

2020 Winter Wheat Annual Report

MONTANA AGRICULTURAL EXPERIMENT STATION
PLANT SCIENCES AND PLANT PATHOLOGY DEPT.
MONTANA STATE UNIVERSITY

2020 MONTANA WINTER WHEAT ANNUAL REPORT

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2020 Winter Wheat Crop

Montana's 2020 winter wheat crop production is projected at 76.0 million bushels, a 20% decrease over the 2019 production of 95.0 million bushels. The 2020 average yield per acre, at 51 bu/ac, is a new record, up one bushel per acre from a tie in both 2018 and 2019. Harvested acres, at 1.59 million was a decrease from the 1.90 million acres in 2019.

Montana 2017-2020 Wheat Production

Wheat Class	Acres harvested (X 1000)				Average Yield (bu/ac)				Total Production (millions of bushels)			
	2017	2018	2019	2020	17	18	19	20	2017	2018	2019	2020
Winter Wheat	1590	1570	1900	1490	42	50	50	51	66.8	78.5	95.0	76.0
Spring Wheat	2290	2820	2730	3280	21	34	37	38	48.1	95.9	105.8	124.6
Durum	785	775	505	685	16	30	43	39	12.6	23.3	22.5	26.7

2020 Winter Wheat Varieties

Warhorse remained the leading variety in 2020 at 47.8%, increasing from 28% in 2019.

Keldin moved to the 2nd leading winter wheat variety in 2020 at 9.8%, up slightly from 9.2% in 2019.

Yellowstone remained the 3rd leading variety in 2020, with 9.7% of the acreage, down from 13% in 2019.

Judee was the 4th leading winter wheat variety in 2020 at 6.7%, up from 5th place but down from 8.1% acreage of 8.1%

Brawl CL Plus dropped to the 5th leading winter wheat variety in 2020 at 3.7%, down from 13.2% in 2019.

Decade moved to the 6th leading winter wheat variety in 2020 at 2.9%, up from 7th place in 2019, but down slightly in percent acreage from 3.4%.

Montana public varieties {Warhorse, Yellowstone, Judee, Decade, Northern (2.8%), and Loma (2.2%)} occupied 72% of the winter wheat acreage in 2019, up from 57% in 2019.

Percentage of Acres Planted Statewide

2020 Winter Wheat Data

2020 Montana Small Grains Variety Summary - by Ag District

Winter Wheat								
	Northwest	North Central	Northeast	Central	Southwest	South Central	Southeast	State
Warhorse	—	51.0%	—	28.9%	80.2%	4.0%	—	47.8%
Keldin	—	9.5%	—	15.2%	—	3.8%	—	9.8%
Yellowstone	—	9.4%	67.4%	10.4%	19.8%	—	—	9.7%
Judee	—	7.5%	—	—	—	—	—	6.7%
Brawl CL Plus	—	1.9%	—	19.0%	—	21.0%	—	3.7%
Decade	—	2.5%	—	7.1%	—	3.7%	—	2.9%
Northern	—	2.9%	5.0%	2.5%	—	—	—	2.8%
Loma	—	2.3%	—	2.6%	—	—	—	2.2%
CDC Falcon	—	2.2%	—	2.5%	—	1.1%	—	2.2%
SY Clearstone	—	1.3%	—	1.9%	—	—	—	1.3%
Other	—	9.5%	11.5%	9.1%	—	50.8%	—	10.9%
Unknown/Unreported	100.0%	0.0%	16.2%	0.9%	0.0%	15.7%	100.0%	0.0%
Observations	1	219	19	54	6	14	1	314

Spring Wheat								
	Northwest	North Central	Northeast	Central	Southwest	South Central	Southeast	State
Vida	—	40.9%	18.5%	26.6%	—	35.8%	—	31.5%
SY Ingmar	—	6.2%	12.3%	5.4%	—	—	—	8.6%
SY Soren	—	—	15.2%	—	—	—	—	6.1%
Corbin	—	10.7%	—	—	—	—	—	6.1%
Reeder	—	—	14.9%	4.1%	—	—	—	6.1%
Brennan	—	—	12.1%	—	—	—	—	4.9%
WB Gunnison	—	7.5%	0.2%	—	—	10.3%	—	4.4%
Duclair	—	7.0%	—	7.0%	—	—	—	4.1%
Lanning	—	5.5%	0.9%	17.8%	—	16.4%	—	3.9%
Mott	—	0.7%	3.2%	—	—	—	—	1.7%
Other	—	20.5%	22.4%	38.0%	100.0%	35.9%	—	22.6%
Unknown/Unreported	100.0%	0.0%	0.3%	1.0%	0.0%	1.7%	100.0%	0.0%
Observations	2	197	127	45	6	13	0	390

2020 Montana Small Grains Variety Summary - by Ag District

Durum Wheat							
	Northwest	North Central	Northeast	Central	Southwest	South Central	Southeast
Alzada	—	82.4%	12.2%	—	—	—	—
Joppa	—	—	33.5%	—	—	—	—
Tioga	—	3.4%	14.5%	—	—	—	—
Divide	—	—	13.1%	—	—	—	—
Kyle	—	—	9.1%	—	—	—	—
Mountrail	—	—	7.0%	—	—	—	—
Other	—	0.7%	10.6%	—	—	—	—
Unknown/Unreported	100.0%	0.0%	0.0%	100.0%	100.0%	100.0%	100.0%
Observations	0	184	87	0	0	0	0
							271

Barley							
	Northwest	North Central	Northeast	Central	Southwest	South Central	Southeast
Metcalfe	—	45.6%	—	50.9%	—	—	—
Hockett	—	31.0%	—	11.3%	—	—	—
Haybet	—	1.6%	68.5%	5.4%	—	9.3%	—
Lavina	—	3.6%	16.0%	4.0%	80.0%	6.0%	—
Haxby	—	4.6%	5.5%	0.9%	—	—	—
Bill Coors 100	—	2.9%	—	5.4%	—	39.4%	—
Other	—	10.8%	9.9%	20.0%	20.0%	45.3%	—
Unknown/Unreported	100.0%	0.0%	0.0%	2.2%	0.0%	0.0%	100.0%
Observations	2	219	50	50	6	13	2
							342

Variety Decisions

Factors in making seed variety decision	Responses	Average Importance	Std Dev	Median Importance	Most Common Response
Overall yield potential	361	8.99	0.32	9	10
Overall protein content potential	357	8.55	0.35	9	10
Your past experience with variety	344	8.30	0.39	9	8
Disease resistance	357	8.18	0.41	8	10
Market conditions/prices	352	8.13	0.51	9	8
Final product quality characteristics	346	8.08	0.42	8	10
Resistance to WSS	354	7.89	0.57	9	10
Other pest resistance	348	7.19	0.51	8	8
Cost of CSO seed	352	7.11	0.58	8	10
Planting CSO vs saved seed	352	5.42	0.58	5	5
Other reasons	29	8.70	0.47	9	10

Notes: State estimates

To estimate a state-level proportion of acres planted to a particular variety of wheat or barley, we combine responses from producers across Montana counties with county-level planted acres reported by the USDA National Agricultural Statistical Service. Specifically, we use the following weighting procedure separately for winter wheat, spring wheat (excluding durum), durum wheat, and barley.

First, for each county, we aggregate the total acreage planted to a particular variety in that county, as reported by survey respondents. We then calculate the proportion of acreage planted to a particular variety in the county by dividing acres in a variety by the sum of acres for all planted varieties. For example, if in county A producers reported that the total number of acres planted to variety 1 was 2,000 acres and the total number acres planted to all varieties in county A was 10,000 acres, then the proportion of acreage planted to variety 1 was 20%. This

Second, we calculate the proportion of total acres planted in a county relative to the total acres planted in Montana as estimated by USDA NASS. For example, if county A reported to have planted 100,000 winter wheat acres and the total planted acres in Montana was 1.5 million, then county A represented 6.7% of total state winter wheat acres. This proportion is used as the state-level weight for determining state-level variety plantings.

Third, the proportion of a planted variety in a county was then multiplied by the proportion of planted acres that the county had relative to the state-level total acres. That is, if producers in county A planted 20% of winter wheat using variety 1, and county A represented 6.7% of total winter wheat acres planted in Montana, then variety 1 in county A is estimated to represent $(20\% * 6.7\%) = 1.34\%$ of total winter wheat acres planted in Montana.

Fourth, the county weights were adjusted by the number of responses observed in each county, to account for a greater amount of information coming from those responses.

Lastly, when the above calculations were completed for all each variety in all counties, the weighted county-level planted acres for each variety were summed together across all Montana counties with production of the particular wheat or barley (i.e., this was done separately for winter wheat, spring wheat, durum, and barley).

Notes: Agricultural district estimates

To estimate the proportion of acres planted to a particular variety of wheat or barley in a USDA NASS Agricultural District that planted each of these crops, we combine responses from producers across those counties with county-level planted acres reported by the USDA National Agricultural Statistical Service. Specifically, we use the following weighting procedure separately for winter wheat, spring wheat (excluding durum), durum wheat, and barley.

First, for each of the counties in a particular agricultural district, we aggregate the total acreage planted to a particular variety in that county as reported by survey respondents. We then calculate the proportion of acreage planted to a particular variety in the county by dividing acres in a variety by the sum of acres for all planted varieties. For example, if in county A producers reported that the total number of acres planted to variety 1 was 2,000 acres and the total number acres planted to all varieties in county A was 10,000 acres, then the proportion of acreage planted to variety 1 was 20%. This calculation was repeated for all varieties.

Second, we calculate the proportion of total acres planted in a county relative to the total acres planted in the counties producing that crop within an agricultural district as estimated by USDA NASS. For example, if county A reported to have planted 100,000 winter wheat acres and the total planted acres in the counties within the agricultural district was 200,000, then county A represented 50% of total winter wheat acres planted in the agricultural district. This proportion is used as the agricultural district weight for determining district-level variety plantings.

Third, the proportion of a planted variety in a county was then multiplied by the proportion of planted acres that the county had relative to the total acres in the agricultural district. That is, if producers in county A planted 20% of winter wheat using variety 1, and county A represented 50% of total winter wheat acres planted in the agricultural district, then variety 1 in county A is estimated to represent $(20\% * 50\%) = 10\%$ of total winter wheat acres planted in the agricultural district.

Fourth, the county weights were adjusted by the number of responses observed in each county, to account for a greater amount of information coming from those responses.

Lastly, when the above calculations were completed for all each variety in all counties, the weighted district-level planted acres for each variety were summed together across all of the planted acres within the agricultural district with production of the particular wheat or barley (i.e., this was done separately for winter wheat, spring wheat, durum, and barley).

Crop Science

Entomology

Horticulture

Plant Biology

Plant Genetics

Plant Pathology

DATE: January 21, 2020

TO: Variety Release and Recommendation Committee Members

FROM: Mike Giroux, Chair

RE: 2020 Variety Release Minutes and Committees

Chair: Mike Giroux, Department Head PSPP

Secretary: Andy Hogg, Research Associate, PSPP

Present committee members:

Mike Giroux, Phil Bruckner, Deanna Nash, Mary Burrows, Doug Holen, David Weaver, Heather Unverzagt

Called in or sent in vote and comments by email:

Peggy Lamb, Patrick Carr, Ken Kephart.

Absent Committee Members:

Ed Davis, Perry Miller, Darrin Boss, Jessica Torrion, Chengci Chen, Marc Vogel, Mike O'Hara.

Others present:

Daniel Juliano, Jason Cook, Sam Anderson, Dave Gettel, Ron Brown, Robert Brown, Bob Hoffman, Heather Unverzagt, Rebecca Papke, Cameron Delaney, Scott Christensen, Ryan Holt, Darin Oelkers, Hwa-Young Heo, Jim Berg, Nancy Blake, Ron Ramsfield, Sam Ackerman.

Agenda for 2020 Variety Release Meeting

Following is the agenda for the 2020 Variety Release meeting to be held on **Tuesday, January 21, 2020 at 1:00 pm in 108 Plant BioScience Building.**

1. Approval of the Minutes of the 2019 meeting.
2. Discuss and vote on motions

Motion to be considered by Wheat VR Committee: Giroux/Hogg
- Release of MTD16005 spring durum wheat:

<http://plantsciences.montana.edu/foundationseed/varietyrelease/2020.html>

Mike Giroux
Department Head and Professor
Department of Plant Sciences and Plant Pathology
College of Agriculture
119 Plant BioScience Building
PO Box 173150
Montana State University
Bozeman, MT 59717-3150

Telephone: 406-994-7877
Fax: 406-994-7600

2020 Wheat Variety Release Committee		
<i>Voting Members, 16</i>	<i>Title / Expertise</i>	<i>Appointing Administrator</i>
1. Phil Bruckner	Professor / Winter Wheat Breeding	PSPP Department Head
1. Jason Cook	Assistant Research Professor / Spring Wheat Breeding	
2. Deanna Nash	Manager of the Cereal Quality Lab / Cereal Quality	PSPP Department Head
3. Mary Burrows	Professor / Plant Pathology	PSPP Department Head
4. Doug Holen	Manager of the Foundation Seed Program / Varietal Development	MT Foundation Seed Board
5. Heather Unverzagt	Exec. Director of the Montana Seed Growers / Foundation Seed and Seed Quality	MT Seed Growers Association Board
6. Ed Davis	Agricultural Specialist / Cropland Weed Research	LRES Department Head
7. Perry Miller	Professor / Cropping Systems	LRES Department Head
8. David Weaver	Professor / Entomology	LRES Department Head
9. Peggy Lamb	Research Scientist NARC / Variety Testing	Research Center Department Head
10. Patrick Carr	Associate Professor and Superintendent CARC / Cropping Systems	Research Center Department Head
11. Darrin Boss	Professor WTARC / Entomology, Insect Ecology	Research Center Department Head
12. Jessica Torrior	Assistant Professor and Superintendent NWARC / Crop Physiology	Research Center Department Head
13. Chengci Chen	Professor and Superintendent EARC / Cropping Systems	Research Center Department Head
14. Ken Kephart	Associate Professor and Superintendent SARC / Agronomist	Research Center Department Head
15. Marc Vogel	Chair MAES Advisory Council	MAES Advisory Board
16. Mike O'Hara	Montana Wheat and Barley Director, Representing Teton & Chouteau County	Montana Wheat and Barley Committee
Ex-officio Daniel Juliano	Associate Director of Technology Licensing / MSU Technology Transfer	V.P. for Research and Economic Development

2020 Minutes

1. Approval of the Minutes of the 2019 meeting.

- Jed Eberly and Pat Carr called in from CARC.
- Ken Kephart sent in his proxy vote by email and commented "MTD16005 looks good to me and I have no significant concerns since yield was very competitive across locations and protein content and strength also look good. Nice to see that this line has the low cadmium trait since that is important to have now in any new releases and was something lacking in the variety Silver."
- Doug Holen mentioned that research fees on MSU seed sales are increasing this year. To \$1/bushel wheat and \$1.25/bushel of barley. This is the first increase since 2015.
- David Weaver motioned to approve the 2019 minutes.
- Phil Bruckner seconded the motion.

- Motion passed unanimously, 9-0.

2. Wheat Committee

- **Mike Giroux** motion to release the spring durum MTD16005 as a public protected variety.
- Mike Giroux acknowledged that MAES research stations are vital for testing and eventual release of new varieties and that it is a team effort and that the proposal represents the work of many MAES faculty and staff.
- Mike Giroux went over the top grown Durum cultivars in Montana. He noted that Alzada is dominant in the North Central region due to its preferred quality characteristics and contract acreage but that NDSU varieties dominate the NE region of Montana.
- Mike Giroux discussed the pedigree and background of MTD16005. One of the parents, M175, was developed at MSU originally with the intent of developing a high amylose durum line in association with a private company. MTD16005 carries a mutation in a starch synthase IIa gene(*ssIIa*) that increases pasta firmness but does not modify amylose content. It was also mentioned that M175 was the donor of the low cadmium accumulation allele present in MTD16005.
- Mike Giroux presented data tables from field testing at 7 locations over three years, all at MAES. MTD16005 is yield competitive or higher yielding than the commonly grown durum cultivars in Montana. MTD16005 is 35 inches tall and flowers a day later than Mountrail and Divide. It has a similar appearance to durum cultivars developed at NDSU, i.e. Mountrail and Divide. MTD16005 had similar quality to currently grown cultivars with acceptable test weight, semolina yield, protein and semolina protein content, and a high yellow color. It also has improved gluten strength compared to Mountrail, which is widely grown, but was equal to Divide and less than Alzada. MTD16005 had the lowest grain and semolina ash.
- Dave Gettel mentioned that it showed no damage from wild oat herbicide applied at a high rate.
- Jim berg asked how screening for low cadmium accumulation was accomplished.
- Mike Giroux replied that is a simple CAPS marker assay for the low accumulation allele that can be done in the lab and that Andy Hogg had confirmed that MTD16005 has low cadmium in its grain relative to varieties lacking the low accumulation allele.
- Mike Giroux discussed the disease evaluations performed on MTD16005 which included stripe rust testing in Washington over 2 years, stem and leaf rust testing at MSU, leaf spot evaluations at MSU, and Fusarium head blight (FHB) testing over 2 years performed by Frankie Crutcher at EARC. MTD16005 was found to have high resistance to the stem and leaf rust isolates tested, seedling susceptibility to stripe rust followed by high temperature adult plant resistance, and moderate susceptibility to FHB. Resistance/susceptibility to stripe rust and FHB was comparable to all other durum cultivars tested.
- Doug Holen confirmed he has ~30 bu for foundation seed production in 2020.
- Heather Unverzagt asked if yield testing was conducted by any private companies?

- Mike Giroux replied that it was only tested at MAES locations.
- Mike Giroux motioned for release of MTD16005 as a public protected variety.
- Peggy Lamb seconded the motion.
- Vote was taken and passed unanimously 9-0.
- Meeting was adjourned at 1:30 pm.

MSU/MAES Hollow-Stemmed Winter Wheat Varieties

Phil Bruckner and Jim Berg, Winter Wheat Breeding Program, Montana State University
Updated 1/2021

Description of selected varieties developed by MSU/MAES Winter Wheat Breeding Program:

Flathead - a hard red winter wheat developed by the Montana Agricultural Experiment Station and available to certified seed growers in fall 2019. Flathead is derived from a composite of 2 crosses involving Yellowstone and a Washing State University line, PI 640431, that carries 2 stripe rust seedling resistance genes. Flathead is an early maturing (especially for a Montana line), hollow-stemmed, medium height wheat with white chaff (Table 2). Flathead has average yield, above average test weight, and average protein, with average winter survival. Flathead out-yields other early maturing varieties, such as Brawl CI Plus (Table 1). Flathead has excellent resistance to stripe rust and is moderately resistant to both stem rust and dwarf bunt. Flathead has medium PPO and above average milling and baking characteristics (Table 3). To be sold by variety name only as a class of certified seed. Montana State University Research Fees due on seed sold. PVP, Title V is pending (Certificate# 202000202).

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. FourOsix is moderately susceptible to stem rust. FourOsix has excellent milling and baking qualities, comparable to Decade and parental cultivar, Yellowstone. PVP, Title V has been issued (Certificate# 201900053).

Northern is a hard red winter wheat developed by the Montana Agricultural Experiment Station and released to growers in 2015. Northern was named to commemorate the 100th anniversary of the Northern Agricultural Research Center (NARC) in Havre, Montana. 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 has above average milling and average baking properties (Table 3.) Northern is a low PPO cultivar with favorable Asian noodle color stability and noodle score. PVP, Title V has been issued (Certificate# 201600092).

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 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.

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).

Phil Bruckner and Jim Berg, Montana State University, Agricultural Experiment Station <<http://plantsciences.montana.edu/crops>>

Table 1. Yield of Hollow-Stemmed Winter Wheat varieties, 2018-2020^{1/}

		Shaded entries, in all tables, are MSU/MAES developed varieties						
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	3	3	16	11	10	12	6	61
Keldin	134.8	132.5	98.4	67.6	68.3	57.9	62.0	79.8
Northern	127.1	131.0	90.0	71.3	70.4	59.6	65.3	78.8
LCS Jet	146.4	129.0	95.8	70.2	66.7	53.2	53.4	78.0
SY Clearstone 2CL	130.6	126.3	85.1	69.3	65.7	57.5	58.4	75.3
Yellowstone	124.4	124.2	84.0	66.4	66.8	57.2	61.4	74.5
FourOsix	121.7	122.3	85.1	68.5	66.0	55.5	58.5	74.2
SY Monument	116.8	117.2	87.0	71.5	63.7	57.4	53.1	74.1
Flathead	134.2	115.3	85.2	61.7	62.8	52.5	53.3	71.6
Brawl CL Plus	110.8	105.1	82.5	58.2	63.7	51.7	46.8	68.0
LSD (0.05)	13.6	9.0	6.0	4.5	ns	4.2	10.5	2.7

bold = indicates highest value within a column

ns = non-significant

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

1/ = 2018-2020 Intrastate and 2018-2020 Off Station tests

2/ includes data from Fort Smith, Hardin area, Hysham Molt, Rapelje

3/ includes data from Belt, Denton, Geraldine, Highwood, Winifred

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

5/ includes data from Ft. Benton, Loma, Turner

Table 2. Agronomic characteristics of Hollow-Stemmed Varieties, 2018-2020^{1/}

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	61	5	24		58	6	61	18	2	1
Brawl CL Plus	<u>62.7</u>	<u>60</u>	157.2	6-Jun	28.1	12	<u>13.5</u>	<u>29</u>	70	2.8
Flathead	61.7	<u>64</u>	159.2	8-Jun	29.4	13	12.8	42	3	2.6
FourOsix	61.2	60	163.1	12-Jun	29.2	9	12.7	51	6	2.8
Keldin	61.7	58	164.1	13-Jun	29.8	11	12.5	44	41	2.8
LCS Jet	58.9	43	164.2	13-Jun	26.7	<u>4</u>	12.3	45	<u>2</u>	3.6
Northern	61.3	62	165.6	15-Jun	30.4	17	12.8	41	8	2.6
SY Clearstone 2CL	60.3	63	164.8	14-Jun	32.6	29	12.6	54	16	2.9
SY Monument	60.7	61	161.7	11-Jun	28.3	11	12.0	42	4	3.1
Yellowstone	60.5	63	165.2	14-Jun	31.8	20	12.6	50	-	2.7
LSD (0.05)	0.3	12	0.6		0.5	12	0.2	7	18	0.2

1/ = 2018-2020 Intrastate and 2018-2020 Off Station tests

ns = non-significant

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 3. Mill and bake characteristics of Hollow-stemmed Varieties, 2018-2019

Variety	PPO ^{1/}	Kernel hardness	Flour			Mixograph			Baking		
			yield %	protein %	Ash %	tolerance (1-6)	mix time min	absorption %	mix time min	absorption %	volume cc
location-years	8	4	8	8	8	8	8	8	8	8	8
Brawl CL Plus	0.245	68.0	71.3	12.0	0.38	2.6	3.8	65.9	7.0	76.0	1059
Flathead	0.220	69.1	72.9	12.0	0.41	4.1	7.8	66.6	16.0	76.9	1074
FourOsix	0.220	69.2	71.3	12.2	0.41	3.1	4.7	65.6	9.8	75.3	1119
Keldin	0.274	63.6	70.4	11.7	0.42	3.0	4.3	64.4	7.3	74.5	1028
LCS Jet	0.226	65.3	72.4	11.3	0.37	3.6	4.9	63.4	8.1	74.5	988
Northern	0.097	80.0	71.1	11.9	0.45	3.0	3.2	63.8	4.9	73.3	1084
SY Clearstone 2CL	0.240	73.6	69.7	11.7	0.41	3.6	4.9	65.1	8.2	74.9	1085
SY Monument	0.170	75.5	72.4	10.9	0.38	4.1	6.9	64.5	14.8	75.1	1013
Yellowstone	0.221	72.0	70.6	12.1	0.41	3.9	6.7	66.5	12.1	76.9	1095
LSD (0.05)	0.029	5.3	1.1	0.5	0.01	0.8	0.8	1.5	1.7	1.7	38

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

1/ polyphenol oxidase, low is best for noodles

MSU/MAES Solid-Stemmed Winter Wheat Varieties

Phil Bruckner and Jim Berg, Winter Wheat Breeding Program, Montana State University
Small Grain QuickFacts: <http://plantsciences.montana.edu/FoundationSeed> (Updated 1/2021)

Description of selected varieties developed by MSU/MAES Winter Wheat Breeding Program:

Bobcat is a solid stemmed hard red winter wheat with improved yield potential (Tables 1, 2) relative to other solid stemmed varieties. Bobcat was developed by the Montana Agricultural Experiment Station and will be released to certified seed growers in fall 2019. Bobcat is a selection from a composite cross of 2 unreleased MT solid-stemmed experimental lines with an unreleased MT hollow-stemmed line. Bobcat is an awned, white-glumed, semi-dwarf wheat with medium to late maturity. Bobcat is the top performing line in locations where sawfly cutting has occurred (Table 2). Stem solidness is excellent, significantly higher than to Warhorse (Table 3). Bobcat has above average test weight and average protein, and average winter hardiness (Table 4). Bobcat is resistant to prevalent races of stripe and stem rust, but susceptible to leaf rust. Bobcat is a medium high PPO variety with above average mill and bake properties (Table 5). PVP, Title V is pending (Certificate# 202000177).

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).

Loma is a semi-solid stemmed hard red winter wheat with improved yield potential relative to other solid stemmed varieties. Loma was developed by the Montana Agricultural Experiment Station and released to seed growers in 2016. Loma (Yellowstone//MTS0112/MTS0125) was a cross between Yellowstone and 2 unreleased solid-stemmed experimental lines. Loma is an awned, white-glumed, medium short wheat with medium to late maturity. Loma performs well in locations where sawfly cutting has occurred. Stem solidness is less than to Judee and WB Quake. Loma has average test weight and protein, and average winter hardiness (Table 4). Loma is resistant to prevalent races of stripe and stem rust, but susceptible to leaf rust. Loma is a medium low PPO variety with above average mill and bake properties. PVP, Title V is issued (Certificate# 201700021).

StandClear CLP – hard red winter wheat developed by the Montana Agricultural Experiment Station for exclusive license to Nutrien Ag Solutions (Loveland Products Inc., Loveland, CO) with a full partnership agreement with BASF Chemical Company. StandClear CLP will be available to certified seed growers in fall 2020. StandClear CLP is a medium maturing, semisolid-stemmed, medium height wheat with white chaff. StandClear CLP has average yield, above average test weight, and average protein, with good winter survival. StandClear CLP has high PPO and average milling and baking characteristics. PVP, Title V has been issued (Certificate# 202000183). Additionally, the CLEARFIELD genes are patented.

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).

Table 1a. Yield of Solid-stemmed varieties, 2016-2020^{1/}

Variety	Districts							All Locations
	1	2	3	4	5	5	6- Sidney & Williston	
	Kalispell	Bozeman	Huntley ^{2/}	Moccasin ^{3/}	Conrad ^{4/}	Havre ^{5/}		
location-years	3	8	18	11	12	28	6	86
Bobcat	117.1	106.6	76.2	65.2	72.3	63.1	57.2	72.9
Loma	126.9	109.4	76.5	69.0	70.4	57.8	59.8	72.3
StandClear CLP	119.1	111.1	78.5	67.6	68.7	58.3	57.9	72.2
Judee	125.3	104.4	73.6	66.4	62.4	56.7	56.5	69.1
Warhorse	116.3	97.8	78.8	65.2	60.5	55.0	52.5	68.0
LSD (0.05)	ns	5.8	3.6	ns	3.4	2.9	ns	1.7

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

1/ = includes 2018-2020 Intrastate, 2018-2020 Off Station, and 2016-2020 Saw fly tests

2/ includes data from Fort Smith, Hardin area, Molt, Rapelje

3/ includes data from Belt, Denton, Geraldine, Highwood

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

5/ includes data from Big Sandy, Fort Benton, Hingham, Gildford, Loma, Turner

Table 2. Solid-stemmed Varieties: Yield Performance under Sawfly Pressure (test average cutting $\geq 10\%$) and % Sawfly Cutting (2018-2020)

Variety	Yield bu/a	Sawfly Cutting (%)
location-years	25	25
Bobcat	66.4	9
Loma	62.3	30
StandClear CLP	61.6	39
Judee	58.8	35
Warhorse	57.3	11
LSD (0.05)	2.8	7

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 3. Stem solidness ratings of solid-stemmed varieties, (2016-2020)

	Stem Solidness Rating (scale 5-25, higher =						Stem Solidness by location, 2016-2020				
	2020	2019	2018	2017	2016	2016-19	Billings	Bozeman	Conrad	Havre ^{1/}	Moccasin
location-years	9	9	9	6	6	39	2	8	6	22	1
Bobcat	24.1	23.9	23.8	23.2	22.3	23.5	23.0	23.6	23.5	23.6	23.4
Judee	21.0	20.7	22.3	19.1	20.0	20.8	22.0	19.5	21.8	20.7	24.4
Loma	21.3	21.0	22.5	20.1	17.9	20.8	22.8	19.2	20.8	21.2	20.6
StandClear	21.7	20.0	20.1	18.4	19.0	20.0	18.4	19.2	19.6	20.6	19.9
Warhorse	22.7	22.3	22.5	21.3	21.4	22.1	22.6	21.6	22.5	22.2	22.3
LSD (0.05)	1.1	1.0	1.2	2.2	1.7	0.6	ns	1.5	1.3	0.8	2.5

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

1/ includes Big Sandy, Carter, Gildford, Hingham, and Loma

Table 4. Agronomic characteristics of MTCS1601 vs. a set of varieties, 2016-2020^{1/}

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	84	5	34		81	6	84	28	2	1
Bobcat	61.4	55	164.5	14-Jun	28.1	8	12.7	9	7	2.9
Judee	61.9	63	163.4	12-Jun	30.0	14	13.2	32	7	3.7
Loma	60.7	61	166.3	15-Jun	28.5	13	12.8	28	9	2.8
StandClear CLP	61.8	66	163.6	13-Jun	29.8	20	12.8	35	10	-
Warhorse	61.0	61	164.5	14-Jun	29.3	10	13.3	10	4	3.2
LSD (0.05)	0.2	6	0.4		0.4	6	0.1	7	ns	0.2

^{1/} = includes 2018-2020 Intrastate, 2018-2020 Off Station, and 2016-2020 Sawfly tests

bold = indicates highest (or most desirable) value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 5. Mill and bake characteristics of solid stemmed varieties, 2016-2019

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	20	13	20	20	20	20	20	20	20	20	20
Bobcat	0.277	67.2	72.4	12.3	0.39	3.3	5.6	67.0	13.3	77.5	1078
Judee	0.242	75.9	70.9	12.5	0.39	3.5	5.5	66.3	9.1	76.0	1172
Loma	0.135	76.7	72.4	12.1	0.39	3.2	6.3	67.2	14.2	77.7	1137
StandClear CLP	0.292	68.5	72.6	12.2	0.39	3.3	4.3	65.5	8.8	76.0	1063
Warhorse	0.239	82.9	70.2	12.7	0.42	2.2	4.6	67.2	7.4	77.2	1131
LSD (0.05)	0.022	3.7	0.5	0.34	0.01	0.44	0.5	1.3	1.5	1.3	38

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

^{1/} low is best for noodles

Phil Bruckner and Jim Berg, Montana State University, Agricultural Experiment Station <<http://plantsciences.montana.edu/crops>>

Summary of climatic data by months for the 2019-2020 crop year (September to August) and averages for the period 1958-2020 at the Post Agronomy Research Farm in Bozeman, Montana.

Month Year	Sep 2019	Oct 2019	Nov 2019	Dec 2019	Jan 2020	Feb 2020	Mar 2020	Apr 2020	May 2020	Jun 2020	Jul 2020	Aug 2020	Year
<u>Precipitation (inches)</u>													
Current Year	3.61	1.40	0.79	0.08	0.31	0.84	1.24	0.87	0.78	3.65	0.66	0.56	14.79
Average (1958-2020)	1.50	1.36	0.93	0.59	0.52	0.53	1.03	1.68	2.59	2.70	1.28	1.21	15.90
difference	2.11	0.04	-0.14	-0.51	-0.21	0.31	0.21	-0.81	-1.81	0.95	-0.62	-0.65	-1.11
<u>Mean Temperature (°F)</u>													
Current Year	58.0	37.0	31.2	27.7	30.9	26.8	33.7	42.1	52.7	59.6	64.9	68.6	44.4
Average (1958-2020)	55.9	45.3	31.7	23.5	22.9	26.9	34.0	42.4	51.3	58.9	65.9	65.1	43.6
difference	2.1	-8.3	-0.5	4.2	8.0	-0.1	-0.3	-0.3	1.4	0.7	-1.0	3.5	0.8

Last killing frost in spring*

2020 _____ May 11 (31°F)
Ave. 1958-2020 _____ May 31

First killing frost in fall*

2020 _____ September 8 (31°F)
Ave. 1958-2020 _____ September 13

Frost free period

2019 _____ 120 days
Ave. 1958-2020 _____ 106 days

Maximum summer temperature _____ 94°F on August 18, 2020
Minimum winter temperature _____ -7°F on October 30, 2019

*In this summary 32° is considered a killing frost.

Summary of climatic data by months for the 2019-2020 crop year (September to August) and averages for the period 1916-2020 at the Northern Agricultural Research Center. Havre, Montana.

Month Year	Sep 2019	Oct 2019	Nov 2019	Dec 2019	Jan 2020	Feb 2020	Mar 2020	Apr 2020	May 2020	Jun 2020	Jul 2020	Aug 2020	Crop Year
<u>Precipitation (inches)</u>													
Current Year	2.37	0.16	1.43	0.20	0.25	0.18	0.34	0.56	1.58	2.69	0.72	0.04	10.52
Average (1916-2020)	1.18	0.68	0.45	0.45	0.43	0.35	0.54	1.00	1.84	2.55	1.42	1.17	12.05
Difference	1.19	-0.52	0.98	-0.25	-0.18	-0.17	-0.20	-0.44	-0.26	0.14	-0.70	-1.13	-1.53
<u>Mean Temperature (°F)</u>													
Current Year	57.4	35.6	28.4	24.3	19.3	28.5	29.9	38.3	53.5	63.2	68.0	71.0	43.1
Average (1916-2020)	56.3	45.5	30.2	19.6	15.8	19.8	30.0	43.5	53.9	61.9	69.2	67.4	42.8
Difference	1.1	-9.9	-1.8	4.7	3.5	8.7	-0.1	-5.2	-0.4	1.3	-1.2	3.6	0.3

Last killing frost in spring*

2020 _____ May 12th (29.2°)
Ave. 1916-2020 _____ May 13th

First killing frost in fall*

2020 _____ October 1st (31.6°)
Ave. 1916-2020 _____ September 20th

Frost free period

2020 _____ 142 days
Ave. 1916-2020 _____ 129 days

Growing degree days (base 50)

May 12-Oct. 1, 2020 _____ 2111.3
May 1-Sept. 30, 2020 _____ 2180.8
Ave. 1951-2020 (May 1-Sept. 30) _____ 2177.1

Maximum summer temperature _____ 99.4° F on August 18, 2020
Minimum winter temperature _____ -23.6° F on January 16, 2020

*In this summary 32° is considered a killing frost.

Summary of climatic data by months for the 2019-2020 crop year (October thru September) and averages for the period 1949-2020 at the Eastern Agricultural Research Center, Sidney, Montana, irrigated and dryland site.

Month Year	Oct 2019	Nov 2019	Dec 2019	Jan 2020	Feb 2020	Mar 2020	Apr 2020	May 2020	June 2020	July 2020	Aug 2020	Sept 2020
<u>Precipitation (inches)</u>												
Current Year-Irrigated	0.67	0.22	0.33	0.46	0.43	0.40	0.03	1.48	1.10	1.62	0.89	0.30
Avg. 1949 to 2020	0.91	0.49	0.44	0.40	0.36	0.54	1.13	2.15	2.71	2.08	1.46	1.38
Current Year-Dryland	0.63	0.22	0.33	0.46	0.43	0.40	0.02	1.60	1.05	1.78	0.91	0.33
Total												
										</		

Last killing frost in spring *

2020 May 11, 2020 (20.5°F)
 Avg. 1949 to 2020 May 15

First killing frost in fall *

2020 September 8, 2020 (28.0°F)
 Avg. 1949 to 2020 September 21

Frost-free period

2020 119
 Avg. 1949 to 2020 129

Growing degree days (base 50) **

May 1 - First killing frost 2077.3
 Avg. 1949 to 2020 2244.1

Maximum summer temperature August 18, 2020 (99.9°F)

Minimum winter temperature February 13, 2020 (-20.3°F)

* 32° is considered a killing frost. ** In calculating growing degree days, 29° is considered a killing frost.

NOTE: *Precipitation* derived from: NDAWN April - October & National Weather Service November - March. *Temperature:* NDAWN

Summary of climatic data for the 2020 crop year: September, 2019 – August 31, 2020

Northwestern Agricultural Research Center, Creston, Montana

Month Year	SEPT 2019	OCT 2019	NOV. 2019	DEC. 2019	JAN. 2020	FEB. 2020	MAR. 2020	APR. 2020	MAY 2020	JUNE 2020	JULY 2020	AUG. 2020	
Precipitation (in.)													Total
Current Year	2.5	1.12	0.9	0.48	1.59	0.61	0.1	1.53	3.44	5.39	1.22	0.41	19.29
Average (1980-2019)	1.39	1.23	1.28	1.74	2.33	3.33	1.47	1.04	1.58	1.41	1.59	1.48	19.85
Difference	1.11	-0.11	-0.38	-1.26	-0.74	-2.72	-1.37	0.49	1.86	3.98	-0.37	-1.07	-0.56
Mean Temperature (°F)													Average
Current Year	56.1	37.4	30.8	31.2	28.8	30.4	34.3	40.6	50.5	57.8	63.25	65.5	43.9
Average (1980-2019)	53.9	42.3	32.7	24.4	24.5	26.8	34.8	42.8	51.6	58.0	64.5	63.7	43.3
Difference	2.2	-4.9	-1.9	6.8	4.3	3.6	-0.5	-2.2	-1.1	-0.2	-1.2	1.8	0.6

Last killing frost in spring*

Spring, 2020: May 10 (31 °F)

Average (1980-2019): May 19 (31°F)

First killing frost in fall*

Fall, 2019: September 8 (28°F)

Average (1980-2019): September 19 (30 °F)

Frost-free period

2020: 121 days

Average (1980-2019): 123 days

Maximum summer temperature: 97°F (August 1st, 2020)

Minimum winter temperature: 1°F (January 16th, 2020)

Growing degree days (base 50)

May 1st – September 30th, 2020: 1750 GDD

Average (2017-2020): 1778 GDD

*32 °F is considered a killing frost

Summary of climatic data by months for the 2019-2020 crop year (September to August) and averages for the periods 1910-2020 (precipitation) and 1912-2020 (temperature) at the Central Agricultural Research Station, Moccasin, MT.

Month Year	Sep 2019	Oct 2019	Nov 2019	Dec 2019	Jan 2020	Feb 2020	Mar 2020	Apr 2020	May 2020	Jun 2020	Jul 2020	Aug 2020	Year
Precipitation (inches)													
Average (1910-2020)	1.45	0.92	0.57	0.53	0.53	0.46	0.7	1.22	2.64	3.08	1.64	1.58	15.32
Current Year	2.87	0.85	0.78	0.30	0.26	0.56	0.43	0.77	2.68	3.79	0.96	0.35	14.60
Difference	1.42	-0.07	0.21	-0.23	-0.27	0.10	-0.27	-0.45	0.04	0.71	-0.68	-1.23	-0.72
Temperature (°F)													
Average (1910-2020)	55.9	34.9	31.0	30.4	26.1	26.6	30.5	36.7	50.8	59.0	64.8	68.9	43.0
Current Year	54.9	44.8	32.9	25.0	21.9	24.5	30.6	40.8	50.1	57.9	65.9	65.0	42.9
Difference	1.0	-9.9	-1.9	5.4	4.2	2.1	-0.1	-4.1	0.7	1.1	-1.1	3.9	0.1
Average													

Summary of climatic data by months for the 2019-2020 cropping year (September-August) compared to averages for the period of record from 1911 to 2019 at the Southern Agricultural Research Center near Huntley, Montana.

	2019					2020								Year
	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug		
<u>Precipitation (inches)</u>													<u>Total</u>	
Current Year (2019-2020)	3.66	1.00	0.81	0.50	0.17	0.46	0.69	0.79	1.58	4.75	0.00	0.72	15.13	
Average (1911-2019)	1.33	1.10	0.63	0.61	0.55	0.47	0.80	1.37	2.21	2.34	1.12	0.97	13.50	
Difference	2.33	-0.10	0.18	-0.11	-0.38	-0.01	-1.1	-0.58	-0.63	2.41	-1.12	-0.25	1.63	
<u>Mean Temperature (°F)</u>													<u>Average</u>	
Current Year (2019-2020)	59.8	37.2	32.2	28.3	24.6	26.8	35.8	40.3	54.9	65.3	70.4	71.4	45.58	
Average (1911-2019)	58.2	46.9	33.7	23.9	21.1	25.8	34.4	45.5	55.0	63.5	70.9	68.8	45.64	
Difference	1.6	-9.7	-1.5	4.4	3.5	1.0	1.4	-5.2	-0.1	1.8	-0.5	2.6	-0.06	

Last Killing Frost in Spring^{1/}

2020 32 °F on May 9
Average (1911-2019) May 16

First Killing Frost in the Fall^{1/}

2020 31 °F on September 9
Average (1911-2019) September 19

Frost-free Period

2020 123 days
Average (1911-2019) 126 days

Growing Degree Days (Base 50)^{2/}

2020 2,028 GDD (°F)
Average (1911-2019) 2,036 GDD (°F)

Growing Degree Days (Base Corn)^{2/}

2020 1,970 GDD (°F)
Average (1911-2019) 1,954 GDD (°F)

Maximum Summer Temperature

102 °F on August 18, 2020

Minimum Winter Temperature

-22 °F on January 18, 2020

1/ 32 °F is considered a killing frost. Average last and first killing frost dates are calculated on a 50% probability of a minimum temperature occurring below the threshold temperature of 32.5 °F based on observations from 1911 to 2019.

2/ Growing degree days calculated from temperatures observed during the frost free period from May 10th through September 30th, 2020, and for the same 145-day interval from the period of record of 1911 to 2019.

Summary of climatic data by months for the 2019-2020 crop year (September to August) and averages for the period 1987-2020 at the Western Triangle Agricultural Research Center near Conrad, Montana.

Month Year	Sep 2019	Oct 2019	Nov 2019	Dec 2019	Jan 2020	Feb 2020	Mar 2020	Apr 2020	May 2020	Jun 2020	Jul 2020	Aug 2020	Year
<u>Precipitation (inches)</u>													<u>Total</u>
Current Year	2.72	0.80	2.66	0.19	0.06	0.37	0.85	0.80	2.66	3.84	0.56	0.49	16.00
34-year Average	1.27	0.68	0.37	0.22	0.28	0.23	0.42	1.07	1.88	2.84	1.31	1.19	11.78
difference	1.45	0.12	2.29	-0.03	-0.22	0.14	0.43	-0.27	0.78	1.00	-0.75	-0.70	4.22
<u>Mean Temperature (°F)</u>													<u>Average</u>
Current Year	55.5	34.8	28.3	26.8	22.4	28.4	31.0	41.4	51.9	60.7	66.5	67.9	43.0
34-year Average	56.6	44.2	31.9	23.7	23.1	23.6	32.4	42.4	51.6	59.4	66.8	65.9	43.6
difference	-1.1	-9.4	-3.6	3.1	-0.7	4.8	-1.4	-1.0	0.3	1.3	-0.3	2.0	-0.6

Last killing frost in spring*

2020 _____ May 5 (29°)
Ave. 1986-2020 _____ May 17

First killing frost in fall*^{1/}

2020 _____ September 8 (31°)
Ave. 1986-2020 _____ September 25

Frost free period^{1/}

2019 _____ 142 days
Ave. 1990-2019 _____ 136 days

Maximum summer temperature _____ 95°F on Aug 17, 2020

Minimum winter temperature _____ -15°F on Jan 15, 2020

*In this summary 32° is considered a killing frost.

Summary of climatic data by months for the 2019-2020 crop year (September to August) and averages for the period 1990-2020 at the Williston Research and Extension Center near Williston, North Dakota.

Month Year	Sep 2019	Oct 2019	Nov ^{1/} 2019	Dec 2019	Jan 2020	Feb 2020	Mar 2020	Apr 2020	May 2020	Jun 2020	Jul 2020	Aug 2020	Year
<u>Precipitation (inches)</u>													
Current Year	5.94	0.64	0.84	0.20	0.53	0.15	0.14	0.13	0.86	1.37	2.10	0.45	13.35
Average (1990-2020)	1.43	0.93	0.53	0.37	0.39	0.35	0.46	1.06	2.12	2.71	2.55	1.62	14.51
difference	4.51	-0.29	0.31	-0.17	0.14	-0.20	-0.32	-0.93	-1.26	-1.34	-0.45	-1.17	-1.16
<u>Mean Temperature (°F)</u>													
Current Year	60.0	40.1	30.0	21.0	16.3	23.7	34.2	39.8	55.0	66.0	71.6	72.4	44.2
Average (1990-2020)	61.0	46.5	30.5	18.5	14.9	19.2	31.7	44.9	56.1	65.2	71.6	70.9	44.2
difference	-1.0	-6.4	-0.5	2.5	1.4	4.5	2.5	-5.1	-1.1	0.8	0.0	1.5	0.0

Last killing frost in spring*

2020 _____ May 13 (28°F)
Ave. 1990-2020 _____ May 12

First killing frost in fall

2020 _____ September 9 (26°F)
Ave. 1990-2020 _____ September 25

Frost free period

2020 _____ 118 days
Ave. 1990-2020 _____ 135 days

Maximum summer temperature _____ 102°F on Aug 18, 2020

Minimum winter temperature _____ -23°F on January 16, 2020

*In this summary 32° is considered a killing frost.

