-37, and PSTv-4 (except few susceptible plants). When tested at the high temperature cycle (10-30°C) at adult-plant stage (Zadoks 45-60), MT1465 was highly resistant (IT 2) to races PSTv-14, PSTv-37, and PSTv-40. The reduced ITs of adult plants compared to seedlings in the tests with PSTv-14 and PSTv-37 indicate that MT1465 has a high level of high-temperature adult-plant (HTAP) resistance to stripe rust. **In summary, MT1465 has both all-stage resistance effective against some races and HTAP resistance that is likely durable based on the general nature of this type of resistance.**

Based on marker data collected on NRPN entries, MT1465 also carries *tsn1*, a recessive resistance allele for tan spot.

Purification/seed stocks: Purification and increase of MT1465 was initiated in 2016 when 126 F₉-derived F₁₀ headrows were grown at Bozeman with evaluation for phenotypic uniformity before bulking all 126 linerows as breeder seed. Breeder seed of MT1465 was increased in 2017 at Bozeman. Foundation seed is planted for 2018 harvest (4.3 acres, Post Farm).

Summary:

This is the third potential cultivar (after Colter and Northern) released as a potential replacement for dominant cultivar Yellowstone. None have surpassed Yellowstone in yield potential although all are statistically similar in yield to Yellowstone. MT1465 is shorter, higher in test weight, and we believe more resistant to stripe rust than Yellowstone. Northern has higher grain protein and better stem rust resistance than MT1465. Both MT1465 and Northern have good stripe rust resistance and very good end use qualities. **MT1465 is proposed for release based on its favorable combination of high yield potential and excellent end-use qualities as well as reduced height and improved test weight and stripe rust resistance relative to Yellowstone.**

Tqble 5. 2015 Advanced Winter Wheat Test (Exp. 14): Plant Disease Assessment

Cultivar/Line		Stripe Rust								Stem Rust
		Pullman, WA		MT. Vernon, WA				Montana %		St. Paul, MN
		Flowering IT ^{1/}	%	Stem elong. IT ^{1/}	%	Milk IT ^{1/}	%	Adv BZ	FE Sr	Field evaluation
						17-Jul 29-Jun		X14 Field		
1	Genou	8	30	8	50	8	50	18	60	60S
2	Yellowstone	2	5	5	40	5	15	3	10	60S
25	i MT1465	2	2	3	5	2	20	1	0	50MS
3	Jagalene	8	10	8	60	5	25	4	10	15MR
4	Decade	8	10	8	70	8	80	17	70	40MR
5	Judee	3	2	5	20	2	20	2	3	20MR/60S
6	i MT1446	2	1	5	15	2	20	4	5	60S
7	MTS1402	8	2	8	40	8	75	5	25	50SMS
8	MTS1404	2	2	6	40	2	15	2	0	60S
9	i MTS1407	5	5	5	20	3	5	3	5	TR,TS
10	MTS1409	3	5	8	60	5	30	3	5	70MSS
11	MTS1410	2	2	8	40	8	50	4	0	30MRMS
12	w MTS1412	5	10	8	60	5	30	13	15	40MSS
13	w MTS1413	4	10	8	60	8	30	10	25	50SMS
14	MTS1422	3	10	8	50	5	35	6	20	30MR
15	p MTF1432	2	1	7	40	2	20	3	0	70S
16	p MTF1435	3	5	5	20	2	20	6	5	70S
17	i MT1443	8	5	8	40	2	15	4	10	60SMS
18	i MT1444	2	5	8	40	2	20	2	3	60SMS
19	MT1445	8	10	5	30	2	20	8	0	50SMS
20	MT1448	2	2	6	20	2	20	2	5	25MSSMR
21	MT1449	2	5	5	20	2	10	8	0	20MR
22	MT1451	2	2	5	10	2	20	2	0	60S
23	MT1459	2	2	3	10	2	20	4	3	70S
24	i MT1460	3	5	3	10	2	20	4	10	70S
26	MT1467	2	2	3	5	2	30	2	0	10R
27	i MT1471	2	1	3	10	2	20	1	0	25MSMR
28	MT1472	2	1	5	5	2	20	0	0	20MRMS
29	MT1473	2	1	5	30	5	15	1	0	20MRMS
30	i MT1478	5	5	7	40	2	25	2	5	80S
31	w MTW1479	2	1	2	5	2	10	1	0	20RMR,5S
32	MT1483	2	1	6	30	2	15	3	0	40SMS
33	i MT1488	2	2	8	60	2	15	4	0	35MSSMR
34	MT1489	2	2	8	50	2	20	3	0	30MSS
35	w MTW1490	5	5	7	50	5	25	5	10	50S
36	i w MTW1491	2	5	5	20	5	30	3	0	60S
Average		5		33		25		4.5	8.4	

i = in 2016 Intrastate Test; p = in 2016 Preliminary A Test (all other MT lines dropped from testing)

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.

