

Cultivar Characteristics of Winter Wheat Varieties Evaluated in Montana

The following pages were compiled from the 2019 Winter Wheat Variety Performance Summary in Montana. Original copies can be found here: <http://plantsciences.montana.edu/crops/>

Authors:

J.E. Berg
P.L. Bruckner
P. Carr
C. Chen
C. Cook
J. Eberly
Z.T. Fang
K.D. Kephart
K. Kowatch-Carlson
P. Lamb
A.T. Link
K. McNamara
J.H. Miller
G. Pradhan
V. Smith
J.A. Torrion
D. Holen
D. Nash
H. Unverzagt

Table 15. Selected agronomic characters, cereal quality evaluations and disease reactions of hard winter wheat varieties.

Variety	Agronomic Characters							Cereal Quality			Disease Reactions ^{8/}			
	Maturity ^{1/}	Chaff Color	Winter Survival ^{2/}	Straw Strength ^{3/}	Stem solid ^{4/}	Clear-field	Coleoptile length ^{5/}	Milling ^{6/}	Baking ^{6/}	PPO ^{7/}	Dwarf Smut	Stripe Rust	Stem Rust	Leaf Rust
AAC Wildfire	L	Red	4	-		N	-	-	-	-	-	MR	-	-
Bearpaw	M	White	2	M	21	N	M	4	2	H	S	S	R	S
Brawl CL Plus	E	White	2	S		Y	L	3	3	H	S	S	-	-
Byrd CL Plus	E	White	3	-		Y	-	3	3	H	-	S	-	-
Decade	M	White	4	S		N	M	3	4	H	S	S	R	MS
FourOsix	M	White	3	S		N	M	3	4	M	S	R	MS	-
Incline AX	M	White	2	-		N ^{10/}	-	-	-	-	-	S	-	-
Judee	M	White	2	M	20	N	L	3	4	H	S	R	S	S
Keldin	M	White	2	S		N	S	3	2	H	S	MS	-	-
Langin	E	White	3	-		N	M	2	3	H	S	MS	-	-
LCS Chrome	M-E	Red	3	-		N	M-L	3	3	M	S	R	-	-
LCS Jet	M	White	2	-		N	L	4	2	H	S	R	-	-
LCS Link	E	White	3	-		N	-	-	-	-	-	MR	-	-
LCS Rocket	M	White	0	-		N	-	-	-	-	-	R	-	-
LCS Zoom	M-E	White	1	-		N	-	-	-	-	-	R	-	-
Loma	M-L	White	4	M	20	N	S	4	4	ML	S	R	R	-
Long Branch	E	White	3	-		N	M	3	3	H	S	R	-	-
Northern	M	White	3	S		N	S	3	3	L	S	R	R	-
MT1564 ^{9/}	E	White	3	S		N	S	3	3	M	MR	R	MR	-
MTC51601 ^{9/}	M	White	3	S	19	Y	-	3	3	H	-	R	MS	-
MTS1588 ^{9/}	M	White	2	S	23	N	S	4	4	ML	S	R	MS	S
MTF1435	L	White	3	MS		N	L	4	3	L	S	R	S	-
Oahe	E	White	3	-		N	-	-	-	-	-	R	-	-
Ray	L	White	2	MS		N	M	3	3	L	S	R	S	-
SY 517 CL2	E	White	2	-		Y	M-L	-	-	-	-	MS	-	-
SY Clearstone 2CL	M	White	3	S		Y	S	3	3	M	S	R	MR	-
SY Legend CL2	M-E	Red	2	-		Y	-	-	-	-	-	MR	-	-
SY Monument	M	White	3	S		N	M	3	2	ML	S	R	-	-
SY Sunrise	E	White	2	S		N	M	3	2	H	S	R	-	-
SY Wolf	M	White	3	S		N	M	3	2	M	S	R	R	-
Warhorse	M	White	4	MS	22	N	M	3	3	H	S	R	R	MR
WB4483	L	White	3	S	20	N	S	3	3	H	S	MS	-	-
WB4575	M	White	3	S		N	M	3	4	M	S	S	-	-
WB4614	M	White	4	S		N	M	3	3	H	S	R	-	-
WB4623CLP	M-L	White	1	M		Y	M	3	4	ML	S	R	-	-
Yellowstone	M	White	4	S		N	S	3	4	M	MS	R	S	MS

1/ VE = Very Early, E = Early, M = Medium, L = Late, VL = Very Late

2/ 5 = Best Winter survival (over several years at Sidney, Williston and Moccasin)

3/ W = Weak

5/ L = long

MW = Medium Weak

M = medium

M = Medium

S = short

MS = Medium Strong

- = no info.