1/ = no data, in NOAA, for November 1 - 8 of 2019

Summary of climatic data by months for the 2019-2020 crop year (September to August) and averages for the period 2008-2020 at Fort Benton, representing the Northern Seeds plot site at Carter, MT.

Month Year	Sep 2019	Oct 2019	Nov 2019	Dec 2019	Jan 2020	Feb 2020	Mar 2020	Apr 2020	May 2020	Jun 2020	Jul 2020	Aug 2020	Year
<u>Precipitation (inches)</u>													
Current Year	2.22	0.83	1.37	0.48	0.12	0.06	0.18	0.43	1.19	1.19	0.11	0.54	8.72
Average (2008-2020)	1.41	0.85	0.67	0.76	0.66	0.51	0.45	1.50	2.03	2.02	1.10	1.11	13.01
difference	0.81	-0.02	0.70	-0.28	-0.54	-0.45	-0.27	-1.07	-0.84	-0.83	-0.99	-0.57	-4.29
<u>Mean Temperature (°F)</u>													
Current Year	59.0	39.6	31.2	28.6	23.4	31.5	32.8	39.8	54.8	63.5	68.3	70.7	45.3
Average (2008-2020)	58.6	45.2	33.8	22.3	22.8	22.6	33.6	44.1	53.6	62.4	70.2	68.9	44.8
difference	0.4	-5.6	-2.6	6.3	0.6	8.9	-0.8	-4.3	1.2	1.1	-1.9	1.8	0.5

Maximum summer temperature _____ 102°F on August 18, 2020
Minimum winter temperature _____ -13°F on January 18, 2020

2019-2020 Intrastate Winter Wheat Nurseries: Crop Information

	Bozeman	Havre	Sidney (2)	Williston	Kalispell	Moccasin	Huntley	Conrad	Ft. Benton/ Carter (3)
Location:									
Latitude, N.	45° 41'	48° 29'	47° 40'	48° 08'	48° 40'	47° 03'	45° 55'	48° 18.4'	47° 47'
Longitude, W.	111° 00'	109° 48'	104° 08'	103° 44'	114° 15'	109° 57'	108° 15'	111° 55.5'	110° 58'
Elevation (ft)	4772	2689	2200	2105	2890	4300	3200	3700	3000
Precipitation (in)									
Average moisture (1)	15.90	12.05	14.05	14.51	19.85	15.32	13.50	11.78	13.01
This year's moisture (1)	14.79	10.52	8.16	13.35	19.29	14.60	15.13	16.00	8.72
October 2019 - July 2020	10.62	8.11	7.20	6.39	16.38	11.38	10.75	12.79	5.96
Previous Crop:									
2017	fallow	fallow	wheat	soybeans	pulses, faba (plots)	lentils	ch. fallow	ch. fallow	wheat
2018	barley	spr. wheat	peas	wheat	spring wheat	Proso millet	ch. fallow	barley	ch. fallow
2019	fallow	fallow	fallow	soybeans	canola	lentil cover crop	ch. fallow	ch. fallow	ch. fallow
Soil Type:									
Series	Amsterdam	Telstad	Williams	Williams-Bowbells	Creston	Judith	Ft. Collins/ Thurflow	Scobey	Scobey
Texture (4)	SiL	CL	CL	L	SiL	CL	CL	CL	CL
Fertilization (lb/ac)									
Available N/P/K									
Nitrogen (lb)	84	89 lb/ac	77.8 lb/ac	12 lb/a	60	N/A	86	na	
Phosphorus (mg/kg, ppm)	18	23 ppm	26 ppm P2O5	35 ppm	6	N/A	20		
Potassium (mg/kg, ppm)	268	435 ppm		277 ppm	130	N/A	701		
Applied N-P-K-S - at seeding	210-22-0-4	125-20-10-10	72 lbs N	49.2-20-0-0.5S	13.5-45-80-11.25 S-1.13 Zn	50 lbs/ac 20-30-20-10			14-0-5-5
- spring		46-0-0			100-0-0	120 lbs/ac 44:0:0	250-0-0		92-0-0
Planting Date	16-Oct-19	25-Sep-19	25-Sep-19	24-Sep-19	24-Sep-19	27-Sep-19	27-Sep-19	19-Oct-19	17-Oct-19
Harvest Date	18-Aug-20	31-Jul-20	28-Jul-20	23-Jul-20	11-Aug-20	7-Aug-20	28-Jul-20	28-Jul-20	5-Aug-20

(1) September - August moisture

(2) October - September moisture

(4) C = clay, L = loam, Sa = Sand, Si = silt

(3) site at Carter, precipitation from Ft Benton
na = information not available

2020 Montana Intrastate Winter Wheat Test: List of Varieties and Lines

Variety	Experimental Designation	Origin	Release Year	Pedigree
Public Varieties				
AAC Wildfire	W512	Alberta/ SECAN	2015	((Norstar*5/PGR16635, AMN4LV) /6/ (RWA53, PI294994/3/ I3C//Norwin/ Blizzard/4/2*AC Readymade /5/ Norstar*5/PGR16635// 2*Redwin/3/ AC Readymade) /7/ (A7257W-71-2-1/ A77695W, ID337-R1)// CDC Kestrel, <u>L99-1236</u> /8/ <u>AC Bellatrix</u>
Bobcat	MTS1588	Montana	2019	selection from a composite of 2 crosses: 07X291, ((SMN82164/ SMN82140//Rocky/Tiber, MT9659)/3/S87-101/4/Pronghorn, <u>MT0598</u>)/5/(98X366E29-1, Heyne/Rampart//((MT9513, BigSky sib)) and 07X295, (((Lew/Tiber//Redwin ,MTS92021)/3/Judith/Arapahoe, MTS0023)/4/Pryor/ Genou, <u>01X258C1</u>)/5/ <u>MT0598</u>
Brawl CL Plus	CO06052	Colorado: Plainsgold/ Colorado Research Foundation	2011	Teal 11A/Above//((CO99314, TX91V4931/ Halt)
Byrd CL Plus	CO13003C	Colorado: Plainsgold/ Colorado Research Foundation	2018	CO06072/4*Byrd (Als1, Als2)
Flathead	MT1564	Montana	2019	selection from a composite of 2 crosses: 07X76, <u>Yellowstone*2/5/ (PI640431</u> , BC4F4 line derived from WA007900*5/4/WA007900// Yr5/6*Avocet/3/ WA007900//Yr15/ 6*Avocet) and 07X77, <u>Yellowstone/PI640431/4/(Yellowstone(340,233), Yellowstone*5/3/ (Yellowstone sib, MT9982) //(MTS0222, Rampart*2/Judith))</u>
FourOsix	MT1465	Montana	2018	selection from a composite of 5 crosses: 06X272, Yellowstone/ (MT0684, a composite - see pedigree); 06X276, Yellowstone/ (MT06102, , a composite - see pedigree); 06X278, Yellowstone/7/ (MT06110, (Arapahoe/3/Brule//Hiplains/ Newton, SD93528)/6/ (MT9409, Tiber/5/ (TAM W-103/Froid/4/Yogo//Turkey Red/ Oro/3/Centurk, MT8030))); 06X282, Yellowstone/3/(MT06123, '2174'/(MT9440, BigSky sib)//BigSky); and 06X285, Yellowstone/7/ (98X168E1, (Nuwest/4/ (MT88001, Sawmont/Tendoy /3/Yogo// Norin 10/Brevor) /5/(MT7863, Froid/Winoka/ Centurk), MTS9720)/6/(PI 191303, Alba = Belgian variety)/Elkhorn);
Incline AX	CO14A065	Colorado: Plainsgold/ Colorado Research Foundation	2017	(AF28/Byrd)//(AF10/2*Byrd)
Judee	MTS0713	Montana	2011	(Vanguard/Norstar//Judith dwf, 93X312E14)/3/ NuHorizon
Langin	CO11D446	Colorado: Plainsgold/ Colorado Research Foundation	2016	(Hatcher/(NW97S295, Antelope sib), CO050270)// Byrd
Loma	MTS1224	Montana	2016	<u>Yellowstone/5/((Lew/Tiber//Redwin, MTS92045)/3/2*Erhardt, MTS0112)/4/(MTS0125, selection from a composite of 4 crosses)</u>
Northern	MT0978	Montana	2015	selection from a composite of 2 crosses: 00X248, (Yellowstone sib, MT9982)/4/((MT8709, Erhardt sib)/NuWest//Erhardt, MTW0072)/3/ (NW97S151, KSSB0192-3/NE89529) and 00X249, (Judith/(PI262605, Karagach, RWA resis.)/3/(S86-740, Norstar/Plainsman V //Ulianovka) ,MTW0047)/4/MTW0072/NW97S151

2020 Montana Intrastate Winter Wheat Test: List of Varieties and Lines

Variety	Experimental Designation	Origin	Release Year	Pedigree
Warhorse	MTS0808	Montana	2013	selection from a composite of 3 crosses: 00X182, ((Froid/Winoka/7/ ((Sinvaloch/Wichita// Hope/Cheyenne /3/Wichita/4/Seu Seun 27, TX55-391-56-D8)/5/Westmont, MT6928)/6/ Trader, MT85200)/8/ Redwin, MT9908)/9/ Nuplains/6/(MTS9862, (NuWest/ Lovrin 24 /4/((Rego/Cheyenne, Sel. 39-18-7)// Winalta, MT7431)/3/(MT7115, Yogo/T. polonicum-70-5), MT91366)/5/ (MTS92137, Lew/Tiber//Redwin)); 00X183, Nuplains/MTS9862/4/ (MTW0047, Judith/(PI262605, Karagach, RWA resis.)/3/(S86-740, Norstar/ Plainsman V //Ulianovka)); and 00X184, Nuplains/MTS9862/5/(MTS0028, Vanguard/4/(Lew/Tiber//Redwin, MTSF1570)/3/ Norstar)
Yellowstone	MT00159	Montana	2005	F ₂ composite of Promontory/Judith and Judith-dwarf/Promontory

Private Varieties

CP7909		Winfield Solutions, LLC, Arden Hills, MN	2018	na
Keldin	ACS55017	Peter Franck: Seed-Link Inc.; Ontario, Canada, Westbred LLC	2011	Barenburg 235/Carlisle//TRX-A16-3-2
LCS Helix AX	LCS15ACC-8-21	Limagrains LLC	2020	na
LCS Jet	NSA10-7208	Limagrains Europe s.a.	2015	Apache/Autan
LCS Photon AX	LCH15ACC-13-4	Limagrains LLC	2018	(AF28/Byrd)//(AF10/2*Byrd)
Long Branch	LCH12-012, HRX1652	Limagrains; Dyna-Gro Wheat	2015	T154 / T158
Mpress (SWW)	09PN066#36, 122006W	Syngenta Participations AG; McGregor Seed Co.	2017	SY Ovation / AP Badger
StandClear CLP	MTCS1601	Montana/ Loveland Products Inc; Loveland, CO	2020	((L'Govskaya 167/Rampart/6/(MT9409, Tiber/5/ (MT8030, TAM W-103/Froid /4/Yogo//Turkey Red /Oro/3/Centurk)) ,MTS0531) /13/ (MTS0532, same pedigree as MTS0531) /12/ (Morgan/5/ (88X24D247-?, (Wasatch/Yogo//Rescue/3/Tendoy, Sel. 251, MT88006)/4/Judith)), 96X17E69) /9/((Tiber/5/(MT8030, TAM W-103/Froid /4/Yogo//Turkey Red /Oro/3/Centurk), MT9409)*2/6/IMI Fidel, MTCL0309)/7/CDC Teal 11A/8/(MTW01143, Promontory/5/ (MT91366, NuWest/ Lovrin 24 /4/((Rego/ Cheyenne, Sel. 39-18-7)//Winalta, MT7431)/3/NuWest)) /10/(MTCL0510, Rampart*3/Fidel/6/ (MTS9720, Nuwest/4/(MT88001, Sawmont/Tendoy /3/Yogo//Norin 10/Brevor)/5/(MT7863, Froid/Winoka/Centurk))) /11/ (MTS0531, see above)
SY 517 CL2	07CL039-7	Syngenta	2017	(BC950811-2-6 / BC98343-09-7, 03B212#4) // (CL03040-6-1, iW98-362A1 (imiJagalene, Als3) / AP502CL (Als1) /3/ Art
SY Clearstone 2CL	MTCL1077	Syngenta, Montana	2012	Yellowstone*4/3/MTCL01158/CDC Teal 11A//Jagalene
SY Legend CL2	07CL046-2	Syngenta	2018	(BC950811-2-6 / BC98343-09-7 /3/ (CL03040-24-1, iW98-362A1 (imiJagalene, Als3) / AP502CL (Als1)), 06CL028) /4/ Jagalene
SY Monument	04BC574-2	Syngenta	2014	(KS89180B-2-1-1/CM75113, F1/X920750-A-11-2, BC991149-11)/3/(00x0090-4, W95091/W98-183
SY Wolverine	08BC379-40-1	Syngenta	2019	Everest / Platte // SY Wolf
WB4269	H4N12-0038	WestBred-Monsanto:	2017	KS98W0512-2-4 // HV9W02-846R / HV9W96-1271R-1
WB4311	XA4104	WestBred-Monsanto:	2017	ACS 51016 / Harvard
WB4418	XA4402	WestBred-Monsanto:	2018	TUKURU-S-3 /3/ KS920750-A-13-1 // KS89180B-2-1-1 / CMBW91M02959T /4/ TX92U3060 / TX91D6564

2020 Montana Intrastate Winter Wheat Test: List of Varieties and Lines

Variety	Experimental Designation	Origin	Release Year	Pedigree
WB4792	XB4711	Bayer: WestBred-Monsanto:	2019	na

Public Elite Lines

	MT1642			Yellowstone/Madsen//Yellowstone
	MT1683			selection from a composite of 2 crosses: 08X243, Yellowstone(L)*2/CDC Buteo and 08X245, same pedigree
	MTCL1732			(NuFrontier-2CL line, AP035-8-1)/11/ ((Yellowstone sib, MT9982)*2/9/(MT9904, (Froid/Winoka/7/((Sinvalocho/Wichita//Hope/ Cheyenne/3/ Wichita/4/Seu Seun 27, TX55-391-56-D8)/5/Westmont, MT6928) /6/Trader, MT85200)/8/Tiber), MT08134) /10/Yellowstone*4 /4/ (IMI-Fidel/ Tiber, MTCL01158)//CDC Teal 11A/3/ Jagalene
	MTCL1737			Yellowstone-2CL /3/ Yellowstone*2 /Pelsart// Promontory/ 3*Yellowstone
	MT1745			Decade*2/3/(NI06732, HBK0630-4-5// (NE98632, Niobrara/NE91525)
	MT1746			selection from a composite of 2 crosses: 09X135, (selection from a composite of 2 crosses, see pedigree, MT06103)/3/ (selection from a composite of 2 crosses, see pedigree, MTW0881)//(SD06W166, Wendy*2/CDC Falcon) and 09X136, (same pedigree as MTW0881, MTW0880)// MTW0881/SD06W166
	MT1787			selection from a composite of 2 crosses: 09X257, MT08185/YLL*2/PI640431 /3/PROM/ 3*YLL/YLL*2/Pelsart and 09X258, MT08185/YLL*2/PI640431/3/ YLL*2/ Pelsart//PROM/3*YLL
	MT1793			Decade/WesleyFHB1-106BC2F4-10
	MTS1810			((Yellowstone loppo plant seln, MT08189) /8/ (Yellowstone loppo plant seln, MT08188)/7/ (MT0419-1, Erhardt/5/ (KS92H21-4, (Plainsman IV/ Cheney// Odessa/ 2*Eagle/3/ Pawnee / DURM, KS82H238-1)/4/ HF5761/ TAM 105/Bounty 203)/6/ Pronghorn)), 08X350-A6) /9/ Warhorse
	MTS1831			selection from a composite of 2 crosses: 09X203, (selection from a composite of 2 crosses, see pedigree , MTS0907/ (MTS0827, selection from a composite of 2 crosses, see pedigree) and 09X211, (selection from a composite of 2 crosses, see pedigree , MTS0916)/MTS0827
	MT1845			Yellowstone // (493-22, Reeder/6*Paul)
	MT1848			Northern// (Yellowstone (Low PPO) plant seln, MT08184) / (MT0887, selection from a composite of 4 crosses, see pedigree)
	MT1855			selection from a composite of 2 crosses: 10X199, (05X438-aC71, (Erhardt //Judith / CDC Kestrel, MT0097)*2 /3/ Jagalene / Choteau) /4/ Roughrider and 10X200, (05X438-aB30-2, (Erhardt //Judith / CDC Kestrel, MT0097)*2 /3/ Jagalene / Choteau) /4/ (MT0890, selection from a composite of 2 crosses, see pedigree)
	MT1866			selection from a composite of 2 crosses: 09X63, ((MT8709, Erhardt sib)/ NuWest// Erhardt, MT0071)/10/ (Wesley sib, N95L1229)/9/ (MT9834, (Froid/ Winoka/7/ ((Sinvalocho/ Wichita// Hope/ Cheyenne/3/ Wichita/4/ Seu Seun 27, TX55-391-56-D8)/5/ Westmont, MT6928)/6/ Trader, MT85200) /8/ Tiber), MT0859)/11/ (selection from a composite of 2 crosses, see pedigree, 00X83cE45)/3/ (MT0698, PI592496// (MT9523, NuWest/Tiber)) and 09X65, MT0859// (Yellowstone (Low PPO) plant seln, MT08188)/ MT0698
	MT1867			selection from a composite of 2 crosses: 09X63, ((MT8709, Erhardt sib)/ NuWest// Erhardt, MT0071)/10/ (Wesley sib, N95L1229)/9/ (MT9834, (Froid/ Winoka/7/ ((Sinvalocho/ Wichita// Hope/ Cheyenne/3/ Wichita/4/ Seu Seun 27, TX55-391-56-D8)/5/ Westmont, MT6928)/6/ Trader, MT85200) /8/ Tiber), MT0859)/11/ (selection from a composite of 2 crosses, see pedigree, 00X83cE45)/3/ (MT0698, PI592496// (MT9523, NuWest/Tiber)) and 09X65, MT0859// (Yellowstone (Low PPO) plant seln, MT08188)/ MT0698

2020 Montana Intrastate Winter Wheat Test: List of Varieties and Lines

Variety	Experimental Designation	Origin	Release Year	Pedigree
	MT1872			selection from a composite of x crosses: 09X83, (((MT8709, Erhardt sib)/ NuWest// Erhardt, MT0071) /10/ (Wesley sib, N95L1229) /9/ (MT9834, (Froid/ Winoka/7/ ((Sinvalocho/ Wichita// Hope/ Cheyenne/3/ Wichita/4/ Seu Seun 27, TX55-391-56-D8)/5/ Westmont, MT6928)/6/ Trader, MT85200) /8/ Tiber), <u>MT0859</u> /11/ ((Judith/(PI262605, Karagach, RWA resis.)/3/(S86-740, Norstar/Plainsman V //Ulianovka), MTW0047)/4/(G97019, G33/Tomahawk//Karl 92), <u>MT0840</u> /5/ (<u>MT0873</u> , selection from a composite of 2 crosses, see pedigree) and 09X84, MT0859*2 / (MT0872, selection from a composite of 2 crosses, see pedigree)
	MTS18116			Loma*2/Warhorse
	MTS18149			Loma*2/AAC Gateway

Private Elite Lines

	LCS-18-7071	Limagrain LLC		na

Table 1. 2020 Intrastate Winter Wheat Test : Statewide Summary

Cultivar/Line		Pedigree	Yield bu/ac	Test weight lb/bu	Winter survival %	Heading date Julian	Plant height in	Stem solidness (5-25)	Sawfly cutting %	Protein %
d = cultivars/lines dropped for 2021 test + = new for 2020, # = paid entry										
Locations			9	9	2	6	7	4	2	9
#	AAC Wildfire	Alberta/SECAN, 2015	81.2	61.3	80	167.1	30.6		33	12.7
	Bobcat	Montana, 2019	77.5	62.4	68	164.6	27.6	23.7	10	12.7
	Brawl CL Plus	Plainsgold/Colorado Wheat Res F	68.7	63.4	78	157.4	27.8		20	13.5
#	Byrd CL Plus	Plainsgold/Col. Wheat Res Fdn, 2	85.3	62.3	84	159.9	30.3		26	11.5
##+	CP7909	Winfield United (Croplan), 2018	63.4	62.4	65	156.0	26.1		37	12.4
	Flathead	Montana, 2019	76.0	62.5	85	158.5	29.0		24	12.7
	FourOsix	Montana, 2018	81.2	62.3	82	162.4	28.4		46	12.5
# d	Incline AX	Plainsgold/Colorado Wheat Res F	77.3	61.3	70	163.0	28.7		21	11.5
	Judee	Montana, 2011	75.1	63.3	79	163.9	29.5	19.9	18	13.4
	Keldin	WestBred, 2011	82.7	62.5	70	163.9	29.0		41	12.5
#r d	Langin	Plainsgold/Colorado Wheat Res F	76.1	61.9	62	157.9	26.9		38	11.6
#	LCS 18-7071	Limagrain Cereal Seeds exp. line	78.5	62.1	53	164.2	29.7		37	11.6
##+	LCS Helix AX	Limagrain Cereal Seeds, 2020	75.8	63.1	79	158.5	27.6		22	12.1
##+ d	LCS Jet	Limagrain Cereal Seeds, 2015	81.6	59.9	75	163.9	25.2		39	12.3
##+ d	LCS Photon AX	Limagrain Cereal Seeds, 2019	65.3	63.9	64	159.2	28.9		40	13.3
	Loma	Montana, 2016	81.3	61.6	80	166.5	28.0	20.8	24	12.9
# d	Long Branch	Limagrain; Dyna-Gro Wheat, 2016	75.5	62.3	77	157.8	27.8		24	12.1
##+ d	Mpress (SWW)	McGregor Co./Syngenta Participat	85.5	60.2	77	166.3	28.4		33	11.3
d	MT1642	Yellowstone/Madsen//Yellowstone	83.8	61.6	92	163.8	31.1		30	12.8
d	MT1683	Yellowstone(L)*2/CDC Buteo	81.8	61.5	81	164.0	31.2		32	12.9
	MT1745	Decade*2/NI06732	80.2	62.4	77	164.5	29.3		24	12.1
d	MT1746	MT06103//MTW0881/SD06W166	74.0	63.2	69	162.9	27.2		23	12.5
d	MT1787	MT08185//YLL*2/PI640431/3/PRO	75.8	62.1	85	163.8	26.9		27	12.7
d	MT1793	Decade-Fhb1	72.7	62.2	91	160.1	28.0		19	13.7
+ d	MT1845	Yellowstone/493-22(Reeder/6*Pau	77.1	61.8	81	161.9	28.8		21	13.0
+ d	MT1848	Northern//MT08184/MT0887	80.5	61.5	82	165.2	28.5		21	13.4
+ d	MT1855	05X438-aC71(MT0097*2//Jagalen	80.8	62.4	76	165.7	27.9		34	12.9
+ d	MT1866	MT0859//00X83cE45/MT0698	76.9	61.8	82	163.7	27.1		26	12.7
+ d	MT1867	MT0859//00X83cE45/MT0698	79.2	62.0	69	162.6	28.6		36	12.1
+ d	MT1872	MT0859//MT0840/MT0873	79.4	62.9	72	163.5	28.4		18	12.5
d	MTCL1732	AP035-8-1/5/MT08134/4/YLL*4/3/I	81.0	61.3	81	163.6	28.1		10	12.3
	MTCL1737	YLL-2CL/3/YLL*2/Pelsart//PROM/	81.4	61.2	76	166.0	26.7		24	12.7
+ d	MTS1810	08X350-A6/Warhorse	77.7	63.2	75	166.2	29.1	24.3	3	13.4
+ d	MTS18116	Loma*2/Warhorse	81.3	62.9	74	166.3	26.8	23.1	7	11.9
+ d	MTS18149	Loma*2/AAC Gateway	80.4	61.3	72	166.5	27.1	21.5	18	13.1
+ d	MTS1831	MTS0907/MTS0827	79.7	62.8	77	167.3	26.8	23.3	7	11.9
	Northern	Montana, 2015	85.7	62.0	83	164.6	30.0		18	13.1
	StandClear CLP	Montana/Loveland Products Inc., 2	78.4	62.7	83	163.9	29.4	21.5	35	13.0
#	SY 517 CL2	Syngenta (AgriPro), 2017	61.7	63.4	60	158.2	26.3		26	13.8
	SY Clearstone 2CL	Montana/Syngenta, 2012	80.9	61.4	83	164.5	31.5		38	12.6
# d	SY Legend CL2	Syngenta, 2018	71.1	62.4	74	160.0	28.1		31	13.0
# d	SY Monument	Syngenta (AgriPro), 2014	72.8	61.4	74	161.5	27.3		32	11.9
#	SY Wolverine	Syngenta 2019	71.6	62.6	70	158.3	26.3		32	12.6
	Warhorse	Montana, 2013	72.3	61.6	79	164.0	28.6	22.3	19	13.2
# d	WB4269	WestBred, 2017	70.1	62.5	79	158.7	25.8		13	12.3
# d	WB4311	WestBred, 2017	72.0	62.5	68	160.7	26.1		32	13.1
#	WB4418	WestBred, 2018	73.4	61.8	76	159.1	26.6		20	12.2
##+	WB4792	WestBred, 2019	81.2	63.6	79	163.1	28.7		21	11.6
	Yellowstone	Montana 2005	80.0	61.6	76	164.4	31.0	7.1	35	12.6
Average			77.2	62.2	75.9	162.6	28.2	20.7	25.8	12.6
LSD (0.05)			5.2	0.7	15.7	1.1	1.1	1.2	16.4	0.5
C. V. (%)			7.3	1.2	10.3	0.6	3.7	5.8	31.6	4.6

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 2. 2020 Intrastate Winter Wheat Test (Exp. 3501): Bozeman

Entry	Cultivar/Line	Pedigree	Yield bu/ac	Test weight lb/bu	Stand % 5-May	Early solid	Heading date Julian	Maturity date Julian	Days to maturity	Plant height in	Protein %
		d = cultivars/lines dropped for 2021 test + = new for 2020, # = paid entry	RCB	LAT	LAT	RCB	LAT	RCB	LAT	RCB	Bulk
		lattice efficiency relative to RCB	92%	143%	105%	93%	107%	100%	112%	103%	
9	FourOsix	Montana, 2018	104.0	63.0	100	7.8	169.6	211.0	41.1	30.8	13.2
4	Keldin	WestBred, 2011	100.1	62.9	93	8.3	172.8	211.0	38.2	31.2	13.8
7	Northern	Montana, 2015	100.0	62.5	95	10.0	172.1	211.3	39.0	33.3	12.8
46 +	MT1855	05X438-aC71(MT0097*2//Jagalen	99.6	62.9	99	20.6	174.0	212.0	37.9	30.6	13.0
29 #+ d	Mpress (SWW)	McGregor Co./Syngenta Participat	97.9	59.4	98	12.5	174.8	212.0	37.4	29.7	12.0
42 +	MTS18116	Loma*2/Warhorse	96.5	63.5	95	18.3	174.2	213.0	38.8	29.8	12.3
8	Loma	Montana, 2016	96.5	61.5	100	19.7	173.9	213.3	39.1	30.6	13.5
20 #	LCS Jet	Limagrain Cereal Seeds, 2015	95.6	59.6	98	10.3	171.3	211.3	39.9	27.0	13.0
49 +	MT1872	MT0859//MT0840/MT0873	94.8	63.4	99	10.1	171.1	209.3	38.5	31.1	13.6
45 + d	MT1848	Northern//MT08184/MT0887	94.5	62.1	98	9.4	173.9	212.7	38.7	32.0	14.0
48 + d	MT1867	MT0859//00X83cE45/MT0698	94.0	63.2	95	8.2	172.0	211.0	38.9	30.2	12.9
25 #	Incline AX	Plainsgold/Colorado Wheat Res F	94.0	61.6	100	8.3	168.5	211.3	42.8	31.6	12.2
28 #	AAC Wildfire	Alberta/SECAN, 2015	93.8	61.9	99	10.0	175.9	213.3	37.3	34.5	13.5
32	MT1642	Yellowstone/Madsen//Yellowstone	93.7	61.9	98	7.3	173.7	210.7	36.9	33.3	13.4
41 +	MTS1831	MTS0907/MTS0827	93.5	62.7	100	19.2	174.5	213.0	38.7	28.6	12.4
27 #	Byrd CL Plus	Plainsgold/Col. Wheat Res Fdn, 2	93.3	63.3	100	6.6	165.1	206.0	40.8	32.7	12.7
22 #+	LCS 18-7071	Limagrain Cereal Seeds exp. line	93.3	62.9	89	10.0	172.1	212.0	40.2	32.2	11.6
43 +	MTS18149	Loma*2/AAC Gateway	93.1	61.6	87	19.2	174.9	213.7	38.5	28.5	13.4
44 + d	MT1845	Yellowstone/493-22(Reeder/6*Pal	93.1	62.9	96	8.1	169.2	210.3	41.0	29.9	14.1
34	MT1745	Decade*2/NI06732	92.9	63.6	97	7.3	173.2	211.0	37.8	31.5	12.6
2	Yellowstone	Montana 2005	92.9	61.5	99	7.2	173.3	211.3	38.1	33.6	13.3
39	MTCL1737	YLL-2CL/3/YLL*2/Pelsart//PROM/	92.7	61.0	87	8.9	174.8	213.3	38.2	29.4	13.0
3	Judee	Montana, 2011	92.2	63.3	99	14.5	171.4	210.7	39.2	33.1	14.1
6	SY Clearstone 2CL	Montana/Syngenta, 2012	92.1	61.7	100	8.5	173.5	210.3	36.7	34.9	13.4
33	MT1683	Yellowstone(L)*2/CDC Buteo	92.1	61.8	100	7.9	172.6	211.0	38.7	33.9	13.5
47 + d	MT1866	MT0859//00X83cE45/MT0698	91.1	62.0	94	11.9	172.2	209.7	37.2	29.0	13.7
11	Bobcat	Montana, 2019	90.5	62.7	96	21.6	172.6	212.0	39.3	29.7	12.9
36	MT1787	MT08185//YLL*2/PI640431/3/PRC	89.9	62.6	97	11.4	171.5	211.3	39.9	27.7	13.2
19 #+	WB4792	WestBred, 2019	89.6	64.1	77	11.3	170.3	211.0	40.7	30.6	12.3
31	StandClear CLP	Montana/Loveland Products Inc., 2	89.5	63.7	100	17.5	171.6	208.3	36.6	32.2	13.8
35	MT1746	MT06103//MTW0881/SD06W166	89.4	64.3	95	10.1	169.1	210.7	41.6	28.7	13.6
26 #r d	Langin	Plainsgold/Colorado Wheat Res F	89.2	62.6	93	8.1	163.7	206.7	43.2	28.9	12.7
37	MT1793	Decade-Fhb1	87.5	62.9	83	11.0	166.1	208.7	42.5	31.4	14.9
40 + d	MTS1810	08X350-A6/Warhorse	87.3	63.8	99	19.4	175.0	213.0	38.4	31.6	13.7
24 #	Long Branch	Limagrain; Dyna-Gro Wheat, 2016	86.4	63.2	96	7.7	164.5	205.0	40.6	29.8	13.4
38	MTCL1732	AP035-8-1/5/MT08134/4/YLL*4/3/	85.3	61.4	99	7.5	172.7	211.7	39.0	30.4	13.1
12 #	SY Monument	Syngenta (AgriPro), 2014	84.2	61.9	96	13.4	168.3	209.3	41.1	28.9	12.8
10	Flathead	Montana, 2019	80.6	62.9	100	13.4	165.2	205.7	40.5	30.2	14.0
17 #	WB4311	WestBred, 2017	80.6	62.7	99	7.6	164.8	209.0	44.4	26.5	14.9
23 #+ d	LCS Helix AX	Limagrain Cereal Seeds, 2020	80.4	63.8	99	8.5	164.4	204.7	40.5	29.9	13.9
15 #	SY Wolverine	Syngenta 2019	79.8	62.9	98	8.1	164.4	206.7	42.3	27.6	13.9
21 #+	LCS Photon AX	Limagrain Cereal Seeds, 2019	75.7	64.2	96	10.1	165.3	206.3	41.2	32.0	14.2
14 #	SY Legend CL2	Syngenta, 2018	74.8	63.1	94	7.8	168.1	208.0	39.7	29.9	13.6
30 #+	CP 7909	Winfield United (Croplan), 2018	74.4	62.7	86	10.8	163.1	206.0	42.8	26.5	13.5
5	Brawl CL Plus	Plainsgold/Colorado Wheat Res F	73.8	63.7	98	5.6	163.7	203.7	40.0	29.4	15.3
1	Warhorse	Montana, 2013	73.8	61.3	99	22.5	171.6	208.0	36.3	31.5	14.5
18 #	WB4418	WestBred, 2018	73.7	62.5	90	7.2	165.1	208.0	43.1	27.4	13.0
16 #	WB4269	WestBred, 2017	73.5	63.0	100	10.3	164.6	204.0	39.5	27.2	13.8
13 #	SY 517 CL2	Syngenta (AgriPro), 2017	61.5	63.6	88	6.2	164.7	206.0	41.4	27.3	15.7
	Average		88.5	62.6	94.0	11.2	170.1	209.8	39.7	30.4	13.4
	LSD (0.05)		8.2	0.8	ns	3.6	1.6	1.8	2.1	1.5	
	C. V. (%)		5.7	0.7	8.7	20.0	0.6	0.5	3.6	3.0	
	P-value (Varieties)		<.0001	<.0001	0.3384	<.0001	<.0001	<.0001	<.0001	<.0001	

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 3. 2020 Intrastate Winter Wheat Test (Exp. 3502): Havre

Entry	Cultivar/Line	Pedigree	Yield bu/ac	Test weight lb/bu	Heading date Julian	Maturity date Julian	Days to maturity	Plant height in	Sawfly cutting %	Falling num- ber	Protein %
	d = cultivars/lines dropped for 2021 test + = new for 2020, # = paid entry		LAT	LAT	LAT	LAT	LAT	LAT	LAT	LAT	LAT
		lattice efficiency relative to RCB	150%	173%	144%	166%	109%	106%	137%	171%	162%
11	Bobcat	Montana, 2019	59.5	62.6	161.6	197.0	36	24.0	19	382	14.4
4	Keldin	WestBred, 2011	58.1	62.0	161.3	195.8	38	25.1	61	392	14.3
27 #	Byrd CL Plus	Plainsgold/Col. Wheat Res Fdn, 20	57.7	63.0	158.0	195.5	34	25.3	44	382	13.1
40 + d	MTS1810	08X350-A6/Warhorse	57.4	63.9	163.6	198.5	36	24.8	1	441	14.5
29 #+ d	Mpress (SWW)	McGregor Co./Syngenta Participati	57.1	60.5	162.9	198.3	41	25.6	43	326	12.9
43 +	MTS18149	Loma*2/AAC Gateway	56.6	62.4	164.1	201.6	34	23.8	29	387	14.8
42 +	MTS18116	Loma*2/Warhorse	56.3	64.0	163.8	199.5	36	23.0	13	369	13.3
38 d	MTCL1732	AP035-8-1/5/MT08134/4/YLL*4/3/1	54.9	62.1	161.1	197.3	35	24.8	18	373	13.5
22 #+	LCS 18-7071	Limagrain Cereal Seeds exp. line	54.3	62.1	162.0	199.6	37	26.1	54	372	12.5
19 #+	WB4792	WestBred, 2019	54.0	64.5	160.8	199.1	35	24.0	31	402	13.1
33 d	MT1683	Yellowstone(L)*2/CDC Buteo	53.6	61.4	161.5	197.4	38	27.7	38	427	14.5
32 d	MT1642	Yellowstone/Madsen//Yellowstone	53.6	61.8	161.3	198.2	38	27.1	41	437	14.6
2	Yellowstone	Montana 2005	53.5	61.5	162.4	198.0	35	27.5	38	438	14.4
31	StandClear CLP	Montana/Loveland Products Inc., 2	53.5	62.4	160.8	195.4	36	25.7	61	394	14.1
44 + d	MT1845	Yellowstone/493-22(Reeder/6*Pau	53.3	61.5	159.7	195.7	37	23.7	31	474	14.7
48 + d	MT1867	MT0859//00X83cE45/MT0698	53.2	61.3	160.3	194.7	36	24.7	56	371	13.5
46 +	MT1855	05X438-aC71(MT0097*2//Jagale	53.1	62.4	162.4	199.4	38	23.7	57	407	14.3
45 + d	MT1848	Northern//MT08184/MT0887	53.1	61.3	162.5	196.9	40	24.9	29	507	15.1
9	FourOsix	Montana, 2018	53.1	62.2	159.2	197.2	36	26.2	62	403	14.2
8	Loma	Montana, 2016	53.0	62.1	164.3	201.3	38	24.0	38	423	14.7
49 +	MT1872	MT0859//MT0840/MT0873	52.9	62.5	160.9	196.2	40	23.4	25	355	13.9
20 # d	LCS Jet	Limagrain Cereal Seeds, 2015	52.5	60.0	161.1	198.7	37	21.2	51	336	14.0
6	SY Clearstone 2CL	Montana/Syngenta, 2012	52.4	61.6	161.5	197.0	35	26.6	55	444	14.7
41 +	MTS1831	MTS0907/MTS0827	52.2	63.9	163.4	199.0	36	23.3	12	355	13.3
25 # d	Incline AX	Plainsgold/Colorado Wheat Res Fc	52.0	61.9	161.4	197.7	37	24.7	34	357	12.9
36 d	MT1787	MT08185//YLL*2/PI640431/3/PRO	52.0	62.1	161.4	197.2	38	23.6	33	390	14.3
28 #	AAC Wildfire	Alberta/SECAN, 2015	52.0	61.5	163.5	199.0	35	24.7	52	399	13.8
39	MTCL1737	YLL-2CL/3/YLL*2/Pelsart//PROM/3	51.8	61.1	163.2	198.8	37	22.8	28	401	14.5
23 #+ d	LCS Helix AX	Limagrain Cereal Seeds, 2020	51.8	63.2	156.6	194.9	37	23.4	40	341	13.1
24 # d	Long Branch	Limagrain; Dyna-Gro Wheat, 2016	51.6	62.5	155.2	193.8	39	24.1	40	342	13.1
1	Warhorse	Montana, 2013	51.4	62.1	161.7	196.4	36	22.9	35	485	14.8
3	Judee	Montana, 2011	50.8	63.6	162.0	196.3	38	24.9	31	387	15.2
10	Flathead	Montana, 2019	50.4	63.1	157.3	195.2	36	26.3	34	423	13.9
34	MT1745	Decade*2/NI06732	50.1	62.9	161.7	198.0	40	24.8	31	428	13.6
17 # d	WB4311	WestBred, 2017	50.0	62.8	158.7	197.1	37	23.2	55	388	14.2
21 #+	LCS Photon AX	Limagrain Cereal Seeds, 2019	49.9	63.6	156.6	196.3	38	24.0	52	400	14.0
47 + d	MT1866	MT0859//00X83cE45/MT0698	49.9	61.6	160.4	195.9	35	22.9	46	362	14.1
26 #r d	Langin	Plainsgold/Colorado Wheat Res Fc	49.9	62.3	156.2	196.1	36	24.5	50	382	13.0
12 # d	SY Monument	Syngenta (AgriPro), 2014	49.8	61.6	158.7	195.7	36	24.2	36	384	13.1
7	Northern	Montana, 2015	49.4	62.0	161.8	198.3	37	23.9	25	460	14.8
35 d	MT1746	MT06103//MTW0881/SD06W166	49.3	62.9	160.9	195.2	38	23.8	35	383	13.7
15 #	SY Wolverine	Syngenta 2019	49.0	63.1	156.7	193.7	37	22.5	48	350	14.5
16 # d	WB4269	WestBred, 2017	49.0	62.4	156.2	193.8	34	23.3	20	376	12.8
14 # d	SY Legend CL2	Syngenta, 2018	48.5	62.7	157.8	195.2	36	24.8	46	447	14.5
5	Brawl CL Plus	Plainsgold/Colorado Wheat Res Fc	47.1	63.4	155.7	193.6	34	24.8	31	391	14.0
18 #	WB4418	WestBred, 2018	46.3	61.4	156.4	197.2	36	21.9	32	363	13.5
37 d	MT1793	Decade-Fhb1	46.2	62.3	158.2	195.2	38	22.2	34	397	15.5
13 #	SY 517 CL2	Syngenta (AgriPro), 2017	44.7	63.7	156.2	194.0	36	23.9	34	391	14.3
30 #+	CP7909	Winfield United (Croplan), 2018	29.8	62.4	155.1	194.7	38	24.0	56	390	13.5
Average			51.7	62.4	160.2	196.9	36.7	24.3	38.1	396.2	14.0
LSD (0.05)			5.8	0.6	1.3	1.8	2.1	1.8	15.6	20.4	0.4
C. V. (%)			6.4	0.5	0.5	0.5	3.4	4.4	23.5	2.9	1.6
P-value (Varieties)			<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 4. 2020 Intrastate Winter Wheat Test (Exp. 3503): Sidney

Entry	Cultivar/Line	Pedigree	Yield bu/ac	Test weight lb/bu	Stand %		Heading date	Plant height	Protein %
					13-May	26-Jun			
			d = cultivars/lines dropped for 2021 test + = new for 2020, # = paid entry			LAT	LAT	EARC LAT	PLB LAT
lattice efficiency relative to RCB			196%	136%	108%	112%	103%	122%	121%
2	Yellowstone	Montana 2005	71.1	60.5	99	89	161.0	26.9	13.3
32	d MT1642	Yellowstone/Madsen//Yellowstone	68.8	59.6	97	83	158.3	25.6	13.8
44	+ d MT1845	Yellowstone/493-22(Reeder/6*Pal	67.0	60.4	94	81	159.0	25.8	13.3
6	SY Clearstone 2CL	Montana/Syngenta, 2012	66.8	59.2	100	87	161.0	24.8	13.9
33	d MT1683	Yellowstone(L)*2/CDC Buteo	65.9	60.1	93	84	160.7	27.6	13.6
7	Northern	Montana, 2015	65.2	59.9	98	85	162.0	24.7	14.1
29	#+ d Mpress (SWW)	McGregor Co./Syngenta Participat	63.5	58.2	95	81	163.3	23.7	12.2
39	MTCL1737	YLL-2CL/3/YLL*2/Pelsart//PROM/	63.5	59.8	91	88	163.0	22.0	14.2
4	Keldin	WestBred, 2011	63.3	60.6	91	78	161.0	25.4	12.7
19	#+ WB4792	WestBred, 2019	61.8	62.8	83	71	160.0	24.9	12.3
42	+ MTS18116	Loma*2/Warhorse	61.6	60.7	94	82	162.7	22.6	13.3
36	d MT1787	MT08185//YLL*2/PI640431/3/PRC	61.3	60.3	94	80	160.7	23.8	13.9
9	FourOsix	Montana, 2018	61.1	60.2	93	76	159.7	22.7	13.8
37	d MT1793	Decade-Fhb1	60.7	59.4	98	88	158.7	24.8	14.0
8	Loma	Montana, 2016	60.5	60.0	95	80	162.7	23.0	13.9
10	Flathead	Montana, 2019	60.2	60.3	94	80	156.3	25.7	13.2
41	+ MTS1831	MTS0907/MTS0827	60.2	61.0	86	81	164.7	22.7	12.9
43	+ MTS18149	Loma*2/AAC Gateway	60.1	60.2	88	75	163.0	20.9	13.7
46	+ MT1855	05X438-aC71(MT0097*2//Jagalen	59.7	60.4	89	80	162.7	21.6	14.1
27	# Byrd CL Plus	Plainsgold/Col. Wheat Res Fdn, 2	59.6	58.5	82	71	159.0	25.9	12.5
28	# AAC Wildfire	Alberta/SECAN, 2015	59.5	58.8	98	87	165.3	25.1	14.1
11	Bobcat	Montana, 2019	58.6	59.4	90	74	161.0	24.0	13.7
34	MT1745	Decade*2/NI06732	58.0	58.7	98	72	161.0	23.7	13.0
20	# d LCS Jet	Limagrain Cereal Seeds, 2015	58.0	58.7	76	69	162.3	20.8	13.4
49	+ MT1872	MT0859//MT0840/MT0873	57.8	59.9	97	78	160.7	24.8	12.8
23	#+ d LCS Helix AX	Limagrain Cereal Seeds, 2020	57.1	61.7	84	72	156.0	22.8	12.2
45	+ d MT1848	Northern//MT08184/MT0887	56.8	59.3	92	74	162.0	22.8	14.9
18	# WB4418	WestBred, 2018	56.5	59.7	83	70	155.3	21.6	12.4
25	# d Incline AX	Plainsgold/Colorado Wheat Res F	56.0	59.1	86	68	160.0	23.0	12.6
5	Brawl CL Plus	Plainsgold/Colorado Wheat Res F	55.8	61.3	92	70	154.7	21.9	13.3
38	d MTCL1732	AP035-8-1/5/MT08134/4/YLL*4/3/	55.2	57.7	95	76	159.3	24.2	13.9
14	# d SY Legend CL2	Syngenta, 2018	55.1	58.0	92	75	158.0	24.8	14.0
22	#+ LCS 18-7071	Limagrain Cereal Seeds exp. line	54.7	60.9	74	61	162.0	23.9	11.8
31	StandClear CLP	Montana/Loveland Products Inc., 2	54.6	58.7	98	77	161.7	24.4	13.6
40	+ d MTS1810	08X350-A6/Warhorse	54.2	60.9	96	82	164.0	24.0	14.7
24	# d Long Branch	Limagrain; Dyna-Gro Wheat, 2016	53.8	59.4	98	77	155.3	22.3	12.2
16	# d WB4269	WestBred, 2017	53.4	60.6	81	74	157.7	20.9	12.2
1	Warhorse	Montana, 2013	53.0	59.1	96	78	161.3	23.0	14.3
48	+ d MT1867	MT0859//00X83cE45/MT0698	52.9	56.3	93	76	158.7	24.5	13.4
35	d MT1746	MT06103//MTW0881/SD06W166	52.9	59.8	94	69	159.3	23.2	13.1
12	# d SY Monument	Syngenta (AgriPro), 2014	52.3	58.1	83	75	158.7	23.7	12.5
26	#r d Langin	Plainsgold/Colorado Wheat Res F	51.6	58.6	85	68	154.7	21.9	12.1
17	# d WB4311	WestBred, 2017	51.6	61.7	79	58	158.7	23.7	13.2
21	#+ LCS Photon AX	Limagrain Cereal Seeds, 2019	51.3	62.4	87	62	157.0	24.7	13.1
15	# SY Wolverine	Syngenta 2019	50.9	59.5	81	65	155.0	21.7	13.0
30	#+ CP7909	Winfield United (Croplan), 2018	50.5	60.0	81	51	154.3	22.7	12.5
3	Judee	Montana, 2011	50.4	61.2	85	72	160.7	23.4	14.7
47	+ d MT1866	MT0859//00X83cE45/MT0698	47.6	59.3	79	62	160.7	22.8	13.8
13	# SY 517 CL2	Syngenta (AgriPro), 2017	45.1	61.3	87	52	155.7	22.3	13.6
Average			57.7	59.8	90.1	74.8	159.8	23.6	13.3
LSD (0.05)			6.5	1.0	12.6	11.9	1.8	2.4	0.4
C. V. (%)			6.4	1.0	8.2	9.3	0.7	5.8	1.7
P-value (Varieties)			<.0001	<.0001	0.0005	<.0001	<.0001	<.0001	<.0001