Table 6. 2016 Intrastate Winter Wheat Test (Exp. 35): Multi-Location Stripe Rust Evaluation, including data from Pullman and Mt. Vernon, WA

Cultivar/Line		Stripe Rust												
		Montana (%)						Pullman, WA		MT. Vernon, WA				
		Kalispell			Bozeman			2 loc	Milk		Stem elong.		Heading/flowering	
d = cultivars/lines dropped + = new for 2016, # = paid entry		5-Jun	10-Jun	30-Jun	2-Jun	8-Jun	16-Jun	'late'	IT ^{1/}	%	IT ^{1/}	%	IT ^{1/}	%
									13-Jun		18-Apr		18-May	
+ #	MT1488	8	17	<u>22</u>	5	12	10	<u>16</u>	2	15	3	30	5	80
#	WB4623CLP	4	7	29	tr	5	4	17	5	15	2	20	3	20
#	SY Monument	3	10	33	tr	1	2	18	5	10	2	10	2	10
+ #	MT1471	<u>3</u>	9	35	0	<u>1</u>	4	20	3	10	2	10	3	20
	Judee	17	21	27	8	9	15	21	5	30	3	20	3	30
	Warhorse	12	16	37	0	4	5	21	5	10	2	20	2	20
	Loma	22	30	35	12	14	10	23	5	15	3	30	2	20
d	Colter	15	23	38	tr	5	12	25	2	20	2	20	2	20
#	SY Sunrise	5	<u>7</u>	38	8	5	12	25	5	15	5	30	4	60
# d	T158	6	13	49	7	5	<u>2</u>	26	5	30	3	30	8	80
+ #	MTW1491	17	51	51	tr	7	10	31	5	10	2	20	4	30
	MT1348	7	12	56	tr	5	8	32	5	15	2	15	2	20
	SY Wolf	17	34	50	0	9	16	33	8	100	3	30	4	60
	MT1265	10	22	67	0	5	6	37	3	15	2	20	2	20
+ d	MT1446	8	25	61	0	4	12	37	5	20	2	20	3	20
d	Freeman	10	28	68	2	5	6	37	5	15	5	30	7	80
+ #	MT1444	12	29	70	0	4	7	39	3	15	2	20	3	20
d	MT1356	18	38	71	tr	6	8	40	5	25	2	15	2	20
d	MT1332	12	21	76	tr	2	6	41	5	20	2	20	2	10
d	MT1138	17	26	73	tr	5	10	42	3	10	2	20	2	30
+ d	MTS1407	21	65	70	2	6	13	42	5	40	2	20	3	20
	WB-Quake	20	27	67	23	21	17	42	5	20	8	40	2	20
d	MT1354	20	43	80	tr	3	8	44	5	25	2	15	2	20
d	WB3768	12	40	82	0	2	6	44	5	20	2	20	2	30
+ d	MT1460	18	39	76	tr	8	13	45	5	20	2	20	3	20
d	MT1257	25	57	84	tr	6	9	47	3	15	3	30	2	20
	SY Clearstone 20	23	48	86	0	4	8	47	5	20	3	20	3	20
+ d	MT1443	25	49	82	2	9	14	48	5	35	5	30	2	20
#	Keldin	27	56	82	tr	11	17	50	5	20	2	20	2	20
	MTCL1131	17	37	87	tr	6	12	50	3	15	2	20	3	30
+ #	MT1465	10	27	37	tr	3	7	22	3	5	2	20	3	20
	Yellowstone	15	51	86	0	6	15	51	5	20	3	20	3	50
	Northern	20	28	52	3	15	14	33	5	30	3	30	2	20
+ d	MT1478	23	71	91	tr	11	13	52	5	25	3	30	4	20
#	WB4614	62	89	82	tr	14	23	53	5	25	2	20	2	20
#+	BZ9W09-2212 (WB44)	53	69	68	20	30	40	54	8	90	3	30	2	20
d	Rampart	30	89	83	0	13	28	56	5	40	3	30	3	30
#+	PSB13NEDH-14-7	52	77	93	5	25	30	62	5	40	3	30	2	20
d	CDC Falcon	87	96	96	5	32	42	69	8	100	8	60	5	80
	Decade	85	94	93	12	36	57	75	8	100	8	40	4	50
#	Brawl CL Plus	70	87	84	12	65	76	80	8	100	5	30	8	80
d	Jerry	89	98	97	18	41	66	82	8	100	8	60	8	80
# d	Byrd	85	94	95	15	49	70	83	8	100	8	80	8	80
	Bearpaw	92	98	96	22	61	72	84	8	100	8	40	5	60
d	Broadview	90	95	88	40	57	83	86	8	100	8	80	8	80
#+	BZ9W09-2075 (WB45)	91	96	96	18	55	75	86	8	100	8	60	4	30
#+	d Avery	73	97	95	7	51	77	86	8	100	2	20	8	80
d	Cowboy	85	94	94	32	49	80	87	8	100	5	30	8	80
# d	WB4059CLP	95	97	99	27	70	87	93	8	100	8	80	8	80
Average		33.4	49.9	69.5	9.2	17.7	25.2	47.4						
LSD (0.05)		7.9	12.9	15.6	8.2	11.8	8.3	31.1						