S = Strong

4/ scored 5-25, 25 = most solid

Combined 2013-2017 Bozeman, Carter, Conrad, Havre, Gildford, Loma, and Moccasin data; varieties with no number were not evaluated

9/ = approved for release in 2019, name pending

6/ 5 = Superior

4

3

2

1 = Inferior

7/ PPO = Polyphenol Oxidase

(low is better for noodles)

L = low

M = medium

H = high

8/ R = Resistant

MR = Moderately Resistant

M = Moderate

MS = Moderately Susceptible

S = Susceptible

VS = Very Susceptible

- = no information

10/ Coaxium herbicide

resistance

Additional Descriptive Information for Winter Wheat Varieties

New for the 2019 Bulletin:

AAC Wildfire – hard red winter wheat developed by Agriculture and AgriFoods Canada in Alberta, released in 2015, and marketed by SECAN. AAC Wildfire is a late maturing, hollow-stemmed, tall wheat with red chaff. AAC Wildfire has average yield, test weight, and protein, with above average winter survival. AAC Wildfire is moderately resistant to stripe rust. Mill and bake characteristics, under Montana conditions, have not been determined.

Byrd CL Plus – hard red winter wheat developed by Colorado and released in 2018. Byrd CL Plus is an early maturing, hollow-stemmed, medium-tall wheat with white chaff. Byrd CL Plus has above average yield, average test weight, and below average protein, with average winter survival. Resistance or susceptibility to stripe rust, under Montana conditions, has not been determined for Byrd CL Plus. Mill and bake characteristics, under Montana conditions, have not been determined PVP, Title V will be applied for. Additionally, the CLEARFIELD genes are patented.

Incline AX – hard red winter wheat developed by Colorado and released in 2017. Incline AX is the first wheat to be released as part of the CoAXium Wheat Production System for use in control of grassy weeds. Incline AX is a medium maturing, hollow-stemmed, medium height wheat with white chaff. Incline AX has below average yield, test weight, and protein, with below average winter survival. Resistance or susceptibility to stripe rust, under Montana conditions, has not been determined for Incline AX. Mill and bake characteristics, under Montana conditions, have not been determined. PVP, Title V will be applied for. Additionally, the CoAXium genes are patented.

LCS Link – hard red winter wheat developed by Limagrain LLC and released in 2017. LCS Link is an early maturing, hollow-stemmed, short wheat with white chaff. LCS Link has average yield, above average test weight, and average protein with average winter survival. Resistance or susceptibility to stripe rust, under Montana conditions, has not been determined for LCS Link. Mill and bake characteristics, under Montana conditions, have not been determined PVP, Title V is pending (Certificate #201700394). *LCS Link will not be in the Montana Intrastate Winter Wheat Test for 2019.*

LCS Rocket – hard red winter wheat developed by Limagrain LLC and released in 2017. LCS Rocket is a medium maturing, hollow-stemmed, short wheat with white chaff. LCS Rocket has average yield, below average test weight and protein, with extremely low winter survival (in limited testing). Resistance to stripe rust, under Montana conditions, appears to be high - since it was the leading variety at Kalispell, in 2018, where stripe rust impacted yield. Mill and bake characteristics, under Montana conditions, have not been determined PVP, Title V is pending (Certificate #201800534). *LCS Rocket will not be in the Montana Intrastate Winter Wheat Test for 2019.*

LCS Zoom – hard red winter wheat developed by Limagrain LLC and released in 2018. LCS Zoom is a medium-early maturing, hollow-stemmed, short, awnless wheat with white chaff. LCS Zoom has above average yield, below average test weight, and average protein, with below average winter survival. Resistance or susceptibility to stripe rust, under Montana conditions, has not been determined for LCS Zoom. Mill and bake characteristics, under Montana conditions, have not been determined PVP, Title V will be applied for