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p=0.05)

Table 5. 2020 Intrastate Winter Wheat Test (Exp. 3504): Williston, ND

Entry #	Cultivar/Line	Pedigree	Stand/					
			Yield	Test	Winter	Heading	Plant	Protein
			bu/ac	weight	survival	date	height	%
d = cultivars/lines dropped for 2021 test				lb/bu	%	Julian	in	
+ = new for 2020, # = paid entry			RCB	RCB	LAT	RCB	RCB	LAT
		lattice efficiency relative to RCB	100%	92%	109%	87%	101%	123%
7	Northern	Montana, 2015	57.8	61.0	89	162.0	21.9	14.9
22 #+	LCS 18-7071	Limagrain Cereal Seeds exp. line	56.2	60.5	71	160.3	23.8	13.0
32 d	MT1642	Yellowstone/Madsen//Yellowstone	56.1	60.1	93	160.3	24.5	14.0
28 #	AAC Wildfire	Alberta/SECAN, 2015	55.2	59.8	86	164.0	22.3	14.8
19 #+	WB4792	WestBred, 2019	54.1	61.8	86	159.3	22.4	12.6
9	FourOsix	Montana, 2018	53.5	60.9	89	159.7	23.4	13.1
6	SY Clearstone 2CL	Montana/Syngenta, 2012	53.5	60.4	93	162.3	24.5	13.7
33 d	MT1683	Yellowstone(L)*2/CDC Buteo	53.1	60.3	89	160.7	24.4	14.3
40 + d	MTS1810	08X350-A6/Warhorse	52.9	61.0	85	164.0	21.3	15.7
20 # d	LCS Jet	Limagrain Cereal Seeds, 2015	52.6	57.7	83	161.0	18.4	14.4
4	Keldin	WestBred, 2011	52.3	61.0	90	159.7	22.7	12.5
39	MTCL1737	YLL-2CL/3/YLL*2/Pelsart//PROM/	52.3	60.4	90	163.3	20.9	14.6
44 + d	MT1845	Yellowstone/493-22(Reeder/6*Pat	52.0	60.1	94	159.0	21.9	13.1
27 #	Byrd CL Plus	Plainsgold/Col. Wheat Res Fdn, 2	51.9	59.5	94	157.3	22.2	12.0
46 +	MT1855	05X438-aC71(MT0097*2//Jagalen	51.7	61.0	81	164.3	19.6	15.7
43 +	MTS18149	Loma*2/AAC Gateway	50.8	60.4	84	162.7	19.4	15.1
29 #+ d	Mpress (SWW)	McGregor Co./Syngenta Participat	50.8	59.6	87	164.0	22.0	12.1
11	Bobcat	Montana, 2019	50.7	60.7	82	162.7	21.7	14.6
34	MT1745	Decade*2/NI06732	50.7	59.9	92	160.7	22.0	12.4
38 d	MTCL1732	AP035-8-1/5/MT08134/4/YLL*4/3/	50.7	59.4	92	161.7	20.9	12.8
8	Loma	Montana, 2016	50.2	60.3	87	163.0	19.3	13.8
42 +	MTS18116	Loma*2/Warhorse	50.1	62.0	84	164.0	19.6	13.7
45 + d	MT1848	Northern//MT08184/MT0887	49.9	60.4	84	162.7	21.9	14.8
31	StandClear CLP	Montana/Loveland Products Inc.,	49.9	60.7	89	162.0	22.3	13.2
16 # d	WB4269	WestBred, 2017	49.6	60.2	91	157.0	17.7	11.8
23 #+	LCS Helix AX	Limagrain Cereal Seeds, 2020	49.3	60.8	90	154.7	20.2	11.9
25 # d	Incline AX	Plainsgold/Colorado Wheat Res F	49.0	59.2	89	160.3	22.7	12.5
41 +	MTS1831	MTS0907/MTS0827	49.0	62.2	86	164.7	19.7	13.7
2	Yellowstone	Montana 2005	48.7	60.5	83	160.7	22.6	13.9
36 d	MT1787	MT08185/YLL*2/PI640431/3/PRC	48.1	60.8	94	160.0	19.7	13.4
3	Judee	Montana, 2011	47.8	61.7	86	161.3	23.2	15.8
18 #	WB4418	WestBred, 2018	47.7	60.9	87	155.3	21.1	12.5
10	Flathead	Montana, 2019	46.7	60.1	91	155.7	21.5	12.3
12 # d	SY Monument	Syngenta (AgriPro), 2014	46.5	58.8	87	158.0	20.1	11.4
37 d	MT1793	Decade-Fhb1	46.5	59.7	96	156.7	20.6	14.3
21 #+ d	LCS Photon AX	Limagrain Cereal Seeds, 2019	46.5	62.3	83	157.0	21.7	13.2
14 # d	SY Legend CL2	Syngenta, 2018	46.5	59.9	91	158.3	21.5	13.0
13 #	SY 517 CL2	Syngenta (AgriPro), 2017	46.3	60.4	86	154.7	20.2	13.4
47 + d	MT1866	MT0859//00X83cE45/MT0698	46.3	59.3	90	161.3	20.5	13.6
26 #r d	Langin	Plainsgold/Colorado Wheat Res F	46.3	60.9	73	156.0	19.2	12.1
5	Brawl CL Plus	Plainsgold/Colorado Wheat Res F	46.1	61.2	97	154.7	21.3	13.4
15 #	SY Wolverine	Syngenta 2019	45.4	60.4	88	156.0	20.5	12.6
30 #+	CP7909	Winfield United (Croplan), 2018	44.3	60.1	74	153.7	19.9	12.1
17 # d	WB4311	WestBred, 2017	44.0	59.4	89	158.3	20.3	13.5
24 # d	Long Branch	Limagrain; Dyna-Gro Wheat, 2016	43.9	59.7	75	155.0	20.9	11.5
1	Warhorse	Montana, 2013	43.7	59.4	92	160.3	21.3	13.7
48 + d	MT1867	MT0859//00X83cE45/MT0698	43.3	59.7	87	158.3	20.9	12.6
49 +	MT1872	MT0859//MT0840/MT0873	42.7	60.2	86	160.0	21.5	12.8
35 d	MT1746	MT06103//MTW0881/SD06W166	41.2	61.1	84	160.0	19.9	12.5
Average			49.3	60.4	87.1	159.8	21.3	13.4
LSD (0.05)			4.7	1.3	10.1	1.7	1.6	0.9
C. V. (%)			5.9	1.4	6.8	0.7	4.5	3.7
P-value (Varieties)			<.0001	<.0001	0.0003	<.0001	<.0001	<.0001

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 6. 2020 Intrastate Winter Wheat Test (Exp. 3505): Kalispell

Entry	Cultivar/Line	Pedigree	Yield bu/ac	Test weight lb/bu	Heading date Julian	Plant height in	TKW g	Falling number	Protein %
d = cultivars/lines dropped for 2021 test + = new for 2020, # = paid entry			RCB	RCB	RCB	RCB	RCB	LAT	LAT
lattice efficiency relative to RCB			101%	101%	100%	99%	99%	106%	122%
19 #+	WB4792	WestBred, 2019	173.5	62.2	167.0	37.4	41.6	373	9.2
20 # d	LCS Jet	Limagrain Cereal Seeds, 2015	171.1	61.5	167.0	33.9	49.6	345	9.6
29 #+ d	Mpress (SWW)	McGregor Co./Syngenta Participat	170.7	60.8	168.3	37.0	56.5	302	9.5
48 + d	MT1867	MT0859//00X83cE45/MT0698	168.1	62.5	167.0	39.0	42.1	318	9.7
4	Keldin	WestBred, 2011	167.6	62.9	167.0	37.4	50.5	349	9.8
34	MT1745	Decade*2/NI06732	166.8	62.5	167.0	41.0	45.2	401	10.2
32 d	MT1642	Yellowstone/Madsen//Yellowstone	166.2	62.3	167.0	40.3	47.9	401	10.1
41 +	MTS1831	MTS0907/MTS0827	166.1	59.5	171.3	35.6	39.1	312	10.2
7	Northern	Montana, 2015	164.0	61.1	167.7	40.8	44.3	379	10.2
8	Loma	Montana, 2016	162.8	61.2	171.3	38.8	42.5	259	10.5
6	SY Clearstone 2CL	Montana/Syngenta, 2012	162.1	61.9	167.0	40.5	47.1	391	9.7
26 #r d	Langin	Plainsgold/Colorado Wheat Res F	161.9	61.4	161.0	35.9	42.6	326	9.2
2	Yellowstone	Montana 2005	161.6	61.4	167.0	40.5	46.2	387	10.2
45 + d	MT1848	Northern//MT08184/MT0887	159.8	62.1	167.0	35.9	39.9	428	11.1
10	Flathead	Montana, 2019	159.6	63.4	161.0	36.8	46.9	380	10.1
23 #+ d	LCS Helix AX	Limagrain Cereal Seeds, 2020	159.3	63.2	163.3	37.7	44.6	346	9.7
38 d	MTCL1732	AP035-8-1/5/MT08134/4/YLL*4/3/	158.7	61.5	167.0	36.6	43.2	356	10.5
27 #	Byrd CL Plus	Plainsgold/Col. Wheat Res Fdn, 2/	158.7	62.2	163.3	40.3	44.3	321	9.0
33 d	MT1683	Yellowstone(L)*2/CDC Buteo	158.5	62.2	167.0	39.3	48.1	381	10.1
28 #	AAC Wildfire	Alberta/SECAN, 2015	156.9	59.1	169.7	42.4	47.9	357	10.2
15 #	SY Wolverine	Syngenta 2019	156.9	63.6	161.0	35.9	40.3	337	10.2
39	MTCL1737	YLL-2CL/3/YLL*2/Pelsart//PROM/	156.7	61.2	168.3	35.2	42.5	343	10.4
42 +	MTS18116	Loma*2/Warhorse	156.0	60.6	169.0	35.0	39.5	319	9.9
47 + d	MT1866	MT0859//00X83cE45/MT0698	155.1	62.6	167.0	36.3	42.5	367	9.8
24 # d	Long Branch	Limagrain; Dyna-Gro Wheat, 2016	155.0	63.1	161.0	36.5	45.0	356	9.7
49 +	MT1872	MT0859//MT0840/MT0873	154.8	63.5	167.0	36.9	49.9	351	10.1
46 +	MT1855	05X438-aC71(MT0097*2//Jagalen	153.6	62.5	167.7	39.0	39.0	338	10.3
25 # d	Incline AX	Plainsgold/Colorado Wheat Res F	150.5	61.1	167.0	38.5	43.1	329	8.9
22 #+	LCS 18-7071	Limagrain Cereal Seeds exp. line	150.4	61.5	167.0	40.2	41.8	353	9.6
31	StandClear CLP	Montana/Loveland Products Inc., 2	149.3	63.7	167.0	36.6	42.9	387	10.5
17 # d	WB4311	WestBred, 2017	148.9	62.6	167.0	32.9	47.5	364	10.3
40 + d	MTS1810	08X350-A6/Warhorse	148.6	62.0	167.7	38.7	44.3	391	11.2
35 d	MT1746	MT06103//MTW0881/SD06W166	146.6	63.6	167.0	37.7	38.1	375	10.4
43 +	MTS18149	Loma*2/AAC Gateway	146.6	58.6	170.3	37.5	44.5	345	10.5
3	Judee	Montana, 2011	146.3	64.0	167.0	38.0	44.1	331	10.4
18 #	WB4418	WestBred, 2018	145.8	60.1	165.0	36.2	35.6	319	10.2
12 # d	SY Monument	Syngenta (AgriPro), 2014	145.2	61.9	167.0	35.7	42.3	362	10.3
44 + d	MT1845	Yellowstone/493-22(Reeder/6*Pal	145.2	62.3	165.0	37.2	42.5	411	11.2
16 # d	WB4269	WestBred, 2017	144.7	63.6	161.0	35.8	36.6	359	10.3
9	FourOsix	Montana, 2018	143.7	62.8	167.0	34.7	44.1	381	9.8
14 # d	SY Legend CL2	Syngenta, 2018	141.9	63.6	161.0	35.8	44.1	405	10.2
36 d	MT1787	MT08185//YLL*2/PI640431/3/PRC	140.8	62.7	167.0	36.0	42.6	389	10.7
11	Bobcat	Montana, 2019	139.5	63.8	167.0	36.4	42.5	376	10.2
1	Warhorse	Montana, 2013	138.5	62.1	167.0	39.2	41.7	394	10.9
37 d	MT1793	Decade-Fhb1	138.0	62.0	163.0	36.1	38.4	382	10.4
5	Brawl CL Plus	Plainsgold/Colorado Wheat Res F	135.6	63.5	161.0	34.5	43.6	387	11.4
21 #+	LCS Photon AX	Limagrain Cereal Seeds, 2019	123.7	64.5	163.0	38.5	40.7	422	10.7
30 #+	CP7909	Winfield United (Croppan), 2018	122.5	63.5	156.0	33.8	40.6	358	9.7
13 #	SY 517 CL2	Syngenta (AgriPro), 2017	122.0	64.8	161.0	32.4	39.3	409	10.7
Average			152.6	62.2	165.8	37.2	43.5	362.3	10.2
LSD (0.05)			15.2	1.1	2.2	3.1	1.7	21.4	0.6
C. V. (%)			6.1	1.1	0.8	5.1	2.4	3.5	3.2
P-value (Varieties)			<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 7. 2020 Intrastate Winter Wheat Test (Exp. 3507): Moccasin

Entry	Cultivar/Line	Pedigree	Yield bu/ac	Test weight lb/bu	Grain moisture %	Protein %
	d = cultivars/lines dropped for 2021 test + = new for 2020, # = paid entry		RCB	RCB	RCB	RCB
		lattice efficiency relative to RCB				
27 #	Byrd CL Plus	Plainsgold/Col. Wheat Res Fdn, 2	66.2	64.8	10.2	9.1
22 #+	LCS 18-7071	Limagrains Cereal Seeds exp. line	64.7	63.2	10.1	9.0
29 #+ d	Mpress (SWW)	McGregor Co./Syngenta Participal	63.9	62.4	9.7	9.0
9	FourOsix	Montana, 2018	62.0	63.6	9.8	10.3
39	MTCL1737	YLL-2CL/3/YLL*2/Pelsart//PROM/	62.0	62.9	9.9	10.1
25 # d	Incline AX	Plainsgold/Colorado Wheat Res F	61.5	62.9	9.9	9.3
4	Keldin	WestBred, 2011	60.7	63.9	10.0	10.9
43 +	MTS18149	Loma*2/AAC Gateway	60.6	62.3	10.0	10.2
38 d	MTCL1732	AP035-8-1/5/MT08134/4/YLL*4/3/	60.3	63.6	9.8	10.1
7	Northern	Montana, 2015	59.8	63.6	9.8	11.1
28 #	AAC Wildfire	Alberta/SECAN, 2015	59.4	63.1	11.6	10.5
8	Loma	Montana, 2016	59.4	63.3	10.2	10.5
32 d	MT1642	Yellowstone/Madsen//Yellowstone	59.2	63.1	9.8	10.9
35 d	MT1746	MT06103//MTW0881/SD06W166	59.2	65.0	10.3	10.7
42 +	MTS18116	Loma*2/Warhorse	59.0	64.3	10.1	9.2
19 #+	WB4792	WestBred, 2019	59.0	65.3	10.5	9.7
20 # d	LCS Jet	Limagrains Cereal Seeds, 2015	58.5	60.6	9.4	9.4
45 + d	MT1848	Northern//MT08184/MT0887	58.1	62.5	9.6	10.5
33 d	MT1683	Yellowstone(L)*2/CDC Buteo	58.0	62.1	9.8	10.7
6	SY Clearstone 2CL	Montana/Syngenta, 2012	57.6	63.2	10.2	10.5
46 +	MT1855	05X438-aC71(MT0097*2//Jagalen	57.3	64.4	9.8	10.4
2	Yellowstone	Montana 2005	57.2	62.6	10.2	10.6
49 +	MT1872	MT0859//MT0840/MT0873	56.8	64.8	10.6	11.5
44 + d	MT1845	Yellowstone/493-22(Reeder/6*Pat	56.7	63.5	10.1	10.9
34	MT1745	Decade*2/NI06732	56.5	64.7	10.2	10.7
3	Judee	Montana, 2011	56.1	64.9	10.3	11.0
26 #r d	Langin	Plainsgold/Colorado Wheat Res F	56.0	63.2	9.9	9.5
12 # d	SY Monument	Syngenta (AgriPro), 2014	55.1	63.9	9.9	10.4
11	Bobcat	Montana, 2019	55.0	63.5	10.0	10.2
41 +	MTS1831	MTS0907/MTS0827	54.8	64.4	10.2	9.5
31	StandClear CLP	Montana/Loveland Products Inc., ;	54.8	65.1	10.4	11.3
48 + d	MT1867	MT0859//00X83cE45/MT0698	54.6	65.2	10.4	10.2
23 #+ d	LCS Helix AX	Limagrains Cereal Seeds, 2020	52.5	63.6	9.9	11.1
17 # d	WB4311	WestBred, 2017	52.4	64.0	10.6	12.0
47 + d	MT1866	MT0859//00X83cE45/MT0698	51.8	64.2	9.7	11.1
40 + d	MTS1810	08X350-A6/Warhorse	51.7	65.0	10.3	11.0
1	Warhorse	Montana, 2013	51.2	63.8	9.6	11.1
18 #	WB4418	WestBred, 2018	50.6	63.3	9.9	11.1
36 d	MT1787	MT08185//YLL*2/PI640431/3/PRC	50.1	63.4	10.1	10.3
37 d	MT1793	Decade-Fhb1	49.7	65.0	10.4	12.5
24 # d	Long Branch	Limagrains; Dyna-Gro Wheat, 2016	48.8	63.1	9.4	11.7
14 # d	SY Legend CL2	Syngenta, 2018	47.9	65.2	9.9	11.7
15 #	SY Wolverine	Syngenta 2019	47.7	64.0	9.9	10.9
10	Flathead	Montana, 2019	46.9	63.3	10.1	11.4
21 #+	LCS Photon AX	Limagrains Cereal Seeds, 2019	46.6	65.4	10.0	12.2
5	Brawl CL Plus	Plainsgold/Colorado Wheat Res F	45.8	65.1	9.8	12.6
16 # d	WB4269	WestBred, 2017	45.0	63.5	9.7	12.8
30 #+	CP7909	Winfield United (Croplan), 2018	42.8	62.9	9.6	11.9
13 #	SY 517 CL2	Syngenta (AgriPro), 2017	35.0	64.8	9.5	14.0
	Average		55.0	63.8	10.0	10.8
	LSD (0.05)		7.2	1.6	0.7	0.7
	C. V. (%)		8.1	1.5	4.3	3.8
	P-value (Varieties)		<.0001	<.0001	0.0006	<.0001

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 8. 2020 Intrastate Winter Wheat Test (Exp. 3508): Huntley

Entry	Cultivar/Line	Pedigree	Yield bu/ac	Test weight lb/bu	Heading date Julian	Plant height in	Grain moisture %	Protein %
	d = cultivars/lines dropped for 2021 test + = new for 2020, # = paid entry		LAT	LAT	LAT	LAT	RCB	LAT
		lattice efficiency relative to RCB	191%	119%	113%	126%	104%	113%
27 #	Byrd CL Plus	Plainsgold/Col. Wheat Res Fdn, 2	98.4	63.9	156.9	34.8	9.1	12.6
4	Keldin	WestBred, 2011	92.3	64.2	161.3	31.6	9.0	13.5
49 +	MT1872	MT0859/MT0840/MT0873	91.9	64.8	161.4	31.8	9.2	13.1
29 #+ d	Mpress (SWW)	McGregor Co./Syngenta Participat	90.3	61.5	164.2	32.1	8.9	12.4
47 + d	MT1866	MT0859//00X83cE45/MT0698	89.1	63.1	160.5	30.7	8.7	14.5
6	SY Clearstone 2CL	Montana/Syngenta, 2012	88.5	62.9	161.4	35.5	9.0	13.9
33 d	MT1683	Yellowstone(L)*2/CDC Buteo	87.8	62.9	161.7	34.2	9.1	13.6
48 + d	MT1867	MT0859//00X83cE45/MT0698	86.8	64.2	159.5	32.6	9.3	13.1
26 #r d	Langin	Plainsgold/Colorado Wheat Res F	86.0	64.0	155.8	31.0	9.2	12.1
39	MTCL1737	YLL-2CL/3/YLL*2/Pelsart//PROM/	85.9	63.0	163.4	29.1	8.7	13.3
36 d	MT1787	MT08185//YLL*2/PI640431/3/PRC	85.4	63.5	162.2	29.8	9.1	13.8
31	StandClear CLP	Montana/Loveland Products Inc.,	84.7	64.0	160.2	33.1	9.2	14.3
25 # d	Incline AX	Plainsgold/Colorado Wheat Res F	84.2	63.0	160.5	31.3	8.9	12.6
20 # d	LCS Jet	Limagrain Cereal Seeds, 2015	84.2	61.8	160.7	28.7	8.9	13.4
2	Yellowstone	Montana 2005	84.2	63.4	161.8	34.5	9.2	13.2
7	Northern	Montana, 2015	84.1	63.7	162.2	33.0	8.9	14.7
9	FourOsix	Montana, 2018	84.0	64.0	159.1	31.5	9.0	13.8
46 +	MT1855	05X438-aC71(MT0097*2//Jagalen	84.0	63.0	163.1	30.7	8.9	14.8
8	Loma	Montana, 2016	83.8	62.3	164.0	31.1	9.0	14.1
24 # d	Long Branch	Limagrain; Dyna-Gro Wheat, 2016	83.8	64.2	155.9	32.9	9.3	12.7
32 d	MT1642	Yellowstone/Madsen//Yellowstone	83.5	62.9	162.1	34.8	8.8	13.9
17 # d	WB4311	WestBred, 2017	83.1	64.7	156.8	29.7	9.2	14.1
40 + d	MTS1810	08X350-A6/Warhorse	83.0	64.7	163.0	32.3	9.3	14.3
15 #	SY Wolverine	Syngenta 2019	82.9	65.2	156.8	30.7	9.2	13.0
34	MT1745	Decade*2/NI06732	82.7	63.6	163.1	32.6	9.2	13.1
35 d	MT1746	MT06103//MTW0881/SD06W166	82.7	65.4	161.2	29.4	9.4	13.9
44 + d	MT1845	Yellowstone/493-22(Reeder/6*Pat	82.4	63.0	159.3	33.5	8.9	14.0
10	Flathead	Montana, 2019	81.3	64.9	155.7	33.0	9.4	13.7
22 #+	LCS 18-7071	Limagrain Cereal Seeds exp. line	81.3	63.3	161.8	32.0	9.0	13.1
5	Brawl CL Plus	Plainsgold/Colorado Wheat Res F	80.4	65.1	154.5	33.8	9.0	14.0
45 + d	MT1848	Northern//MT08184/MT0887	80.2	62.2	163.0	31.0	8.5	14.4
12 # d	SY Monument	Syngenta (AgriPro), 2014	79.0	63.3	158.3	31.5	8.8	12.4
3	Judee	Montana, 2011	78.9	63.7	161.2	32.9	8.9	14.2
23 #+	LCS Helix AX	Limagrain Cereal Seeds, 2020	78.5	64.8	156.1	30.8	9.4	12.8
38 d	MTCL1732	AP035-8-1/5/MT08134/4/YLL*4/3/	78.4	62.6	159.6	30.5	8.8	13.0
30 #+	CP7909	Winfield United (Croplan), 2018	77.6	64.5	153.8	30.0	9.1	12.6
11	Bobcat	Montana, 2019	77.5	63.0	162.4	28.8	9.0	14.2
43 +	MTS18149	Loma*2/AAC Gateway	77.1	62.5	163.8	30.4	9.1	14.0
28 #	AAC Wildfire	Alberta/SECAN, 2015	77.0	63.2	164.2	32.3	9.1	14.0
41 +	MTS1831	MTS0907/MTS0827	76.9	64.6	165.0	29.1	9.2	12.4
1	Warhorse	Montana, 2013	76.7	62.7	162.2	32.4	8.9	13.9
18 #	WB4418	WestBred, 2018	75.5	64.4	157.3	30.4	8.8	12.9
13 #	SY 517 CL2	Syngenta (AgriPro), 2017	75.2	65.3	156.9	29.8	9.1	14.2
14 # d	SY Legend CL2	Syngenta, 2018	74.7	64.1	157.0	31.3	9.0	13.4
16 # d	WB4269	WestBred, 2017	73.8	64.6	155.5	29.7	9.0	12.3
37 d	MT1793	Decade-Fhb1	73.0	63.5	157.7	31.1	8.8	14.9
19 #+	WB4792	WestBred, 2019	72.6	65.2	161.2	31.8	9.8	12.2
42 +	MTS18116	Loma*2/Warhorse	71.0	63.9	163.8	28.6	9.1	12.9
21 #+ d	LCS Photon AX	Limagrain Cereal Seeds, 2019	68.7	65.6	156.5	31.7	9.1	14.8
	Average		81.7	63.8	160.1	31.5	9.0	13.5
	LSD (0.05)		7.3	0.9	1.3	1.6	0.3	0.6
	C. V. (%)		5.1	0.9	0.5	2.9	2.0	2.7
	P-value (Varieties)							

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 9. 2020 Intrastate Winter Wheat Test (Exp. 3518): Conrad

								Lodging/		
Entry	Cultivar/Line		Pedigree	Yield bu/ac	Test weight lb/bu	Winter survival %	Heading date Julian no	Plant height in no	Sawfly cutting %	Protein %
d = cultivars/lines dropped for 2021 test + = new for 2020, # = paid entry				LAT	LAT	LAT			LAT	LAT
lattice efficiency relative to RCB				119%	160%	159%	data	data	126%	190%
7	Northern	Montana, 2015		117.8	61.9	77			12	12.2
38	d MTCL1732	AP035-8-1/5/MT08134/4/YLL*4/3/I		111.2	62.1	71			2	11.3
27	# Byrd CL Plus	Plainsgold/Col. Wheat Res Fdn, 201		110.5	62.8	74			9	10.9
9	FourOsix	Montana, 2018		109.2	62.3	75			29	11.8
42	+ MTS18116	Loma*2/Warhorse		108.9	63.0	63			1	10.6
32	d MT1642	Yellowstone/Madsen//Yellowstone		108.7	61.5	90			19	11.2
28	# AAC Wildfire	Alberta/SECAN, 2015		107.7	62.3	75			13	11.6
33	d MT1683	Yellowstone(L)*2/CDC Buteo		107.7	61.5	72			26	11.7
31	StandClear CLP	Montana/Loveland Products Inc., 201		107.1	64.0	76			10	12.2
43	+ MTS18149	Loma*2/AAC Gateway		107.1	62.1	60			7	12.3
11	Bobcat	Montana, 2019		106.2	63.6	54			1	11.6
19	#+ WB4792	WestBred, 2019		106.2	63.9	72			10	10.9
45	+ d MT1848	Northern//MT08184/MT0887		106.1	62.2	79			13	12.1
8	Loma	Montana, 2016		103.8	62.3	72			9	11.6
41	+ MTS1831	MTS0907/MTS0827		101.4	63.4	68			1	10.9
10	Flathead	Montana, 2019		100.9	62.9	78			14	11.9
34	MT1745	Decade*2/NI06732		100.4	62.6	62			17	11.3
40	+ d MTS1810	08X350-A6/Warhorse		99.7	64.7	65			5	12.1
36	d MT1787	MT08185//YLL*2/PI640431/3/PRC		99.6	62.8	75			20	11.6
1	Warhorse	Montana, 2013		99.0	62.1	66			3	12.2
39	MTCL1737	YLL-2CL/3/YLL*2/Pelsart//PROM/		98.5	61.3	63			19	11.7
49	+ MT1872	MT0859//MT0840/MT0873		98.1	64.0	58			10	11.7
23	#+ d LCS Helix AX	Limagrain Cereal Seeds, 2020		98.0	64.0	69			4	11.2
47	+ d MT1866	MT0859//00X83cE45/MT0698		97.9	62.6	75			7	11.1
29	#+ d Mpress (SWW)	McGregor Co./Syngenta Participat		97.0	59.7	67			23	10.7
46	+ MT1855	05X438-aC71(MT0097*2//Jagalen		95.5	62.4	71			11	11.4
48	+ d MT1867	MT0859//00X83cE45/MT0698		95.4	62.2	50			15	11.6
18	# WB4418	WestBred, 2018		95.4	62.4	64			8	11.5
24	# d Long Branch	Limagrain; Dyna-Gro Wheat, 2016		93.6	63.6	78			8	12.1
6	SY Clearstone 2CL	Montana/Syngenta, 2012		92.7	60.8	73			21	10.9
37	d MT1793	Decade-Fhb1		92.6	63.2	86			5	12.7
3	Judee	Montana, 2011		91.9	63.9	72			5	11.8
20	# d LCS Jet	Limagrain Cereal Seeds, 2015		91.4	58.9	67			27	11.5
14	# d SY Legend CL2	Syngenta, 2018		91.0	62.4	57			17	12.6
2	Yellowstone	Montana 2005		90.1	61.8	68			30	11.7
35	d MT1746	MT06103//MTW0881/SD06W166		88.3	64.2	53			11	11.3
4	Keldin	WestBred, 2011		88.0	62.9	50			22	12.2
26	#r d Langin	Plainsgold/Colorado Wheat Res F		87.7	62.7	50			25	11.4
22	#+ LCS 18-7071	Limagrain Cereal Seeds exp. line		87.6	61.6	35			20	11.4
44	+ d MT1845	Yellowstone/493-22(Reeder/6*Pal		86.7	61.6	69			10	12.3
16	# d WB4269	WestBred, 2017		86.4	63.4	66			6	11.9
25	# d Incline AX	Plainsgold/Colorado Wheat Res F		85.9	61.5	50			9	11.0
12	# d SY Monument	Syngenta (AgriPro), 2014		85.6	62.1	61			27	11.7
30	#+ CP7909	Winfield United (Croplan), 2018		82.3	63.3	56			18	12.3
5	Brawl CL Plus	Plainsgold/Colorado Wheat Res F		80.9	64.5	59			9	13.2
17	# d WB4311	WestBred, 2017		79.8	63.0	48			10	12.4
15	# SY Wolverine	Syngenta 2019		77.5	63.3	52			16	12.1
13	# SY 517 CL2	Syngenta (AgriPro), 2017		77.1	64.1	33			17	13.2
21	#+ LCS Photon AX	Limagrain Cereal Seeds, 2019		74.1	63.9	44			27	13.3
Average				96.0	62.6	64.7			13.4	11.8
LSD (0.05)				12.8	0.7	16.8			11.1	0.8
C. V. (%)				7.8	0.6	14.9			47.8	4.0
P-value (Varieties)				<.0001	<.0001	<.0001			<.0001	<.0001

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 10. 2020 Intrastate Winter Wheat Test (Exp. 35FB): Fort Benton/Carter (Nutrien)

Entry	Cultivar/Line	Pedigree	Yield bu/ac	Test weight lb/bu	Plant height in	Protein %
d = cultivars/lines dropped for 2021 test + = new for 2020, # = paid entry			RCB	RCB	RCB	RCB
29 #+ d	Mpress (SWW)	McGregor Co./Syngenta Participat	78.0	60.1	29.0	11.0
38 d	MTCL1732	AP035-8-1/5/MT08134/4/YLL*4/3/	74.0	61.0	29.3	12.2
7	Northern	Montana, 2015	73.2	62.6	32.3	12.8
46 +	MT1855	05X438-aC71(MT0097*2//Jagalen	72.3	62.3	30.3	12.2
42 +	MTS18116	Loma*2/Warhorse	71.9	63.7	28.7	11.9
43 +	MTS18149	Loma*2/AAC Gateway	71.4	61.7	29.3	13.5
27 #	Byrd CL Plus	Plainsgold/Col. Wheat Res Fdn, 2	71.2	62.6	30.7	11.5
20 # d	LCS Jet	Limagrains Cereal Seeds, 2015	70.9	60.4	26.7	12.4
28 #	AAC Wildfire	Alberta/SECAN, 2015	69.4	62.0	32.7	11.8
18 #	WB4418	WestBred, 2018	68.9	61.4	27.7	12.5
39	MTCL1737	YLL-2CL/3/YLL*2/Pelsart//PROM/	68.8	60.5	27.7	12.8
45 + d	MT1848	Northern/MT08184/MT0887	65.9	61.3	30.7	13.3
40 + d	MTS1810	08X350-A6/Warhorse	64.7	62.4	31.0	13.2
49 +	MT1872	MT0859//MT0840/MT0873	64.6	63.1	29.3	12.8
48 + d	MT1867	MT0859//00X83cE45/MT0698	64.5	63.2	28.3	12.1
32 d	MT1642	Yellowstone/Madsen//Yellowstone	64.4	61.6	32.0	12.9
22 #+	LCS 18-7071	Limagrains Cereal Seeds exp. line	63.8	62.5	30.0	12.6
34	MT1745	Decade*2/NI06732	63.7	63.0	29.7	12.2
1	Warhorse	Montana, 2013	63.7	62.1	30.0	13.5
41 +	MTS1831	MTS0907/MTS0827	63.3	63.4	28.3	12.0
47 + d	MT1866	MT0859//00X83cE45/MT0698	63.2	61.1	27.7	12.8
6	SY Clearstone 2CL	Montana/Syngenta, 2012	62.7	61.0	34.0	12.8
25 # d	Incline AX	Plainsgold/Colorado Wheat Res F	62.6	61.6	29.3	11.7
24 # d	Long Branch	Limagrains; Dyna-Gro Wheat, 2016	62.6	61.5	28.0	12.8
31	StandClear CLP	Montana/Loveland Products Inc.,	62.5	61.8	31.7	13.8
4	Keldin	WestBred, 2011	62.2	61.8	29.7	12.8
8	Loma	Montana, 2016	61.9	61.8	29.3	13.6
3	Judee	Montana, 2011	61.8	63.4	31.3	13.6
19 #+	WB4792	WestBred, 2019	60.3	62.8	30.0	12.3
2	Yellowstone	Montana 2005	60.3	61.0	31.7	13.0
37 d	MT1793	Decade-Fhb1	60.2	62.0	30.0	14.2
9	FourOsix	Montana, 2018	60.0	61.5	29.3	12.7
14 # d	SY Legend CL2	Syngenta, 2018	59.9	62.5	28.7	13.6
33 d	MT1683	Yellowstone(L)*2/CDC Buteo	59.9	60.8	31.3	14.0
11	Bobcat	Montana, 2019	59.8	62.2	28.3	12.7
44 + d	MT1845	Yellowstone/493-22(Reeder/6*Pat	57.8	60.7	29.7	13.7
17 # d	WB4311	WestBred, 2017	57.7	61.8	26.7	13.6
12 # d	SY Monument	Syngenta (AgriPro), 2014	57.7	60.9	27.3	12.5
10	Flathead	Montana, 2019	57.5	61.6	29.3	13.7
35 d	MT1746	MT06103//MTW0881/SD06W166	56.6	62.7	28.0	13.6
26 #r d	Langin	Plainsgold/Colorado Wheat Res F	56.4	61.4	27.0	12.4
16 # d	WB4269	WestBred, 2017	55.8	61.6	26.0	12.9
23 #+	LCS Helix AX	Limagrains Cereal Seeds, 2020	55.4	62.7	28.3	12.7
36 d	MT1787	MT08185//YLL*2/PI640431/3/PRC	55.1	61.0	28.0	13.1
15 #	SY Wolverine	Syngenta 2019	54.2	61.1	25.0	13.5
5	Brawl CL Plus	Plainsgold/Colorado Wheat Res F	52.6	62.8	28.7	14.6
21 #+ d	LCS Photon AX	Limagrains Cereal Seeds, 2019	51.5	63.2	30.0	14.3
13 #	SY 517 CL2	Syngenta (AgriPro), 2017	48.0	62.6	28.3	14.8
30 #+	CP7909	Winfield United (Croplan), 2018	46.5	61.9	25.7	13.7
Average			62.3	61.9	29.2	13.0
LSD (0.05)			9.5	1.0	1.9	1.1
C. V. (%)			9.4	1.0	4.1	5.3
P-value (Varieties)			<.0001	<.0001	<.0001	<.0001

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 11. 2020 Intrastate Winter Wheat Test (Exp. 35): Multi-Location Yield (bu/a)

	Cultivar/Line	Bozeman RCB	Havre LAT	Sidney LAT	Williston RCB	Kalispell RCB	Moccasin RCB	Huntley LAT	Conrad LAT	Ft. Benton RCB	9 Loc Avg.
	lattice efficiency		150%	196%				191%	119%		
	Northern	100.0	49.4	65.2	57.8	164.0	59.8	84.1	117.8	73.2	85.7
#+	d Mpress (SWW)	97.9	57.1	63.5	50.8	170.7	63.9	90.3	97.0	78.0	85.5
#	Byrd CL Plus	93.3	57.7	59.6	51.9	158.7	66.2	98.4	110.5	71.2	85.3
	d MT1642	93.7	53.6	68.8	56.1	166.2	59.2	83.5	108.7	64.4	83.8
	Keldin	100.1	58.1	63.3	52.3	167.6	60.7	92.3	88.0	62.2	82.7
	d MT1683	92.1	53.6	65.9	53.1	158.5	58.0	87.8	107.7	59.9	81.8
#	d LCS Jet	95.6	52.5	58.0	52.6	171.1	58.5	84.2	91.4	70.9	81.6
	MTCL1737	92.7	51.8	63.5	52.3	156.7	62.0	85.9	98.5	68.8	81.4
	Loma	96.5	53.0	60.5	50.2	162.8	59.4	83.8	103.8	61.9	81.3
+	MTS18116	96.5	56.3	61.6	50.1	156.0	59.0	71.0	108.9	71.9	81.3
#	AAC Wildfire	93.8	52.0	59.5	55.2	156.9	59.4	77.0	107.7	69.4	81.2
	FourOsix	104.0	53.1	61.1	53.5	143.7	62.0	84.0	109.2	60.0	81.2
#+	WB4792	89.6	54.0	61.8	54.1	173.5	59.0	72.6	106.2	60.3	81.2
	d MTCL1732	85.3	54.9	55.2	50.7	158.7	60.3	78.4	111.2	74.0	81.0
	SY Clearstone 2CL	92.1	52.4	66.8	53.5	162.1	57.6	88.5	92.7	62.7	80.9
+	MT1855	99.6	53.1	59.7	51.7	153.6	57.3	84.0	95.5	72.3	80.8
+	d MT1848	94.5	53.1	56.8	49.9	159.8	58.1	80.2	106.1	65.9	80.5
+	MTS18149	93.1	56.6	60.1	50.8	146.6	60.6	77.1	107.1	71.4	80.4
	MT1745	92.9	50.1	58.0	50.7	166.8	56.5	82.7	100.4	63.7	80.2
	Yellowstone	92.9	53.5	71.1	48.7	161.6	57.2	84.2	90.1	60.3	80.0
+	MTS1831	93.5	52.2	60.2	49.0	166.1	54.8	76.9	101.4	63.3	79.7
+	MT1872	94.8	52.9	57.8	42.7	154.8	56.8	91.9	98.1	64.6	79.4
+	d MT1867	94.0	53.2	52.9	43.3	168.1	54.6	86.8	95.4	64.5	79.2
#+	LCS 18-7071	93.3	54.3	54.7	56.2	150.4	64.7	81.3	87.6	63.8	78.5
	StandClear CLP	89.5	53.5	54.6	49.9	149.3	54.8	84.7	107.1	62.5	78.4
+	d MTS1810	87.3	57.4	54.2	52.9	148.6	51.7	83.0	99.7	64.7	77.7
	Bobcat	90.5	59.5	58.6	50.7	139.5	55.0	77.5	106.2	59.8	77.5
#	d Incline AX	94.0	52.0	56.0	49.0	150.5	61.5	84.2	85.9	62.6	77.3
+	d MT1845	93.1	53.3	67.0	52.0	145.2	56.7	82.4	86.7	57.8	77.1
+	d MT1866	91.1	49.9	47.6	46.3	155.1	51.8	89.1	97.9	63.2	76.9
#	d Langin	89.2	49.9	51.6	46.3	161.9	56.0	86.0	87.7	56.4	76.1
	Flathead	80.6	50.4	60.2	46.7	159.6	46.9	81.3	100.9	57.5	76.0
#+	d LCS Helix AX	80.4	51.8	57.1	49.3	159.3	52.5	78.5	98.0	55.4	75.8
	d MT1787	89.9	52.0	61.3	48.1	140.8	50.1	85.4	99.6	55.1	75.8
#	d Long Branch	86.4	51.6	53.8	43.9	155.0	48.8	83.8	93.6	62.6	75.5
	Judee	92.2	50.8	50.4	47.8	146.3	56.1	78.9	91.9	61.8	75.1
	d MT1746	89.4	49.3	52.9	41.2	146.6	59.2	82.7	88.3	56.6	74.0
#	WB4418	73.7	46.3	56.5	47.7	145.8	50.6	75.5	95.4	68.9	73.4
#	d SY Monument	84.2	49.8	52.3	46.5	145.2	55.1	79.0	85.6	57.7	72.8
	d MT1793	87.5	46.2	60.7	46.5	138.0	49.7	73.0	92.6	60.2	72.7
	Warhorse	73.8	51.4	53.0	43.7	138.5	51.2	76.7	99.0	63.7	72.3
#	d WB4311	80.6	50.0	51.6	44.0	148.9	52.4	83.1	79.8	57.7	72.0
#	SY Wolverine	79.8	49.0	50.9	45.4	156.9	47.7	82.9	77.5	54.2	71.6
#	d SY Legend CL2	74.8	48.5	55.1	46.5	141.9	47.9	74.7	91.0	59.9	71.1
#	d WB4269	73.5	49.0	53.4	49.6	144.7	45.0	73.8	86.4	55.8	70.1
	Brawl CL Plus	73.8	47.1	55.8	46.1	135.6	45.8	80.4	80.9	52.6	68.7
#+	LCS Photon AX	75.7	49.9	51.3	46.5	123.7	46.6	68.7	74.1	51.5	65.3
#+	CP7909	74.4	29.8	50.5	44.3	122.5	42.8	77.6	82.3	46.5	63.4
#	SY 517 CL2	61.5	44.7	45.1	46.3	122.0	35.0	75.2	77.1	48.0	61.7
	Average	88.5	51.7	57.7	49.3	152.4	55.0	81.7	96.0	62.3	77.2
	LSD (0.05)	8.2	5.8	6.5	4.7	15.0	7.2	7.3	12.8	9.5	5.2
	C. V. (%)	5.7	6.4	6.4	5.9	6.2	8.1	5.1	7.8	9.4	7.3
	P-value (Varieties)	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001		<.0001	<.0001	<.0001