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.

** = indicates highest value within a column

Table 7. 2017 Intrastate Winter Wheat Test (Exp. 35): Multi-Location Stripe Rust Evaluation, including data from Pullman and Mt. Vernon, WA

Cultivar/Line	Stripe Rust											
	Huntley		Montana (%)				Pullman, WA		MT. Vernon, WA			
			Bozeman		2 loc 'late'	Ft Ellis 2-Jul	Milk IT ^{1/} %	Stem elong. IT ^{1/} %	Heading/flowering IT ^{1/} %			
d = cultivars/lines dropped + = new for 2017, # = paid entry												
+ d MT1542	1	1	2	<u>2</u>	<u>2</u>	3	2	30	3	5	2	5
##+ LCS Chrome	<u>0</u>	<u>0</u>	2	3	2	2	3	2	8	10	7	70
##+ LCS Jet	<u>0</u>	<u>1</u>	2	3	2	1	5	10	2	5	2	5
d MT1471	<u>0</u>	3	2	3	3	2	2	20	2	5	2	5
+ MT1564	1	3	1	3	3	2	5	20	2	5	3	5
d MT1488	1	2	10	5	3	5	5	50	2	5	2	10
# SY Monument	<u>0</u>	<u>0</u>	5	7	4	1	8	30	2	5	2	10
Loma	3	1	7	7	4	3	5	40	5	10	2	5
+ MT1547	2	2	1	6	4	3	2	30	2	5	2	10
Judee	2	<u>0</u>	6	9	5	5	5	40	3	10	2	10
# WB4623CLP	2	2	1	7	5	3	5	40	3	10	2	10
+ MTS1588	1	1	3	9	5	5	5	40	2	5	2	20
Warhorse	3	6	2	4	5	5	5	30	2	5	2	10
+ d MT1507	<u>0</u>	2	4	10	6	5	5	30	5	10	2	10
##+ Long Branch	<u>0</u>	5	5	7	6	2	5	30	5	10	2	5
MT1465	5	1	3	11	6	3	3	5	2	5	2	5
Northern	<u>0</u>	1	8	14	8	5	3	20	5	10	2	20
MTW1491	3	3	3	11	7	5	5	30	2	5	2	10
+ d MT1540	2	4	3	11	8	10	5	20	5	10	2	10
+ d MTF1559	<u>0</u>	1	3	15	8	10	2	60	8	10	2	5
+ d MT1565	3	2	8	14	8	15	5	20	2	5	2	10
d MT1444	<u>0</u>	6	1	14	10	5	8	30	5	10	3	20
##+ d BZ9WM09-1620	<u>0</u>	9	4	11	10	5	8	40	5	10	2	5
MT1265	2	1	5	20	10	5	5	30	2	5	2	5
+ d MTS1573	7	10	8	12	11	10	5	60	2	5	2	20
# SY Sunrise	<u>0</u>	<u>0</u>	19	21	11	5	3	10	2	5	2	20
+ MTF1432	4	7	3	14	11	10	5	20	2	5	2	5
d MT1348	2	3	5	20	11	5	5	20	2	5	2	10
+ MT1563	1	5	4	19	12	10	5	40	5	10	2	10
d WB-Quake	<u>0</u>	5	12	19	12	10	5	70	5	10	2	20
d MTCL1131	2	6	4	21	13	10	8	30	2	5	2	5
+ MTF1435	5	4	2	24	14	20	8	40	2	5	2	5
##+ PSB13NEDH-7-14	2	6	3	24	15	5	5	40	2	5	3	10
SY Clearstone 20	13	14	3	18	16	15	5	60	2	5	3	10
# WB4614	6	7	8	35	21	25	8	30	8	20	2	10
SY Wolf	15	7	4	35	21	15	8	40	8	10	3	10
##+ Langin	10	12	19	44	28	10	8	70	8	10	4	30
07CL039-7 (SY 517 C)	11	9	15	52	31	10	8	80	2	5	4	30
# Keldin	2	21	5	60	41	20	8	70	8	20	2	5
##+ d PSB13NEDH-7-45	22	25	15	66	45	25	8	60	2	5	8	80
# WB4483	38	73	45	66	69	70	5	30	8	10	2	10
# Brawl CLP	64	61	44	79	70	90	8	70	5	10	4	20
##+ CO13003C	73	68	42	73	71	60	8	90	8	20	6	60
Decade	40	77	35	71	74	70	8	90	5	10	6	70
Bearpaw	79	96	21	82	89	80	8	80	2	5	8	50
##+ d BZ9W09-2216	97	100	70	89	95	80	8	90	5	10	4	50
# WB4575	85	100	61	91	96	90	8	80	8	20	3	30
##+ d Denali	79	99	27	94	97	80	8	90	8	10	7	80
Warhorse #2 ^{1/}			1	3		5	3	20	2	5	2	5
Average	8.1	13.3	11.5	27.2	22.6	19.2		42		8		19
LSD (0.05)	6.0	4.4	12.4	13.2	18.2							