MT1435 – hard red winter wheat developed by the Montana Agricultural Experiment Station and licensed to both AgWest Seeds, Ephraim, UT and Sioux Nation Ag, Fort Pierre, SD. MTF1435 was approved in 2018 and intended for release outside of Montana. Like Ray, MTF1435 is a late maturing, tall, awnless line developed for **forage** production as a possible replacement (or supplement to) Willow Creek (MT, 2005). Compared to Willow Creek, MTF1435 has similar forage yield and forage quality, but superior seed yield. Compared to conventional bread wheats; MTF1435 has below average yield, below average test weight, and average protein. MTF1435 is resistant to stripe rust and susceptible to stem rust. MTF1435 has low PPO and above average milling and average baking characteristics. PVP, Title V will be applied for. *MTF1435 will not be in the Montana Intrastate Winter Wheat Test for 2019.*

SY Legend CL2 – hard red winter wheat developed by Syngenta Participations AG and released in 2018. SY Legend CL2 is a medium-early maturing, hollow-stemmed, short wheat with white chaff. SY Legend CL2 has below average yield, above average test weight, and average protein with below average winter survival.

Resistance or susceptibility to stripe rust, under Montana conditions, has not been determined for SY Legend CL2. Mill and bake characteristics, under Montana conditions, have not been determined. PVP, Title V will be applied for. Additionally, the CLEARFIELD genes are patented.

Lines approved for variety release in 2019, names to be determined later:

MT1564 (name pending) – hard red winter wheat developed by the Montana Agricultural Experiment Station and available to certified seed growers in fall 2019. MT1564 is an early maturing (especially for a Montana line), hollow-stemmed, medium height wheat with white chaff. MT1564 has average yield, above average test weight, and average protein, with average winter survival. MT1564 has excellent resistance to stripe rust and is moderately resistant to both stem rust and dwarf bunt. MT1564 has medium PPO and above average milling and baking characteristics. PVP, Title V will be applied for.

MTS1588 (name pending) – hard red winter wheat developed by the Montana Agricultural Experiment Station and available to certified seed growers in fall 2019. MTS1588 is a medium maturing, solid-stemmed, short wheat with white chaff. MTS1588 has above average yield and test weight, average protein, with average winter survival. MTS1588 has the highest yield and lowest percent sawfly cutting, of all varieties, in trials where sawfly pressure was above 10% cutting. MTS1588 has excellent resistance to stripe rust and is moderately susceptible to stem rust. MTS1588 has medium-low PPO and above average milling and baking characteristics. PVP, Title V will be applied for.

MTCL1601 (name pending) – hard red winter wheat developed by the Montana Agricultural Experiment Station for exclusive license to a private company (to be determined) with a full partnership agreement with BASF Chemical Company. MTCL1601 will be available to certified seed growers in fall 2019. MTCL1601 is a medium maturing, semisolid-stemmed, medium height wheat with white chaff. MTCL1601 has average yield, above average test weight, and average protein, with good winter survival. MTCL1601 has high PPO and average milling and baking characteristics. PVP, Title V will be applied for. Additionally, the CLEARFIELD genes are patented.

Varieties previously in bulletin:

Bearpaw – hard red winter wheat developed by the Montana Agricultural Experiment Station in 2011. Bearpaw is a white-glumed, solid-stem, semi-dwarf (*Rht1*) wheat with medium maturity. Bearpaw has average yield, test weight, and protein, and below average winter hardiness. Bearpaw is resistant to prevalent races of stem rust but susceptible to stripe and leaf rust. Stem-solidness of Bearpaw is most similar to Rampart. Bearpaw is a high PPO variety with above average milling and below average baking properties. PVP, Title V option has been issued (Certificate #201200407). *Bearpaw will not be in the Montana Intrastate Winter Wheat Test for 2019.*

Brawl CL Plus – hard red winter wheat developed by Colorado and released in 2011. Brawl CL Plus is an early maturing, medium short statured wheat, with white chaff. Brawl CL Plus has average yield and above average test weight and protein. Brawl CL Plus is susceptible to stripe rust. Brawl CL Plus is a high PPO variety with average mill and bake characteristics. PVP, Title V has been issued (Certificate #201200434). Additionally, the CLEARFIELD genes are patented.