+ = new for 2020, # = paid entry

d = cultivars/lines dropped for 2021 test

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 12. 2020 Intrastate Winter Wheat Test (Exp. 35): Multi-Location Test Weight (lb/bu)

Cultivar/Line		Bozeman LAT	Havre LAT	Sidney LAT	Williston RCB	Kalispell RCB	Moccasin RCB	Huntley LAT	Conrad LAT	Ft. Benton RCB	9 Loc Avg.
lattice efficiency		143%	173%	136%				119%	160%		
#+ d	LCS Photon AX	64.2	63.6	62.4	62.3	64.5	65.4	65.6	63.9	63.2	63.9
#+	WB4792	64.1	64.5	62.8	61.8	62.2	65.3	65.2	63.9	62.8	63.6
#	SY 517 CL2	63.6	63.7	61.3	60.4	64.8	64.8	65.3	64.1	62.6	63.4
	Brawl CL Plus	63.7	63.4	61.3	61.2	63.5	65.1	65.1	64.5	62.8	63.4
	Judee	63.3	63.6	61.2	61.7	64.0	64.9	63.7	63.9	63.4	63.3
+ d	MTS1810	63.8	63.9	60.9	61.0	62.0	65.0	64.7	64.7	62.4	63.2
	d MT1746	64.3	62.9	59.8	61.1	63.6	65.0	65.4	64.2	62.7	63.2
#+	LCS Helix AX	63.8	63.2	61.7	60.8	63.2	63.6	64.8	64.0	62.7	63.1
+	MTS18116	63.5	64.0	60.7	62.0	60.6	64.3	63.9	63.0	63.7	62.9
+	MT1872	63.4	62.5	59.9	60.2	63.5	64.8	64.8	64.0	63.1	62.9
+	MTS1831	62.7	63.9	61.0	62.2	59.5	64.4	64.6	63.4	63.4	62.8
	StandClear CLP	63.7	62.4	58.7	60.7	63.7	65.1	64.0	64.0	61.8	62.7
#	SY Wolverine	62.9	63.1	59.5	60.4	63.6	64.0	65.2	63.3	61.1	62.6
# d	WB4311	62.7	62.8	61.7	59.4	62.6	64.0	64.7	63.0	61.8	62.5
# d	WB4269	63.0	62.4	60.6	60.2	63.6	63.5	64.6	63.4	61.6	62.5
	Keldin	62.9	62.0	60.6	61.0	62.9	63.9	64.2	62.9	61.8	62.5
	Flathead	62.9	63.1	60.3	60.1	63.4	63.3	64.9	62.9	61.6	62.5
+	MT1855	62.9	62.4	60.4	61.0	62.5	64.4	63.0	62.4	62.3	62.4
#+	CP7909	62.7	62.4	60.0	60.1	63.5	62.9	64.5	63.3	61.9	62.4
	Bobcat	62.7	62.6	59.4	60.7	63.8	63.5	63.0	63.6	62.2	62.4
	MT1745	63.6	62.9	58.7	59.9	62.5	64.7	63.6	62.6	63.0	62.4
# d	SY Legend CL2	63.1	62.7	58.0	59.9	63.6	65.2	64.1	62.4	62.5	62.4
	FourOsix	63.0	62.2	60.2	60.9	62.8	63.6	64.0	62.3	61.5	62.3
# d	Long Branch	63.2	62.5	59.4	59.7	63.1	63.1	64.2	63.6	61.5	62.3
#	Byrd CL Plus	63.3	63.0	58.5	59.5	62.2	64.8	63.9	62.8	62.6	62.3
d	MT1793	62.9	62.3	59.4	59.7	62.0	65.0	63.5	63.2	62.0	62.2
#+	LCS 18-7071	62.9	62.1	60.9	60.5	61.5	63.2	63.3	61.6	62.5	62.1
d	MT1787	62.6	62.1	60.3	60.8	62.7	63.4	63.5	62.8	61.0	62.1
	Northern	62.5	62.0	59.9	61.0	61.1	63.6	63.7	61.9	62.6	62.0
+ d	MT1867	63.2	61.3	56.3	59.7	62.5	65.2	64.2	62.2	63.2	62.0
# d	Langin	62.6	62.3	58.6	60.9	61.4	63.2	64.0	62.7	61.4	61.9
+ d	MT1845	62.9	61.5	60.4	60.1	62.3	63.5	63.0	61.6	60.7	61.8
#	WB4418	62.5	61.4	59.7	60.9	60.1	63.3	64.4	62.4	61.4	61.8
+ d	MT1866	62.0	61.6	59.3	59.3	62.6	64.2	63.1	62.6	61.1	61.8
	Yellowstone	61.5	61.5	60.5	60.5	61.4	62.6	63.4	61.8	61.0	61.6
	Loma	61.5	62.1	60.0	60.3	61.2	63.3	62.3	62.3	61.8	61.6
d	MT1642	61.9	61.8	59.6	60.1	62.3	63.1	62.9	61.5	61.6	61.6
	Warhorse	61.3	62.1	59.1	59.4	62.1	63.8	62.7	62.1	62.1	61.6
d	MT1683	61.8	61.4	60.1	60.3	62.2	62.1	62.9	61.5	60.8	61.5
+ d	MT1848	62.1	61.3	59.3	60.4	62.1	62.5	62.2	62.2	61.3	61.5
	SY Clearstone 2CL	61.7	61.6	59.2	60.4	61.9	63.2	62.9	60.8	61.0	61.4
# d	SY Monument	61.9	61.6	58.1	58.8	61.9	63.9	63.3	62.1	60.9	61.4
+	MTS18149	61.6	62.4	60.2	60.4	58.6	62.3	62.5	62.1	61.7	61.3
# d	Incline AX	61.6	61.9	59.1	59.2	61.1	62.9	63.0	61.5	61.6	61.3
#	AAC Wildfire	61.9	61.5	58.8	59.8	59.1	63.1	63.2	62.3	62.0	61.3
d	MTCL1732	61.4	62.1	57.7	59.4	61.5	63.6	62.6	62.1	61.0	61.3
	MTCL1737	61.0	61.1	59.8	60.4	61.2	62.9	63.0	61.3	60.5	61.2
#+ d	Mpress (SWW)	59.4	60.5	58.2	59.6	60.8	62.4	61.5	59.7	60.1	60.2
# d	LCS Jet	59.6	60.0	58.7	57.7	61.5	60.6	61.8	58.9	60.4	59.9
Average		62.6	62.4	59.8	60.4	62.2	63.8	63.8	62.6	61.9	62.2
LSD (0.05)		0.8	0.6	1.0	1.3	1.1	1.6	0.9	0.7	1.0	0.7
C. V. (%)		0.7	0.5	1.0	1.4	1.1	1.5	0.9	0.6	1.0	1.2
P-value (Varieties)		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001		<.0001	<.0001	<.0001

+ = new for 2020, # = paid entry

d = cultivars/lines dropped for 2021 test

bold = indicates highest value within a column

1/ = not in overall statistics, due to no value at Sidney

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 13. 2020 Intrastate Winter Wheat Test (Exp. 35): Multi-Location Winter Survival (%)

Cultivar/Line	Conrad LAT	Williston LAT	2 Loc Avg.
lattice efficiency	159%	109%	
d MT1642	90	93	92
d MT1793	86	96	91
d MT1787	75	94	85
Flathead	78	91	85
# Byrd CL Plus	74	94	84
Northern	77	89	83
SY Clearstone 2CL	73	93	83
StandClear CLP	76	89	83
+ d MT1866	75	90	82
FourOsix	75	89	82
+ d MT1848	79	84	82
+ d MT1845	69	94	81
d MTCL1732	71	92	81
d MT1683	72	89	81
# AAC Wildfire	75	86	80
Loma	72	87	80
#+ d LCS Helix AX	69	90	79
Judee	72	86	79
#+ WB4792	72	86	79
Warhorse	66	92	79
# d WB4269	66	91	79
Brawl CL Plus	59	97	78
#+ d Mpress (SWW)	67	87	77
MT1745	62	92	77
+ MTS1831	68	86	77
# d Long Branch	78	75	77
+ MT1855	71	81	76
MTCL1737	63	90	76
# WB4418	64	87	76
Yellowstone	68	83	76
# d LCS Jet	67	83	75
+ d MTS1810	65	85	75
# d SY Legend CL2	57	91	74
# d SY Monument	61	87	74
+ MTS18116	63	84	74
+ MTS18149	60	84	72
+ MT1872	58	86	72
# d Incline AX	50	89	70
# SY Wolverine	52	88	70
Keldin	50	90	70
+ d MT1867	50	87	69
d MT1746	53	84	69
Bobcat	54	82	68
# d WB4311	48	89	68
#+ CP7909	56	74	65
#+ LCS Photon AX	44	83	64
#r d Langin	50	73	62
# SY 517 CL2	33	86	60
#+ LCS 18-7071	35	71	53
Average	64.7	87.1	75.9
LSD (0.05)	16.8	10.1	15.7
C. V. (%)	14.9	6.8	10.3
P-value (Varieties)	<.0001	0.0003	0.0152

+ = new for 2020, # = paid entry

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 14. 2020 Intrastate Winter Wheat Test (Exp. 35): Multi-Location Heading Date (days from Jan. 1)

Cultivar/Line		Bozeman LAT	Havre LAT	Sidney RCB	Williston RCB	Kalispell RCB	Moccasin not used	Huntley LAT	Conrad not taken	Ft. Benton not taken	6 Loc Avg.
lattice efficiency		107%	144%					113%			
#+	CP7909	163.1	155.1	154.3	153.7	156.0		153.8			156.0
	Brawl CL Plus	163.7	155.7	154.7	154.7	161.0		154.5			157.4
#	d Long Branch	164.5	155.2	155.3	155.0	161.0		155.9			157.8
#r	d Langin	163.7	156.2	154.7	156.0	161.0		155.8			157.9
#	SY 517 CL2	164.7	156.2	155.7	154.7	161.0		156.9			158.2
#	SY Wolverine	164.4	156.7	155.0	156.0	161.0		156.8			158.3
	Flathead	165.2	157.3	156.3	155.7	161.0		155.7			158.5
#+	LCS Helix AX	164.4	156.6	156.0	154.7	163.3		156.1			158.5
#	d WB4269	164.6	156.2	157.7	157.0	161.0		155.5			158.7
#	WB4418	165.1	156.4	155.3	155.3	165.0		157.3			159.1
#+	d LCS Photon AX	165.3	156.6	157.0	157.0	163.0		156.5			159.2
#	Byrd CL Plus	165.1	158.0	159.0	157.3	163.3		156.9			159.9
#	d SY Legend CL2	168.1	157.8	158.0	158.3	161.0		157.0			160.0
	d MT1793	166.1	158.2	158.7	156.7	163.0		157.7			160.1
#	d WB4311	164.8	158.7	158.7	158.3	167.0		156.8			160.7
#	d SY Monument	168.3	158.7	158.7	158.0	167.0		158.3			161.5
+	d MT1845	169.2	159.7	159.0	159.0	165.0		159.3			161.9
	FourOsix	169.6	159.2	159.7	159.7	167.0		159.1			162.4
+	d MT1867	172.0	160.3	158.7	158.3	167.0		159.5			162.6
	d MT1746	169.1	160.9	159.3	160.0	167.0		161.2			162.9
#	d Incline AX	168.5	161.4	160.0	160.3	167.0		160.5			163.0
#+	WB4792	170.3	160.8	160.0	159.3	167.0		161.2			163.1
+	MT1872	171.1	160.9	160.7	160.0	167.0		161.4			163.5
	d MTCL1732	172.7	161.1	159.3	161.7	167.0		159.6			163.6
+	d MT1866	172.2	160.4	160.7	161.3	167.0		160.5			163.7
	d MT1642	173.7	161.3	158.3	160.3	167.0		162.1			163.8
	d MT1787	171.5	161.4	160.7	160.0	167.0		162.2			163.8
	Judee	171.4	162.0	160.7	161.3	167.0		161.2			163.9
	Keldin	172.8	161.3	161.0	159.7	167.0		161.3			163.9
#	d LCS Jet	171.3	161.1	162.3	161.0	167.0		160.7			163.9
	StandClear CLP	171.6	160.8	161.7	162.0	167.0		160.2			163.9
	d MT1683	172.6	161.5	160.7	160.7	167.0		161.7			164.0
	Warhorse	171.6	161.7	161.3	160.3	167.0		162.2			164.0
#+	LCS 18-7071	172.1	162.0	162.0	160.3	167.0		161.8			164.2
	Yellowstone	173.3	162.4	161.0	160.7	167.0		161.8			164.4
	MT1745	173.2	161.7	161.0	160.7	167.0		163.1			164.5
	SY Clearstone 2CL	173.5	161.5	161.0	162.3	167.0		161.4			164.5
	Bobcat	172.6	161.6	161.0	162.7	167.0		162.4			164.6
	Northern	172.1	161.8	162.0	162.0	167.7		162.2			164.6
+	d MT1848	173.9	162.5	162.0	162.7	167.0		163.0			165.2
+	MT1855	174.0	162.4	162.7	164.3	167.7		163.1			165.7
	MTCL1737	174.8	163.2	163.0	163.3	168.3		163.4			166.0
+	d MTS1810	175.0	163.6	164.0	164.0	167.7		163.0			166.2
#+	d Mpress (SWW)	174.8	162.9	163.3	164.0	168.3		164.2			166.3
+	MTS18116	174.2	163.8	162.7	164.0	169.0		163.8			166.3
	Loma	173.9	164.3	162.7	163.0	171.3		164.0			166.5
+	MTS18149	174.9	164.1	163.0	162.7	170.3		163.8			166.5
#	AAC Wildfire	175.9	163.5	165.3	164.0	169.7		164.2			167.1
+	MTS1831	174.5	163.4	164.7	164.7	171.3		165.0			167.3
Average		170.1	160.2	159.8	159.8	165.8		160.1			162.6
LSD (0.05)		1.6	1.3	1.8	1.7	2.2		1.3			1.1
C. V. (%)		0.6	0.5	0.7	0.7	0.8		0.5			0.6
P-value (Varieties)		<.0001	<.0001	<.0001	<.0001	<.0001					<.0001

+ = new for 2020, # = paid entry

d = cultivars/lines dropped for 2021 test

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 15. 2020 Intrastate Winter Wheat Test (Exp. 35): Multi-Location Plant Height (in)

	Cultivar/Line	Bozeman RCB	Havre LAT	Sidney LAT	Williston RCB	Kalispell RCB	Moccasin not used	Huntley LAT	Conrad not taken	Ft. Benton RCB	7 Loc Avg.
	lattice efficiency		106%	122%				126%			
#	d LCS Jet	27.0	21.2	20.8	18.4	33.9		28.7		26.7	25.2
#	d WB4269	27.2	23.3	20.9	17.7	35.8		29.7		26.0	25.8
#+	CP7909	26.5	24.0	22.7	19.9	33.8		30.0		25.7	26.1
#	d WB4311	26.5	23.2	23.7	20.3	32.9		29.7		26.7	26.1
#	SY 517 CL2	27.3	23.9	22.3	20.2	32.4		29.8		28.3	26.3
#	SY Wolverine	27.6	22.5	21.7	20.5	35.9		30.7		25.0	26.3
#	WB4418	27.4	21.9	21.6	21.1	36.2		30.4		27.7	26.6
	MTCL1737	29.4	22.8	22.0	20.9	35.2		29.1		27.7	26.7
+	MTS18116	29.8	23.0	22.6	19.6	35.0		28.6		28.7	26.8
+	MTS1831	28.6	23.3	22.7	19.7	35.6		29.1		28.3	26.8
#r	d Langin	28.9	24.5	21.9	19.2	35.9		31.0		27.0	26.9
	d MT1787	27.7	23.6	23.8	19.7	36.0		29.8		28.0	26.9
+	d MT1866	29.0	22.9	22.8	20.5	36.3		30.7		27.7	27.1
+	MTS18149	28.5	23.8	20.9	19.4	37.5		30.4		29.3	27.1
	d MT1746	28.7	23.8	23.2	19.9	37.7		29.4		28.0	27.2
#	d SY Monument	28.9	24.2	23.7	20.1	35.7		31.5		27.3	27.3
	Bobcat	29.7	24.0	24.0	21.7	36.4		28.8		28.3	27.6
#+	LCS Helix AX	29.9	23.4	22.8	20.2	37.7		30.8		28.3	27.6
	Brawl CL Plus	29.4	24.8	21.9	21.3	34.5		33.8		28.7	27.8
#	d Long Branch	29.8	24.1	22.3	20.9	36.5		32.9		28.0	27.8
+	MT1855	30.6	23.7	21.6	19.6	39.0		30.7		30.3	27.9
	Loma	30.6	24.0	23.0	19.3	38.8		31.1		29.3	28.0
	d MT1793	31.4	22.2	24.8	20.6	36.1		31.1		30.0	28.0
	d MTCL1732	30.4	24.8	24.2	20.9	36.6		30.5		29.3	28.1
#	d SY Legend CL2	29.9	24.8	24.8	21.5	35.8		31.3		28.7	28.1
	FourOsix	30.8	26.2	22.7	23.4	34.7		31.5		29.3	28.4
#+	d Mpress (SWW)	29.7	25.6	23.7	22.0	37.0		32.1		29.0	28.4
+	MT1872	31.1	23.4	24.8	21.5	36.9		31.8		29.3	28.4
+	d MT1848	32.0	24.9	22.8	21.9	35.9		31.0		30.7	28.5
+	d MT1867	30.2	24.7	24.5	20.9	39.0		32.6		28.3	28.6
	Warhorse	31.5	22.9	23.0	21.3	39.2		32.4		30.0	28.6
#	d Incline AX	31.6	24.7	23.0	22.7	38.5		31.3		29.3	28.7
#+	WB4792	30.6	24.0	24.9	22.4	37.4		31.8		30.0	28.7
+	d MT1845	29.9	23.7	25.8	21.9	37.2		33.5		29.7	28.8
#+	d LCS Photon AX	32.0	24.0	24.7	21.7	38.5		31.7		30.0	28.9
	Flathead	30.2	26.3	25.7	21.5	36.8		33.0		29.3	29.0
	Keldin	31.2	25.1	25.4	22.7	37.4		31.6		29.7	29.0
+	d MTS1810	31.6	24.8	24.0	21.3	38.7		32.3		31.0	29.1
	MT1745	31.5	24.8	23.7	22.0	41.0		32.6		29.7	29.3
	StandClear CLP	32.2	25.7	24.4	22.3	36.6		33.1		31.7	29.4
	Judee	33.1	24.9	23.4	23.2	38.0		32.9		31.3	29.5
#+	LCS 18-7071	32.2	26.1	23.9	23.8	40.2		32.0		30.0	29.7
	Northern	33.3	23.9	24.7	21.9	40.8		33.0		32.3	30.0
#	Byrd CL Plus	32.7	25.3	25.9	22.2	40.3		34.8		30.7	30.3
#	AAC Wildfire	34.5	24.7	25.1	22.3	42.4		32.3		32.7	30.6
	Yellowstone	33.6	27.5	26.9	22.6	40.5		34.5		31.7	31.0
	d MT1642	33.3	27.1	25.6	24.5	40.3		34.8		32.0	31.1
	d MT1683	33.9	27.7	27.6	24.4	39.3		34.2		31.3	31.2
	SY Clearstone 2CL	34.9	26.6	24.8	24.5	40.5		35.5		34.0	31.5
	Average	30.4	24.3	23.6	21.3	37.2		31.5		29.2	28.2
	LSD (0.05)	1.5	1.8	2.4	1.6	3.1		1.6		1.9	1.1
	C. V. (%)	3.0	4.4	5.8	4.5	5.1		2.9		4.1	3.7
	P-value (Varieties)	<.0001	<.0001	<.0001	<.0001	<.0001				<.0001	<.0001

+ = new for 2020, # = paid entry

d = cultivars/lines dropped for 2021 test

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p=0.05)

Table 16. 2020 Intrastate Winter Wheat Test (Exp. 35): Multi-Location Sawfly cutting (%)

Cultivar/Line		Havre LAT	Conrad LAT	2 Loc Avg.
lattice efficiency		137%	126%	
+ d	MTS1810	1	5	3
+	MTS1831	12	1	7
+	MTS18116	13	1	7
	Bobcat	19	1	10
d	MTCL1732	18	2	10
# d	WB4269	20	6	13
	Judee	31	5	18
+	MT1872	25	10	18
+	MTS18149	29	7	18
	Northern	25	12	18
	Warhorse	35	3	19
d	MT1793	34	5	19
#	WB4418	32	8	20
	Brawl CL Plus	31	9	20
+ d	MT1845	31	10	21
#+	WB4792	31	10	21
# d	Incline AX	34	9	21
+	d MT1848	29	13	21
#+	d LCS Helix AX	40	4	22
d	MT1746	35	11	23
	MTCL1737	28	19	24
	Loma	38	9	24
	Flathead	34	14	24
# d	Long Branch	40	8	24
	MT1745	31	17	24
#	SY 517 CL2	34	17	26
#	Byrd CL Plus	44	9	26
+	d MT1866	46	7	26
d	MT1787	33	20	27
d	MT1642	41	19	30
# d	SY Legend CL2	46	17	31
# d	SY Monument	36	27	32
d	MT1683	38	26	32
#	SY Wolverine	48	16	32
# d	WB4311	55	10	32
#	AAC Wildfire	52	13	33
#+	d Mpress (SWW)	43	23	33
+	MT1855	57	11	34
	Yellowstone	38	30	35
	StandClear CLP	61	10	35
+	d MT1867	56	15	36
#+	LCS 18-7071	54	20	37
#+	CP7909	56	18	37
#r d	Langin	50	25	38
	SY Clearstone 2CL	55	21	38
# d	LCS Jet	51	27	39
#+	LCS Photon AX	52	27	40
	Keldin	61	22	41
	FourOsix	62	29	46
Average		38.1	13.4	25.8
LSD (0.05)		15.6	11.1	16.4
C. V. (%)		23.5	47.8	31.6
P-value (Varieties)		<.0001	<.0001	0.0002

+ = new for 2020, # = paid entry

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 16b. 2020 Intrastate Winter Wheat Test (Exp. 35): Falling Number

Cultivar/Line		Havre LAT	Kalispell LAT	2 Loc Avg.
lattice efficiency		171%	106%	
+	d MT1848	507	428	467
+	d MT1845	474	411	442
	Warhorse	485	394	439
#	d SY Legend CL2	447	405	426
	Northern	460	379	419
	d MT1642	437	401	419
	SY Clearstone 2CL	444	391	417
+	d MTS1810	441	391	416
	MT1745	428	401	414
	Yellowstone	438	387	413
#+	LCS Photon AX	400	422	411
	d MT1683	427	381	404
	Flathead	423	380	401
#	SY 517 CL2	391	409	400
	FourOsix	403	381	392
	StandClear CLP	394	387	391
	d MT1787	390	389	390
	d MT1793	397	382	390
	Brawl CL Plus	391	387	389
#+	WB4792	402	373	388
	d MT1746	383	375	379
	Bobcat	382	376	379
#	AAC Wildfire	399	357	378
#	d WB4311	388	364	376
#+	CP7909	390	358	374
#	d SY Monument	384	362	373
+	MT1855	407	338	373
	MTCL1737	401	343	372
	Keldin	392	349	371
#	d WB4269	376	359	368
+	MTS18149	387	345	366
	d MTCL1732	373	356	365
+	d MT1866	362	367	364
#+	LCS 18-7071	372	353	362
	Judee	387	331	359
#r	d Langin	382	326	354
+	MT1872	355	351	353
#	Byrd CL Plus	382	321	352
#	d Long Branch	342	356	349
+	d MT1867	371	318	344
#	SY Wolverine	350	337	344
+	MTS18116	369	319	344
#+	d LCS Helix AX	341	346	344
#	d Incline AX	357	329	343
#	WB4418	363	319	341
	Loma	423	259	341
#	d LCS Jet	336	345	341
+	MTS1831	355	312	334
#+	d Mpress (SWW)	326	302	314
Average		396.2	362.3	379.3
LSD (0.05)		20.4	21.4	46.7
C. V. (%)		2.9	3.5	6.1
P-value (Varieties)		<.0001	<.0001	<.0001

+ = new for 2020, # = paid entry

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 17. 2020 Intrastate Winter Wheat Test (Exp. 35): Multi-Location Grain Protein (%)

	Cultivar/Line	Bozeman Bulk	Havre LAT	Sidney LAT	Williston LAT	Kalispell LAT	Moccasin RCB	Huntley LAT	Conrad LAT	Ft. Benton RCB	9 Loc Avg.
	lattice efficiency		162%	121%	123%	122%		113%	190%		
#	SY 517 CL2	15.7	14.3	13.6	13.4	10.7	14.0	14.2	13.2	14.8	13.8
d	MT1793	14.9	15.5	14.0	14.3	10.4	12.5	14.9	12.7	14.2	13.7
	Brawl CL Plus	15.3	14.0	13.3	13.4	11.4	12.6	14.0	13.2	14.6	13.5
	Judee	14.1	15.2	14.7	15.8	10.4	11.0	14.2	11.8	13.6	13.4
+	d MT1848	14.0	15.1	14.9	14.8	11.1	10.5	14.4	12.1	13.3	13.4
+	d MTS1810	13.7	14.5	14.7	15.7	11.2	11.0	14.3	12.1	13.2	13.4
#+	d LCS Photon AX	14.2	14.0	13.1	13.2	10.7	12.2	14.8	13.3	14.3	13.3
	Warhorse	14.5	14.8	14.3	13.7	10.9	11.1	13.9	12.2	13.5	13.2
+	MTS18149	13.4	14.8	13.7	15.1	10.5	10.2	14.0	12.3	13.5	13.1
	Northern	12.8	14.8	14.1	14.9	10.2	11.1	14.7	12.2	12.8	13.1
#	d WB4311	14.9	14.2	13.2	13.5	10.3	12.0	14.1	12.4	13.6	13.1
+	d MT1845	14.1	14.7	13.3	13.1	11.2	10.9	14.0	12.3	13.7	13.0
	StandClear CLP	13.8	14.1	13.6	13.2	10.5	11.3	14.3	12.2	13.8	13.0
#	d SY Legend CL2	13.6	14.5	14.0	13.0	10.2	11.7	13.4	12.6	13.6	13.0
	Loma	13.5	14.7	13.9	13.8	10.5	10.5	14.1	11.6	13.6	12.9
	d MT1683	13.5	14.5	13.6	14.3	10.1	10.7	13.6	11.7	14.0	12.9
+	MT1855	13.0	14.3	14.1	15.7	10.3	10.4	14.8	11.4	12.2	12.9
	d MT1642	13.4	14.6	13.8	14.0	10.1	10.9	13.9	11.2	12.9	12.8
#	AAC Wildfire	13.5	13.8	14.1	14.8	10.2	10.5	14.0	11.6	11.8	12.7
	Bobcat	12.9	14.4	13.7	14.6	10.2	10.2	14.2	11.6	12.7	12.7
	Flathead	14.0	13.9	13.2	12.3	10.1	11.4	13.7	11.9	13.7	12.7
	d MT1787	13.2	14.3	13.9	13.4	10.7	10.3	13.8	11.6	13.1	12.7
+	d MT1866	13.7	14.1	13.8	13.6	9.8	11.1	14.5	11.1	12.8	12.7
	MTCL1737	13.0	14.5	14.2	14.6	10.4	10.1	13.3	11.7	12.8	12.7
	SY Clearstone 2CL	13.4	14.7	13.9	13.7	9.7	10.5	13.9	10.9	12.8	12.6
#	SY Wolverine	13.9	14.5	13.0	12.6	10.2	10.9	13.0	12.1	13.5	12.6
	Yellowstone	13.3	14.4	13.3	13.9	10.2	10.6	13.2	11.7	13.0	12.6
	FourOsix	13.2	14.2	13.8	13.1	9.8	10.3	13.8	11.8	12.7	12.5
	Keldin	13.8	14.3	12.7	12.5	9.8	10.9	13.5	12.2	12.8	12.5
	d MT1746	13.6	13.7	13.1	12.5	10.4	10.7	13.9	11.3	13.6	12.5
+	MT1872	13.6	13.9	12.8	12.8	10.1	11.5	13.1	11.7	12.8	12.5
#+	CP7909	13.5	13.5	12.5	12.1	9.7	11.9	12.6	12.3	13.7	12.4
#	d LCS Jet	13.0	14.0	13.4	14.4	9.6	9.4	13.4	11.5	12.4	12.3
	d MTCL1732	13.1	13.5	13.9	12.8	10.5	10.1	13.0	11.3	12.2	12.3
#	d WB4269	13.8	12.8	12.2	11.8	10.3	12.8	12.3	11.9	12.9	12.3
#	WB4418	13.0	13.5	12.4	12.5	10.2	11.1	12.9	11.5	12.5	12.2
#+	LCS Helix AX	13.9	13.1	12.2	11.9	9.7	11.1	12.8	11.2	12.7	12.1
#	d Long Branch	13.4	13.1	12.2	11.5	9.7	11.7	12.7	12.1	12.8	12.1
	MT1745	12.6	13.6	13.0	12.4	10.2	10.7	13.1	11.3	12.2	12.1
+	d MT1867	12.9	13.5	13.4	12.6	9.7	10.2	13.1	11.6	12.1	12.1
+	MTS18116	12.3	13.3	13.3	13.7	9.9	9.2	12.9	10.6	11.9	11.9
+	MTS1831	12.4	13.3	12.9	13.7	10.2	9.5	12.4	10.9	12.0	11.9
#	d SY Monument	12.8	13.1	12.5	11.4	10.3	10.4	12.4	11.7	12.5	11.9
#	d Langin	12.7	13.0	12.1	12.1	9.2	9.5	12.1	11.4	12.4	11.6
#+	LCS 18-7071	11.6	12.5	11.8	13.0	9.6	9.0	13.1	11.4	12.6	11.6
#+	WB4792	12.3	13.1	12.3	12.6	9.2	9.7	12.2	10.9	12.3	11.6
#	Byrd CL Plus	12.7	13.1	12.5	12.0	9.0	9.1	12.6	10.9	11.5	11.5
#	d Incline AX	12.2	12.9	12.6	12.5	8.9	9.3	12.6	11.0	11.7	11.5
#+	d Mpress (SWW)	12.0	12.9	12.2	12.1	9.5	9.0	12.4	10.7	11.0	11.3
	Average	13.4	14.0	13.3	13.4	10.2	10.8	13.5	11.8	13.0	12.6
	LSD (0.05)		0.4	0.4	0.9	0.6	0.7	0.6	0.8	1.1	0.5
	C. V. (%)		1.6	1.7	3.7	3.2	3.8	2.7	4.0	5.3	4.6
	P-value (Varieties)		<.0001	<.0001	<.0001	<.0001	<.0001		<.0001	<.0001	<.0001

+ = new for 2020, # = paid entry

d = cultivars/lines dropped for 2021 test

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p=0.05)

Table 18. 2020 Intrastate Winter Wheat Test (Exp. 35): Multi-Location Stem Solidness (5-25)

Cultivar/Line		Pedigree	Bozeman		Conrad	Havre	Northern Seeds - Carter	4 Loc Average
d = cultivars/lines dropped for 2021 test			7-Jul	2-Jul	26%	2-Jul	25-Jun	
		stem clipping date						
		% sawfly Infestation						
+	d	MTS1810	08X350-A6/Warhorse	25.0	24.8	24.2	23.3	24.3
		Bobcat	Montana, 2019	24.7	23.0	22.7	24.4	23.7
+		MTS1831	MTS0907/MTS0827	24.5	23.0	22.1	23.4	23.3
+		MTS18116	Loma*2/Warhorse	24.3	23.6	21.2	23.3	23.1
		Warhorse	Montana, 2013	23.8	22.7	21.2	21.4	22.3
+		MTS18149	Loma*2/AAC Gateway	22.0	22.0	22.0	20.0	21.5
		StandClear CLP	Montana/Loveland Products Inc., 2020 (MTCS1601R)	22.5	20.6	21.7	20.0	21.2
		Loma	Montana, 2016	22.5	20.8	20.6	19.4	20.8
		Judee	Montana, 2011	21.1	20.7	18.0	19.9	19.9
		Yellowstone	Montana 2005	7.2	7.5	7.8	5.9	7.1
		MT1855 ^{1/}	05X438-aC71(MT0097*2/Jagalene/Choteau)/Roughrider	22.0		20.8		
Average			21.7	20.9		20.1	20.1	20.7
LSD (0.05)			0.8	1.5		2.4	2.0	1.2
C. V. (%)			2.1	4.2		6.9	5.8	4.0
P-value (Varieties)			<.0001	<.0001		<.0001	<.0001	<.0001

+ = new for 2020, # = paid entry

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

1/ not in 4 location stats

Table 19. 2020 Intrastate Winter Wheat Test (Exp. 35): Multi-Location Stripe Rust Evaluation, including data from Pullman and Mt. Vernon, WA

Cultivar/Line d = cultivars/lines dropped for 2021 test + = new for 2020, # = paid entry		Stripe Rust					
		Pullman, WA		MT. Vernon, WA			
		Milk		Stem elong.		Heading/flowering	
		IT ^{1/}	%	IT ^{1/}	%	IT ^{1/}	%
#	AAC Wildfire	8	40	3	20	2	15
	Bobcat	5	10	2	10	2	5
	Brawl CL Plus	8	60	3	20	3	20
#	Byrd CL Plus	9	60	5	50	3	30
#+	CP7909	9	50	2	10	2	5
	Flathead	5	5	2	10	2	10
	FourOsix	5	20	2	15	2	5
# d	Incline AX	9	70	2	15	5	30
	Judee	5	15	2	10	2	5
	Keldin	5	30	3	20	3	20
#r d	Langin	8	30	2	10	2	10
# d	LCS Jet	5	60	2	15	3	15
#+ d	LCS Photon AX	8	70	2	5	3	10
#+ d	LCS Helix AX	5	30	2	15	3	15
#+ d	LCS-18-7071	9	80	5	40	5	40
	Loma	5	15	2	10	2	5
# d	Long Branch	5	5	2	10	2	10
#+ d	Mpress (SWW)	2	10	2	10	2	15
	MT1642	5	5	2	15	2	5
	MT1683	5	5	2	15	2	5
	MT1745	5	5	2	15	2	5
	MT1746	5	5	2	10	2	5
	MT1787	2	5	2	5	2	5
	MT1793	9	50	5	40	8	80
+ d	MT1845	5	5	2	15	2	5
+ d	MT1848	2	10	2	10	2	5
+ d	MT1855	2	10	2	15	2	5
+ d	MT1866	5	5	2	10	2	5
+ d	MT1867	5	5	2	15	2	10
+ d	MT1872	5	5	2	10	2	5
	MTCL1732	8	10	2	5	2	10
	MTCL1737	5	20	2	15	2	10
+ d	MTS1810	5	15	3	30	2	5
+ d	MTS18116	5	5	2	10	2	2
+ d	MTS18149	5	10	2	10	2	2
+ d	MTS1831	8	10	2	10	2	5
	Northern	5	10	2	15	2	5
	StandClear CLP	5	30	2	20	2	10
#	SY 517 CL2	8	60	2	15	2	5
	SY Clearstone 2C	5	10	2	20	2	10
# d	SY Legend CL2	8	50	2	10	8	60
# d	SY Monument	8	40	2	10	2	5
#	SY Wolverine	9	60	2	15	5	30
	Warhorse	5	10	2	10	2	5
# d	WB4269	8	50	2	10	2	5
# d	WB4311	2	2	3	20	2	10
#	WB4418	8	60	2	10	2	5
#+	WB4792	8	60	2	10	2	5
	Yellowstone	5	10	2	10	2	10
Average		26		15		12	

^{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

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 20. 2020 Winter Wheat Quality Drill Strips, Northern Agricultural Research Center

Entry	ID	Yield*	Test Weight	Moisture	Protein	Head Date	Plant Ht	Sawfly
		bu/ac	lb/bu	%	%	day	in	% cut
1	+ Yellowstone	63.2	61.9	9.3	14.7	6/8/20	27.5	36.0
2	+ Jagalene	58.7	63.5	9.3	14.4	6/5/20	25.2	39.0
3	+ MT1745	61.5	62.6	9.4	13.7	6/9/20	24.7	16.0
4	MT1746	59.9	63.1	9.3	14.5	6/9/20	23.9	14.0
5	+ MTCL1737	63.8	61.9	9.3	14.7	6/11/20	22.7	15.0

+ = lines entered in the 2020 Wheat Quality Council Mill and Bake Tests at Manhattan, KS

*Yield adjusted to 13% moisture.

Seeded September 25, 2019

Harvested July 31, 2020

Precipitation:

Seeding to Harvest: 9.21"

April 1 to June 30: 4.83

Table 21. 2017-2020 Intrastate Winter Wheat Test (Exp. 3501): Bozeman Yield, Test Weight and Protein

Cultivar/Line	Grain Yield (bushels/acre)				Test Weight (lb/bu)				Protein (%)			
	2020	2019-20	2018-20	2017-20	2020	2019-20	2018-20	2017-20	2020	2019-20	2018-20	2017-20
	1y	2y	3y	4y	1y	2y	3y	4y	1y	2y	3y	4y
# AAC Wildfire	93.8	109.6	118.1		61.9	62.5	62.9		13.5	13.0	12.8	
Bobcat	90.5	105.0	114.8	108.9	62.7	63.0	63.6	62.8	12.9	12.4	12.3	12.6
Brawl CL Plus	73.8	100.1	105.1	94.5	63.7	64.1	64.5	62.5	15.3	13.8	13.7	13.7
# Byrd CL Plus	93.3	115.7	122.3	107.3	63.3	63.1	63.5	61.8	12.7	11.9	11.6	11.9
#+ CP7909	74.4				62.7				13.5			
Flathead	80.6	107.8	115.3	116.2	62.9	63.5	63.9	63.7	14.0	12.8	12.6	12.6
FourOsix	104.0	116.3	122.3	117.9	63.0	63.1	63.5	62.9	13.2	12.6	12.4	12.6
# Incline AX	94.0	108.0	115.8		61.6	61.6	62.1		12.2	11.5	11.4	
Judee	92.2	107.4	114.3	108.2	63.3	63.4	64.0	63.1	14.1	13.3	12.9	13.1
Keldin	100.1	126.5	132.5	123.8	62.9	63.3	63.7	62.8	13.8	12.7	12.5	12.5
#r Langin	89.2				62.6				12.7			
#+ LCS 18-7071	93.3				62.9				11.6			
#+ LCS Helix AX	80.4				63.8				13.9			
# LCS Jet	95.6	120.8	129.0	127.9	59.6	60.5	61.1	60.6	13.0	12.2	12.1	12.4
#+ LCS Photon AX	75.7				64.2				14.2			
Loma	96.5	112.6	121.6	115.2	61.5	62.3	62.8	62.2	13.5	12.6	12.4	12.5
# Long Branch	86.4	103.6	114.0	112.9	63.2	63.4	63.7	63.1	13.4	12.3	12.2	12.2
#+ Mpress (SWW)	97.9				59.4				12.0			
MT1642	93.7	118.9	126.0		61.9	62.3	62.7		13.4	12.6	12.4	
MT1683	92.1	115.7	124.3		61.8	62.1	62.6		13.5	12.9	12.6	
MT1745	92.9	115.1			63.6	63.5			12.6	12.0		
MT1746	89.4	109.6			64.3	64.5			13.6	12.8		
MT1787	89.9	107.8			62.6	62.8			13.2	12.7		
MT1793	87.5	106.1			62.9	62.7			14.9	13.7		
+ MT1845	93.1				62.9				14.1			
+ MT1848	94.5				62.1				14.0			
+ MT1855	99.6				62.9				13.0			
+ MT1866	91.1				62.0				13.7			
+ MT1867	94.0				63.2				12.9			
+ MT1872	94.8				63.4				13.6			
MTCL1732	85.3	101.9			61.4	61.3			13.1	12.4		
MTCL1737	92.7	108.9			61.0	61.7			13.0	12.7		
+ MTS1810	87.3				63.8				13.7			
+ MTS18116	96.5				63.5				12.3			
+ MTS18149	93.1				61.6				13.4			
+ MTS1831	93.5				62.7				12.4			
Northern	100.0	122.6	131.0	120.8	62.5	62.8	63.1	62.0	12.8	12.2	12.1	12.5
StandClear CLP	89.5	108.6	117.5		63.7	63.8	64.0		13.8	13.1	13.0	
# SY 517 CL2	61.5	89.4	97.5	92.9	63.6	64.1	64.5	63.1	15.7	14.1	13.6	13.4
SY Clearstone 2CL	92.1	118.3	126.3	119.5	61.7	61.7	62.2	61.3	13.4	12.9	12.7	12.6
# SY Legend CL2	74.8	94.3	101.9		63.1	63.6	64.0		13.6	12.4	12.3	
# SY Monument	84.2	107.5	117.2	112.7	61.9	62.2	62.6	61.5	12.8	12.0	11.9	12.1
# SY Wolverine	79.8	96.2			62.9	63.1			13.9	13.3		
Warhorse	73.8	96.4	104.5	101.7	61.3	62.1	62.6	62.1	14.5	13.6	13.4	13.4
# WB4269	73.5	93.6			63.0	63.1			13.8	12.7		
# WB4311	80.6	103.6			62.7	63.5			14.9	13.5		
# WB4418	73.7	92.9			62.5	62.2			13.0	12.3		
#+ WB4792	89.6				64.1				12.3			
Yellowstone	92.9	117.7	124.2		61.5	61.9	62.5		13.3	12.5	12.3	
Average	88.5	108.1	118.0	112.0	62.6	62.7	63.2	62.4	13.4	12.7	12.5	12.7
LSD (0.05)	8.2	12.6	9.0	13.6	0.8	0.9	0.5	1.5		0.9	0.6	0.7
C.V.	5.7	5.7	4.6	8.5	0.7	0.7	0.5	1.7		3.5	2.8	3.6

+ = new for 2020, # = paid entry

1/ Yellowstone mis-planted in 2017: no 4 year data

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 22. 2017-2020 Intrastate Winter Wheat Test (Exp. 3502): Havre Yield, Test Weight and Protein

Cultivar/Line	Grain Yield (bushels/acre)				Test Weight (lb/bu)				Protein (%)			
	2020	2019-20	2018-20	2017-20	2020	2019-20	2018-20	2017-20	2020	2019-20	2018-20	2017-20
	1y	2y	3y	4y	1y	2y	3y	4y	1y	2y	3y	4y
# AAC Wildfire	52.0	53.0	59.5		61.5	60.2	60.8		13.8	14.2	14.1	
Bobcat	59.5	61.1	61.6	60.2	62.6	61.6	62.0	62.1	14.4	14.7	14.5	14.4
Brawl CL Plus	47.1	49.7	52.3	50.1	63.4	62.7	63.2	63.1	14.0	14.7	14.4	14.4
# Byrd CL Plus	57.7	54.4	55.8	55.0	63.0	61.8	62.3	62.1	13.1	13.5	13.2	13.3
#+ CP7909	29.8				62.4				13.5			
Flathead	50.4	49.8	53.6	53.1	63.1	61.8	62.4	62.4	13.9	14.5	14.3	14.1
FourOsix	53.1	55.3	57.0	55.3	62.2	61.1	61.6	61.8	14.2	14.6	14.7	14.6
# Incline AX	52.0	57.6	59.6		61.9	60.9	61.4		12.9	13.3	13.0	
Judee	50.8	51.7	53.0	52.2	63.6	62.5	62.8	62.9	15.2	15.5	15.5	15.2
Keldin	58.1	55.3	59.7	59.0	62.0	61.0	61.7	61.8	14.3	14.7	14.4	14.0
#r Langin	49.9				62.3				13.0			
#+ LCS 18-7071	54.3				62.1				12.5			
#+ LCS Helix AX	51.8				63.2				13.1			
# LCS Jet	52.5	55.7	57.0	54.8	60.0	58.8	59.4	59.6	14.0	14.3	14.1	13.9
#+ LCS Photon AX	49.9				63.6				14.0			
Loma	53.0	52.1	54.9	53.3	62.1	60.9	61.5	61.6	14.7	15.0	14.8	14.6
# Long Branch	51.6	56.6	59.2	57.1	62.5	61.7	62.2	61.7	13.1	13.5	13.1	13.1
#+ Mpress (SWW)	57.1				60.5				12.9			
MT1642	53.6	52.5	55.0		61.8	60.3	60.4		14.6	15.2	15.2	
MT1683	53.6	52.6	55.6		61.4	60.6	60.9		14.5	14.8	14.7	
MT1745	50.1	53.8			62.9	61.9			13.6	14.0		
MT1746	49.3	52.1			62.9	62.2			13.7	14.2		
MT1787	52.0	52.2			62.1	61.2			14.3	14.7		
MT1793	46.2	52.4			62.3	61.0			15.5	15.8		
+ MT1845	53.3				61.5				14.7			
+ MT1848	53.1				61.3				15.1			
+ MT1855	53.1				62.4				14.3			
+ MT1866	49.9				61.6				14.1			
+ MT1867	53.2				61.3				13.5			
+ MT1872	52.9				62.5				13.9			
MTCL1732	54.9	54.0			62.1	60.9			13.5	14.0		
MTCL1737	51.8	54.1			61.1	59.9			14.5	14.7		
+ MTS1810	57.4				63.9				14.5			
+ MTS18116	56.3				64.0				13.3			
+ MTS18149	56.6				62.4				14.8			
+ MTS1831	52.2				63.9				13.3			
Northern	49.4	53.6	54.5	53.9	62.0	61.2	61.5	61.7	14.8	14.8	14.6	14.6
StandClear CLP	53.5	57.6	56.9		62.4	61.6	62.0		14.1	14.6	14.6	
# SY 517 CL2	44.7	45.6	47.5	44.5	63.7	62.5	63.0	63.0	14.3	15.2	14.8	14.7
SY Clearstone 2CL	52.4	54.6	57.0	54.7	61.6	60.6	60.8	61.2	14.7	15.0	14.8	14.7
# SY Legend CL2	48.5	51.1	52.4		62.7	61.7	62.2		14.5	14.7	14.4	
# SY Monument	49.8	53.6	55.5	54.9	61.6	60.6	61.2	61.2	13.1	13.6	13.4	13.2
# SY Wolverine	49.0	49.0			63.1	61.7			14.5	15.1		
Warhorse	51.4	49.0	51.6	49.7	62.1	61.2	61.6	61.7	14.8	15.5	15.3	15.2
# WB4269	49.0	51.3			62.4	61.6			12.8	13.3		
# WB4311	50.0	50.6			62.8	61.6			14.2	14.6		
# WB4418	46.3	49.9			61.4	60.7			13.5	14.0		
#+ WB4792	54.0				64.5				13.1			
Yellowstone	53.5	54.2	56.7		61.5	60.5	60.6		14.4	14.8	14.6	
Average	51.7	53.0	55.7	53.8	62.4	61.2	61.6	61.9	14.0	14.5	14.4	14.3
LSD (0.05)	5.8	ns	5.9	4.3	0.6	0.6	0.6	0.7	0.4	0.5	0.5	0.5
C.V.	6.4	6.4	6.4	5.6	0.5	0.5	0.6	0.8	1.6	1.6	2.1	0.5