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.

bold = indicates highest value within a column

1/ Yellow stone misplanted as Warhorse

Table 8. MT1465 Field Tests for stripe rust resistance as summarized by Xianming Chen, Pullman.

2017 1712_WHWN

Entry No.	Line	SOURCE pedigree	2017 PLOT	LOC 04	LOC 05		LOC 06		LOC 07	Field Summary	Overall rating	Possible HTAP resistance
				6/14	5/2	6/7	4/22	5/18	5/24			
				Fks 10.51 IT %	5 IT %	10.1-10.51 IT %	6 IT %	10 IT %	0.00 - 10. IT %			
41	MT1465	Yellowstone/MT0684	43	2.5	3.5	5.20	5.20	2.15	3.15	MR	3	High
	PS279	(S. check)	61	8.100	7.5	8.100	8.80	8.100	8.80	S	9	No

2017 1719_WMWN

MT No.	Name	Pedigree	2017 PLOT	LOC 04	LOC 05 ^b	
				6/15	5/2	6/7
				Fks 10.51 IT %	Fks 5 IT %	Fks 11.1 IT %
1	Yellowstone	Montana 2005	1	3.20	2.5	2.5
34	MT1465	Yellowstone/MT0684	35	3.5	2.5	2.5
	PS279	(S. check)	41	8.90	8.30	8.80

2016 1619_WMWN

MT No.	Name	Pedigree	2016 PLOT	LOC 04	LOC 05	
				6/13/16	4/18/16	5/18/16
				Soft dough IT %	Stem elong IT %	Flower. IT %
1	Yellowstone	Montana 2005	1	5.20	3.20	3.50
45	MT1465	Yellowstone/MT0684	47	3.5	2.20	3.20
	PS279	(S. check)	61	8.100	8.80	8.90

2015 1519_WMWN

MT No.	Entry	Source/Pedigree	2015 PLOT	LOC 04	LOC 05 ^b	
				6/24	4/15	5/28
				Soft dough IT %	Stem elong IT %	Flowering IT %
1	Yellowstone	Montana 2005	1	2.5	2.5	5.50
74	MT1465	Yellowstone/MT0684	77	2.2	3.5	2.20
	PS279	(S. check)	81	8.90	8.60	8.80

2014 1419_WMWN

MT No.	Entry	Source/Pedigree	2014 PLOT	LOC 04 ^{**}	LOC 05	
				6/24	4/30	6/3
				Milk IT %	Stem elong IT %	Flowering IT %
1	Yellowstone	Montana 2005	1	8.5	2.15	2.5
38	MT1465	Yellowstone/MT0684	180	2.5	2.10	2.10
	PS279	(S. check)	181	8.100	8.80	8.100

MT1465 Greenhouse Test

2017 1712GH

Entry No.	Line	SOURCE pedigree	2017 PLOT	Infection type produced by PST races ^a									Possible HTAP ^c resistance			
				Seedling Test ^b					Adult-plant Test ^b							
				(4 - 20 C)										(10 - 30 C)		
				PSTv-4	PSTv-14	PSTv-37	PSTv-40	PSTv-51	PSTv-14	PSTv-37	PSTv-40					
41	MT1465	Yellowstone	43	5,8	5	5	2	2,8(2)	2,2,2	2,2,2	2,2,2	High				
	PS279	(S. check)	61	8	8	8	8	8	8,8,8	8,8,8	8,8,8	No				