Decade – hard red winter wheat developed by the Montana Agricultural Experiment Station and released jointly with North Dakota (pending at publication) in 2010. Decade is an early to medium maturing reduced height wheat with white chaff. Decade is a high yielding wheat with good winter hardiness and medium to high test weight and protein. Decade is resistant to prevalent races of stem rust but very susceptible to stripe rust. Decade has excellent milling and baking quality. PVP, Title V has been issued (Certificate #201100096).

FourOsix - hard red winter wheat developed by the Montana Agricultural Experiment Station and available to seed growers in fall 2018. FourOsix is a medium maturing, short to medium statured wheat, with average winter-hardiness. FourOsix is a high yielding variety with above average test weight and average protein. FourOsix (50% Yellowstone, in pedigree) is similar in grain yield of Yellowstone - but with significantly earlier heading, shorter plant height, and significantly higher test weight and protein. FourOsix is resistant to stripe rust and this resistance is either similar or significantly higher than that of Yellowstone. MFourOsix is moderately susceptible to stem rust. FourOsix has excellent milling and baking qualities, comparable to Decade and parental cultivar, Yellowstone. PVP, Title V will be applied for.

Judee – hard red winter wheat developed by the Montana Agricultural Experiment Station in 2011. Judee is a white-glumed, solid-stem, semi-dwarf (*Rht1*) wheat with medium maturity. Judee has average yield, test weight, and protein, and below average winter hardiness. Judee is susceptible to prevalent races of stem and leaf rust but resistant to stripe rust. Stem-solidness of Judee is most similar to Genou. Judee is a high PPO variety with average mill and above average bake properties. PVP, Title V has been issued (Certificate #201200161).

Keldin – hard red winter wheat developed by Peter Franck (Germany) and released by WestBred in 2011. Keldin is a medium maturing, medium short statured wheat, with white chaff. Keldin has above average yield and test weight and average protein. Keldin is moderately susceptible to stripe rust. Keldin is a high PPO variety with average mill and below average bake characteristics. PVP, Title V has been issued (Certificate #201300462).

Langin – hard red winter wheat developed by Colorado and released in 2016. Langin is an early maturing, short statured wheat, with white chaff. Winter-hardiness is average. Langin has average yield and test weight and below average protein. Langin is moderately susceptible to stripe rust. Langin is a high PPO variety with below average mill and average bake characteristics. PVP, Title V is pending (Certificate #201700298). *Langin will not be in the Montana Intrastate Winter Wheat Test for 2019.*

LCS Chrome – hard red winter wheat developed by Limagrain LLC and released in 2016. LCS Chrome is an early to medium maturing, medium statured wheat, with red chaff. Winter-hardiness is average. LCS Chrome has above average yield and test weight and average protein. LCS Chrome is resistant to stripe rust. Mill and bake characteristics, under Montana conditions, have not been determined. PVP, Title V is pending (Certificate #201600404).

LCS Jet – hard red winter wheat developed by Limagrain LLC and released in 2015. LCS Jet is a medium maturing, short statured wheat, with white chaff. Winter-hardiness is below average. LCS Jet has above average yield (#1 in 2017 across 7 locations tested) and below average test weight and average protein. LCS Jet is resistant to stripe rust. LCS Jet is a high PPO variety with above average mill and below average bake characteristics. PVP, Title V has been issued (Certificate #201600094).

Loma – hard red winter wheat developed by the Montana Agricultural Experiment Station and available to growers in fall 2016. Loma is a semi-solid stemmed (similar to Genou), medium-late maturing, medium short statured wheat, with white chaff. Loma has above average yield and average test weight and protein. Loma is resistant to both stripe and stem rust. Loma is a medium low PPO line with above average mill and bake. PVP, Title V is pending (Certificate #201700021).

Long Branch – hard red winter wheat developed by Limagrain LLC, licensed by Dyna Gro Wheat, and released in 2015. Long Branch is an early maturing, short statured wheat, with white chaff. Winter-hardiness is average. Long Branch has above average yield and test weight and below average protein. Long Branch is resistant to stripe rust. Mill and bake characteristics, under Montana conditions, have not been determined. PVP, Title V is pending (Certificate #201700105).