+ = new for 2020, # = paid entry

1/ Yellowstone mis-planted in 2017: no 4 year data

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 23. 2017-2020 Intrastate Winter Wheat Test (Exp. 3503): Sidney Yield, Test Weight and Protein

Cultivar/Line	Grain Yield (bushels/acre)				Test Weight (lb/bu)				Protein (%)			
	2020	2019-20	2018-20	2017-20	2020	2019-20	2018-20	2017-20	2020	2019-20	2018-20	2017-20
	1y	2y	3y	4y	1y	2y	3y	4y	1y	2y	3y	4y
# AAC Wildfire	59.5	74.2	72.9		58.8	61.7	61.7		14.1	13.6	12.6	
Bobcat	58.6	61.9	62.7	56.5	59.4	61.8	62.5	63.1	13.7	13.6	12.6	11.8
Brawl CL Plus	55.8	45.8	50.8	45.2	61.3	62.3	63.0	63.6	13.3	14.5	13.7	13.0
# Byrd CL Plus	59.6	55.4	62.7	57.6	58.5	60.8	61.4	62.2	12.5	12.7	11.7	10.6
#+ CP7909	50.5				60.0				12.5			
Flathead	60.2	63.4	61.3	55.8	60.3	62.2	62.7	63.6	13.2	13.5	12.5	11.8
FourOsix	61.1	62.9	64.6	58.7	60.2	61.6	61.9	62.6	13.8	14.0	12.9	11.7
# Incline AX	56.0	52.2	57.7		59.1	60.3	61.1		12.6	12.8	12.1	
Judee	50.4	65.8	66.1	53.0	61.2	63.2	63.4	63.6	14.7	14.4	13.5	13.2
Keldin	63.3	65.1	74.1	63.0	60.6	62.2	62.8	63.3	12.7	13.4	12.3	11.6
#r Langin	51.6				58.6				12.1			
#+ LCS 18-7071	54.7				60.9				11.8			
#+ LCS Helix AX	57.1				61.7				12.2			
# LCS Jet	58.0	66.8	58.6	52.0	58.7	59.5	58.6	59.5	13.4	13.3	13.1	12.1
#+ LCS Photon AX	51.3				62.4				13.1			
Loma	60.5	66.2	68.1	60.2	60.0	61.3	61.4	61.8	13.9	13.8	13.2	12.6
# Long Branch	53.8	52.3	57.7	51.7	59.4	61.4	61.7	62.5	12.2	12.8	11.9	11.2
#+ Mpress (SWW)	63.5				58.2				12.2			
MT1642	68.8	68.6	66.9		59.6	60.9	61.1		13.8	13.7	13.1	
MT1683	65.9	72.5	75.6		60.1	61.4	61.6		13.6	13.5	12.6	
MT1745	58.0	72.9			58.7	61.4			13.0	13.0		
MT1746	52.9	61.5			59.8	62.0			13.1	13.3		
MT1787	61.3	65.0			60.3	61.7			13.9	14.1		
MT1793	60.7	62.9			59.4	61.4			14.0	14.6		
+ MT1845	67.0				60.4				13.3			
+ MT1848	56.8				59.3				14.9			
+ MT1855	59.7				60.4				14.1			
+ MT1866	47.6				59.3				13.8			
+ MT1867	52.9				56.3				13.4			
+ MT1872	57.8				59.9				12.8			
MTCL1732	55.2	60.1			57.7	60.3			13.9	13.4		
MTCL1737	63.5	69.9			59.8	61.4			14.2	13.8		
+ MTS1810	54.2				60.9				14.7			
+ MTS18116	61.6				60.7				13.3			
+ MTS18149	60.1				60.2				13.7			
+ MTS1831	60.2				61.0				12.9			
Northern	65.2	75.9	78.5	68.1	59.9	61.8	62.2	62.8	14.1	13.9	12.9	12.1
StandClear CLP	54.6	67.0	67.9		58.7	61.6	62.6		13.6	13.9	12.4	
# SY 517 CL2	45.1	35.7	43.9	39.4	61.3	62.4	63.0	63.8	13.6	14.8	13.5	12.7
SY Clearstone 2CL	66.8	70.3	68.5	61.7	59.2	61.2	61.2	62.0	13.9	13.6	12.9	11.8
# SY Legend CL2	55.1	46.9	52.3		58.0	60.6	61.3		14.0	14.1	13.3	
# SY Monument	52.3	45.5	57.1	54.1	58.1	59.5	60.2	61.1	12.5	13.3	12.0	11.0
# SY Wolverine	50.9	38.2			59.5	60.7			13.0	14.1		
Warhorse	53.0	53.2	58.5	52.0	59.1	61.1	61.5	62.0	14.3	15.1	14.0	13.1
# WB4269	53.4	43.7			60.6	61.8			12.2	13.2		
# WB4311	51.6	48.5			61.7	62.5			13.2	14.4		
# WB4418	56.5	48.6			59.7	61.3			12.4	12.8		
#+ WB4792	61.8				62.8				12.3			
Yellowstone	71.1	72.2	72.4		60.5	61.7	61.8		13.3	13.4	12.4	
Average	57.7	59.7	63.6	55.3	59.8	61.4	61.8	62.5	13.3	13.7	12.8	12.0
LSD (0.05)	6.5	22.4	17.7	ns	1.0	ns	1.5	1.2	0.4	ns	1.1	1.0
C.V.	6.4	18.4	16.9	19.3	1.0	1.4	1.5	1.3	1.7	5.4	5.3	6.1

+ = new for 2020, # = paid entry

1/ Yellowstone mis-planted in 2017: no 4 year data

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 24. 2018-2020 Intrastate Winter Wheat Test (Exp. 3504): Williston Yield, Test Weight and Protein

Cultivar/Line	No harvest in 2017 due to extreme winter-kill								
	Grain Yield (bushels/acre)			Test Weight (lb/bu)			Protein (%)		
	2020	2019-20	2018-20	2020	2019-20	2018-20	2020	2019-20	2018-20
	1y	2y	3y	1y	2y	3y	1y	2y	3y
# AAC Wildfire	55.2	54.7	54.8	59.8	60.2	60.4	14.8	15.8	15.1
Bobcat	50.7	54.1	51.7	60.7	60.7	60.3	14.6	15.9	15.4
Brawl CL Plus	46.1	45.0	42.8	61.2	61.0	61.1	13.4	16.1	15.4
# Byrd CL Plus	51.9	50.3	48.0	59.5	60.3	60.1	12.0	14.1	13.5
#+ CP7909	44.3			60.1			12.1		
Flathead	46.7	45.7	45.3	60.1	60.4	60.3	12.3	15.3	14.6
FourOsix	53.5	55.1	52.3	60.9	60.9	60.6	13.1	15.0	14.6
# Incline AX	49.0	53.0	49.6	59.2	59.6	59.7	12.5	13.6	13.3
Judee	47.8	48.6	47.0	61.7	61.8	61.6	15.8	17.1	16.2
Keldin	52.3	52.4	50.0	61.0	61.1	61.0	12.5	14.6	14.0
#r Langin	46.3			60.9			12.1		
#+ LCS 18-7071	56.2			60.5			13.0		
#+ LCS Helix AX	49.3			60.8			11.9		
# LCS Jet	52.6	50.7	48.1	57.7	57.5	57.7	14.4	15.0	14.5
#+ LCS Photon AX	46.5			62.3			13.2		
Loma	50.2	54.1	51.6	60.3	60.5	60.2	13.8	15.5	15.0
# Long Branch	43.9	48.1	43.3	59.7	60.3	59.9	11.5	13.7	13.3
#+ Mpress (SWW)	50.8			59.6			12.1		
MT1642	56.1	59.7	56.7	60.1	60.1	59.9	14.0	15.3	14.8
MT1683	53.1	55.0	52.9	60.3	60.5	60.3	14.3	15.4	14.7
MT1745	50.7	51.5		59.9	60.4		12.4	14.4	
MT1746	41.2	46.8		61.1	61.2		12.5	14.9	
MT1787	48.1	54.2		60.8	60.9		13.4	15.1	
MT1793	46.5	44.9		59.7	59.9		14.3	16.9	
+ MT1845	52.0			60.1			13.1		
+ MT1848	49.9			60.4			14.8		
+ MT1855	51.7			61.0			15.7		
+ MT1866	46.3			59.3			13.6		
+ MT1867	43.3			59.7			12.6		
+ MT1872	42.7			60.2			12.8		
MTCL1732	50.7	51.0		59.4	59.5		12.8	15.3	
MTCL1737	52.3	54.2		60.4	60.1		14.6	16.1	
+ MTS1810	52.9			61.0			15.7		
+ MTS18116	50.1			62.0			13.7		
+ MTS18149	50.8			60.4			15.1		
+ MTS1831	49.0			62.2			13.7		
Northern	57.8	55.5	52.1	61.0	61.0	60.9	14.9	16.3	15.6
StandClear CLP	49.9	50.4	47.9	60.7	60.5	60.1	13.2	15.7	15.2
# SY 517 CL2	46.3	45.2	43.3	60.4	61.1	60.7	13.4	15.5	14.8
SY Clearstone 2CL	53.5	49.5	48.2	60.4	60.3	60.0	13.7	15.9	15.2
# SY Legend CL2	46.5	46.0	43.3	59.9	60.7	60.5	13.0	15.5	14.8
# SY Monument	46.5	52.5	49.1	58.8	59.6	59.3	11.4	13.9	13.4
# SY Wolverine	45.4	46.5		60.4	60.5		12.6	15.5	
Warhorse	43.7	47.3	46.6	59.4	60.4	60.3	13.7	16.0	15.4
# WB4269	49.6	43.5		60.2	59.8		11.8	14.4	
# WB4311	44.0	46.7		59.4	59.9		13.5	15.7	
# WB4418	47.7	43.2		60.9	59.4		12.5	15.3	
#+ WB4792	54.1			61.8			12.6		
Yellowstone	48.7	52.2	50.4	60.5	60.4	60.3	13.9	15.4	14.9
Average	49.3	50.2	48.9	60.4	60.3	60.2	13.4	15.3	14.7
LSD (0.05)	4.7	8.8	5.4	1.3	1.4	0.8	0.9	ns	1.1
C.V.	5.9	8.6	6.7	1.4	1.1	0.8	3.7	5.7	4.6

+ = new for 2020, # = paid entry

1/ Yellowstone mis-planted in 2017: no 4 year data

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 25. 2018-2020 Intrastate Winter Wheat Test (Exp. 3505): Kalispell Yield, Test Weight and Protein

Cultivar/Line	*** No harvest in 2017; Spring flooded - test abandoned ***								
	Grain Yield (bushels/acre)			Test Weight (lb/bu)			Protein (%)		
	2020	2019-20	2018-20	2020	2019-20	2018-20	2020	2019-20	2018-20
	1y	2y	3y	1y	2y	3y	1y	2y	3y
# AAC Wildfire	156.9	145.7	124.8	59.1	60.7	59.1	10.2	9.3	10.2
Bobcat	139.5	128.6	117.1	63.8	63.0	61.9	10.2	9.5	10.3
Brawl CL Plus	135.6	122.8	110.8	63.5	62.4	61.6	11.4	10.4	11.0
# Byrd CL Plus	158.7	142.5	118.3	62.2	60.9	59.0	9.0	8.4	9.5
#+ CP7909	122.5			63.5			9.7		
Flathead	159.6	148.3	134.2	63.4	62.4	62.2	10.1	9.2	9.9
FourOsix	143.7	136.4	121.7	62.8	61.5	61.4	9.8	8.9	9.7
# Incline AX	150.5	136.5	108.6	61.1	60.1	57.6	8.9	8.2	9.2
Judee	146.3	140.7	125.3	64.0	63.2	61.6	10.4	9.5	10.7
Keldin	167.6	151.5	134.8	62.9	61.9	61.8	9.8	9.0	9.7
#r Langin	161.9			61.4			9.2		
#+ LCS 18-7071	150.4			61.5			9.6		
#+ LCS Helix AX	159.3			63.2			9.7		
# LCS Jet	171.1	158.4	146.4	61.5	60.2	59.8	9.6	8.6	9.1
#+ LCS Photon AX	123.7			64.5			10.7		
Loma	162.8	146.6	126.9	61.2	61.4	59.4	10.5	9.6	10.5
# Long Branch	155.0	138.1	125.9	63.1	62.4	62.3	9.7	9.2	9.9
#+ Mpress (SWW)	170.7			60.8			9.5		
MT1642	166.2	151.0	132.7	62.3	62.2	59.5	10.1	9.2	10.0
MT1683	158.5	148.6	132.4	62.2	61.6	60.9	10.1	9.3	10.0
MT1745	166.8	145.6		62.5	61.7		10.2	9.0	
MT1746	146.6	137.5		63.6	63.0		10.4	9.5	
MT1787	140.8	130.8		62.7	62.1		10.7	9.7	
MT1793	138.0	129.9		62.0	61.0		10.4	9.6	
+ MT1845	145.2			62.3			11.2		
+ MT1848	159.8			62.1			11.1		
+ MT1855	153.6			62.5			10.3		
+ MT1866	155.1			62.6			9.8		
+ MT1867	168.1			62.5			9.7		
+ MT1872	154.8			63.5			10.1		
MTCL1732	158.7	141.0		61.5	61.1		10.5	9.3	
MTCL1737	156.7	144.6		61.2	60.9		10.4	9.4	
+ MTS1810	148.6			62.0			11.2		
+ MTS18116	156.0			60.6			9.9		
+ MTS18149	146.6			58.6			10.5		
+ MTS1831	166.1			59.5			10.2		
Northern	164.0	151.6	127.1	61.1	61.2	59.5	10.2	9.4	10.3
StandClear CLP	149.3	136.0	119.1	63.7	63.1	62.2	10.5	9.7	10.7
# SY 517 CL2	122.0	107.8	89.6	64.8	64.1	61.4	10.7	10.2	10.7
SY Clearstone 2CL	162.1	151.2	130.6	61.9	61.2	60.5	9.7	8.8	9.5
# SY Legend CL2	141.9	130.5	110.7	63.6	62.4	61.9	10.2	9.4	10.2
# SY Monument	145.2	133.1	116.8	61.9	60.9	60.2	10.3	9.4	10.1
# SY Wolverine	156.9	134.1		63.6	62.4		10.2	9.3	
Warhorse	138.5	128.5	116.3	62.1	61.4	61.2	10.9	9.8	10.7
# WB4269	144.7	128.8		63.6	62.5		10.3	9.6	
# WB4311	148.9	135.4		62.6	62.2		10.3	10.0	
# WB4418	145.8	134.0		60.1	59.8		10.2	9.3	
#+ WB4792	173.5			62.2			9.2		
Yellowstone	161.6	144.8	124.4	61.4	61.1	60.0	10.2	9.2	9.8
Average	152.6	138.8	122.5	62.2	61.7	60.7	10.2	9.3	10.1
LSD (0.05)	15.2	10.8	13.7	1.1	1.7	2.7	0.6	0.6	0.6
C.V.	6.1	3.8	6.8	1.1	1.3	2.7	3.2	2.9	3.7

+ = new for 2020, # = paid entry

1/ Yellowstone mis-planted in 2017: no 4 year data

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 26. 2017-2020 Intrastate Winter Wheat Test (Exp. 3507): Moccasin Yield, Test Weight and Protein

Cultivar/Line	Grain Yield (bushels/acre)				Test Weight (lb/bu)				Protein (%)			
	2020	2019-20	2018-20	2017-20	2020	2019-20	2018-20	2017-20	2020	2019-20	2018-20	2017-20
	1y	2y	3y	4y	1y	2y	3y	4y	1y	2y	3y	4y
# AAC Wildfire	59.4	68.7	67.5		63.1	62.2	62.0		10.5	10.1	10.7	
Bobcat	55.0	63.2	63.4	62.7	63.5	63.6	63.6	62.5	10.2	10.0	10.6	11.2
Brawl CL Plus	45.8	54.5	56.3	58.7	65.1	65.1	64.8	64.1	12.6	11.8	12.4	12.4
# Byrd CL Plus	66.2	71.2	70.0	68.3	64.8	62.9	63.3	61.5	9.1	9.1	9.9	10.4
#+ CP7909	42.8				62.9				11.9			
Flathead	46.9	55.7	59.0	61.6	63.3	63.7	63.6	62.3	11.4	10.8	11.2	11.7
FourOsix	62.0	69.2	69.2	66.7	63.6	63.4	63.5	62.2	10.3	9.9	10.8	11.5
# Incline AX	61.5	69.8	69.2		62.9	62.5	62.1		9.3	9.3	10.0	
Judee	56.1	62.9	60.9	60.8	64.9	64.7	64.4	63.1	11.0	10.6	11.3	12.0
Keldin	60.7	66.9	66.5	67.1	63.9	63.7	63.5	62.2	10.9	10.3	10.9	11.5
#r Langin	56.0				63.2				9.5			
#+ LCS 18-7071	64.7				63.2				9.0			
#+ LCS Helix AX	52.5				63.6				11.1			
# LCS Jet	58.5	72.3	71.4	70.0	60.6	60.3	60.0	58.6	9.4	9.1	9.8	10.6
#+ LCS Photon AX	46.6				65.4				12.2			
Loma	59.4	65.5	66.1	64.2	63.3	63.2	62.9	61.7	10.5	10.1	10.6	11.4
# Long Branch	48.8	61.9	61.9	62.2	63.1	63.5	63.4	62.3	11.7	10.8	11.2	11.5
#+ Mpress (SWW)	63.9				62.4				9.0			
MT1642	59.2	71.4	72.9		63.1	63.0	62.4		10.9	10.5	10.9	
MT1683	58.0	66.4	71.5		62.1	62.4	62.4		10.7	10.2	10.7	
MT1745	56.5	67.2			64.7	63.8			10.7	10.3		
MT1746	59.2	66.3			65.0	64.8			10.7	10.4		
MT1787	50.1	61.4			63.4	63.5			10.3	10.1		
MT1793	49.7	56.6			65.0	64.4			12.5	11.9		
+ MT1845	56.7				63.5				10.9			
+ MT1848	58.1				62.5				10.5			
+ MT1855	57.3				64.4				10.4			
+ MT1866	51.8				64.2				11.1			
+ MT1867	54.6				65.2				10.2			
+ MT1872	56.8				64.8				11.5			
MTCL1732	60.3	65.8			63.6	63.0			10.1	9.9		
MTCL1737	62.0	66.8			62.9	62.1			10.1	10.0		
+ MTS1810	51.7				65.0				11.0			
+ MTS18116	59.0				64.3				9.2			
+ MTS18149	60.6				62.3				10.2			
+ MTS1831	54.8				64.4				9.5			
Northern	59.8	69.6	68.2	66.3	63.6	63.4	63.2	61.7	11.1	10.5	11.0	11.9
StandClear CLP	54.8	61.4	63.7		65.1	64.5	64.1		11.3	10.9	11.4	
# SY 517 CL2	35.0	54.1	56.2	57.7	64.8	63.9	64.0	62.7	14.0	12.2	12.3	12.4
SY Clearstone 2CL	57.6	69.1	69.1	67.7	63.2	62.9	62.6	61.5	10.5	9.9	10.5	11.2
# SY Legend CL2	47.9	56.1	54.3		65.2	64.9	64.6		11.7	11.3	11.9	
# SY Monument	55.1	66.4	68.5	68.9	63.9	63.7	63.4	62.0	10.4	10.0	10.6	10.9
# SY Wolverine	47.7	60.6			64.0	63.7			10.9	10.8		
Warhorse	51.2	58.6	59.0	60.1	63.8	63.7	63.3	61.8	11.1	10.7	11.3	11.9
# WB4269	45.0	56.7			63.5	63.8			12.8	11.9		
# WB4311	52.4	64.8			64.0	63.3			12.0	11.4		
# WB4418	50.6	60.8			63.3	63.1			11.1	10.8		
#+ WB4792	59.0				65.3				9.7			
Yellowstone	57.2	64.6	66.3		62.6	62.8	62.6		10.6	10.1	10.6	
Average	55.0	63.9	65.0	64.1	63.8	63.4	63.2	62.0	10.8	10.5	10.9	11.5
LSD (0.05)	7.2	8.9	7.4	7.0	1.6	1.3	1.0	1.0	0.7	1.0	0.7	0.9
C.V.	8.1	6.8	6.9	7.6	1.5	1.0	1.0	1.2	3.8	4.5	4.1	5.5

+ = new for 2020, # = paid entry

1/ Yellowstone mis-planted in 2017: no 4 year data

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 27. 2017-2020 Intrastate Winter Wheat Test (Exp. 3508): Huntley Yield, Test Weight and Protein

Cultivar/Line	Grain Yield (bushels/acre)				Test Weight (lb/bu)				Protein (%)			
	2020	2019-20	2018-20	2017-20	2020	2019-20	2018-20	2017-20	2020	2019-20	2018-20	2017-20
	1y	2y	3y	4y	1y	2y	3y	4y	1y	2y	3y	4y
# AAC Wildfire	77.0	87.4	91.2		63.2	62.6	62.6		14.0	13.4	13.2	
Bobcat	77.5	88.7	92.7	97.0	63.0	62.6	62.5	62.4	14.2	13.5	13.3	13.5
Brawl CL Plus	80.4	101.8	105.9	108.4	65.1	64.5	64.0	64.1	14.0	13.5	13.2	13.3
# Byrd CL Plus	98.4	109.1	114.5	117.2	63.9	62.3	62.2	62.1	12.6	11.9	11.8	11.8
#+ CP7909	77.6				64.5				12.6			
Flathead	81.3	101.0	106.3	112.7	64.9	63.6	63.4	63.3	13.7	13.0	12.6	12.6
FourOsix	84.0	94.6	100.1	104.2	64.0	62.8	62.6	62.7	13.8	13.1	12.9	13.0
# Incline AX	84.2	94.2	99.0		63.0	61.5	61.3		12.6	11.9	11.7	
Judee	78.9	87.5	91.7	97.6	63.7	62.4	62.3	62.5	14.2	13.6	13.3	13.4
Keldin	92.3	112.7	120.6	124.3	64.2	63.4	63.3	63.4	13.5	12.4	12.1	12.2
#r Langin	86.0				64.0				12.1			
#+ LCS 18-7071	81.3				63.3				13.1			
#+ LCS Helix AX	78.5				64.8				12.8			
# LCS Jet	84.2	106.7	116.1	122.1	61.8	61.1	61.2	61.3	13.4	13.0	12.8	13.1
#+ LCS Photon AX	68.7				65.6				14.8			
Loma	83.8	88.5	91.7	96.6	62.3	61.4	61.3	61.3	14.1	13.1	12.9	12.9
# Long Branch	83.8	100.3	106.3	111.7	64.2	63.2	63.0	62.9	12.7	12.1	11.8	11.9
#+ Mpress (SWW)	90.3				61.5				12.4			
MT1642	83.5	101.7	107.9		62.9	62.2	62.0		13.9	13.1	13.0	
MT1683	87.8	99.4	101.3		62.9	61.6	61.6		13.6	13.0	12.8	
MT1745	82.7	97.7			63.6	62.4			13.1	12.6		
MT1746	82.7	101.5			65.4	64.8			13.9	12.8		
MT1787	85.4	97.0			63.5	62.7			13.8	13.2		
MT1793	73.0	93.6			63.5	62.5			14.9	13.4		
+ MT1845	82.4				63.0				14.0			
+ MT1848	80.2				62.2				14.4			
+ MT1855	84.0				63.0				14.8			
+ MT1866	89.1				63.1				14.5			
+ MT1867	86.8				64.2				13.1			
+ MT1872	91.9				64.8				13.1			
MTCL1732	78.4	96.4			62.6	61.2			13.0	12.6		
MTCL1737	85.9	101.4			63.0	62.2			13.3	12.7		
+ MTS1810	83.0				64.7				14.3			
+ MTS18116	71.0				63.9				12.9			
+ MTS18149	77.1				62.5				14.0			
+ MTS1831	76.9				64.6				12.4			
Northern	84.1	97.5	101.1	104.1	63.7	63.0	62.8	62.4	14.7	13.5	13.1	13.2
StandClear CLP	84.7	97.8	100.1		64.0	63.5	63.2		14.3	13.4	13.3	
# SY 517 CL2	75.2	101.0	107.5	106.6	65.3	64.8	64.3	64.4	14.2	13.2	12.7	12.7
SY Clearstone 2CL	88.5	99.9	101.0	105.6	62.9	61.4	61.4	61.4	13.9	13.0	12.8	13.1
# SY Legend CL2	74.7	86.3	91.7		64.1	62.0	62.3		13.4	12.8	12.5	
# SY Monument	79.0	98.7	106.5	112.4	63.3	61.9	62.0	62.2	12.4	12.0	12.0	12.1
# SY Wolverine	82.9	108.0			65.2	64.2			13.0	12.4		
Warhorse	76.7	92.1	98.3	101.3	62.7	62.4	62.5	62.6	13.9	13.5	13.5	13.5
# WB4269	73.8	94.1			64.6	63.7			12.3	11.8		
# WB4311	83.1	101.8			64.7	64.0			14.1	13.2		
# WB4418	75.5	91.6			64.4	62.9			12.9	12.5		
#+ WB4792	72.6				65.2				12.2			
Yellowstone	84.2	94.9	98.1		63.4	61.9	61.7		13.2	12.8	12.7	
Average	81.7	97.6	102.3	108.1	63.8	62.7	62.4	62.6	13.5	12.9	12.7	12.8
LSD (0.05)	7.3	ns	10.5	9.8	0.9	1.2	1.0	0.7	0.6	0.8	0.5	0.5
C.V.	5.1	7.4	6.3	6.4	0.9	1.0	0.9	0.8	2.7	3.0	2.5	2.5

+ = new for 2020, # = paid entry

1/ Yellowstone mis-planted in 2017: no 4 year data

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 28. 2017-2020 Intrastate Winter Wheat Test (Exp. 3518): Conrad Yield, Test Weight and Protein

Cultivar/Line	Grain Yield (bushels/acre)				Test Weight (lb/bu)				Protein (%)			
	2020	2019-20	2018-20	2017-20	2020	2019-20	2018-20	2017-20	2020	2019-20	2018-20	2017-20
	1y	2y	3y	4y	1y	2y	3y	4y	1y	2y	3y	4y
# AAC Wildfire	107.7	79.0	73.2		62.3	59.9	60.2		11.6	13.2	13.4	
Bobcat	106.2	87.3	80.5	80.3	63.6	60.8	61.4	61.3	11.6	12.9	13.4	13.5
Brawl CL Plus	80.9	80.2	75.3	76.6	64.5	61.5	62.2	62.5	13.2	13.2	13.1	13.0
# Byrd CL Plus	110.5	88.1	84.2	84.0	62.8	59.4	59.9	60.1	10.9	12.1	12.4	12.3
#+ CP7909	82.3				63.3				12.3			
Flathead	100.9	82.0	72.4	72.5	62.9	59.3	60.0	60.4	11.9	12.7	13.5	13.3
FourOsix	109.2	86.8	78.1	76.4	62.3	59.3	59.9	60.2	11.8	12.8	13.2	13.1
# Incline AX	85.9	73.3	71.6		61.5	58.6	59.4		11.0	11.8	11.8	
Judee	91.9	70.3	65.9	67.8	63.9	60.5	61.4	61.6	11.8	13.4	14.0	13.9
Keldin	88.0	80.4	74.1	75.6	62.9	59.9	60.7	61.1	12.2	13.0	13.2	13.2
#r Langin	87.7				62.7				11.4			
#+ LCS 18-7071	87.6				61.6				11.4			
#+ LCS Helix AX	98.0				64.0				11.2			
# LCS Jet	91.4	82.2	77.0	79.0	58.9	57.0	58.1	58.1	11.5	12.5	12.9	12.8
#+ LCS Photon AX	74.1				63.9				13.3			
Loma	103.8	84.0	77.5	76.3	62.3	59.6	60.6	60.6	11.6	12.8	13.5	13.5
# Long Branch	93.6	83.2	76.7	80.5	63.6	60.6	61.4	61.7	12.1	12.4	12.6	12.5
#+ Mpress (SWW)	97.0				59.7				10.7			
MT1642	108.7	87.1	78.4		61.5	59.5	59.8		11.2	12.5	13.2	
MT1683	107.7	82.1	74.2		61.5	58.8	59.6		11.7	12.8	13.3	
MT1745	100.4	86.0			62.6	59.8			11.3	12.2		
MT1746	88.3	75.6			64.2	61.1			11.3	12.4		
MT1787	99.6	89.7			62.8	60.5			11.6	12.7		
MT1793	92.6	79.3			63.2	60.0			12.7	13.1		
+ MT1845	86.7				61.6				12.3			
+ MT1848	106.1				62.2				12.1			
+ MT1855	95.5				62.4				11.4			
+ MT1866	97.9				62.6				11.1			
+ MT1867	95.4				62.2				11.6			
+ MT1872	98.1				64.0				11.7			
MTCL1732	111.2	81.7			62.1	58.8			11.3	12.6		
MTCL1737	98.5	84.6			61.3	59.1			11.7	12.7		
+ MTS1810	99.7				64.7				12.1			
+ MTS18116	108.9				63.0				10.6			
+ MTS18149	107.1				62.1				12.3			
+ MTS1831	101.4				63.4				10.9			
Northern	117.8	93.5	80.7	79.1	61.9	59.6	60.4	60.3	12.2	13.1	13.6	13.4
StandClear CLP	107.1	85.9	81.0		64.0	61.0	61.3		12.2	13.4	13.5	
# SY 517 CL2	77.1	70.5	70.0	71.6	64.1	61.5	62.0	62.3	13.2	13.0	12.9	12.8
SY Clearstone 2CL	92.7	77.7	73.6	75.5	60.8	58.1	58.7	59.1	10.9	12.4	12.9	13.0
# SY Legend CL2	91.0	75.5	74.1		62.4	59.5	60.1		12.6	13.2	13.3	
# SY Monument	85.6	78.6	73.6	75.0	62.1	59.3	60.0	59.9	11.7	12.2	12.5	12.4
# SY Wolverine	77.5	74.5			63.3	61.6			12.1	12.9		
Warhorse	99.0	74.3	66.2	66.2	62.1	58.7	59.2	59.2	12.2	13.3	13.8	13.7
# WB4269	86.4	80.8			63.4	61.4			11.9	12.1		
# WB4311	79.8	74.6			63.0	61.2			12.4	12.9		
# WB4418	95.4	78.7			62.4	59.1			11.5	12.4		
#+ WB4792	106.2				63.9				10.9			
Yellowstone	90.1	73.8	68.0		61.8	59.0	59.6		11.7	12.7	13.3	
Average	96.0	80.7	74.8	75.7	62.6	59.8	60.3	60.6	11.8	12.7	13.2	13.1
LSD (0.05)	12.8	ns	ns	ns	0.7	1.5	0.9	0.8	0.8	ns	ns	0.8
C.V.	7.8	13.4	11.9	10.7	0.6	1.2	0.9	1.0	4.0	4.9	5.0	4.5

+ = new for 2020, # = paid entry

1/ Yellowstone mis-planted in 2017: no 4 year data

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 29. 2017-2020 Intrastate Winter Wheat Test (Exp. 3503): Ft. Benton Yield, Test Weight and Protein

Cultivar/Line	Grain Yield (bushels/acre)				Test Weight (lb/bu)				Protein (%)			
	2020	2019-20	2018-20	2017-20	2020	2019-20	2018-20	2017-20	2020	2019-20	2018-20	2017-20
	1y	2y	3y	4y	1y	2y	3y	4y	1y	2y	3y	4y
# AAC Wildfire	69.4	57.3	61.6		62.0	61.3	60.8		11.8	12.5	12.5	
Bobcat	59.8	60.9	63.5	62.0	62.2	61.4	61.4	60.6	12.7	12.9	12.5	12.5
Brawl CL Plus	52.6	56.9	59.0	56.2	62.8	62.0	<u>62.2</u>	61.0	14.6	13.6	13.2	13.1
# Byrd CL Plus	71.2	58.8	63.8	60.9	62.6	59.8	59.9	59.2	11.5	11.8	11.7	11.8
#+ CP7909	46.5				61.9				13.7			
Flathead	57.5	58.3	58.4	58.8	61.6	60.7	60.5	59.7	13.7	13.1	12.6	12.7
FourOsix	60.0	58.4	56.7	55.7	61.5	60.2	60.1	59.5	12.7	12.9	12.6	12.7
# Incline AX	62.6	56.7	56.1		61.6	59.9	59.6		11.7	11.9	11.8	
Judee	61.8	61.4	62.2	60.3	63.4	62.4	61.9	60.4	13.6	13.5	13.1	13.1
Keldin	62.2	58.9	59.3	58.8	61.8	60.8	60.5	59.6	12.8	12.9	12.6	12.6
#r Langin	56.4				61.4				12.4			
#+ LCS 18-7071	63.8				62.5				12.6			
#+ LCS Helix AX	55.4				62.7				12.7			
# LCS Jet	70.9	61.6	59.3	58.4	60.4	58.7	58.3	57.9	12.4	12.5	12.3	12.3
#+ LCS Photon AX	51.5				63.2				14.3			
Loma	61.9	60.8	62.9	61.4	61.8	61.0	60.4	59.9	13.6	13.3	13.0	12.9
# Long Branch	62.6	60.4	62.7	59.2	61.5	60.7	60.7	60.0	12.8	12.5	11.9	11.8
#+ Mpress (SWW)	<u>78.0</u>				60.1				11.0			
MT1642	64.4	60.8	62.7		61.6	60.5	59.8		12.9	13.1	12.8	
MT1683	59.9	57.4	60.7		60.8	59.9	59.8		14.0	13.5	12.9	
MT1745	63.7	61.7			63.0	61.4			12.2	12.3		
MT1746	56.6	56.7			62.7	<u>62.5</u>			13.6	13.2		
MT1787	55.1	56.6			61.0	60.7			13.1	13.2		
MT1793	60.2	58.1			62.0	61.2			14.2	13.9		
+ MT1845	57.8				60.7				13.7			
+ MT1848	65.9				61.3				13.3			
+ MT1855	72.3				62.3				12.2			
+ MT1866	63.2				61.1				12.8			
+ MT1867	64.5				63.2				12.1			
+ MT1872	64.6				63.1				12.8			
MTCL1732	74.0	65.5			61.0	60.1			12.2	12.5		
MTCL1737	68.8	61.1			60.5	59.8			12.8	13.2		
+ MTS1810	64.7				62.4				13.2			
+ MTS18116	71.9				<u>63.7</u>				11.9			
+ MTS18149	71.4				61.7				13.5			
+ MTS1831	63.3				63.4				12.0			
Northern	73.2	64.7	66.3	60.4	62.6	61.4	60.8	59.3	12.8	13.1	12.8	12.7
StandClear CLP	62.5	59.6	57.3		61.8	61.0	60.8		13.8	13.3	13.0	
# SY 517 CL2	48.0	53.7	55.5	56.4	62.6	62.0	61.9	<u>61.4</u>	<u>14.8</u>	<u>14.0</u>	<u>13.4</u>	<u>13.3</u>
SY Clearstone 2CL	62.7	59.7	62.6	57.9	61.0	60.2	59.8	58.9	12.8	12.9	12.7	12.8
# SY Legend CL2	59.9	57.3	61.3		62.5	60.7	60.5		13.6	13.3	12.8	
# SY Monument	57.7	57.2	63.6	58.8	60.9	60.0	59.5	58.1	12.5	12.4	12.1	12.2
# SY Wolverine	54.2	49.2			61.1	60.9			13.5	13.7		
Warhorse	63.7	60.6	64.5	61.7	62.1	61.6	61.3	59.9	13.5	13.5	13.2	13.1
# WB4269	55.8	56.0			61.6	61.2			12.9	12.5		
# WB4311	57.7	57.6			61.8	61.4			13.6	13.3		
# WB4418	68.9	61.6			61.4	60.8			12.5	12.5		
#+ WB4792	60.3				62.8				12.3			
Yellowstone	60.3	56.1	60.7		61.0	60.0	59.6		13.0	13.0	12.7	
Average	62.3	58.7	60.9	59.1	61.9	60.8	60.5	59.7	13.0	13.0	12.6	12.6
LSD (0.05)	9.5	ns	ns	ns	1.0	1.5	1.1	1.4	1.1	1.1	0.8	0.6
C.V.	9.4	10.2	10.0	10.9	1.0	1.3	1.1	1.6	5.3	4.1	3.8	3.2

+ = new for 2020, # = paid entry

1/ Yellowstone mis-planted in 2017: no 4 year data

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 30. 2017-2020 Intrastate Winter Wheat Test (Exp. 3501): Combined Locations Yield, Test Weight and Protein

Cultivar/Line	Grain Yield (bushels/acre)				Test Weight (lb/bu)				Protein (%)			
	2020	2019-20	2018-20	2017-20	2020	2019-20	2018-20	2017-20	2020	2019-20	2018-20	2017-20
location-years	9	18	27	34	9	18	27	34	9	18	27	34
# AAC Wildfire	81.2	81.0	80.4		61.3	61.2	61.2		12.7	12.8	12.7	
Bobcat	77.5	79.0	78.7	77.0	62.4	62.0	62.1	61.9	12.7	12.8	12.8	12.8
Brawl CL Plus	68.7	73.0	73.1	71.2	63.4	62.8	63.0	62.7	13.5	13.5	13.3	13.2
# Byrd CL Plus	85.3	82.8	82.2	79.4	62.3	61.2	61.3	61.0	11.5	11.7	11.7	11.7
#+ CP7909	63.4				62.4				12.4			
Flathead	76.0	79.1	78.4	78.3	62.5	61.9	62.1	62.0	12.7	12.7	12.6	12.6
FourOsix	81.2	81.7	80.2	78.3	62.3	61.5	61.7	61.6	12.5	12.6	12.6	12.6
# Incline AX	77.3	77.9	76.4		61.3	60.5	60.5		11.5	11.6	11.6	
Judee	75.1	77.3	76.3	74.0	63.3	62.7	62.6	62.3	13.4	13.4	13.4	13.4
Keldin	82.7	85.5	85.7	83.5	62.5	61.9	62.1	61.9	12.5	12.5	12.4	12.4
#r Langin	76.1				61.9				11.6			
#+ LCS 18-7071	78.5				62.1				11.6			
#+ LCS Helix AX	75.8				63.1				12.1			
# LCS Jet	81.6	86.1	84.8	83.5	59.9	59.3	59.4	59.3	12.3	12.3	12.3	12.3
#+ LCS Photon AX	65.3				63.9				13.3			
Loma	81.3	81.1	80.1	77.8	61.6	61.3	61.2	61.0	12.9	12.9	12.9	12.9
# Long Branch	75.5	78.3	78.6	77.9	62.3	61.9	62.0	61.9	12.1	12.1	12.0	11.9
#+ Mpress (SWW)	85.5				60.2				11.3			
MT1642	83.8	85.7	84.4		61.6	61.2	60.8		12.8	12.8	12.8	
MT1683	81.8	83.3	83.2		61.5	61.0	61.1		12.9	12.8	12.7	
MT1745	80.2	83.5			62.4	61.8			12.1	12.2		
MT1746	74.0	78.6			63.2	62.9			12.5	12.6		
MT1787	75.8	79.4			62.1	61.8			12.7	12.8		
MT1793	72.7	75.9			62.2	61.6			13.7	13.6		
+ MT1845	77.1				61.8				13.0			
+ MT1848	80.5				61.5				13.4			
+ MT1855	80.8				62.4				12.9			
+ MT1866	76.9				61.8				12.7			
+ MT1867	79.2				62.0				12.1			
+ MT1872	79.4				62.9				12.5			
MTCL1732	81.0	79.7			61.3	60.7			12.3	12.4		
MTCL1737	81.4	82.8			61.2	60.8			12.7	12.8		
+ MTS1810	77.7				63.2				13.4			
+ MTS18116	81.3				62.9				11.9			
+ MTS18149	80.4				61.3				13.1			
+ MTS1831	79.7				62.8				11.9			
Northern	85.7	87.1	84.4	80.8	62.0	61.7	61.6	61.2	13.1	13.0	12.9	12.9
StandClear CLP	78.4	80.5	79.1		62.7	62.2	62.3		13.0	13.1	13.0	
# SY 517 CL2	61.7	67.0	67.9	66.9	63.4	62.9	62.8	62.6	13.8	13.6	13.2	13.1
SY Clearstone 2CL	80.9	83.4	81.9	79.6	61.4	60.8	60.8	60.7	12.6	12.7	12.7	12.7
# SY Legend CL2	71.1	71.5	71.3		62.4	61.8	61.9		13.0	12.9	12.8	
# SY Monument	72.8	77.0	78.6	77.8	61.4	60.8	60.9	60.7	11.9	12.1	12.0	11.9
# SY Wolverine	71.6	72.9			62.6	62.1			12.6	13.0		
Warhorse	72.3	73.3	73.9	72.3	61.6	61.4	61.5	61.2	13.2	13.4	13.4	13.4
# WB4269	70.1	72.0			62.5	62.1			12.3	12.4		
# WB4311	72.0	75.9			62.5	62.1			13.1	13.2		
# WB4418	73.4	73.5			61.8	61.0			12.2	12.4		
#+ WB4792	81.2				63.6				11.6			
Yellowstone	80.0	81.1	80.1		61.6	61.0	61.0		12.6	12.6	12.6	
Average	77.2	79.0	79.1	77.2	62.2	61.6	61.5	61.5	12.6	12.7	12.7	12.7
LSD (0.05)	5.2	4.8	4.2	4.0	0.7	0.5	0.4	0.4	0.5	0.4	0.3	0.3
C.V.	7.3	9.4	10.0	10.8	1.2	1.1	1.4	1.4	4.6	4.2	4.2	4.4

+ = new for 2020, # = paid entry

1/ Yellowstone mis-planted in 2017: no 4 year data

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 31. 2017-2020 Intrastate Winter Wheat Test (Exp. 35): Combined Locations Winter Survival and associated Yield (Locations: Williston (2019, 2020), Sidney (2017, 2018, 2019), and Conrad (2020) = 6 locations

	Winter Survival (%)				Yield under Winterkill conditions			
	2020	2019-20	2018-20	2017-20	2020	2019-20	2018-20	2017-20
location-years	2	4	5	6	2	4	5	6
# AAC Wildfire	80	67	66		81.5	76.5	75.2	
Bobcat	68	56	55	49	78.5	69.9	68.8	63.6
Brawl CL Plus	78	63	60	54	63.5	51.7	53.5	49.3
# Byrd CL Plus	84	63	62	57	81.2	65.6	67.9	63.6
#+ CP7909	65				63.3			
Flathead	85	69	64	62	73.8	64.7	63.2	59.2
FourOsix	82	64	60	58	81.4	71.0	70.4	65.5
# Incline AX	70	56	50		67.5	60.1	61.8	
Judee	79	66	63	56	69.9	67.5	67.4	58.4
Keldin	70	58	58	53	70.2	64.9	70.3	63.6
#r Langin	62				67.0			
#+ LCS 18-7071	53				71.9			
#+ LCS Helix AX	79				73.7			
# LCS Jet	75	50	43	38	72.0	67.1	62.1	57.1
#+ LCS Photon AX	64				60.3			
Loma	80	64	61	57	77.0	70.9	71.1	65.4
# Long Branch	77	64	61	59	68.8	60.1	61.8	57.1
#+ Mpress (SWW)	77				73.9			
MT1642	92	67	61		82.4	74.1	72.0	
MT1683	81	66	64		80.4	74.2	75.7	
MT1745	77	66			75.6	72.8		
MT1746	69	59			64.8	63.0		
MT1787	85	66			73.9	69.2		
MT1793	91	77			69.6	61.9		
+ MT1845	81				69.4			
+ MT1848	82				78.0			
+ MT1855	76				73.6			
+ MT1866	82				72.1			
+ MT1867	69				69.4			
+ MT1872	72				70.4			
MTCL1732	81	64			81.0	69.6		
MTCL1737	76	62			75.4	70.8		
+ MTS1810	75				76.3			
+ MTS18116	74				79.5			
+ MTS18149	72				79.0			
+ MTS1831	77				75.2			
Northern	83	65	62	58	87.8	78.8	79.8	72.6
StandClear CLP	83	67	66		78.5	71.8	71.4	
# SY 517 CL2	60	51	49	44	61.7	48.5	50.8	46.7
SY Clearstone 2CL	83	67	63	61	73.1	66.4	66.1	62.0
# SY Legend CL2	74	59	54		68.8	55.4	56.9	
# SY Monument	74	62	61	59	66.1	57.3	61.9	59.1
# SY Wolverine	70	53			61.5	49.0		
Warhorse	79	63	61	59	71.4	61.7	63.2	58.1
# WB4269	79	59			68.0	51.8		
# WB4311	68	56			61.9	54.7		
# WB4418	76	60			71.6	55.6		
#+ WB4792	79				80.2			
Yellowstone ^{1/}	76	63	63		69.4	66.9	68.1	
Average	75.9	62.2	59.3	54.9	72.7	64.5	66.3	60.1
LSD (0.05)	15.7	10.6	10.5	9.9	12.6	12.4	11.4	10.8
C.V.	10.3	12.2	14.0	15.7	8.6	13.7	13.6	15.5