Northern – hard red winter wheat developed the Montana Agricultural Experiment Station and available to growers in fall 2015. Northern is a medium-late maturing, medium-short statured wheat, with white chaff. Northern has average yield (similar to Yellowstone and Colter), average test weight, and average protein. Northern is resistant to both stem and stripe rust. Northern is a low PPO variety with average milling and average baking properties. PVP, Title V has been issued (Certificate #201600092).

Ray – a hard red winter wheat developed by the Montana Agricultural Experiment Station and available to seed growers in fall 2018. Ray is a late maturing, tall, awnless line developed for **forage** production as a possible replacement (or supplement to) Willow Creek (MT, 2005). Compared to Willow Creek, Ray has similar forage yield and forage quality, but superior seed yield. Compared to conventional bread wheats; Ray has average to above average yield, below average test weight, and average protein. Ray is resistant to stripe rust and susceptible to stem rust. Ray has low PPO and average milling and baking characteristics. PVP, Title V will be applied for.

SY 517 CL2 – a 2-gene CLEARFIELD hard red winter wheat developed by Syngenta and released in 2017. SY 517 CL2 is an early maturing, short statured wheat, with white chaff. Winter-hardiness is below average. SY 517 CL2 has below average yield, above average test weight, and average protein. SY 517 CL2 is moderately susceptible to stripe rust. SY 517 CL2 is a medium PPO variety

with average mill and below average bake characteristics. PVP, Title V is pending (Certificate #201700216). Additionally, the CLEARFIELD genes are patented.

SY Clearstone 2CL – a 2-gene CLEARFIELD hard red winter wheat developed by Montana Agricultural Experiment Station in 2012 and licensed exclusively to Syngenta Seeds. SY Clearstone wheat 2CL is very similar to Yellowstone. It is a medium maturing, medium tall, white chaffed wheat with average winter hardiness. It is a high yielding wheat with average test weight and protein. SY Clearstone 2CL is resistant to stripe rust and has moderate resistance to stem rust, the latter an improvement over Yellowstone. SY Clearstone 2CL is resistant to common bunt. SY Clearstone 2CL is a medium PPO variety with average mill and above average bake properties. PVP, Title V has been issued (Certificate #201300357). Additionally, the CLEARFIELD genes are patented.

SY Monument – hard red winter wheat developed by Syngenta and released in 2015. SY Monument is a medium maturing, medium short statured wheat, with white chaff. SY Monument has average yield, below average test weight and average protein. SY Monument is resistant to stripe rust. SY Monument is a medium low PPO variety with average mill and below average bake characteristics. PVP, Title V has been issued (Certificate #201400332).

SY Sunrise – hard red winter wheat developed by Syngenta and released in 2015. SY Sunrise is an early maturing, short statured wheat, with white chaff. SY Sunrise has average yield, above average test weight, and average protein. SY Sunrise is resistant to stripe rust. SY Monument is a high PPO variety with average mill and below average bake characteristics under Montana conditions. PVP, Title V has been issued (Certificate #201500370). *SY Sunrise will not be in the Montana Intrastate Winter Wheat Test for 2019.*

SY-Wolf – hard red winter wheat developed by Syngenta (AgriPro) Seeds in 2010. SY-Wolf is a medium maturing, short statured wheat with white glumes. SY-Wolf has above average yield and test weight and average protein. Winter-hardiness is average. SY-Wolf is moderately susceptible to moderately resistant (MS/MR) to stripe rust, but resistant to stem rust. SY Wolf has average milling and below average baking properties. PVP, Title V has been issued (Certificate #201100390). *SY Wolf*

will not be in the Montana Intrastate Winter Wheat Test for 2019.

Warhorse - is an awned, white glumed, solid-stemmed hard red winter wheat released in 2013 by the Montana Agricultural Experiment Station. Warhorse has medium maturity and has medium short, semi-dwarf height. Warhorse's winter hardiness, rated at 4 on 0-5 scale, is an improvement over other solid stem varieties. Stem solidness is similar to that of Bearpaw and Rampart, while sawfly cutting of stems is very low (similar to Rampart). Warhorse yield is similar to Judee, while test weight and protein are above average. Warhorse is resistant to both stem and stripe rust. Warhorse has acceptable mill and bake qualities. PVP, Title V has been issued (Certificate #201400131).

WB4483 – hard red winter wheat developed by WestBred/Monsanto in 2016. WB4483 is solid stemmed, late maturing, short to medium statured wheat, with white chaff. WB4483 has slightly below average yield and average test weight and protein. WB4483 is moderately susceptible to stripe rust. WB4483 is a high PPO variety with average mill and below average bake characteristics under Montana conditions. PVP, Title V is pending (Certificate #201600380). *WB4483 will not be in the Montana Intrastate Winter Wheat Test for 2019.*

WB4575 – hard red winter wheat developed by WestBred/Monsanto in 2016. WB4575 is a medium maturing, short to medium statured wheat, with white chaff. WB4575 has below average yield and above average test weight and protein. WB4575 is susceptible to stripe rust. WB4575 is a medium PPO variety with average mill and above average bake characteristics under Montana conditions. PVP, Title V is pending. *WB4575 will not be in the Montana Intrastate Winter Wheat Test for 2019.*

WB4614 – hard red winter wheat developed by WestBred and released in 2013. WB4614 is a medium maturing, medium short statured wheat, with white chaff. WB4614 has average yield and protein and above average test weight. WB4614 is resistant to stripe rust. WB4614 is a high PPO variety with average mill and bake characteristics. PVP, Title V has been issued (Certificate #201500188). *WB4614 will not be in the Montana Intrastate Winter Wheat Test for 2019.*

WB4623CLP – hard red winter wheat developed by WestBred and released in 2015. WB4623CLP is a medium late maturing, short statured wheat, with white chaff. WB4623CLP has average yield, test weight, and protein. WB4623CLP is resistant to stripe rust. WB4623CLP is a medium low PPO variety with average mill and above average bake characteristics. PVP, Title V has been issued (Certificate #201500189). Additionally, the CLEARFIELD genes are patented. WB4623CLP will not be in the Montana Intrastate Winter Wheat Test for 2019.

Yellowstone – hard red winter wheat developed by the Montana Agricultural Experiment Station and released to seed growers in 2005. Yellowstone is a very high yielding winter hardy variety with medium test weight, maturity, height, and grain protein. Yellowstone has excellent baking and good Asian noodle quality. It is moderately resistant to TCK smut and resistant to stripe rust, but susceptible to stem rust. Yellowstone has been the leading winter wheat variety planted in Montana since 2012. PVP, Title V has been issued (Certificate #200600284).

Plant Variety Protection

The Plant Variety Act, signed into law in 1970, offers legal protection to developers of new varieties of plants which reproduce sexually – that is, through seeds. The law provides for a Plant Variety Protection Office in the U.S. Department of Agriculture. The office receives and processes applications and when “novelty” is established, issues a certificate granting protection rights specified by the applicant.

The owner (or developer) holding a “certificate of protection” has complete control over the variety for 20 years. The law provides two types of protection:

1. Without Seed Certification

The owner of the protected variety may exclude others from reproducing the variety, selling it, offering it for sale, importing or exporting it, or use it in the commercial production of a hybrid or a different variety without permission. In this sense, the owner of a protected variety may bring civil damage action against anyone who infringes upon his rights.

2. Certified Seed Option

The owner may specify that the seed of his variety “...be sold or advertised only as a class of Certified Seed”. Production and sale of such seed by variety

name, when not certified, constitute a violation of the Federal Seed Act. This means of protection may be used extensively for publicly as well as privately developed varieties.

Amendments to the Plant Variety Protection Act (PVPA) have passed both houses of Congress and been signed into law by the President. These amendments went into effect in 1995. The farmers exemption has been changed for new varieties. Seed for varieties issued a certificate after April 4, 1995, may only be purchased from the owner or his agent. A farmer can only save seed of these varieties for use on his own farm and cannot sell seed of the protected variety to his neighbor.

A variety protected under the certification option does not permit a farmer producing seed to sell or offer for sale or advertise by variety name unless it is certified. Sale of such seed by variety name as uncertified seed will constitute a violation of the Federal Seed Act. Interstate movement of seed is subject to inspection by Federal Seed Control officials. Seed within the state is subject to inspection by State Department of Agriculture inspectors.

Owners of protected varieties will give public notice that their variety is protected by affixing to the label or container the words: “Unauthorized Propagation Prohibited” or the words, “Unauthorized Seed Multiplication Prohibited”. Producers must check the label (tag) or the container for the above wording.