+ = new for 2019, # = paid entry

1/ Yellowstone mis-planted in 2017: no 4 year data

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 32. 2017-2020 Intrastate Winter Wheat Test (Exp. 35): Combined Locations Heading Date, Height, and Lodging

Cultivar/Line	Heading Date (Julian)				Plant Height (in)				Lodging %
	2020	2019-20	2018-20	2017-20	2020	2019-20	2018-20	2017-20	2019
location-years	6	14	22	28	7	15	24	30	1
# AAC Wildfire	167.1	170.5	168.4		30.6	31.6	32.3		24
Bobcat	164.6	167.0	165.2	163.4	27.6	28.3	28.3	28.3	10
Brawl CL Plus	157.4	159.2	157.6	156.0	27.8	28.6	28.6	29.0	8
# Byrd CL Plus	159.9	162.5	160.5	158.8	30.3	30.8	31.3	31.3	19
## CP7909	156.0				26.1				
Flathead	158.5	161.3	159.5	157.9	29.0	29.6	29.8	30.2	0
FourOsix	162.4	165.0	163.2	161.5	28.4	29.1	29.3	29.3	0
# Incline AX	163.0	165.5	163.4		28.7	29.6	29.6		0
Judee	163.9	165.9	164.0	162.2	29.5	30.4	30.7	30.5	6
Keldin	163.9	166.5	164.5	162.6	29.0	29.6	30.1	30.2	3
# Langin	157.9				26.9				
## LCS 18-7071	164.2				29.7				
## LCS Helix AX	158.5				27.6				
# LCS Jet	163.9	166.3	164.7	162.9	25.2	26.6	26.9	27.1	0
## LCS Photon AX	159.2				28.9				
Loma	166.5	168.5	166.6	164.8	28.0	28.8	28.9	28.8	15
# Long Branch	157.8	159.6	157.9	156.3	27.8	28.2	28.1	28.6	28
## Mpress (SWW)	166.3				28.4				
MT1642	163.8	167.6	166.5		31.1	31.7	31.8		0
MT1683	164.0	166.6	164.9		31.2	32.0	32.3		13
MT1745	164.5	167.1			29.3	30.1			0
MT1746	162.9	165.5			27.2	28.0			3
MT1787	163.8	166.9			26.9	27.2			6
MT1793	160.1	162.5			28.0	29.0			3
+ MT1845	161.9				28.8				
+ MT1848	165.2				28.5				
+ MT1855	165.7				27.9				
+ MT1866	163.7				27.1				
+ MT1867	162.6				28.6				
+ MT1872	163.5				28.4				
MTCL1732	163.6	166.2			28.1	28.6			0
MTCL1737	166.0	168.8			26.7	27.9			0
+ MTS1810	166.2				29.1				
+ MTS18116	166.3				26.8				
+ MTS18149	166.5				27.1				
+ MTS1831	167.3				26.8				
Northern	164.6	167.6	165.9	164.1	30.0	30.7	30.8	30.5	22
StandClear CLP	163.9	166.2	164.2		29.4	30.1	30.5		15
# SY 517 CL2	158.2	160.2	158.3	156.5	26.3	27.1	27.7	27.8	0
SY Clearstone 2CL	164.5	166.7	165.3	163.3	31.5	32.1	32.8	32.9	32
# SY Legend CL2	160.0	163.1	161.1		28.1	28.7	28.6		70
# SY Monument	161.5	164.0	162.0	160.2	27.3	28.1	28.5	28.8	12
# SY Wolverine	158.3	161.0			26.3	26.5			0
Warhorse	164.0	166.5	164.8	163.1	28.6	29.4	29.6	29.5	6
# WB4269	158.7	161.5			25.8	26.4			0
# WB4311	160.7	163.4			26.1	26.7			0
# WB4418	159.1	161.3			26.6	27.0			3
## WB4792	163.1				28.7				
Yellowstone ^{1/}	164.4	167.0	165.4		31.0	31.9	32.2		3
Average	162.6	164.9	163.4	160.9	28.2	29.1	29.9	29.5	12.0
LSD (0.05)	1.1	0.8	0.6	0.6	1.1	0.8	0.7	0.7	8.0
C.V.	0.6	0.7	0.7	0.7	3.7	4.0	4.2	4.5	17.1

+ = new for 2019, # = paid entry

^{1/} Yellowstone mis-planted in 2017: no 4 year data

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 33. 2017-2020 Intrastate Winter Wheat Test (Exp. 35): Combined Locations Sawfly Cutting and Yield

Cultivar/Line	Sawfly Cutting (%) Conrad, Havre and Ft. Benton				Yield under cutting greater than 10%			
	Test Average above 10%							
	2020	2019-20	2018-20	2017-20	2020	2019-20	2018-20	2017-20
location-years	2	5	7	8	2	5	7	8
# AAC Wildfire	33	40	33		79.9	61.8	63.0	
Bobcat	10	12	9	7	82.9	71.7	70.6	61.3
Brawl CL Plus	20	35	32	32	64.0	64.2	64.2	55.3
# Byrd CL Plus	26	33	34	34	84.1	66.3	68.8	59.3
#+ CP7909	37				56.1			
Flathead	24	42	44	40	75.7	64.5	62.1	54.9
FourOsix	46	54	53	49	81.2	68.2	65.0	56.4
# Incline AX	21	27	28		69.0	62.5	62.2	
Judee	18	29	26	23	71.4	61.0	60.8	53.4
Keldin	41	54	49	44	73.1	65.4	64.1	56.2
#r Langin	38				68.8			
#+ LCS 18-7071	37				71.0			
#+ LCS Helix AX	22				74.9			
# LCS Jet	39	40	38	35	72.0	65.6	64.2	56.1
#+ LCS Photon AX	40				62.0			
Loma	24	28	24	22	78.4	66.3	66.2	57.8
# Long Branch	24	34	34	35	72.6	67.5	67.0	57.5
#+ Mpress (SWW)	33				77.1			
MT1642	30	43	38		81.2	67.2	66.3	
MT1683	32	50	53		80.7	64.8	64.3	
MT1745	24	31			75.3	67.9		
MT1746	23	28			68.8	62.4		
MT1787	27	37			75.8	68.3		
MT1793	19	41			69.4	63.9		
+ MT1845	21				70.0			
+ MT1848	21				79.6			
+ MT1855	34				74.3			
+ MT1866	26				73.9			
+ MT1867	36				74.3			
+ MT1872	18				75.5			
MTCL1732	10	13			83.1	65.6		
MTCL1737	24	33			75.2	66.2		
+ MTS1810	3				78.6			
+ MTS18116	7				82.6			
+ MTS18149	18				81.9			
+ MTS1831	7				76.8			
Northern	18	33	32	32	83.6	70.0	67.8	57.5
StandClear CLP	35	40	35		80.3	68.7	66.8	
# SY 517 CL2	26	36	33	29	60.9	58.3	59.9	53.2
SY Clearstone 2CL	38	53	53	50	72.6	64.3	65.0	55.4
# SY Legend CL2	31	54	45		69.8	61.5	64.1	
# SY Monument	32	48	47	45	67.7	64.2	65.9	56.2
# SY Wolverine	32	38			63.3	58.2		
Warhorse	19	16	12	10	75.2	60.8	60.9	53.3
# WB4269	13	28			67.7	64.1		
# WB4311	32	42			64.9	61.5		
# WB4418	20	27			70.9	62.3		
#+ WB4792	21				80.1			
Yellowstone	35	47	50		71.8	61.5	62.0	
Average	25.8	36.4	36.4	36.3	73.9	64.6	64.6	
LSD (0.05)	16.4	8.4	7.2	11.5	12.8	ns	ns	
C.V.	31.6	28.0	32.8	32.1	8.6	10.3	10.5	

+ = new for 2019, # = paid entry

1/ Yellowstone mis-planted in 2017: no 4 year data

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 34. 2020 Off-Station Winter Wheat Tests: Summary

Cultivar/Line	Origin/Pedigree	Locations			Yield bu/ac	Test weight lb/bu	Plant height in	Sawfly cutting %	Falling number	Protein %
+ = new for 2020										
AAC Wildfire	Alberta: SECAN, 2015	75.1	60.6	32.4	12	373	13.1			
Bobcat	Montana, 2019	74.3	60.8	29.7	4	414	13.1			
Brawl CLP	Colorado Research Foundation, 2011	71.5	62.4	29.4	7	386	13.3			
Byrd CL Plus	Plainsgold/Col. Wheat Res Fdn, 2018 (CO130)	79.3	60.9	31.9	15	370	12.3			
Decade	Montana/North Dakota, 2010	73.8	61.2	30.7	13	419	13.3			
Flathead	Montana, 2019	75.3	61.2	30.9	5	412	13.2			
FourOsix	Montana, 2018	79.3	61.0	30.8	15	413	13.1			
Judee	Montana, 2011	72.5	61.3	30.9	4	413	13.5			
Keldin	Westbred, 2011	83.6	61.1	30.0	12	432	12.9			
LCS Jet	Limagrain Cereal Seeds, 2015	80.3	59.3	27.9	10	359	12.7			
Loma	Montana, 2016	73.9	60.9	30.1	9	370	13.3			
MT1683	Yellowstone(L)*2/CDC Buteo	77.5	60.1	32.7	11	415	12.8			
+ MT1745	Decade*2/NI06732	77.8	60.8	31.2	10	434	12.7			
+ MT1746	MT06103//MTW0881/SD06W166	79.3	62.2	28.4	9	421	12.6			
+ MT1793	Decade-Fhb1	77.8	61.1	30.1	9	434	13.2			
MTCL1732	AP035-8-1/5/MT08134/4/YLL*4/3/MTCL01158	79.1	60.8	29.5	7	387	12.4			
+ MTCL1737	YLL-2CL/3/YLL*2/Pelsart//PROM/3*YLL	76.8	60.0	28.7	8	397	12.9			
+ MTS18149	Loma*2/AAC Gateway	74.6	60.6	29.2	3	395	13.1			
Northern	Montana, 2015	81.8	61.0	31.4	10	459	13.0			
Ray	Montana, 2018	61.2	59.1	35.1	15	436	13.2			
StandClear CLP	Montana/Loveland Products Inc., 2020 (MTCS)	79.1	61.9	30.9	11	401	12.8			
SY Clearstone 2CL	Montana/Syngenta, 2012	72.5	60.0	32.2	17	453	13.1			
SY Monument	Syngenta, 2015	76.9	60.4	29.6	6	383	12.4			
Warhorse	Montana, 2013	74.5	61.3	30.4	5	440	13.4			
Yellowstone	Montana 2005	72.6	60.0	31.3	11	410	13.1			
Average		76.0	60.8	30.6	9.6	408.0	13.0			
LSD (0.05)		ns	0.9	1.6	ns	52.7	0.6			
C.V. (%)		12.5	1.4	4.8	55.7	6.2	4.4			

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 35. 2020 Off-Station Winter Wheat Test (Exp. 3851): Turner (NARC)

Entry	Cultivar/Line	Origin/Pedigree	Yield bu/ac	Test weight lb/bu	Stand %	Plant height in	Sawfly cutting %	Falling number	Protein %
+ = new for 2020		lattice efficiency relative to RCB	RCB	LAT	RCB	RCB	LAT	RCB	RCB
			102%	131%	100%	101%	134%		103%
25	+ MTS18149	Loma*2/AAC Gateway	66.9	60.4	98.7	22.2	0	400	13.9
20	AAC Wildfire	Alberta: SECAN, 2015	59.7	59.5	98.3	25.4	13	382	13.7
10	Loma	Montana, 2016	58.0	60.3	98.3	23.8	4	346	14.3
16	StandClear CLP	Montana/Loveland Products Inc., 202	57.9	61.9	97.3	26.1	9	385	13.6
3	Judee	Montana, 2011	57.1	61.1	97.6	25.2	4	386	14.7
9	Northern	Montana, 2015	56.9	60.2	95.7	24.6	15	430	14.1
4	Keldin	Westbred, 2011	56.3	60.0	86.2	24.7	10	381	14.1
19	Byrd CL Plus	Plainsgold/Col. Wheat Res Fdn, 2011	55.8	61.1	96.6	27.3	22	367	12.8
14	Bobcat	Montana, 2019	55.7	60.5	96.3	24.4	5	423	14.0
23	+ MT1745	Decade*2/NI06732	55.3	61.2	96.5	24.4	19	430	13.0
22	+ MTCL1737	YLL-2CL/3/YLL*2/Pelsart//PROM/3*Y	54.6	59.5	98.3	21.8	13	397	14.1
6	SY Clearstone 2CL	Montana/Syngenta, 2012	54.5	60.0	96.9	26.1	23	417	14.1
24	+ MT1746	MT06103/MTW0881/SD06W166	54.2	62.2	98.0	21.8	8	426	13.6
7	Decade	Montana/North Dakota, 2010	53.4	60.6	98.6	24.8	18	393	14.4
18	MT1683	Yellowstone(L)*2/CDC Buteo	53.2	59.9	98.0	25.1	17	412	14.2
11	SY Monument	Syngenta, 2015	51.9	60.0	99.0	23.9	9	406	13.0
13	Ray	Montana, 2018	51.8	58.5	96.6	32.0	18	457	13.8
8	+ MT1793	Decade-Fhb1	51.2	60.3	97.6	24.0	8	424	15.2
2	Yellowstone	Montana 2005	51.2	60.3	95.9	25.6	17	408	14.0
21	MTCL1732	AP035-8-1/5/MT08134/4/YLL*4/3/MT	51.2	60.7	98.3	22.2	8	383	13.6
12	FourOsix	Montana, 2018	51.0	60.1	97.2	24.2	13	415	13.9
1	Warhorse	Montana, 2013	49.7	60.2	97.7	24.2	5	437	14.5
17	LCS Jet	Limagrain Cereal Seeds, 2015	45.1	58.1	98.0	21.3	5	351	13.8
15	Flathead	Montana, 2019	43.4	60.9	94.9	23.1	5	415	14.3
5	Brawl CLP	Colorado Research Foundation, 201	33.9	61.8	93.7	20.0	11	355	14.5
Average			53.2	60.4	96.8	24.3	11.2	401.1	14.0
LSD (0.05)			4.7	0.6	ns	1.6	10.8	17.8	0.3
C.V. (%)			5.4	0.5	3.7	3.9	40.0	2.5	1.5
P-value (Varieties)			<.0001	<.0001	0.1347	<.0001	<.0001	<.0001	<.0001

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 36. 2020 Off-Station Winter Wheat Test (Exp. 3853): Loma (NARC)

Entry	Cultivar/Line	Origin/Pedigree	Yield bu/ac	Test weight lb/bu	Plant height in	Sawfly cutting %	Falling number	Protein %
+ = new for 2020			LAT	LAT	LAT	LAT	LAT	LAT
lattice efficiency relative to RCB			559%	183%	167%	131%	109%	538%
9	Northern	Montana, 2015	67.8	60.0	28.8	5	487	13.9
22	+ MTCL1737	YLL-2CL/3YLL*2/Pelsart//PROM/3*Y	67.1	59.7	26.5	4	396	13.7
6	SY Clearstone 2CL	Montana/Syngenta, 2012	66.2	59.2	28.8	10	490	13.7
23	+ MT1745	Decade*2/NI06732	64.3	60.5	27.3	2	437	12.8
19	Byrd CL Plus	Plainsgold/Col. Wheat Res Fdn, 2011	62.7	59.0	28.5	9	373	13.0
18	MT1683	Yellowstone(L)*2/CDC Buteo	62.5	59.3	30.4	6	417	13.6
5	Brawl CLP	Colorado Research Foundation, 2011	62.1	61.5	27.0	2	418	13.0
10	Loma	Montana, 2016	61.7	59.8	27.4	13	393	13.8
15	Flathead	Montana, 2019	61.0	59.7	28.2	6	408	13.5
7	Decade	Montana/North Dakota, 2010	59.8	59.0	27.9	8	445	13.8
2	Yellowstone	Montana 2005	59.6	59.8	28.2	5	412	13.5
11	SY Monument	Syngenta, 2015	59.4	58.9	25.6	3	359	12.3
14	Bobcat	Montana, 2019	59.2	60.4	27.5	4	405	13.5
24	+ MT1746	MT06103//MTW0881/SD06W166	58.7	61.1	25.4	9	416	13.1
13	Ray	Montana, 2018	58.7	59.2	31.5	12	415	13.5
4	Keldin	Westbred, 2011	58.4	59.5	26.8	15	484	13.4
8	+ MT1793	Decade-Fhb1	57.5	59.8	25.6	10	444	14.1
21	MTCL1732	AP035-8-1/5/MT08134/4/YLL*4/3/MT	57.4	58.8	27.4	7	391	13.0
25	+ MTS18149	Loma*2/AAC Gateway	57.3	59.9	24.9	6	389	14.2
12	FourOsix	Montana, 2018	56.4	59.6	26.9	17	411	13.9
20	AAC Wildfire	Alberta: SECAN, 2015	56.3	58.6	27.8	11	364	13.9
16	StandClear CLP	Montana/Loveland Products Inc., 2012	56.1	61.2	26.4	12	417	13.7
3	Judee	Montana, 2011	55.8	59.8	29.3	4	440	14.3
1	Warhorse	Montana, 2013	52.4	59.8	26.6	4	443	13.9
17	LCS Jet	Limagrain Cereal Seeds, 2015	46.8	57.3	22.8	15	368	13.1
Average			59.4	59.7	27.3	8.0	416.9	13.5
LSD (0.05)			6.2	0.8	2.9	6.3	28.1	0.5
C.V. (%)			5.7	0.7	5.8	44.3	3.9	1.8
P-value (Varieties)			<.0001	<.0001	0.0008	0.0002	<.0001	<.0001

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 37. 2020 Off-Station Winter Wheat Test (Exp. 3871): Denton (CARC)

Entry	Cultivar/Line	Origin/Pedigree	Yield bu/ac	Test weight lb/bu	Plant height in	Protein %
+ = new for 2020			LAT	RCB	LAT	RCB
lattice efficiency relative to RCB			142%	105%	118%	95%
21	MTCL1732	AP035-8-1/5/MT08134/4/YLL*4/3/MT	113.9	62.1	32.4	12.1
9	Northern	Montana, 2015	113.8	61.2	34.5	12.0
12	FourOsix	Montana, 2018	109.8	62.5	34.1	12.3
17	LCS Jet	Limagrain Cereal Seeds, 2015	108.0	59.4	29.6	12.6
16	StandClear CLP	Montana/Loveland Products Inc., 202	106.8	62.7	33.7	12.4
1	Warhorse	Montana, 2013	104.4	61.2	33.4	12.6
24 +	MT1746	MT06103//MTW0881/SD06W166	102.2	63.3	31.9	11.7
20	AAC Wildfire	Alberta: SECAN, 2015	101.4	62.0	37.4	12.1
15	Flathead	Montana, 2019	99.5	61.8	32.3	12.1
18	MT1683	Yellowstone(L)*2/CDC Buteo	99.3	60.9	35.6	11.6
25 +	MTS18149	Loma*2/AAC Gateway	98.9	60.6	32.9	12.3
3	Judee	Montana, 2011	98.6	62.6	33.3	12.1
4	Keldin	Westbred, 2011	97.9	62.3	32.5	12.6
23 +	MT1745	Decade*2/NI06732	96.0	61.2	32.3	12.6
11	SY Monument	Syngenta, 2015	95.3	60.6	32.1	12.1
10	Loma	Montana, 2016	95.0	61.2	32.7	12.7
19	Byrd CL Plus	Plainsgold/Col. Wheat Res Fdn, 201	93.9	61.8	33.8	11.6
2	Yellowstone	Montana 2005	93.6	61.2	34.4	11.9
22 +	MTCL1737	YLL-2CL/3/YLL*2/Pelsart//PROM/3*Y	92.5	61.6	30.8	12.9
8 +	MT1793	Decade-Fhb1	91.2	61.9	33.1	11.1
6	SY Clearstone 2CL	Montana/Syngenta, 2012	90.8	60.9	36.8	12.7
7	Decade	Montana/North Dakota, 2010	90.8	61.5	34.0	11.8
14	Bobcat	Montana, 2019	86.9	62.0	29.6	11.9
5	Brawl CLP	Colorado Research Foundation, 201	78.8	62.2	30.9	12.5
13	Ray^{1/}	Montana, 2018	28.9	58.5	37.5	13.3
Average			95.5	61.5	33.3	12.2
LSD (0.05)			15.2	1.2	1.9	ns
C.V. (%)			8.8	1.1	3.3	5.7
P-value (Varieties)			<.0001	<.0001	<.0001	0.0937

bold = indicates highest value within a column

^{1/} Ray = heavily grazed (heads) by deer

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 38. 2020 Off-Station Winter Wheat Test (Exp. 3880): Huntley Irrigated (SARC)

Entry	Cultivar/Line	Origin/Pedigree	Yield bu/ac	Test weight lb/bu	Heading date	Plant height in	Lodg- ing %	Grain moisture %	Protein %
+ = new for 2020			RCB	RCB	RCB	RCB	LAT	LAT	LAT
lattice efficiency relative to RCB			100%	90%	102%	102%	123%	115%	116%
4	Keldin	Westbred, 2011	157.1	61.4	160.0	37.9	34	11.0	12.3
17	LCS Jet	Limagrain Cereal Seeds, 2015	144.8	59.6	158.7	34.0	0	10.7	12.3
24	+ MT1746	MT06103/MTW0881/SD06W166	134.1	62.3	160.0	35.4	33	11.0	12.6
8	+ MT1793	Decade-Fhb1	127.2	60.0	158.3	35.8	45	10.5	13.1
11	SY Monument	Syngenta, 2015	127.1	59.4	158.7	36.0	28	10.6	12.6
5	Brawl CLP	Colorado Research Foundation, 2011	124.8	63.5	153.7	34.1	17	10.5	12.6
12	FourOsix	Montana, 2018	122.7	60.3	160.3	37.1	19	11.7	13.0
15	Flathead	Montana, 2019	122.4	61.5	153.7	36.6	26	10.9	12.6
19	Byrd CL Plus	Plainsgold/Col. Wheat Res Fdn, 2018	121.2	58.8	157.7	38.3	52	11.0	12.2
21	MTCL1732	AP035-8-1/5/MT08134/4/YLL*4/3/MT	120.3	59.6	159.3	34.6	42	10.4	12.6
9	Northern	Montana, 2015	119.1	59.7	160.7	37.8	46	10.1	13.0
16	StandClear CLP	Montana/Loveland Products Inc., 202	118.3	61.9	159.3	37.7	44	10.2	13.3
1	Warhorse	Montana, 2013	114.6	60.1	160.0	38.6	49	10.5	14.1
23	+ MT1745	Decade*2/NI06732	114.5	59.7	159.3	37.7	32	10.5	12.7
7	Decade	Montana/North Dakota, 2010	113.5	60.7	159.7	38.3	14	11.6	13.0
20	AAC Wildfire	Alberta: SECAN, 2015	111.4	59.0	162.0	38.8	42	10.2	13.6
22	+ MTCL1737	YLL-2CL/3/YLL*2/Pelsart//PROM/3*Y	109.7	57.4	161.3	34.9	49	11.0	13.2
14	Bobcat	Montana, 2019	107.8	58.6	160.0	36.2	34	10.4	14.2
25	+ MTS18149	Loma*2/AAC Gateway	105.4	59.0	162.3	35.3	36	11.4	13.4
18	MT1683	Yellowstone(L)*2/CDC Buteo	103.9	57.4	159.3	39.1	50	10.1	13.4
2	Yellowstone	Montana 2005	101.6	56.6	159.3	39.2	44	10.1	13.4
6	SY Clearstone 2CL	Montana/Syngenta, 2012	97.4	56.6	159.3	39.6	64	10.8	13.4
10	Loma	Montana, 2016	96.9	59.0	162.0	36.7	38	10.4	13.3
13	Ray	Montana, 2018	94.5	56.2	162.3	42.3	49	10.6	14.0
3	Judee	Montana, 2011	93.7	59.3	160.0	37.8	46	10.9	13.2
Average			116.2	59.5	159.5	37.2	37.3	10.7	13.1
LSD (0.05)			12.1	2.0	1.9	2.3	ns	ns	0.5
C.V. (%)			6.4	2.0	0.7	3.7	46.6	5.9	2.0
P-value (Varieties)			<.0001	<.0001	<.0001	<.0001	0.0922	0.2344	<.0001

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 39. 2020 Off-Station Winter Wheat Test (Exp. 3881): Rapelje (SARC)

Entry	Cultivar/Line	Origin/Pedigree	Yield bu/ac	Test weight lb/bu	Stand %	Plant height in	Protein %
+ = new for 2020			RCB	RCB	RCB	RCB	RCB
lattice efficiency relative to RCB			100%	98%	89%	102%	97%
17	LCS Jet	Limagrain Cereal Seeds, 2015	68.9	60.8	100	24.5	11.6
22	+ MTCL1737	YLL-2CL/3/YLL*2/Pelsart//PROM/3*Y	65.9	62.4	100	26.9	11.7
16	StandClear CLP	Montana/Loveland Products Inc., 202	65.7	63.7	100	29.9	11.7
21	MTCL1732	AP035-8-1/5/MT08134/4/YLL*4/3/MT	65.7	62.7	100	27.8	11.8
18	MT1683	Yellowstone(L)*2/CDC Buteo	65.0	62.5	100	30.1	11.9
12	FourOsix	Montana, 2018	61.6	62.7	100	27.7	13.1
14	Bobcat	Montana, 2019	61.2	63.0	100	26.0	12.2
23	+ MT1745	Decade*2/NI06732	59.8	63.2	95	29.0	12.3
24	+ MT1746	MT06103//MTW0881/SD06W166	57.9	64.0	100	25.6	12.7
6	SY Clearstone 2CL	Montana/Syngenta, 2012	56.3	61.8	97	30.1	13.2
1	Warhorse	Montana, 2013	56.0	62.4	100	28.0	13.3
9	Northern	Montana, 2015	55.5	62.4	95	27.3	13.3
20	AAC Wildfire	Alberta: SECAN, 2015	54.9	62.2	95	31.4	12.6
2	Yellowstone	Montana 2005	54.9	61.5	93	28.2	13.5
13	Ray	Montana, 2018	54.1	61.5	100	33.1	12.7
3	Judee	Montana, 2011	51.0	62.7	97	28.2	14.5
19	Byrd CL Plus	Plainsgold/Col. Wheat Res Fdn, 2011	50.2	63.0	80	29.4	12.6
4	Keldin	Westbred, 2011	49.9	62.2	78	25.9	13.3
10	Loma	Montana, 2016	48.9	62.1	88	25.9	14.0
5	Brawl CLP	Colorado Research Foundation, 2011	48.4	63.9	100	27.2	14.4
8	+ MT1793	Decade-Fhb1	48.3	62.1	97	27.0	14.5
7	Decade	Montana/North Dakota, 2010	46.8	62.0	88	28.2	14.7
25	+ MTS18149	Loma*2/AAC Gateway	46.2	61.8	80	24.5	13.9
15	Flathead	Montana, 2019	45.4	63.3	88	26.9	14.2
11	SY Monument	Syngenta, 2015	43.4	61.7	82	24.3	13.6
Average			55.3	62.5	94.1	27.7	13.1
LSD (0.05)			11.8	0.9	17.3	2.9	1.4
C.V. (%)			13.0	0.9	11.2	6.4	6.6
P-value (Varieties)			0.0009	<.0001	0.0487	0.0002	0.0001

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 40. 2020 Off-Station Winter Wheat Test (Exp. 3884): Fly Creek (Hardin Area, SARC)

Entry	Cultivar/Line	Origin/Pedigree	Yield bu/ac	Test weight lb/bu	Plant height in	Protein %
			LAT	LAT	LAT	LAT
+ = new for 2020						
		lattice efficiency relative to RCB	113%	113%	119%	109%
8	+ MT1793	Decade-Fhb1	77.5	61.4	31.1	12.6
5	Brawl CLP	Colorado Research Foundation, 2011	76.8	62.7	33.7	12.8
11	SY Monument	Syngenta, 2015	76.5	60.8	30.6	11.3
4	Keldin	Westbred, 2011	74.5	62.0	29.4	11.9
24	+ MT1746	MT06103//MTW0881/SD06W166	73.9	62.4	27.3	11.7
9	Northern	Montana, 2015	71.6	62.8	31.2	13.1
21	MTCL1732	AP035-8-1/5/MT08134/4/YLL*4/3/MT	71.4	60.4	29.2	12.2
12	FourOsix	Montana, 2018	71.0	61.2	30.0	12.6
18	MT1683	Yellowstone(L)*2/CDC Buteo	71.0	60.6	34.6	12.4
17	LCS Jet	Limagrains Cereal Seeds, 2015	70.9	59.6	28.4	12.4
15	Flathead	Montana, 2019	70.3	62.1	33.0	12.8
7	Decade	Montana/North Dakota, 2010	70.2	61.6	29.3	13.3
19	Byrd CL Plus	Plainsgold/Col. Wheat Res Fdn, 2011	70.2	61.2	32.1	11.4
16	StandClear CLP	Montana/Loveland Products Inc., 2012	68.8	62.1	30.1	12.8
14	Bobcat	Montana, 2019	68.7	61.6	28.8	13.0
23	+ MT1745	Decade*2/NI06732	68.1	61.2	29.8	12.6
2	Yellowstone	Montana 2005	68.1	61.2	32.3	12.3
13	Ray	Montana, 2018	66.9	61.3	35.1	11.9
3	Judee	Montana, 2011	66.5	62.4	30.3	12.2
6	SY Clearstone 2CL	Montana/Syngenta, 2012	64.1	61.2	34.4	12.7
10	Loma	Montana, 2016	63.2	62.0	30.4	13.2
20	AAC Wildfire	Alberta: SECAN, 2015	62.6	62.0	33.0	12.5
25	+ MTS18149	Loma*2/AAC Gateway	62.3	62.5	28.6	12.6
1	Warhorse	Montana, 2013	61.6	62.4	31.3	13.2
22	+ MTCL1737	YLL-2CL/3/YLL*2/Pelsart//PROM/3*Y	56.2	61.2	29.8	13.3
Average			68.9	61.6	31.0	12.5
LSD (0.05)			6.5	0.5	2.1	0.7
C.V. (%)			5.3	0.5	3.7	3.2
P-value (Varieties)			<.0001	<.0001	<.0001	<.0001

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 41. 2020 Off-Station Winter Wheat Test (Exp. 3885): Molt (SARC)

Entry	Cultivar/Line	Origin/Pedigree	Yield bu/ac	Test weight lb/bu	Plant height in	Protein %
+ = new for 2020			LAT	RCB	LAT	LAT
		lattice efficiency relative to RCB	133%	102%	108%	113%
4	Keldin	Westbred, 2011	100.9	61.4	33.6	12.4
11	SY Monument	Syngenta, 2015	93.3	61.7	33.7	11.5
17	LCS Jet	Limagrains Cereal Seeds, 2015	91.9	57.9	30.3	11.6
15	Flathead	Montana, 2019	91.9	62.2	34.0	11.9
9	Northern	Montana, 2015	91.0	60.2	32.9	13.0
19	Byrd CL Plus	Plainsgold/Col. Wheat Res Fdn, 2011	87.8	60.8	35.4	11.8
12	FourOsix	Montana, 2018	87.3	60.2	33.7	12.5
13	Ray	Montana, 2018	86.7	58.7	37.7	12.7
6	SY Clearstone 2CL	Montana/Syngenta, 2012	85.1	59.1	36.4	13.0
18	MT1683	Yellowstone(L)*2/CDC Buteo	85.0	60.2	35.8	11.6
8	+ MT1793	Decade-Fhb1	84.5	61.2	32.3	13.2
23	+ MT1745	Decade*2/NI06732	84.5	61.3	34.5	12.0
7	Decade	Montana/North Dakota, 2010	82.7	60.6	35.4	12.9
24	+ MT1746	MT06103//MTW0881/SD06W166	82.6	62.9	30.6	12.5
5	Brawl CLP	Colorado Research Foundation, 2011	82.1	63.2	32.1	11.8
2	Yellowstone	Montana 2005	80.6	59.7	35.2	12.7
21	MTCL1732	AP035-8-1/5/MT08134/4/YLL*4/3/MT	80.3	59.8	32.6	11.8
1	Warhorse	Montana, 2013	79.7	61.1	33.2	13.2
25	+ MTS18149	Loma*2/AAC Gateway	78.9	59.4	31.5	13.3
22	+ MTCL1737	YLL-2CL/3/YLL*2/Pelsart//PROM/3*Y	78.2	60.3	29.7	12.1
10	Loma	Montana, 2016	77.3	60.2	34.6	12.8
3	Judee	Montana, 2011	75.7	61.0	33.1	13.3
14	Bobcat	Montana, 2019	73.8	60.3	31.7	12.7
16	StandClear CLP	Montana/Loveland Products Inc., 2012	73.7	61.6	32.9	11.8
20	AAC Wildfire	Alberta: SECAN, 2015	73.2	58.6	34.2	13.2
Average			83.5	60.5	33.5	12.5
LSD (0.05)			7.2	1.4	2.3	1.0
C.V. (%)			4.8	1.4	3.9	4.3
P-value (Varieties)			<.0001	<.0001	<.0001	0.0005

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 42. 2020 Off-Station Winter Wheat Test (Exp. 38): Multi-Location Yield (bu/a)

Cultivar/Line	Turner		Loma	Denton	Fly Cr/				Ft Smith		7 Loc. Average
	NARC	RCB	NARC	CARC	Huntley	Rapelje	Hysham	Hardin	Molt		
			LAT	LAT	SARC	SARC	SARC	SARC	SARC		
+ = new for 2020											
	102%	559%	142%		100%	100%	113%	133%			
Keldin	56.3	58.4	97.9	<u>157.1</u>	49.9	74.5	91.0	83.6			
Northern	56.9	67.8	113.8	119.1	55.5	71.6	87.8	81.8			
LCS Jet	45.1	46.8	108.0	144.8	68.9	70.9	77.3	80.3			
Byrd CL Plus	55.8	62.7	93.9	121.2	50.2	70.2	100.9	79.3			
FourOsix	51.0	56.4	109.8	122.7	61.6	71.0	82.7	79.3			
+ MT1746	54.2	58.7	102.2	134.1	57.9	73.9	73.8	79.3			
MTCL1732	51.2	57.4	113.9	120.3	65.7	71.4	73.7	79.1			
StandClear CLP	57.9	56.1	106.8	118.3	65.7	68.8	80.3	79.1			
+ MT1745	55.3	64.3	96.0	114.5	59.8	68.1	86.7	77.8			
+ MT1793	51.2	57.5	91.2	127.2	48.3	77.5	91.9	77.8			
MT1683	53.2	62.5	99.3	103.9	65.0	71.0	87.3	77.5			
SY Monument	51.9	59.4	95.3	127.1	43.4	76.5	84.5	76.9			
+ MTCL1737	54.6	67.1	92.5	109.7	65.9	56.2	91.9	76.8			
Flathead	43.4	61.0	99.5	122.4	45.4	70.3	85.1	75.3			
AAC Wildfire	59.7	56.3	101.4	111.4	54.9	62.6	79.7	75.1			
+ MTS18149	66.9	57.3	98.9	105.4	46.2	62.3	85.0	74.6			
Warhorse	49.7	52.4	104.4	114.6	56.0	61.6	82.6	74.5			
Bobcat	55.7	59.2	86.9	107.8	61.2	68.7	80.6	74.3			
Loma	58.0	61.7	95.0	96.9	48.9	63.2	93.3	73.9			
Decade	53.4	59.8	90.8	113.5	46.8	70.2	82.1	73.8			
Yellowstone	51.2	59.6	93.6	101.6	54.9	68.1	78.9	72.6			
Judee	57.1	55.8	98.6	93.7	51.0	66.5	84.5	72.5			
SY Clearstone 2CL	54.5	66.2	90.8	97.4	56.3	64.1	78.2	72.5			
Brawl CLP	33.9	62.1	78.8	124.8	48.4	76.8	75.7	71.5			
Ray	51.8	58.7	28.9^{1/}	94.5	54.1	66.9	73.2	61.2			
Average	53.2	59.4	95.5	116.2	55.3	68.9	83.5	76.0			
LSD (0.05)	4.7	6.2	15.2	12.1	11.8	6.5	7.2	ns			
C.V. (%)	5.4	5.7	8.8	6.4	13.0	5.3	4.8	12.5			

bold = indicates highest value within a column ^{1/} Ray = heavily grazed (heads) by deer at Denton
bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 43. 2020 Off-Station Winter Wheat Test (Exp. 38): Multi-Location Test Weight (lb/bu)

Cultivar/Line	Devon/				Fly Ctl/				7 Loc. Average
	Turner	Loma	Denton	Huntley	Rapelje	Hysham	Hardin	Molt	
	NARC LAT	NARC LAT	CARC RCB	SARC RCB	SARC RCB	SARC not used	SARC LAT	SARC RCB	
+ = new for 2020	131%	183%	105%	90%	98%		113%	102%	
Brawl CLP + MT1746 StandClear CLP Judee Warhorse Decade Flathead Keldin + MT1793 FourOsix Northern Byrd CL Plus	61.8	61.5	62.2	63.5	63.9		62.7	61.0	62.4
	62.2	61.1	63.3	62.3	64.0		62.4	60.3	62.2
	61.9	61.2	62.7	61.9	63.7		62.1	59.8	61.9
	61.1	59.8	62.6	59.3	62.7		62.4	61.2	61.3
	60.2	59.8	61.2	60.1	62.4		62.4	62.9	61.3
	60.6	59.0	61.5	60.7	62.0		61.6	63.2	61.2
	60.9	59.7	61.8	61.5	63.3		62.1	59.1	61.2
	60.0	59.5	62.3	61.4	62.2		62.0	60.2	61.1
	60.3	59.8	61.9	60.0	62.1		61.4	62.2	61.1
Loma Bobcat + MT1745 MTCCL1732 AAC Wildfire + MTS18149 SY Monument MT1683 + MTCCL1737 SY Clearstone 2Cl Yellowstone LCS Jet Ray	60.1	59.6	62.5	60.3	62.7		61.2	60.6	61.0
	60.2	60.0	61.2	59.7	62.4		62.8	60.8	61.0
	61.1	59.0	61.8	58.8	63.0		61.2	61.4	60.9
	60.3	59.8	61.2	59.0	62.1		62.0	61.7	60.9
	60.5	60.4	62.0	58.6	63.0		61.6	59.7	60.8
	61.2	60.5	61.2	59.7	63.2		61.2	58.7	60.8
	60.7	58.8	62.1	59.6	62.7		60.4	61.6	60.8
	59.5	58.6	62.0	59.0	62.2		62.0	61.1	60.6
	60.4	59.9	60.6	59.0	61.8		62.5	60.2	60.6
Average LSD (0.05) C.V. (%)	60.0	58.9	60.6	59.4	61.7		60.8	61.3	60.4
	59.9	59.3	60.9	57.4	62.5		60.6	60.2	60.1
	59.5	59.7	61.6	57.4	62.4		61.2	57.9	60.0
	60.0	59.2	60.9	56.6	61.8		61.2	60.3	60.0
	60.3	59.8	61.2	56.6	61.5		61.2	59.4	60.0
	58.1	57.3	59.4	59.6	60.8		59.6	60.2	59.3
	58.5	59.2	58.5	56.2	61.5		61.3	58.6	59.1
	60.4	59.7	61.5	59.5	62.5		61.6	60.5	60.8
	0.6	0.8	1.2	2.0	0.9		0.5	1.4	0.9
0.5	0.7	1.1	2.0	0.9		0.5	1.4	1.4	

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 44. 2020 Off-Station Winter Wheat Test (Exp. 38): Multi-Location Plant height (in)

Cultivar/Line	Devon/				Fly Ctr/				7 Loc. Average										
	Turner		Loma		Denton		Huntley			Rapelje		Hysham		Hardin		Molt		Ft Smith	
	NARC	RCB	NARC	LAT	CARC	LAT	SARC	RCB		SARC	RCB	SARC	not used	LAT	SARC	LAT	SARC	LAT	SARC
+ = new for 2020	101%		167%		118%		102%		102%		102%		119%		108%				
LCS Jet	21.3	22.8	29.6	34.0	24.5	28.4	34.6	27.2	34.1	27.2	33.7	33.1	29.4	32.9	30.7	27.9			
+ MT1746	21.8	25.4	31.9	35.4	25.6	27.3	31.7	25.6	35.4	25.6	27.3	31.7	30.4	33.7	30.1	28.4			
+ MTCL1737	21.8	26.5	30.8	34.9	26.9	29.8	30.3	24.5	34.9	26.9	29.8	30.3	28.6	34.5	30.3	28.7			
+ MTS18149	22.2	24.9	32.9	35.3	32.9	33.1	30.6	28.8	35.3	24.5	28.6	35.8	31.1	34.0	30.4	29.2			
Brawl CLP	20.0	27.0	30.9	34.1	27.2	33.7	33.1	29.4	34.1	27.2	33.7	33.1	29.4	32.9	30.7	29.4			
MTCL1732	22.2	27.4	32.4	34.6	27.8	29.2	32.9	29.4	34.6	27.8	29.2	32.9	30.6	34.5	30.3	29.5			
SY Monument	23.9	25.6	32.1	36.0	24.3	30.6	34.5	29.6	36.0	24.3	30.6	34.5	31.1	34.0	30.1	29.6			
Bobcat	24.4	27.5	29.6	36.2	26.0	28.8	35.2	30.0	36.2	26.0	28.8	35.2	31.3	30.6	30.4	29.7			
Keldin	24.7	26.8	32.5	37.9	25.9	29.4	32.9	29.4	37.9	25.9	29.4	32.9	30.4	33.7	30.1	30.0			
Loma	23.8	27.4	32.7	36.7	25.9	30.4	33.7	29.4	36.7	25.9	30.4	33.7	31.1	34.0	30.1	30.1			
+ MT1793	24.0	25.6	33.1	35.8	27.0	31.3	30.6	30.0	35.8	27.0	31.3	30.6	31.3	30.6	30.4	30.1			
Warhorse	24.2	26.6	33.4	38.6	28.0	31.3	30.6	30.0	38.6	28.0	31.3	30.6	31.3	30.6	30.4	30.4			
Decade	24.8	27.9	34.0	38.3	28.2	29.3	32.1	30.7	38.3	28.2	29.3	32.1	30.0	35.4	30.8	30.7			
FourOsix	24.2	26.9	34.1	37.1	27.7	30.0	35.4	30.8	37.1	27.7	30.0	35.4	33.0	36.4	30.9	30.8			
Flathead	23.1	28.2	32.3	36.6	26.9	33.0	36.4	30.9	36.6	26.9	33.0	36.4	33.0	36.4	30.9	30.9			
Judee	25.2	29.3	33.3	37.8	28.2	30.3	32.3	30.9	37.8	28.2	30.3	32.3	30.3	32.3	30.9	30.9			
StandClear CLP	26.1	26.4	33.7	37.7	29.9	30.1	32.6	30.9	37.7	29.9	30.1	32.6	29.8	37.7	30.9	30.9			
+ MT1745	24.4	27.3	32.3	37.7	29.0	29.8	37.7	31.2	37.7	29.0	29.8	37.7	32.3	31.5	31.2	31.2			
Yellowstone	25.6	28.2	34.4	39.2	28.2	32.3	31.5	31.3	39.2	28.2	32.3	31.5	31.2	35.4	31.3	31.3			
Northern	24.6	28.8	34.5	37.8	27.3	31.2	35.4	31.4	37.8	27.3	31.2	35.4	32.1	33.6	31.4	31.4			
Byrd CL Plus	27.3	28.5	33.8	38.3	29.4	32.1	33.6	31.9	38.3	29.4	32.1	33.6	34.4	29.7	31.9	31.9			
SY Clearstone 2Cl	26.1	28.8	36.8	39.6	30.1	34.4	29.7	32.2	39.6	30.1	34.4	29.7	33.0	33.2	32.2	32.2			
AAC Wildfire	25.4	27.8	37.4	38.8	31.4	33.0	33.2	32.4	38.8	31.4	33.0	33.2	34.6	33.7	32.4	32.4			
MT1683	25.1	30.4	35.6	39.1	30.1	34.6	33.7	32.7	39.1	30.1	34.6	33.7	35.1	34.2	32.7	32.7			
Ray	32.0	31.5	37.5	42.3	33.1	35.1	34.2	35.1	42.3	33.1	35.1	34.2			35.1	35.1			
Average	24.3	27.3	33.3	37.2	27.7	31.0	33.5	30.6	37.2	27.7	31.0	33.5	31.0	33.5	30.6	30.6			
LSD (0.05)	1.6	2.9	1.9	2.3	2.9	2.1	2.3	1.6	2.3	2.9	2.1	2.3	2.1	2.3	1.6	1.6			
C.V. (%)	3.9	5.8	3.3	3.7	6.4	3.7	3.9	4.8	3.7	6.4	3.7	3.9	3.7	3.9	4.8	4.8			

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 45. 2020 Off-Station Winter Wheat Test (Exp. 38): Multi-Location Protein (%)

Cultivar/Line	Devon/				Fly Ctl/				7 Loc. Average																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	Turner	Loma	Denton	Huntley	Rapelje	Hysham	Hardin	Molt	Ft Smith	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT	SARC	LAT

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 46. 2020 Off-Station Winter Wheat Test (Exp. 38): Multi-Location Sawfly Cutting (%)

Cultivar/Line		Origin/Pedigree		NARC		2 Loc Average
				Turner	Loma	
+ = new for 2020				LAT	LAT	
		lattice efficiency relative to RCB	134%	131%		
+ MTS18149	Judee	Loma*2/AAC Gateway Montana, 2011	<u>0</u> 4	6 4	3 4	
	Bobcat	Montana, 2019	5	4	4	
	Warhorse	Montana, 2013	5	4	5	
	Flathead	Montana, 2019	5	6	5	
	SY Monument	Syngenta, 2015	9	3	6	
	Brawl CLP	Colorado Research Foundation, 2011	11	2	7	
	MTCL1732	AP035-8-1/5/MT08134/4/YLL*4/3/MT06103	8	7	7	
+ MTCL1737		YLL-2CL/3/YLL*2/Pelsart//PROM/3*YLL-2CL/3/YLL*2/Pelsart//PROM/3*Y	13	4	8	
+ MT1746		MT06103//MTW0881/SD06W166	8	9	9	
	Loma	Montana, 2016	4	13	9	
+ MT1793		Decade-Fhb1	8	10	9	
	LCS Jet	Limagrain Cereal Seeds, 2015	5	15	10	
	Northern	Montana, 2015	15	5	10	
+ MT1745		Decade*2/NI06732	19	<u>2</u>	10	
	StandClear CLP	Montana/Loveland Products Inc., 2020	9	12	11	
	MT1683	Yellowstone(L)*2/CDC Buteo	17	6	11	
	Yellowstone	Montana 2005	17	5	11	
	AAC Wildfire	Alberta: SECAN, 2015	13	11	12	
	Keldin	Westbred, 2011	10	15	12	
	Decade	Montana/North Dakota, 2010	18	8	13	
	Ray	Montana, 2018	18	12	15	
	FourOsix	Montana, 2018	13	17	15	
	Byrd CL Plus	Plainsgold/Col. Wheat Res Fdn, 2018	22	9	15	
	SY Clearstone 2CL	Montana/Syngenta, 2012	23	10	17	
Average			11.2	8.0	9.6	
LSD (0.05)			10.8	6.3	ns	
C.V. (%)			40.0	44.3	55.7	

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 47. 2020 Off-Station Winter Wheat Test (Exp. 38): Falling Number

		Target ≥ 300		
Cultivar/Line	Origin/Pedigree	Turner NARC LAT	Loma NARC LAT	2 Loc Average
+ = new for 2020				
	lattice efficiency relative to RCB	118%	109%	
Northern	Montana, 2015	430	487	459
SY Clearstone 2CL	Montana/Syngenta, 2012	417	490	453
Warhorse	Montana, 2013	437	443	440
Ray	Montana, 2018	457	415	436
+ MT1793	Decade-Fhb1	424	444	434
+ MT1745	Decade*2/NI06732	430	437	434
Keldin	Westbred, 2011	381	484	432
+ MT1746	MT06103//MTW0881/SD06W166	426	416	421
Decade	Montana/North Dakota, 2010	393	445	419
MT1683	Yellowstone(L)*2/CDC Buteo	412	417	415
Bobcat	Montana, 2019	423	405	414
FourOsix	Montana, 2018	415	411	413
Judee	Montana, 2011	386	440	413
Flathead	Montana, 2019	415	408	412
Yellowstone	Montana 2005	408	412	410
StandClear CLP	Montana/Loveland Products Inc., 202	385	417	401
+ MTCL1737	YLL-2CL/3/YLL*2/Pelsart//PROM/3*Y	397	396	397
+ MTS18149	Loma*2/AAC Gateway	400	389	395
MTCL1732	AP035-8-1/5/MT08134/4/YLL*4/3/MT	383	391	387
Brawl CLP	Colorado Research Foundation, 2011	355	418	386
SY Monument	Syngenta, 2015	406	359	383
AAC Wildfire	Alberta: SECAN, 2015	382	364	373
Byrd CL Plus	Plainsgold/Col. Wheat Res Fdn, 2018	367	373	370
Loma	Montana, 2016	346	393	370
LCS Jet	Limagrain Cereal Seeds, 2015	351	368	359
Average		401.1	416.9	408.0
LSD (0.05)		17.8	28.1	52.7
C.V. (%)		2.5	3.9	6.2
P-value (Varieties)		<.0001	<.0001	0.0303

Table 48. 2017-2020 Off-Station Winter Wheat Test (Exp. 3851): Turner (NARC) Yield, Test Weight and Protein

Cultivar/Line	Grain Yield (bu/a)				Test Weight (lb/bu)				Protein (%)			
	2020	2019-20	2018-20	2017-20	2020	2019-20	2018-20	2017-20	2020	2019-20	2018-20	2017-20
	1y	2y	3y	4y	1y	2y	3y	4y	1y	2y	3y	4y
AAC Wildfire	59.7	59.0			59.5	58.8			13.7	13.8		
Bobcat	55.7	64.6	54.5	46.6	60.5	60.2	60.8	60.0	14.0	13.9	14.4	14.3
Brawl CLP	33.9	40.3	34.2	29.7	61.8	60.8	61.4	60.9	14.5	14.9	15.3	14.7
Byrd CL Plus	55.8	56.1			61.1	60.4			12.8	13.0		
Decade	53.4	56.4	49.5	42.4	60.6	59.8	60.4	59.5	14.4	14.6	15.1	15.0
Flathead	43.4	47.8	41.2		60.9	60.1	60.6		14.3	14.5	15.0	
FourOsix	51.0	56.4	49.0	41.5	60.1	59.4	60.1	59.3	13.9	14.1	14.6	14.5
Judee	57.1	58.1	49.2	41.5	61.1	60.7	61.3	60.4	14.7	14.7	15.3	15.2
Keldin	56.3	60.1	51.2	43.6	60.0	59.9	60.5	59.8	14.1	14.0	14.4	14.1
LCS Jet	45.1	50.3	44.4		58.1	57.3	57.8		13.8	13.8	14.0	
Loma	58.0	64.5	54.8	46.4	60.3	59.6	60.3	59.5	14.3	14.5	15.0	15.0
MT1683	53.2	63.3			59.9	59.6			14.2	14.2		
+ MT1745	55.3				61.2				13.0			
+ MT1746	54.2				62.2				13.6			
+ MT1793	51.2				60.3				15.2			
MTCL1732	51.2	56.8			60.7	59.7			13.6	13.8		
+ MTCL1737	54.6				59.5				14.1			
+ MTS18149	66.9				60.4				13.9			
Northern	56.9	61.2	53.5	45.5	60.2	60.0	60.6	59.8	14.1	14.2	14.7	14.6
Ray	51.8	56.8	49.5	41.7	58.5	58.1	58.7	57.8	13.8	13.8	14.2	14.1
StandClear CLP	57.9	56.9	49.8		61.9	61.1	61.4		13.6	13.8	14.5	
SY Clearstone 2CL	54.5	58.2	49.8	42.1	60.0	59.6	60.1	59.2	14.1	14.3	14.8	14.7
SY Monument	51.9	53.6	44.8	38.3	60.0	59.4	60.0	59.2	13.0	13.2	13.7	13.3
Warhorse	49.7	50.8	44.4	37.5	60.2	59.5	59.8	58.5	14.5	14.5	14.9	14.7
Yellowstone	51.2	63.0	54.0	45.3	60.3	59.8	60.3	59.1	14.0	14.1	14.5	14.3
Average	53.2	56.7	48.4	41.7	60.4	59.7	60.3	59.5	14.0	14.1	14.7	14.5
LSD (0.05)	4.7	10.1	6.4	5.4	0.6	0.7	0.5	0.6	0.3	0.4	0.4	0.5
C.V. (%)	5.4	8.5	7.9	9.0	0.5	0.6	0.5	0.8	1.5	1.3	1.5	2.3

+ = new for 2020

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 49. 2017-2020 Off-Station Winter Wheat Test (Exp. 3853): Loma (NARC) Yield, Test Weight and Protein

Cultivar/Line	Grain Yield (bu/a)				Test Weight (lb/bu)				Protein (%)			
	2020	2019-20	2018-20	2017-20	2020	2019-20	2018-20	2017-20	2020	2019-20	2018-20	2017-20
	1y	2y	3y	4y	1y	2y	3y	4y	1y	2y	3y	4y
AAC Wildfire	56.3	58.2			58.6	59.3			13.9	13.4		
Bobcat	59.2	66.6	66.5	62.3	60.4	61.1	61.1	61.1	13.5	12.7	13.0	13.5
Brawl CLP	62.1	61.6	61.5	58.3	61.5	61.6	61.7	61.7	13.0	13.2	13.7	14.0
Byrd CL Plus	62.7	61.6			59.0	60.2			13.0	12.4		
Decade	59.8	60.6	60.9	55.8	59.0	60.0	60.0	60.0	13.8	12.8	13.4	13.9
Flathead	61.0	57.8	56.7		59.7	60.3	60.6		13.5	13.4	13.5	
FourOsix	56.4	58.9	59.1	55.2	59.6	60.1	59.9	60.1	13.9	13.0	13.3	13.7
Judee	55.8	58.9	58.2	53.9	59.8	61.1	60.8	60.8	14.3	13.2	13.4	14.1
Keldin	58.4	61.0	61.6	55.9	59.5	60.1	60.1	60.2	13.4	13.0	13.3	13.7
LCS Jet	46.8	52.6	52.2		57.3	57.6	57.3		13.1	12.4	12.9	
Loma	61.7	60.9	59.8	55.2	59.8	60.3	59.7	59.9	13.8	13.6	13.9	14.1
MT1683	62.5	61.4			59.3	59.7			13.6	12.9		
+ MT1745	64.3				60.5				12.8			
+ MT1746	58.7				61.1				13.1			
+ MT1793	57.5				59.8				14.1			
MTCL1732	57.4	60.5			58.8	59.7			13.0	12.8		
+ MTCL1737	67.1				59.7				13.7			
+ MTS18149	57.3				59.9				14.2			
Northern Ray	67.8	64.3	63.9	58.9	60.0	60.2	60.1	60.2	13.9	13.5	13.8	14.2
	58.7	60.2	59.8	55.2	59.2	59.4	58.8	58.7	13.5	12.7	13.3	13.8
StandClear CLP	56.1	53.3	53.7		61.2	61.1	61.0		13.7	13.3	13.5	
SY Clearstone 2CL	66.2	60.8	60.5	55.0	59.2	59.3	59.0	59.3	13.7	13.1	13.5	14.1
SY Monument	59.4	66.8	65.6	59.2	58.9	59.7	59.9	59.9	12.3	12.2	12.4	12.7
Warhorse	52.4	48.5	46.8	45.3	59.8	60.6	60.2	60.4	13.9	14.0	14.2	14.7
Yellowstone	59.6	56.4	57.2	53.6	59.8	59.5	59.3	59.5	13.5	13.4	13.6	14.1
Average	59.4	59.5	59.0	55.7	59.7	60.0	60.0	60.1	13.5	13.0	13.4	13.9
LSD (0.05)	6.2	ns	7.1	6.1	0.8	1.3	1.0	0.8	0.5	ns	0.8	0.7
C.V. (%)	5.7	8.9	7.2	7.7	0.7	1.0	1.0	0.9	1.8	3.9	3.6	3.4

+ = new for 2020

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 50. 2017-2018 Off-Station Winter Wheat Test (Exp. 3865): The Knees (WTARC) Yield, Test Weight and Protein

Cultivar/Line	Grain Yield (bu/a)				Test Weight (lb/bu)				Protein (%)			
	2018		2017-18		2018		2017-18		2018		2017-18	
	1y	2y	1y	2y	1y	1y	1y	2y	1y	1y	2y	2y
AAC Wildfire												
Bobcat												
Brawl CLP												
Byrd CL Plus												
Decade												
Flathead												
FourOsix												
Judee												
Keldin												
LCS Jet												
Loma												
MT1683												
+ MT1745												
+ MT1746												
+ MT1793												
MTCL1732												
+ MTCL1737												
+ MTS18149												
Northern Ray												
StandClear CLP												
SY Clearstone 2CL												
SY Monument												
Warhorse												
Yellowstone												
Average												
LSD (0.05)												
C.V. (%)												

+ = new for 2020

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 51. 2017-2019 Off-Station Winter Wheat Test (Exp. 3864): Cut Bank (WTARC) Yield, Test Weight and Protein

Cultivar/Line	Grain Yield (bu/a)			Test Weight (lb/bu)			Protein (%)		
	2019	2018-19	2017-19	2019	2018-19	2017-19	2019	2018-19	2017-19
	1y	2y	3y	1y	2y	3y	1y	2y	3y
AAC Wildfire	70.2			59.5			12.7		
Bobcat	73.7	78.1	81.0	59.4	60.6	61.4	13.5	12.9	11.9
Brawl CLP	63.9	63.1	68.6	61.2	62.3	62.8	14.6	14.4	13.2
Byrd CL Plus	67.5			59.5			12.1		
Decade	64.1	66.7	70.5	59.7	60.8	61.4	14.1	14.0	12.7
Flathead	66.4	64.4		60.5	60.8		13.2	13.1	
FourOsix	68.6	67.2	75.3	60.3	61.1	61.5	12.8	12.9	11.8
Judee	64.9	71.1	74.0	61.0	61.5	62.3	14.1	13.8	12.6
Keldin	70.1	77.7	84.4	60.3	61.3	61.9	12.9	12.3	11.4
LCS Jet	74.4	76.9		57.8	58.2		12.2	12.2	
Loma	70.9	79.0	79.6	60.1	60.7	61.2	13.2	13.0	11.9
MT1683	70.1			58.1			13.0		
+ MT1745									
+ MT1746									
+ MT1793									
MTCL1732	61.8			57.8			13.0		
+ MTCL1737									
+ MTS18149									
Northern	71.5	73.4	78.0	60.0	60.9	61.2	12.7	12.6	11.7
Ray	71.7	75.2	77.7	60.3	59.8	60.0	12.0	12.4	11.4
StandClear CLP	67.9	71.5		60.2	61.2		13.1	13.0	
SY Clearstone 2CL	69.6	76.5	79.5	59.6	59.7	60.1	12.1	12.6	11.7
SY Monument	72.3	68.0	76.7	59.2	60.4	60.6	12.5	12.4	11.4
Warhorse	60.9	64.9	69.8	58.2	59.4	60.4	14.0	13.8	12.6
Yellowstone	70.1	78.7	80.7	60.0	60.3	60.7	12.7	12.6	11.6
Average	68.2	72.2	76.4	59.8	60.6	61.2	13.0	12.9	11.9
LSD (0.05)	ns	ns	ns	1.3	1.4	1.1	1.0	0.9	0.7
C.V. (%)	8.6	7.7	7.3	1.4	1.1	1.1	4.5	3.2	3.5

+ = new for 2020

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 52. 2017-2019 Off-Station Winter Wheat Test (Exp. 3865): Shelby area - Devon (WTARC) Yield, Test Weight and Protein

Cultivar/Line	Grain Yield (bu/a)			Test Weight (lb/bu)			Protein (%)		
	2019	2018-19	2017-19	2019	2018-19	2017-19	2019	2018-19	2017-19
	1y	2y	3y	1y	2y	3y	1y	2y	3y
AAC Wildfire	46.7			60.7			12.8		
Bobcat	64.8	57.0	60.6	61.5	60.9	61.1	12.7	12.5	12.5
Brawl CLP	42.1	37.3	46.2	63.1	62.3	62.6	12.6	13.0	13.1
Byrd CL Plus	47.9			61.7			11.7		
Decade	58.1	48.0	52.8	60.8	59.9	60.1	13.0	12.9	12.8
Flathead	38.9	38.9		61.6	60.2		12.9	13.1	
FourOsix	46.0	43.7	50.5	60.8	59.6	60.3	12.7	12.5	12.6
Judee	43.9	42.8	49.3	62.3	61.2	61.2	13.7	13.3	13.1
Keldin	45.9	42.9	50.4	61.1	60.3	60.6	12.5	12.2	12.4
LCS Jet	37.9	40.5		58.4	56.9		12.4	12.2	
Loma	52.9	49.0	55.2	61.9	60.2	60.6	13.2	13.0	12.9
MT1683	48.0			60.7			13.0		
+ MT1745									
+ MT1746									
+ MT1793									
MTCL1732	52.5			60.2			12.4		
+ MTCL1737									
+ MTS18149									
Northern	59.1	52.9	56.8	61.9	60.4	60.6	12.7	12.7	12.9
Ray	49.8	43.7	50.9	59.9	58.0	58.2	12.4	12.5	12.6
StandClear CLP	52.8	47.0		62.5	61.2		12.5	12.6	
SY Clearstone 2CL	44.7	42.8	51.1	60.1	58.9	59.4	13.1	12.8	12.7
SY Monument	42.2	38.1	48.5	59.7	58.4	58.7	11.9	12.3	12.3
Warhorse	54.6	47.8	52.5	61.8	60.6	60.9	13.2	13.3	13.3
Yellowstone	53.7	49.0	54.8	59.8	58.9	59.5	12.8	12.7	12.8
Average	48.9	45.5	52.5	61.2	59.9	60.3	12.7	12.7	12.8
LSD (0.05)	11.8	9.3	ns	1.3	1.1	0.8	0.5	ns	0.5
C.V. (%)	13.9	9.6	8.7	1.3	0.9	0.8	2.3	2.5	2.5

+ = new for 2020

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 53. 2017-2019 Off-Station Winter Wheat Test (Exp. 3863): Choteau area (WTARC) Yield, Test Weight and Protein

Cultivar/Line	Grain Yield (bu/a)			Test Weight (lb/bu)			Protein (%)		
	2019	2018-19	2017-19	2019	2018-19	2017-19	2019	2018-19	2017-19
	1y	2y	3y	1y	2y	3y	1y	2y	3y
AAC Wildfire	88.0			62.5			13.2		
Bobcat	86.9	84.4	73.8	62.6	60.9	60.0	13.3	14.3	14.2
Brawl CLP	69.7	75.0	69.8	63.8	63.2	62.7	14.1	14.2	13.7
Byrd CL Plus	86.8			62.8			12.1		
Decade	67.7	70.8	63.4	62.2	60.8	60.3	13.8	14.5	14.2
Flathead	69.6	71.5		62.6	61.5		13.2	13.8	
FourOsix	77.6	74.8	68.8	62.5	60.0	59.3	13.1	14.0	13.9
Judee	73.3	72.0	64.2	63.8	61.3	60.3	13.9	14.9	14.8
Keldin	88.5	79.7	72.3	62.8	61.7	61.0	13.4	14.3	14.1
LCS Jet	74.8	73.3		60.3	58.0		13.3	14.0	
Loma	88.5	81.3	70.6	62.1	59.7	58.8	13.8	14.6	14.3
MT1683	75.0			61.6			13.4		
+ MT1745									
+ MT1746									
+ MT1793									
MTCL1732	81.2			62.2			12.9		
+ MTCL1737									
+ MTS18149									
Northern	77.7	75.0	67.4	62.2	60.8	59.7	13.3	14.0	14.0
Ray	76.8	69.7	64.2	60.6	58.7	58.0	13.0	13.7	13.7
StandClear CLP	79.0	77.5		63.4	62.0		13.2	13.9	
SY Clearstone 2CL	73.9	70.7	65.8	61.5	59.5	58.4	13.3	14.1	13.8
SY Monument	73.1	73.7	67.6	61.9	60.4	58.8	12.7	13.4	13.3
Warhorse	75.8	71.1	64.7	61.8	60.0	59.1	13.9	14.4	14.3
Yellowstone	81.8	76.2	67.7	61.2	59.4	58.3	13.1	14.0	14.1
Average	79.2	75.0	68.1	62.4	60.4	59.6	13.3	14.1	14.0
LSD (0.05)	12.1	ns	ns	0.9	1.7	1.2	0.4	0.7	0.6
C.V. (%)	8.7	8.3	8.0	0.9	1.3	1.2	1.6	2.4	2.5

+ = new for 2020

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 54. 2017//2020 Off-Station Winter Wheat Test (Exp. 3871): Denton (CARC) Yield, Test Weight and Protein

Cultivar/Line	Grain Yield (bu/a)			Test Weight (lb/bu)			Protein (%)		
	2020	2019-20	2017//20	2020	2019-20	2017//20	2020	2019-20	2017//20
	1y	2y	3y	1y	2y	3y	1y	2y	3y
AAC Wildfire	101.4	80.4	2018, spring wheat contam-ination data not used	62.0	60.3		12.1	12.5	
Bobcat	86.9	73.9		62.0	61.5	58.6	11.9	11.7	12.4
Brawl CLP	78.8	67.5		62.2	62.0	60.8	12.5	12.5	12.5
Byrd CL Plus	93.9	79.9		61.8	60.7		11.6	11.4	
Decade	90.8	79.1	66.6	61.5	60.6	58.1	11.8	12.1	12.4
Flathead	99.5	76.9		61.8	61.2		12.1	12.1	
FourOsix	109.8	89.5	73.0	62.5	60.8	57.6	12.3	12.1	12.5
Judee	98.6	77.6	63.7	62.6	61.4	58.7	12.1	12.4	12.8
Keldin	97.9	84.0	71.2	62.3	61.4	58.8	12.6	12.5	12.8
LCS Jet	108.0	87.3		59.4	58.3		12.6	12.0	
Loma	95.0	78.3	60.1	61.2	60.6	57.1	12.7	12.0	12.8
MT1683	99.3	79.8		60.9	60.8		11.6	11.2	
+ MT1745	96.0			61.2			12.6		
+ MT1746	102.2			63.3			11.7		
+ MT1793	91.2			61.9			11.1		
MTCL1732	113.9	88.9		62.1	60.2		12.1	12.0	
+ MTCL1737	92.5			61.6			12.9		
+ MTS18149	98.9			60.6			12.3		
Northern Ray	113.8	90.5	72.9	61.2	61.1	57.6	12.0	12.0	12.7
	28.9	43.6	42.7	58.5	58.7	54.7	13.3	12.6	13.0
StandClear CLP	106.8	84.5		62.7	61.9		12.4	12.2	
SY Clearstone 2CL	90.8	75.3	64.0	60.9	60.1	56.8	12.7	12.2	12.5
SY Monument	95.3	77.7	65.0	60.6	60.1	57.0	12.1	11.7	12.0
Warhorse	104.4	83.1	67.4	61.2	60.9	57.7	12.6	12.3	12.8
Yellowstone	93.6	76.5	65.6	61.2	60.7	57.2	11.9	11.6	12.3
Average	95.5	78.7	64.0	61.5	60.6	57.7	12.2	12.0	12.6
LSD (0.05)	15.2	ns	ns	1.2	1.7	2.2	ns	ns	ns
C.V. (%)	8.8	15.1	19.6	1.1	1.3	2.2	5.7	3.6	3.9

+ = new for 2020

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 55. 2017-2019 Off-Station Winter Wheat Test (Exp. 3872): Geraldine (CARC) Yield, Test Weight and Protein

Cultivar/Line	Grain Yield (bu/a)			Test Weight (lb/bu)			Protein (%)		
	2019	2018-19	2017-19	2019	2018-19	2017-19	2019	2018-19	2017-19
	1y	2y	3y	1y	2y	3y	1y	2y	3y
AAC Wildfire	79.5			61.4			11.4		
Bobcat	70.5	73.6	75.2	61.2	62.7	62.9	11.7	11.8	11.7
Brawl CLP	80.9	78.2	78.8	62.3	63.7	64.1	12.9	13.2	12.8
Byrd CL Plus	85.4			61.1			10.8		
Decade	78.1	78.9	79.6	61.4	62.7	62.9	11.6	12.2	12.1
Flathead	71.5	73.3		61.9	62.9		11.6	11.7	
FourOsix	69.9	70.0	74.4	61.2	62.4	62.7	11.4	11.7	11.5
Judee	72.4	75.7	73.8	62.4	63.6	63.1	11.6	12.0	11.8
Keldin	82.8	84.3	86.6	61.6	62.9	63.1	11.2	11.7	11.2
LCS Jet	73.4	78.2		58.3	59.6		11.0	11.5	
Loma	77.6	78.8	77.0	61.4	62.2	62.2	11.3	11.5	11.4
MT1683	73.8			60.8			11.3		
+ MT1745									
+ MT1746									
+ MT1793									
MTCL1732	80.0			60.4			11.4		
+ MTCL1737									
+ MTS18149									
Northern Ray	85.0	81.9	81.2	61.6	62.5	62.5	11.5	11.9	12.0
	61.7	69.0	74.3	60.1	61.0	60.8	11.7	11.9	11.7
StandClear CLP	76.9	79.7		61.8	63.0		11.8	12.0	
SY Clearstone 2CL	84.1	82.6	82.2	60.3	61.6	61.5	11.4	11.6	11.4
SY Monument	84.8	81.6	83.4	60.3	61.8	61.8	10.8	11.3	11.0
Warhorse	73.1	73.7	72.4	61.1	62.4	62.5	11.9	12.4	12.4
Yellowstone	77.7	76.0	77.8	60.9	61.9	61.9	11.1	11.4	11.4
Average	77.2	77.3	78.3	61.3	62.3	62.5	11.5	11.8	11.7
LSD (0.05)	8.5	ns	8.1	0.7	0.6	0.7	0.4	0.4	0.5
C.V. (%)	6.7	5.2	6.2	0.6	0.5	0.7	2.0	1.8	2.4

+ = new for 2020

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 56. 2017-2019 Off-Station Winter Wheat Test (Exp. 3875): Belt (CARC) Yield, Test Weight and Protein

Cultivar/Line	Grain Yield (bu/a)			Test Weight (lb/bu)			Protein (%)		
	2019	2018-19	2017-19	2019	2018-19	2017-19	2019	2018-19	2017-19
	1y	2y	3y	1y	2y	3y	1y	2y	3y
AAC Wildfire	72.9			63.2			9.8		
Bobcat	75.3	75.3	65.5	63.6	62.9	62.8	10.3	11.3	10.7
Brawl CLP	62.2	59.8	57.9	62.5	62.3	63.1	12.8	13.2	11.8
Byrd CL Plus	89.6			62.7			9.1		
Decade	68.2	70.9	62.9	63.2	62.6	62.5	10.3	11.4	10.7
Flathead	62.2	66.4		63.0	62.7		10.2	11.2	
FourOsix	64.0	67.7	61.6	62.8	62.3	62.2	10.8	11.4	10.5
Judee	70.9	70.6	61.8	64.0	63.1	63.1	9.8	11.3	10.5
Keldin	57.7	65.2	60.2	62.6	61.7	62.1	10.5	11.9	10.7
LCS Jet	68.7	69.2		59.6	58.9		9.7	10.8	
Loma	74.3	77.3	66.7	63.8	62.7	62.4	9.8	10.8	10.2
MT1683	71.5			62.3			9.6		
+ MT1745									
+ MT1746									
+ MT1793									
MTCL1732	73.5			62.7			10.1		
+ MTCL1737									
+ MTS18149									
Northern Ray	73.1	71.7	64.8	63.8	62.5	62.1	10.1	11.5	10.6
	62.6	64.1	60.1	62.4	61.0	60.5	9.9	10.9	10.1
StandClear CLP	77.4	74.9		63.8	63.2		10.2	11.4	
SY Clearstone 2CL	64.5	69.0	64.2	62.2	61.5	61.4	9.7	10.6	9.9
SY Monument	76.2	77.7	68.3	62.1	61.3	61.2	9.5	10.7	10.0
Warhorse	61.8	67.8	60.7	63.9	62.7	62.6	10.7	11.8	10.9
Yellowstone	68.8	68.8	63.1	62.6	61.8	61.7	9.6	10.7	10.0
Average	70.8	70.4	63.1	63.0	62.0	62.1	10.2	11.2	10.5
LSD (0.05)	15.3	9.2	ns	1.0	1.0	1.1	0.8	0.8	0.8
C.V. (%)	12.3	6.2	8.4	0.9	0.7	1.0	4.2	3.4	4.6

+ = new for 2020

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 57. 2017-2020 Off-Station Winter Wheat Test (Exp. 3876): Highwood (CARC) Yield, Test Weight and Protein

Cultivar/Line	Grain Yield (bu/a)			Test Weight (lb/bu)			Protein (%)		
	2019	2018-19	2017-19	2019	2018-19	2017-19	2019	2018-19	2017-19
	1y	2y	3y	1y	2y	3y	1y	2y	3y
AAC Wildfire	61.9			62.4			11.0		
Bobcat	44.7	40.7	43.2	59.4	61.2	61.5	12.0	13.1	13.0
Brawl CLP	38.5	30.0	31.9	62.4	63.1	63.2	12.6	14.0	14.1
Byrd CL Plus	58.8			61.9			10.3		
Decade	57.5	51.4	55.6	61.4	62.5	62.7	11.3	12.7	12.5
Flathead	42.1	34.5		62.0	62.9		11.8	13.2	
FourOsix	53.3	46.1	51.2	61.6	62.6	62.6	11.6	12.6	12.4
Judee	49.7	50.3	52.3	63.0	63.7	63.3	11.7	12.8	12.8
Keldin	44.4	38.5	44.1	60.9	62.0	61.9	11.7	13.3	13.0
LCS Jet	49.0	44.2		59.4	60.4		11.1	12.3	
Loma	55.2	45.9	50.9	61.5	62.3	62.2	12.1	13.4	13.0
MT1683	54.5			61.0			11.4		
+ MT1745									
+ MT1746									
+ MT1793									
MTCL1732	56.0			60.6			11.1		
+ MTCL1737									
+ MTS18149									
Northern	58.3	46.1	50.9	61.7	62.6	62.5	11.6	13.2	13.0
Ray	42.1	36.6	44.4	60.5	61.5	61.0	11.8	12.9	12.6
StandClear CLP	43.0	37.2		61.3	62.2		12.6	13.6	
SY Clearstone 2CL	55.7	50.8	56.4	61.1	62.1	61.8	10.9	11.9	11.8
SY Monument	60.6	53.5	57.3	60.9	62.3	62.2	10.4	11.6	11.5
Warhorse	47.9	45.6	47.5	61.4	62.3	61.7	12.4	13.3	13.4
Yellowstone	54.2	44.7	47.5	61.4	62.3	62.1	11.0	12.7	12.8
Average	51.5	43.6	48.9	61.5	62.3	62.2	11.5	12.9	12.7
LSD (0.05)	8.6	8.9	7.7	1.2	0.8	0.9	0.7	0.7	0.6
C.V. (%)	9.1	9.7	9.4	1.2	0.6	0.9	3.5	2.6	3.0

+ = new for 2020

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 58. 2017//2020 Off-Station Winter Wheat Test (Exp. 3880): Huntley Irrigated (SARC) Yield, Test Weight and Protein

Cultivar/Line	Grain Yield (bu/a)			Test Weight (lb/bu)			Protein (%)		
	2020	2018//20	2017//20	2020	2018//20	2017//20	2020	2018//20	2017//20
	1y	2y	3y	1y	2y	3y	1y	2y	3y
AAC Wildfire	111.4	2019, hailed out		59.0			13.6		
Bobcat	107.8		106.0	58.6	59.1	60.8	14.2	14.3	13.4
Brawl CLP	124.8		114.1	63.5	62.6	63.3	12.6	13.1	12.9
Byrd CL Plus	121.2			58.8			12.2		
Decade	113.5	109.5	103.2	60.7	60.2	60.5	13.0	13.4	12.8
Flathead	122.4	112.0		61.5	60.2		12.6	13.1	
FourOsix	122.7	102.9	112.9	60.3	59.7	61.3	13.0	13.6	12.8
Judee	93.7	90.0	91.7	59.3	60.0	61.4	13.2	13.4	13.0
Keldin	157.1	142.1	131.9	61.4	61.6	61.7	12.3	12.7	12.6
LCS Jet	144.8	140.1		59.6	59.0		12.3	12.9	
Loma	96.9	92.4	97.0	59.0	58.0		13.3	13.6	13.0
MT1683	103.9			57.4			13.4		
+ MT1745	114.5			59.7			12.7		
+ MT1746	134.1			62.3			12.6		
+ MT1793	127.2			60.0			13.1		
MTCL1732	120.3			59.6			12.6		
+ MTCL1737	109.7			57.4			13.2		
+ MTS18149	105.4			59.0			13.4		
Northern	119.1	112.0	109.5	59.7	59.6	60.4	13.0	13.1	12.7
Ray	94.5	100.9	99.6	56.2	57.4	58.7	14.0	13.9	13.2
StandClear CLP	118.3	111.4		61.9	61.3		13.3	13.6	
SY Clearstone 2CL	97.4	98.8	100.0	56.6	57.5	59.1	13.4	13.6	12.9
SY Monument	127.1	121.3	116.3	59.4	59.9	60.9	12.6	13.0	12.5
Warhorse	114.6	109.2	106.4	60.1	60.4	61.3	14.1	14.3	13.8
Yellowstone	101.6	98.8	104.8	56.6	57.6	59.4	13.4	13.4	12.7
Average	116.2	110.2	107.2	59.5	59.6	60.6	13.1	13.4	13.0
LSD (0.05)	12.1	18.0	ns	2.0	2.4	2.0	0.5	0.7	ns
C.V. (%)	6.4	7.6	11.4	2.0	1.9	2.0	2.0	2.3	3.7

+ = new for 2020

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 59. 2017-2020 Off-Station Winter Wheat Test (Exp. 3881): Rapelje (SARC) Yield, Test Weight and Protein

Cultivar/Line	Grain Yield (bu/a)				Test Weight (lb/bu)				Protein (%)			
	2020	2019-20	2018-20	2017-20	2020	2019-20	2018-20	2017-20	2020	2019-20	2018-20	2017-20
	1y	2y	3y	4y	1y	2y	3y	4y	1y	2y	3y	4y
AAC Wildfire	54.9	62.0			62.2	62.9			12.6	12.4		
Bobcat	61.2	69.4	86.2	78.8	63.0	63.3	63.3	63.7	12.2	12.2	12.4	11.4
Brawl CLP	48.4	57.5	76.8	71.5	63.9	64.2	64.2	64.7	14.4	14.5	14.5	13.3
Byrd CL Plus	50.2	64.2			63.0	63.0			12.6	12.0		
Decade	46.8	63.9	79.1	74.2	62.0	62.9	62.5	63.0	14.7	13.9	13.9	12.7
Flathead	45.4	60.0	82.6		63.3	63.6	63.6		14.2	13.7	13.6	
FourOsix	61.6	70.0	86.4	79.5	62.7	63.2	63.1	63.0	13.1	12.8	13.0	11.8
Judee	51.0	61.3	76.0	71.6	62.7	63.5	63.3	63.7	14.5	13.8	13.7	12.4
Keldin	49.9	67.9	86.3	80.6	62.2	63.0	62.6	63.0	13.3	12.8	13.1	11.8
LCS Jet	68.9	73.6	91.2		60.8	60.9	60.4		11.6	11.6	12.0	
Loma	48.9	63.5	81.8	75.1	62.1	62.6	61.8	62.3	14.0	13.1	12.9	11.8
MT1683	65.0	72.1			62.5	62.7			11.9	12.3		
+ MT1745	59.8				63.2				12.3			
+ MT1746	57.9				64.0				12.7			
+ MT1793	48.3				62.1				14.5			
MTCL1732	65.7	71.4			62.7	62.5			11.8	12.0		
+ MTCL1737	65.9				62.4				11.7			
+ MTS18149	46.2				61.8				13.9			
Northern	55.5	71.4	91.2	84.5	62.4	62.8	62.5	62.7	13.3	12.7	12.8	11.7
Ray	54.1	65.2	82.8	76.9	61.5	61.7	60.4	60.5	12.7	12.6	12.7	11.5
StandClear CLP	65.7	70.5	88.1		63.7	63.8	63.6		11.7	12.2	12.7	
SY Clearstone 2CL	56.3	68.7	85.5	79.4	61.8	62.1	61.5	61.7	13.2	12.6	12.8	11.5
SY Monument	43.4	54.9	82.9	76.2	61.7	62.2	62.3	62.2	13.6	12.8	12.8	11.5
Warhorse	56.0	66.1	84.2	76.5	62.4	62.8	62.3	62.6	13.3	13.4	13.8	12.5
Yellowstone	54.9	69.5	86.0	79.1	61.5	62.2	61.8	62.0	13.5	13.0	13.1	11.8
Average	55.3	66.1	84.2	77.2	62.5	62.8	62.5	62.7	13.1	12.8	13.1	12.0
LSD (0.05)	11.8	ns	ns	ns	0.9	0.8	1.1	1.0	1.4	1.2	0.9	0.6
C.V. (%)	13.0	8.7	8.1	7.4	0.9	0.6	1.0	1.1	6.6	4.6	4.1	3.5

+ = new for 2020

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 60. 2017//2020 Off-Station Winter Wheat Test (Exp. 3882): Hysham [SARC] Yield, Test Weight and Protein

Cultivar/Line	Grain Yield (bu/a)		Test Weight (lb/bu)		Protein (%)	
	2019	2017//19 2y	2019	2017//19 2y	2019	2017//19 2y
AAC Wildfire	51.6	2018, no harvest	60.0	61.0	7.5	10.4
Bobcat	48.5	50.8	59.5	61.4	8.1	10.4
Brawl CLP	44.0	49.9	59.1	61.4	8.6	10.4
Byrd CL Plus	55.4	out	57.7		6.8	
Decade	49.1	49.0	58.7	59.9	7.7	10.3
Flathead	47.5		58.8		7.3	
FourOsix	48.7	51.3	57.7	60.3	7.1	9.8
Judee	49.1	49.0	60.3	61.2	7.9	10.3
Keldin	50.3	52.6	59.0	60.9	7.5	9.7
LCS Jet	49.0		56.3		7.5	
Loma	48.5	51.6	60.3	60.9	8.3	10.2
MT1683	49.2		59.0		7.6	
+ MT1745						
+ MT1746						
+ MT1793						
MTCL1732	57.2		57.7		7.4	
+ MTCL1737						
+ MTS18149						
Northern	51.7	52.7	59.8	60.7	7.7	10.5
Ray	46.3	47.4	59.2	60.3	7.7	10.4
StandClear CLP	43.7		58.8		7.6	
SY Clearstone 2CL	59.7	58.2	58.8	60.4	7.2	9.7
SY Monument	43.2	51.6	57.3	59.1	7.2	9.1
Warhorse	49.0	51.7	59.0	60.6	7.8	10.8
Yellowstone	54.7	59.3	58.8	60.8	7.2	9.4
Average	49.4	52.1	58.9	60.5	7.6	10.0
LSD (0.05)	6.1	ns	0.4	ns	0.5	ns
C.V. (%)	6.9	8.1	0.4	1.4	3.9	4.9

+ = new for 2020

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 61. 2017-2020 Off-Station Winter Wheat Test (Exp. 3884): Fly Creek (Hardin area - SARC) Yield, Test Weight and Protein

Cultivar/Line	Grain Yield (bu/a)				Test Weight (lb/bu)				Protein (%)			
	2020	2019-20	2018-20	2017-20	2020	2019-20	2018-20	2017-20	2020	2019-20	2018-20	2017-20
	1y	2y	3y	4y	1y	2y	3y	4y	1y	2y	3y	4y
AAC Wildfire	62.6	71.8			62.0	61.0			12.5	12.8		
Bobcat	68.7	71.3	79.3	68.1	61.6	61.0	61.4	61.2	13.0	12.8	12.6	13.1
Brawl CLP	76.8	76.3	83.2	72.1	62.7	61.4	62.4	62.4	12.8	12.4	12.5	12.8
Byrd CL Plus	70.2	74.0			61.2	60.3			11.4	11.5		
Decade	70.2	77.1	87.3	74.1	61.6	60.8	61.4	61.3	13.3	13.5	13.3	13.4
Flathead	70.3	72.6	81.1		62.1	60.8	61.3		12.8	12.7	12.6	
FourOsix	71.0	74.2	83.6	73.8	61.2	60.1	61.1	61.1	12.6	12.6	12.4	12.9
Judee	66.5	70.0	81.8	69.4	62.4	61.8	62.0	61.7	12.2	12.6	12.7	13.3
Keldin	74.5	85.2	94.8	82.2	62.0	61.1	61.7	61.7	11.9	11.9	12.0	12.1
LCS Jet	70.9	73.5	85.5		59.6	58.9	58.7		12.4	12.4	12.4	
Loma	63.2	70.3	81.5	70.5	62.0	60.7	60.5	60.5	13.2	13.2	12.8	13.3
MT1683	71.0	76.2			60.6	59.9			12.4	12.5		
+ MT1745	68.1				61.2				12.6			
+ MT1746	73.9				62.4				11.7			
+ MT1793	77.5				61.4				12.6			
MTCL1732	71.4	76.6			60.4	59.4			12.2	12.2		
+ MTCL1737	56.2				61.2				13.3			
+ MTS18149	62.3				62.5				12.6			
Northern Ray	71.6	72.0	82.9	70.4	62.8	61.6	61.3	61.2	13.1	13.3	13.0	13.5
	66.9	73.2	80.3	69.3	61.3	60.1	58.6	59.0	11.9	12.5	12.5	13.0
StandClear CLP	68.8	68.8	77.8		62.1	61.5	62.1		12.8	12.8	12.6	
SY Clearstone 2CL	64.1	72.2	80.0	70.3	61.2	60.1	60.2	60.3	12.7	12.8	12.5	13.1
SY Monument	76.5	78.8	87.1	76.1	60.8	59.7	60.2	60.4	11.3	11.6	11.7	11.8
Warhorse	61.6	71.6	81.9	70.6	62.4	61.6	61.5	61.5	13.2	13.3	13.3	13.7
Yellowstone	68.1	72.2	80.0	70.2	61.2	60.3	59.7	60.0	12.3	12.6	12.4	12.8
Average	68.9	73.7	83.0	72.1	61.6	60.6	60.9	60.9	12.5	12.6	12.6	13.0
LSD (0.05)	6.5	ns	7.4	6.2	0.5	0.7	1.9	1.5	0.7	0.7	0.7	0.7
C.V. (%)	5.3	6.3	5.4	6.0	0.5	0.6	1.9	1.8	3.2	2.5	2.9	3.6

+ = new for 2020

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 62. 2017//2020 Off-Station Winter Wheat Test (Exp. 3885): Molt (SARC) Yield, Test Weight and Protein

Cultivar/Line	Grain Yield (bu/a)			Test Weight (lb/bu)			Protein (%)		
	2020	2018//20	2017//20	2020	2018//20	2017//20	2020	2018//20	2017//20
	1y	2y	3y	1y	2y	3y	1y	2y	3y
AAC Wildfire	73.2	2019, hailed out	62.5	58.6	61.4	61.9	13.2	12.6	11.2
Bobcat	73.8		60.8	60.3	62.4	63.1	12.7	12.5	11.8
Brawl CLP	82.1			63.2			11.8		
Byrd CL Plus	87.8			60.8			11.8		
Decade	82.7	87.3	69.3	60.6	61.4	62.7	12.9	13.3	11.1
Flathead	91.9	81.1		62.2	61.3		11.9	12.6	
FourOsix	87.3	83.6	67.3	60.2	61.1	61.2	12.5	12.4	11.0
Judee	75.7	81.8	63.0	61.0	62.0	62.2	13.3	12.7	10.9
Keldin	100.9	94.8	70.7	61.4	61.7	61.5	12.4	12.0	11.3
LCS Jet	91.9	85.5		57.9	58.7		11.6	12.4	
Loma	77.3	81.5	67.1	60.2	60.5	61.2	12.8	12.8	10.8
MT1683	85.0			60.2			11.6		
+ MT1745	84.5			61.3			12.0		
+ MT1746	82.6			62.9			12.5		
+ MT1793	84.5			61.2			13.2		
MTCL1732	80.3			59.8			11.8		
+ MTCL1737	78.2			60.3			12.1		
+ MTS18149	78.9			59.4			13.3		
Northern Ray	91.0	82.9	71.2	60.2	61.3	61.9	13.0	13.0	10.9
	86.7	80.3	61.4	58.7	58.6	59.7	12.7	12.5	11.2
StandClear CLP	73.7	77.8		61.6	62.1		11.8	12.6	
SY Clearstone 2CL	85.1	80.0	63.4	59.1	60.2	61.0	13.0	12.5	10.7
SY Monument	93.3	87.1	69.3	61.7	60.2	61.2	11.5	11.7	10.3
Warhorse	79.7	81.9	65.1	61.1	61.5	62.3	13.2	13.3	11.3
Yellowstone	80.6	80.0	65.8	59.7	59.7	61.1	12.7	12.4	11.1
Average	83.5	69.6	65.9	60.5	61.1	61.6	12.5	11.8	11.0
LSD (0.05)	7.2	ns	ns	1.4	ns	1.5	1.0	ns	ns
C.V. (%)	4.8	9.4	9.6	1.4	1.8	1.5	4.3	4.9	5.0

+ = new for 2020

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 63. 2018-2020 Off-Station Winter Wheat Test (Exp. 3886): Fort Smith (SARC) Yield, Test Weight and Protein

Cultivar/Line	Grain Yield (bu/a)				Test Weight (lb/bu)				Protein (%)			
	2019		2018-19		2019		2018-19		2019		2018-19	
	1y	2y	2017, not planted	2y	1y	2y	1y	2y	1y	2y	1y	2y
AAC Wildfire	84.7	86.1	2017, not planted	86.1	64.0	62.9	11.6	12.4	11.6	12.4	11.6	12.4
Bobcat	78.5	86.1	2017, not planted	86.1	64.3	62.9	12.0	12.4	12.0	12.4	12.0	12.4
Brawl CLP	60.9	58.4	2017, not planted	58.4	64.4	63.0	14.2	14.8	14.2	14.8	14.2	14.8
Byrd CL Plus	89.0	89.0	2017, not planted	89.0	64.1	63.0	11.5	11.5	11.5	11.5	11.5	11.5
Decade	78.4	81.1	2017, not planted	81.1	63.9	61.9	12.5	13.4	12.5	13.4	12.5	13.4
Flathead	78.0	73.9	2017, not planted	73.9	63.5	62.2	13.1	13.2	13.1	13.2	13.1	13.2
FourOsix	84.1	80.7	2017, not planted	80.7	63.8	61.7	12.0	12.5	12.0	12.5	12.0	12.5
Judee	80.5	79.6	2017, not planted	79.6	64.6	63.0	12.8	13.4	12.8	13.4	12.8	13.4
Keldin	83.4	90.1	2017, not planted	90.1	64.3	62.6	11.6	12.3	11.6	12.3	11.6	12.3
LCS Jet	81.4	87.5	2017, not planted	87.5	61.0	59.5	11.5	12.0	11.5	12.0	11.5	12.0
Loma	85.4	89.1	2017, not planted	89.1	63.5	61.0	11.7	12.2	11.7	12.2	11.7	12.2
MT1683	81.2	81.2	2017, not planted	81.2	63.0	63.0	11.5	11.5	11.5	11.5	11.5	11.5
+ MT1745												
+ MT1746												
+ MT1793												
MTCL1732	83.1	83.1			63.3		12.4		12.4			
+ MTCL1737												
+ MTS18149												
Northern Ray	91.5	90.5		90.5	63.7	61.2	12.0	12.6	12.0	12.6	12.0	12.6
	74.6	81.4		81.4	61.7	59.2	12.0	12.4	12.0	12.4	12.0	12.4
StandClear CLP	73.9	83.1		83.1	64.3	62.9	12.5	12.8	12.5	12.8	12.5	12.8
SY Clearstone 2CL	81.2	86.8		86.8	62.8	59.6	11.9	12.3	11.9	12.3	11.9	12.3
SY Monument	66.2	65.9		65.9	62.9	62.0	12.1	12.5	12.1	12.5	12.1	12.5
Warhorse	81.0	81.8		81.8	63.5	61.2	12.5	13.4	12.5	13.4	12.5	13.4
Yellowstone	79.5	83.3		83.3	63.3	61.4	12.0	12.4	12.0	12.4	12.0	12.4
Average	80.5	82.0		82.0	63.6	61.4	12.2	12.7	12.2	12.7	12.2	12.7
LSD (0.05)	8.9	12.3		12.3	0.5	2.3	0.9	0.7	0.9	0.7	0.9	0.7
C.V. (%)	6.0	7.1		7.1	0.5	1.8	4.2	2.6	4.2	2.6	4.2	2.6

+ = new for 2020

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 64. 2017-2020 Off-Station Winter Wheat Test (Exp. 38): Combined Locations - Yield, Test Weight and Protein

Cultivar/Line	Grain Yield (bu/a)					Test Weight (lb/bu)					Protein (%)				
	2020	2019-20	2018-20	2017-20		2020	2019-20	2018-20	2017-20		2020	2019-20	2018-20	2017-20	
	7	20	34	50		7	20	34	50		7	20	34	50	
AAC Wildfire	75.1	70.5				60.6	60.9				13.1	12.3			
Bobcat	74.3	71.1	71.7	67.6		60.8	61.2	61.3	61.3		13.1	12.3	12.7	12.5	
Brawl CLP	71.5	63.4	63.9	62.4		62.4	62.2	62.4	62.6		13.3	13.2	13.5	13.1	
Byrd CL Plus	79.3	73.7				60.9	61.0				12.3	11.5			
Decade	73.8	69.5	70.5	66.0		61.2	61.2	61.1	61.0		13.3	12.6	13.1	12.8	
Flathead	75.3	65.7	66.2			61.2	61.3	61.3			13.2	12.6	12.9		
FourOsix	79.3	70.8	69.3	67.2		61.0	60.9	60.8	60.8		13.1	12.3	12.7	12.5	
Judee	72.5	66.7	67.7	63.6		61.3	61.9	61.8	61.6		13.5	12.8	13.1	12.9	
Keldin	83.6	74.4	75.1	71.4		61.1	61.3	61.3	61.2		12.9	12.2	12.7	12.4	
LCS Jet	80.3	70.2	72.6			59.3	58.8	58.5			12.7	11.9	12.3		
Loma	73.9	70.9	71.8	67.1		60.9	61.1	60.7	60.5		13.3	12.5	12.8	12.6	
MT1683	77.5	71.0				60.1	60.5				12.8	12.1			
+ MT1745	77.8					60.8					12.7				
+ MT1746	79.3					62.2					12.6				
+ MT1793	77.8					61.1					13.2				
MTCL1732	79.1	72.4				60.8	60.4				12.4	12.0			
+ MTCL1737	76.8					60.0					12.9				
+ MTS18149	74.6					60.6					13.1				
Northern Ray	81.8	74.7	74.4	69.6		61.0	61.3	61.1	60.8		13.0	12.4	12.8	12.7	
	61.2	62.5	65.4	63.2		59.1	59.8	59.2	59.0		13.2	12.3	12.6	12.5	
StandClear CLP	79.1	69.1	70.0			61.9	61.8	61.8			12.8	12.3	12.8		
SY Clearstone 2CL	72.5	69.0	70.0	67.2		60.0	60.3	59.9	59.9		13.1	12.2	12.6	12.4	
SY Monument	76.9	69.7	70.6	68.0		60.4	60.4	60.5	60.2		12.4	11.7	12.1	11.8	
Warhorse	74.5	67.1	68.1	64.0		61.3	61.2	60.9	60.7		13.4	12.9	13.3	13.1	
Yellowstone	72.6	69.8	70.0	67.3		60.0	60.4	60.2	60.1		13.1	12.3	12.6	12.4	
Average	76.0	69.6	69.8	66.5		60.8	60.9	60.8	60.7		13.0	12.3	12.8	12.6	
LSD (0.05)	ns	4.6	3.6	2.7		0.9	0.4	0.4	0.3		0.6	0.3	0.2	0.2	
C.V. (%)	12.5	10.7	10.8	10.5		1.4	1.1	1.3	1.3		4.4	3.8	3.6	3.9	

+ = new for 2020

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 65. 2015-2020 Intrastate (Exp. 35) and Off-Station (Exp. 38) Winter Wheat Tests: Combined Locations Yield

Cultivar/Line	Grain Yield (bu/a)									
	2020	2019-20	2018-2020	2017-20		2016-20		2015-20		
				no Yll	w/Yll	no Yll	w/Yll	no Yll	w/Yll	
	Location-years									
+ = new for 2020 in Off Sta.	16	38	61	84	77	109	102	130	123	
	AAC Wildfire	78.6	75.5							
	Bobcat	76.1	74.8	74.8	71.4	71.5				
	Brawl CLP	69.9	67.9	68.0	66.0	66.2				
	Byrd CL Plus	82.7	78.0							
	Flathead	75.7	72.0	71.6						
	FourOsix	80.4	75.9	74.2	71.7	71.8				
	Judee	74.0	71.8	71.5	67.8	68.0	67.6	67.8	65.2	
	Keldin	83.1	79.6	79.8	76.3	76.4	77.1	77.3	65.3	
	LCS Jet	81.0	77.8	78.0						
Loma	78.1	75.7	75.5	71.4	71.7	71.3	71.5	69.9		
70.0										
MT1683	79.9	76.8								
+ MT1745	79.2									
+ MT1746	76.3									
+ MT1793	75.0									
MTCL1732	80.1	75.8								
+ MTCL1737	79.4									
+ MTS18149	77.8									
Northern	84.0	80.6	78.8	74.1	74.8	73.9	74.4	72.1	72.5	
StandClear CLP	78.7	74.5	74.0							
SY Clearstone 2CL	77.2	75.8	75.3	72.2	72.3	72.8	72.9	70.6	70.6	
SY Monument	74.6	73.2	74.1	71.9	71.7					
Warhorse	73.3	70.0	70.7	67.4	67.5	67.3	67.3	65.4	65.3	
Yellowstone	76.7	75.2	74.5		71.8		72.6		71.3	
Average	77.9	75.1	74.3	71.0	71.3	71.7	72.0	68.7	69.2	
LSD (0.05)	4.8	3.2	2.6	2.1	2.2	1.8	1.8	1.4	1.4	
C.V. (%)	8.9	9.4	9.9	9.9	9.7	9.2	9.0	8.3	8.3	

bold = indicates highest value within a column

1/ = Yellowstone misplanted in 2017 Intrastate Tests
bold = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 66. 2015-2020 Intrastate (Exp. 35) and Off-Station (Exp. 38) Winter Wheat Tests: Combined Locations Test Weight

Cultivar/Line	Test Weight (lb/bu)									
	2020	2019-20	2018-2020	2017-20		2016-20		2015-20		
				no Yll	w/Yll	no Yll	w/Yll	no Yll	w/Yll	
+ = new for 2020 in Off Sta.										
Location-years	16	38	61	84	77	109	102	130	123	
AAC Wildfire	61.0	61.1								
Bobcat	61.7	61.6	61.7	61.5	61.6					
Brawl CLP	63.0	62.5	62.7	62.6	62.7					
Byrd CL Plus	61.7	61.1								
Flathead	61.9	61.6	61.7							
FourOsix	61.7	61.2	61.2	61.1	61.1					
Judee	62.4	62.3	62.1	61.9	62.0	61.5	61.6	61.2	61.2	
Keldin	61.9	61.6	61.7	61.5	61.5	61.2	61.2			
LCS Jet	59.6	59.0	58.9	60.7	60.7	60.4	60.3	60.0	60.0	
Loma	61.3	61.2	60.9							
MT1683	60.9	60.7								
+ MT1745	61.7									
+ MT1746	62.8									
+ MT1793	61.7									
MTCL1732	61.1	60.6								
+ MTCL1737	60.7									
+ MTS18149	61.0									
Northern	61.6	61.5	61.3	61.0	61.1	60.6	60.6	60.2	60.3	
StandClear CLP	62.3	62.0	62.0							
SY Clearstone 2CL	60.8	60.5	60.3	60.2	60.2	59.9	59.9	59.6	59.6	
SY Monument	61.0	60.6	60.7	60.4	60.5					
Warhorse	61.5	61.3	61.2	60.9	61.0	60.6	60.7	60.3	60.3	
Yellowstone	60.9	60.7	60.5		60.4		60.1	59.9		
Average	61.5	61.2	61.2	61.2	61.2	60.7	60.2	60.3	60.2	
LSD (0.05)	0.5	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	
C.V. (%)	1.2	1.1	1.2	1.3	1.2	1.3	1.2	1.3	1.2	

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

1/ = Yellowstone misplanted in 2017 Intrastate Tests

Table 67. 2015-2020 Intrastate (Exp. 35) and Off-Station (Exp. 38) Winter Wheat Tests: Combined Locations Protein

Cultivar/Line	Protein (%)									
	2020		2019-20		2018-2020		2017-20		2016-20	
	no Yll		w/Yll		no Yll		w/Yll		no Yll	
+ = new for 2020 in Off Sta.										
Location-years	16		38		61		84	77	107	100
AAC Wildfire	12.9		12.5		12.7		12.6	12.6		
Bobcat	12.9		12.6		12.7		12.5	12.5		
Brawl CLP	13.4		13.3		13.5		13.2	13.2		
Byrd CL Plus	11.8		11.6							
Flathead	12.9		12.7		12.8					
FourOsix	12.8		12.5		12.7		12.5	12.5		
Judee	13.4		13.1		13.2		13.1	12.9	12.9	12.8
Keldin	12.7		12.4		12.5		12.4	12.4	12.2	12.1
LCS Jet	12.5		12.1		12.3		12.7	12.7	12.6	12.5
Loma	13.1		12.7		12.8					
MT1683	12.9		12.5							
+ MT1745	12.4									
+ MT1746	12.6									
+ MT1793	13.5									
MTCL1732	12.3		12.2							
+ MTCL1737	12.8									
+ MTS18149	13.1									
Northern	13.1		12.7		12.8		12.8	12.8	12.7	12.6
StandClear CLP	12.9		12.7		12.9					
SY Clearstone 2CL	12.8		12.5		12.6		12.5	12.5	12.3	12.3
SY Monument	12.1		11.9		12.0		11.8	11.9		
Warhorse	13.3		13.1		13.3		13.2	13.2	13.1	13.0
Yellowstone	12.8		12.4		12.6		12.5	12.3		12.2
Average	12.8		12.5		12.8		12.7	12.7	12.6	12.6
LSD (0.05)	0.4		0.2		0.2		0.2	0.2	0.1	0.1
C.V. (%)	4.3		3.8		3.8		4.0	3.9	4.0	3.9

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

1/ = Yellowstone misplanted in 2017 Intrastate Tests

Table 68. 2016-2020 Combined Locations Yield under Sawfly Pressure and % Sawfly Cutting
(Note: Sawfly cutting in each location-year $\geq 10\%$, see table on next page for locations)

Cultivar/Line	Grain Yield (bu/a)					Sawfly Cutting (%)				
	2020	2019-20	2018-20	2017-20	2016-20	2020	2019-20	2018-20	2017-20	2016-20
+ = new for 2020 in Off Sta.	3	10	16	19	21	3	10	16	19	21
AAC Wildfire	73.1	63.6				26	35			
Bobcat	73.8	71.5	69.5	65.9		8	11	8	8	
Brawl CLP	54.0	59.0	59.6	57.3		17	34	32	36	
Byrd CL Plus	74.7	67.2				25	36			
Flathead	64.9	59.1	58.2			18	43	47		
FourOsix	71.1	64.1	61.4	59.1		35	53	56		
Judee	66.6	61.2	60.3	57.5	60.6	13	33	37	35	34
Keldin	67.5	63.9	62.1	59.7	63.3	31	47	49	49	50
LCS Jet	63.0	61.3	59.7			28	45	50		
Loma	71.6	66.5	65.1	62.0	63.7	17	26	29	29	27
MT1683	71.5	63.2				27	55			
+ MT1745	68.6					23				
+ MT1746	63.9					18				
+ MT1793	63.3					16				
MTCL1732	72.4	65.0				9	16			
+ MTCL1737	68.3					20				
+ MTS18149	76.9					12				
Northern	74.7	67.8	65.2	61.2	63.0	17	37	45	45	42
StandClear CLP	72.8	66.1	63.8			27	34	35		
SY Clearstone 2CL	66.5	61.4	60.8	57.7	61.0	33	54	59	58	57
SY Monument	62.4	63.9	62.9	59.7		24	43	47	49	
Warhorse	66.7	59.0	57.7	55.5	57.0	14	15	12	11	10
Yellowstone^{1/}	64.9	61.6	60.8	58.7	61.5	29	50	56	53	53
Average	68.4	63.6	61.9	59.6	61.5	21.2	36.9	40.1	37.5	36.8
LSD (0.05)	9.3	5.6	4.0	3.8	4.1	21.8	9.8	9.1	8.8	7.9
C.V. (%)	8.2	10.0	9.3	10.0	10.9	36.7	30.2	32.7	36.6	34.8

bold = indicates highest value within a column
^{1/} = Yellowstone not in statistics for 4 and 5 year averages
bold = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 69. 2003-2020 All Locations with % Sawfly Cutting data (incl. selected variety cutting)

Location	Year	Cutting	Rampart	Genou	Judee	Bearpaw	Warhorse	Loma	Bobcat	StandClear	Yellowstone
V = locations used in analysis in Table. 77			% cutting								
V Havre	2020	38	-	-	31	-	35	38	19	61	38
V Havre	2019	24	-	-	12	-	3	15	1	12	30
Havre	2018	6	-	-	5	2	0	4	2	4	8
Havre	2017	<1									
Havre	2016	none recorded									
Havre	2015	5	1	1	1	2	2	2			2
Havre	2014	2	1	1	1	1	1	2			2
Havre	2013	10	4	7	5	6	2				10
Havre	2012	8	0	6	2	3	2				9
Havre (no harv.)	2011	6	0	1	4	1	1				4
Havre	2010	12	6	16	5	2	1				9
Havre	2009	22	0	1	4	1					21
Havre	2008	23	13	9	8						18
Havre	2007	27	0	8							40
Havre	2006	25	3	8							23
Havre	2005	32	8	18							43
V Turner	2020	11	-	-	4	-	5	4	5	9	17
Turner	2017	<1									
Turner	2014	hail - no harvest									
Turner	2013	3	2	1	1	1	1				7
Turner	2012	18	12	18	8	20	2				18
Turner	2011	13	1	7	1	4	1				20
North Havre	2010	6	1	4	4	1					10
North Havre	2009	poor stand - no harv.									
North Havre	2008	40	22	30							50
North Havre	2007	53	12	20							82
North Havre	2006	34	4	4							73
North Havre	2005	54	7	8							70
North Havre	2004	winterkill - no harv.									
North Havre	2003	46	3	8							43
Loma	2020	8	-	-	4	-	4	13	4	12	5
V Loma	2019	40	-	-	41	-	17	22	6	45	53
V Loma	2018	64	-	-	65	-	17	32	7	48	85
V Loma	2017	43	-	-	41	11	13	38	24		31
Loma	2016	2	0	-	1	0	0	4			2

Table 69. 2003-2020 All Locations with % Sawfly Cutting data (incl. selected variety cutting)

Location	Year	Cutting	Rampart	Genou	Judee	Bearpaw	Warhorse	Loma	Bobcat	StandClear	Yellowstone
V = locations used in analysis in Table. 77			% cutting								
Loma	2015	12	2	9	1	7	0	12			15
Loma	2014	4	1	4	4	1	1				5
Loma	2013	20	17	23	30	20	8				15
Loma	2012	65	17	27	32	13	5				98
Loma	2011	19	10	22	10	10	5				22
Loma	2010	72	10	52	53	8					99
Loma	2009	60	17	50	32						85
Loma	2008	7	4	4							10
Loma	2007	4	0	2							2
Loma	2006	none recorded									
Loma	2005	2	0	0							0
✓ Conrad	2020	13	-	-	5	-	3	9	1	10	30
✓ Conrad	2019	51	-	-	52	-	27	48	20	49	58
✓ Conrad	2018	18	-	-	9	8	4	11	1		20
Carter/Ft. Benton	2020	none recorded									
✓ Carter/Ft. Benton	2019	57	-	-	45	-	13	32	18	67	80
✓ Carter/Ft. Benton	2018	53	-	-	30	25	1	18	2		92
✓ Carter/Ft. Benton	2017	54	-	-	22	18	2	27	2		-
✓ Carter/Ft. Benton	2016	27	5	-	6	8	1	8			20
✓ Shelby/Devon	2019	62	-	-	73	-	17	47	12	50	85
✓ Choteau	2019	52	-	-	60	-	33	43	27	25	79
✓ Belt	2019	13	-	-	3	-	0	3	0	7	27
✓ The Knees	2018	52	-	-	67	-	2	36	0	43	74
✓ Shelby/Devon	2018	23	-	-	12	-	1	10	1	13	23
✓ Choteau	2018	82	-	-	87	-	12	90	4	78	98
✓ Fly Creek (SARC)	2017	34	-	-	10	10	3	17	7		33
✓ The Knees	2016	65	36	-	46	12	0	24			81
Willow Creek	2012	10	1	2	2	2	1				12
Denton	2010	7	2	2	2	1					25
Geraldine	2008	4	2	1							5

Table 70. 2020 Advanced Yield Nursery: All location Summary

Entry	ID	Pedigree	Yield bu/ac	Test weight lb/bu	Heading date 1-Jan	Plant height in	Sawfly cutting %	Protein %
w = white-seeded								
		locations	7	7	5	6	2	7
1	Yellowstone	check	72.6	61.7	165.8	29.1	26	13.2
2	Warhorse	check	67.6	61.6	165.8	27.6	15	13.5
3	SY Monumer	check	70.9	61.7	162.1	26.4	34	12.5
4	Bobcat	check	71.5	62.3	167.3	26.8	19	13.2
5 i	MTS1903	(Judee sib, MTS0819)//08X350-A6/Warhorse	75.1	62.4	166.9	27.6	8	12.7
6 i	MTS1908	(Judee sib, MTS0819)//08X350-A6/Warhorse	77.1	62.2	168.6	28.4	8	13.1
7	MTS1914	MTS1585//Loma/AAC Gateway	71.3	60.7	164.7	24.8	21	12.6
8 i	MTS1915	MTS1596//Emerson/Spur	74.1	62.4	168.0	26.5	15	12.6
9	MTS1916	MTS1596//Emerson/Spur	71.4	62.2	167.0	26.5	14	13.3
10	MTS1918	Judee//MTS0907/MTS0827	68.5	62.2	164.2	27.9	19	13.6
11	MTS1919	Warhorse*2/Accipiter	68.2	62.4	167.5	27.5	20	13.7
12	MTS1920	Warhorse*2/Accipiter	70.5	62.0	167.7	27.3	21	13.7
13	MTS1922	08X350-A6/Warhorse	73.4	63.0	168.1	27.9	9	13.4
14	MTS1943	MTS1584*2/Loma	74.2	62.3	167.2	28.3	12	12.6
15	MTS1945	MTS1584*2/Loma	70.9	61.2	166.0	26.0	24	13.0
16	MTS1954	MTS1584*2/Loma	71.1	61.4	166.8	25.9	23	13.1
17	MTS1971	Loma*2/MTS1574	72.0	61.0	167.3	26.6	17	12.7
18	MTS1976	Loma*2/MTS1574	72.2	62.1	168.0	26.2	12	13.2
19	MTS19102	MTS1412*2/Warhorse	66.5	61.7	163.4	28.6	18	13.9
20	MT19116	DecadeFhb1-DH11/Overland FHB-1	62.2	62.7	159.4	27.4	17	14.3
21 i	MT19132	MT1078//Colter/Emerson	71.6	61.0	163.5	30.2	37	13.2
22	MT19133	MT1078//Judee/Emerson	76.0	61.4	165.9	30.3	18	12.5
23	MT19142	MT1332/DecadeFhb1-DH17	76.6	61.7	165.2	28.7	31	12.7
24 i	MTCL19149	MTCL1125/MT1091	75.7	61.4	166.2	27.2	33	13.1
25 i	MTCL19151	MT0871/(06X445B1-2, SY Clearstone sib)	73.3	62.6	163.0	25.7	22	13.0
26	MTCL19152	MT0871/(06X445B1-2, SY Clearstone sib)	72.2	62.6	162.2	25.5	30	13.0
27	MTCL19153	MT0871/(06X445B1-2, SY Clearstone sib)	73.4	62.4	166.3	25.3	18	13.5
28 a	MT19159	Northern//02X22cE38/MT10121	75.7	62.3	167.9	26.6	21	12.9
29	MT19173	HV9W04-1594R/Accipiter	73.1	63.2	163.6	25.8	14	13.0
30 i	MT19175	SD08198/Northern	77.6	61.7	167.6	26.6	12	12.5
31	MT19176	MTW1098//Yellowstone-Lr41/Decade	69.2	62.2	162.1	26.0	26	14.2
32	MT19183	MT1078//AAC Gateway/MT1265	73.8	62.9	165.4	29.3	28	13.4
33	MT19186	MT1090//MT08185/MT0742	71.0	62.8	164.3	28.5	24	13.4
34	MT19189	MT1084//MT08184/CO04575(cl)	74.8	62.2	167.5	26.6	21	13.3
35	MT19193	Yellowstone/SD08W015	70.1	63.1	162.2	27.2	23	13.5
36	MT19196	Northern//Yellowstone/MTW0880	75.8	61.9	167.0	27.7	20	13.2
Average			72.3	62.1	165.6	27.2	20.2	13.2
LSD (0.05)			5.7	0.7	2.2	1.4	ns	0.6
C.V. (%)			7.4	1.0	1.1	4.4	48.0	4.1

i = in 2021 Intrastate Test (all other MT lines dropped from testing); a = returned to 2021 Advanced Test

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD ($p=0.05$)

Table 71. 2020 Advanced Yield Nursery (Exp. 1401): Bozeman

Entry	ID	Pedigree	Yield bu/ac	Test weight lb/bu	Stand % 5-May	Heading date Julian	Plant height in	Protein %
w = white			LAT	LAT	LAT	RCB	RCB	bulk
		lattice efficiency relative to RCB	116%	109%	115%	104%	97%	
22	MT19133	MT1078/Judee/Emerson	101.9	62.6	100	171.7	34.5	12.4
6 i	MTS1908	(Judee sib, MTS0819)//08X350-A6/Warhorse	101.6	62.5	99	174.7	31.9	12.6
32	MT19183	MT1078//AAC Gateway/MT1265	101.3	63.9	96	174.3	33.1	12.5
30 i	MT19175	SD08198/Northern	98.5	62.1	96	174.0	29.9	12.3
5 i	MTS1903	(Judee sib, MTS0819)//08X350-A6/Warhorse	98.3	62.7	96	175.7	31.6	12.5
36	MT19196	Northern//Yellowstone/MTW0880	97.4	62.3	95	174.0	30.6	12.6
14	MTS1943	MTS1584*2/Loma	97.2	63.0	98	172.3	32.3	12.2
15	MTS1945	MTS1584*2/Loma	96.2	62.3	99	172.7	29.1	13.0
24 i	MTCL19149	MTCL1125/MT1091	95.7	62.0	96	172.0	30.7	12.8
17	MTS1971	Loma*2/MTS1574	95.6	61.5	94	174.3	29.5	12.2
27	MTCL19153	MT0871/(06X445B1-2, SY Clearstone sib)	95.3	63.1	98	173.3	29.0	13.2
21 i	MT19132	MT1078//Colter/Emerson	93.4	62.4	97	171.3	35.0	13.1
28 a	MT19159	Northern//02X22cE38/MT10121	93.1	62.0	94	174.3	31.0	12.9
18	MTS1976	Loma*2/MTS1574	93.0	62.5	95	174.7	29.8	13.1
13	MTS1922	08X350-A6/Warhorse	92.9	63.8	100	174.7	32.5	13.0
23	MT19142	MT1332/DecadeFhb1-DH17	92.6	62.3	99	172.0	33.6	13.1
33	MT19186	MT1090//MT08185/MT0742	91.7	63.2	94	172.3	32.5	13.6
34	MT19189	MT1084//MT08184/CO04575(cl)	91.2	63.1	93	173.3	29.5	13.0
31	MT19176	MTW1098//Yellowstone-Lr41/Decade	91.2	63.4	98	167.0	30.2	14.3
16	MTS1954	MTS1584*2/Loma	91.2	61.3	99	173.3	29.3	12.9
10	MTS1918	Judee//MTS0907/MTS0827	90.5	62.8	100	172.7	32.4	13.5
1	Yellowstone	check	89.8	61.9	92	174.3	33.5	13.1
7	MTS1914	MTS1585//Loma/AAC Gateway	89.6	60.9	96	172.7	27.2	12.3
8 i	MTS1915	MTS1596//Emerson/Spur	89.1	62.6	100	174.0	29.8	13.0
35	MT19193	Yellowstone/SD08W015	88.7	63.6	97	167.7	29.8	13.4
25 i	MTCL19151	MT0871/(06X445B1-2, SY Clearstone sib)	86.4	63.3	97	170.3	27.6	13.2
26	MTCL19152	MT0871/(06X445B1-2, SY Clearstone sib)	85.8	63.3	97	168.0	27.3	13.1
3	SY Monument	check	85.8	62.5	100	168.0	29.7	12.8
4	Bobcat	check	85.6	62.7	86	174.3	29.3	13.0
9	MTS1916	MTS1596//Emerson/Spur	83.3	62.1	95	174.3	29.5	13.6
19	MTS19102	MTS1412*2/Warhorse	81.8	62.3	99	170.0	32.4	14.7
29	MT19173	HV9W04-1594R/Accipiter	81.7	63.0	94	170.3	28.9	13.4
11	MTS1919	Warhorse*2/Accipiter	81.7	62.5	99	175.0	31.1	14.0
2	Warhorse	check	78.5	61.6	98	174.0	31.9	14.0
12	MTS1920	Warhorse*2/Accipiter	77.1	61.6	92	174.7	31.4	13.9
20	MT19116	DecadeFhb1-DH11/Overland FHB-1	71.4	63.6	98	164.0	30.4	15.5
Average			90.4	62.6	96.7	172.4	30.8	13.2
LSD (0.05)			7.2	0.5	6.4	1.4	1.5	
C.V. (%)			4.6	0.5	3.8	0.5	1.6	
P-value (Varieties)			<.0001	<.0001	0.0167	<.0001	<.0001	

i = in 2021 Intrastate Test (all other MT lines dropped from testing); a = returned to 2021 Advanced Test

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 72. 2020 Advanced Yield Nursery (Exp. 1402): Havre

Entry	ID	Pedigree	Yield bu/ac	Test weight lb/bu	Heading date Julian	Plant height in	Sawfly cutting %	Protein %
w = white			LAT	RCB	LAT	RCB	LAT	LAT
		lattice efficiency over RCB	142%	93%	106%	100%	123%	111%
8 i	MTS1915	MTS1596//Emerson/Spur	68.6	62.0	164.2	26.2	27	13.5
34	MT19189	MT1084//MT08184/CO04575(cl)	68.3	62.2	161.8	25.0	22	14.0
18	MTS1976	Loma*2/MTS1574	65.2	62.4	163.4	27.2	22	13.5
3	SY Monumer	check	65.0	62.4	160.7	22.4	47	14.0
6 i	MTS1908	(Judee sib, MTS0819)//08X350-A6/Warhorse	63.4	63.3	164.5	24.4	16	14.1
23	MT19142	MT1332/DecadeFhb1-DH17	63.0	61.7	162.8	23.4	33	14.2
4	Bobcat	check	62.7	63.1	162.3	26.6	33	13.6
36	MT19196	Northern//Yellowstone/MTW0880	62.6	62.7	161.8	28.3	28	14.1
35	MT19193	Yellowstone/SD08W015	62.2	61.8	162.1	27.8	37	14.2
28 a	MT19159	Northern//02X22cE38/MT10121	62.1	62.4	163.6	23.9	26	13.9
22	MT19133	MT1078//Judee/Emerson	61.6	61.5	164.2	26.3	19	13.7
31	MT19176	MTW1098//Yellowstone-Lr41/Decade	61.3	60.7	162.9	22.6	45	14.4
14	MTS1943	MTS1584*2/Loma	61.2	62.6	164.3	23.7	24	14.8
20	MT19116	DecadeFhb1-DH11/Overland FHB-1	60.6	61.3	159.1	23.7	27	13.4
27	MTCL19153	MT0871/(06X445B1-2, SY Clearstone sib)	60.6	61.8	163.4	24.5	28	14.4
29	MT19173	HV9W04-1594R/Accipiter	60.5	62.8	163.2	23.8	17	14.2
24 i	MTCL19149	MTCL1125/MT1091	59.5	61.6	164.3	25.3	51	14.2
15	MTS1945	MTS1584*2/Loma	58.8	61.7	160.2	26.3	44	14.4
33	MT19186	MT1090//MT08185/MT0742	58.8	62.2	163.7	23.5	20	14.2
1	Yellowstone	check	58.7	62.6	163.6	23.8	19	14.2
12	MTS1920	Warhorse*2/Accipiter	58.3	62.0	163.3	23.4	40	14.0
9	MTS1916	MTS1596//Emerson/Spur	58.3	62.3	161.9	24.7	26	14.1
13	MTS1922	08X350-A6/Warhorse	58.2	62.8	164.1	24.3	18	14.6
16	MTS1954	MTS1584*2/Loma	57.8	62.6	159.6	24.1	41	14.4
26	MTCL19152	MT0871/(06X445B1-2, SY Clearstone sib)	57.6	61.3	160.2	28.6	50	14.2
2	Warhorse	check	57.0	61.5	162.5	23.0	29	14.0
5 i	MTS1903	(Judee sib, MTS0819)//08X350-A6/Warhorse	57.0	63.0	157.9	23.2	15	13.8
19	MTS19102	MTS1412*2/Warhorse	57.0	61.6	162.0	26.2	32	14.4
25 i	MTCL19151	MT0871/(06X445B1-2, SY Clearstone sib)	56.7	61.9	162.5	24.0	34	14.1
30 i	MT19175	SD08198/Northern	56.0	62.0	162.6	25.4	15	13.9
11	MTS1919	Warhorse*2/Accipiter	55.9	61.9	160.7	25.1	38	14.1
21 i	MT19132	MT1078//Colter/Emerson	55.2	61.8	161.5	28.1	38	14.0
17	MTS1971	Loma*2/MTS1574	54.5	62.6	161.7	26.0	28	14.1
32	MT19183	MT1078//AAC Gateway/MT1265	52.6	62.6	160.3	25.2	36	14.2
7	MTS1914	MTS1585//Loma/AAC Gateway	51.5	62.5	154.9	26.1	32	14.3
10	MTS1918	Judee//MTS0907/MTS0827	51.0	62.0	158.5	23.6	35	14.8
Average			59.4	62.1	162.0	25.0	30.3	14.1
LSD (0.05)			7.7	1.2	1.5	2.2	15.7	ns
C.V. (%)			7.4	1.2	0.5	5.5	29.6	3.0
P-value (Varieties)			0.0053	0.0074	<.0001	<.0001	<.0001	0.0728

i = in 2021 Intrastate Test (all other MT lines dropped from testing); a = returned to 2021 Advanced Test

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 73. 2020 Advanced Yield Nursery (Exp. 1404): Williston

			Stand/					
Entry	ID	Pedigree	Yield bu/ac	Test weight lb/bu	Winter survival %	Heading date Julian	Plant height in	Protein %
w = white			RCB	RCB	RCB	RCB	RCB	LAT
		lattice efficiency over RCB	100%	92%	103%	87%	101%	123%
30 i	MT19175	SD08198/Northern	57.4	60.4	92	163.0	20.3	13.2
1	Yellowstone	check	56.6	60.7	87	160.3	24.1	13.9
36	MT19196	Northern//Yellowstone/MTW0880	55.6	60.4	82	163.3	21.3	14.8
25 i	MTCL19151	MT0871/(06X445B1-2, SY Clearstone sib)	55.6	60.9	87	158.3	20.6	13.5
33	MT19186	MT1090//MT08185/MT0742	54.0	61.8	75	158.7	23.1	14.6
15	MTS1945	MTS1584*2/Loma	52.4	58.5	87	160.3	20.1	13.5
28 a	MT19159	Northern//02X22cE38/MT10121	51.7	61.6	77	164.3	21.3	13.9
21 i	MT19132	MT1078//Colter/Emerson	51.3	58.7	87	159.3	24.0	14.3
5 i	MTS1903	(Judee sib, MTS0819)//08X350-A6/Warhorse	50.8	60.7	90	163.3	22.7	14.2
8 i	MTS1915	MTS1596//Emerson/Spur	50.7	61.0	80	164.3	19.8	14.2
17	MTS1971	Loma*2/MTS1574	50.6	58.9	82	163.0	19.9	14.0
22	MT19133	MT1078//Judee/Emerson	50.6	59.7	83	162.7	24.3	12.8
14	MTS1943	MTS1584*2/Loma	50.4	60.0	92	162.0	23.0	12.8
10	MTS1918	Judee//MTS0907/MTS0827	49.9	60.4	83	160.3	22.3	15.3
24 i	MTCL19149	MTCL1125/MT1091	49.8	60.5	85	161.7	21.7	14.8
7	MTS1914	MTS1585//Loma/AAC Gateway	49.5	57.1	82	159.7	19.0	12.7
9	MTS1916	MTS1596//Emerson/Spur	49.0	61.0	87	162.3	21.0	14.5
4	Bobcat	check	48.6	60.4	75	163.0	21.5	14.8
6 i	MTS1908	(Judee sib, MTS0819)//08X350-A6/Warhorse	48.3	61.6	85	165.0	24.0	15.0
34	MT19189	MT1084//MT08184/CO04575(cl)	48.3	61.3	80	164.3	20.7	15.6
35	MT19193	Yellowstone/SD08W015	48.3	61.3	75	158.3	21.4	14.1
3	SY Monumer	check	48.2	58.5	82	158.3	20.9	11.9
12	MTS1920	Warhorse*2/Accipiter	48.1	60.6	85	163.7	21.3	15.1
32	MT19183	MT1078//AAC Gateway/MT1265	48.0	62.1	72	162.3	24.5	15.2
13	MTS1922	08X350-A6/Warhorse	48.0	62.0	75	164.3	22.3	15.4
18	MTS1976	Loma*2/MTS1574	47.8	60.7	77	163.3	19.7	14.9
26	MTCL19152	MT0871/(06X445B1-2, SY Clearstone sib)	47.6	61.5	83	159.0	19.0	13.2
23	MT19142	MT1332/DecadeFhb1-DH17	47.3	59.9	90	161.0	22.3	13.2
27	MTCL19153	MT0871/(06X445B1-2, SY Clearstone sib)	47.2	61.5	85	161.3	19.4	15.0
20	MT19116	DecadeFhb1-DH11/Overland FHB-1	45.9	61.0	80	157.3	21.5	13.2
16	MTS1954	MTS1584*2/Loma	45.8	60.1	85	163.0	19.7	13.7
31	MT19176	MTW1098//Yellowstone-Lr41/Decade	44.6	60.8	80	158.7	21.8	13.8
11	MTS1919	Warhorse*2/Accipiter	44.3	61.4	85	165.0	21.9	14.7
29	MT19173	HV9W04-1594R/Accipiter	42.8	60.6	82	160.3	20.3	13.6
19	MTS19102	MTS1412*2/Warhorse	42.4	60.0	80	159.3	23.5	13.8
2	Warhorse	check	41.6	59.5	87	162.3	22.8	13.9
Average			49.1	60.5	82.7	161.6	21.6	14.1
LSD (0.05)			9.3	0.8	ns	2.4	2.0	0.8
C.V. (%)			11.6	0.8	8.4	0.9	5.7	3.5
P-value (Varieties)			0.0027	<.0001	0.0939	<.0001	<.0001	<.0001

i = in 2021 Intrastate Test (all other MT lines dropped from testing); a = returned to 2021 Advanced Test

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 74. 2020 Advanced Yield Nursery (Exp. 1407): Moccasin

Entry	ID	Pedigree	Yield bu/ac	Test weight lb/bu	Heading date Julian	Plant height in	Grain moisture %	Protein %
w = white			LAT	RCB	RCB	LAT	LAT	LAT
		lattice efficiency relative to RCB	111%	101%	94%	106%	116%	175%
30 i	MT19175	SD08198/Northern	70.6	62.8	173.3	25.6	10.7	10.2
28 a	MT19159	Northern//02X22cE38/MT10121	65.1	63.6	173.3	24.0	10.7	10.4
14	MTS1943	MTS1584*2/Loma	64.9	63.3	173.3	26.4	11.2	10.0
1	Yellowstone	check	64.7	63.1	168.7	27.8	10.9	11.1
23	MT19142	MT1332/DecadeFhb1-DH17	64.4	63.3	168.3	27.7	10.7	9.9
21 i	MT19132	MT1078//Colter/Emerson	62.1	62.6	166.3	28.0	10.7	10.1
36	MT19196	Northern//Yellowstone/MTW0880	61.5	62.4	173.0	25.2	10.5	10.9
17	MTS1971	Loma*2/MTS1574	61.2	62.1	173.0	23.0	10.1	10.6
7	MTS1914	MTS1585//Loma/AAC Gateway	60.0	62.5	173.0	22.5	10.2	10.1
16	MTS1954	MTS1584*2/Loma	59.5	63.2	173.3	24.1	10.7	10.4
32	MT19183	MT1078//AAC Gateway/MT1265	59.5	63.3	169.0	27.6	9.9	11.4
22	MT19133	MT1078//Judee/Emerson	58.6	62.2	171.0	28.6	10.3	10.2
4	Bobcat	check	58.2	63.3	173.3	24.3	10.5	10.6
24 i	MTCL19149	MTCL1125/MT1091	58.0	62.6	173.0	23.8	11.2	9.7
18	MTS1976	Loma*2/MTS1574	57.9	63.0	173.7	23.7	10.1	10.9
9	MTS1916	MTS1596//Emerson/Spur	57.7	63.7	173.0	24.1	10.5	10.4
27	MTCL19153	MT0871/(06X445B1-2, SY Clearstone sib)	57.7	63.6	173.0	22.1	10.4	11.1
34	MT19189	MT1084//MT08184/CO04575(cl)	56.6	63.1	173.7	24.4	10.3	10.7
29	MT19173	HV9W04-1594R/Accipiter	56.5	66.0	165.3	23.7	10.7	10.7
5 i	MTS1903	(Judee sib, MTS0819)//08X350-A6/Warhorse	55.8	63.3	173.3	25.7	10.6	10.0
25 i	MTCL19151	MT0871/(06X445B1-2, SY Clearstone sib)	55.4	64.3	165.3	22.8	10.4	10.9
6 i	MTS1908	(Judee sib, MTS0819)//08X350-A6/Warhorse	55.4	62.3	174.3	26.5	10.2	10.9
12	MTS1920	Warhorse*2/Accipiter	55.3	63.4	173.0	24.7	9.9	10.8
33	MT19186	MT1090//MT08185/MT0742	54.9	64.6	166.0	27.6	10.7	10.5
11	MTS1919	Warhorse*2/Accipiter	54.8	63.8	173.3	24.4	10.3	11.1
15	MTS1945	MTS1584*2/Loma	53.7	63.5	173.0	23.1	10.7	10.5
10	MTS1918	Judee//MTS0907/MTS0827	53.2	63.5	168.3	26.6	10.2	11.1
26	MTCL19152	MT0871/(06X445B1-2, SY Clearstone sib)	53.2	64.3	165.0	21.8	10.4	10.9
3	SY Monumer	check	52.7	62.9	165.0	24.1	10.6	10.8
2	Warhorse	check	52.3	63.9	169.0	25.0	10.2	11.1
35	MT19193	Yellowstone/SD08W015	52.2	64.9	165.0	23.7	10.2	11.9
31	MT19176	MTW1098//Yellowstone-Lr41/Decade	52.0	63.4	165.0	23.1	10.6	12.0
13	MTS1922	08X350-A6/Warhorse	51.1	64.5	173.3	25.3	10.8	10.6
8 i	MTS1915	MTS1596//Emerson/Spur	48.3	63.5	173.7	24.9	10.3	10.3
19	MTS19102	MTS1412*2/Warhorse	46.7	62.7	165.0	25.4	9.8	12.1
20	MT19116	DecadeFhb1-DH11/Overland FHB-1	43.1	64.0	162.0	25.0	10.1	14.0
Average			56.8	63.4	170.3	24.9	10.5	10.8
LSD (0.05)			11.1	0.9	2.7	1.5	ns	0.6
C.V. (%)			11.3	0.9	1.0	3.5	4.5	3.4
P-value (Varieties)			0.0138	<.0001	<.0001	<.0001	0.1660	<.0001

i = in 2021 Intrastate Test (all other MT lines dropped from testing); a = returned to 2021 Advanced Test

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 75. 2020 Advanced Yield Nursery (Exp. 1408): Huntley

Entry	ID	Pedigree	Yield bu/ac	Test weight lb/bu	Heading date Julian	Plant height in	Grain moisture %	Protein %
w = white			LAT	LAT	RCB	RCB	RCB	RCB
		lattice efficiency relative to RCB	166%	113%	100%	104%	100%	100%
22	MT19133	MT1078/Judee/Emerson	95.3	62.7	159.7	34.8	10.4	13.4
24 i	MTCL19149	MTCL1125/MT1091	94.9	63.0	160.0	31.7	10.2	14.4
30 i	MT19175	SD08198/Northern	92.2	62.8	165.0	29.2	10.8	13.3
5 i	MTS1903	(Judee sib, MTS0819)//08X350-A6/Warhor:	89.2	63.4	164.3	31.4	10.8	13.8
6 i	MTS1908	(Judee sib, MTS0819)//08X350-A6/Warhor:	88.4	63.1	164.7	31.8	11.3	13.6
25 i	MTCL19151	MT0871/(06X445B1-2, SY Clearstone sib)	88.2	63.8	158.7	30.3	10.4	13.8
32	MT19183	MT1078/AAC Gateway/MT1265	87.8	64.0	161.0	32.5	10.4	14.0
14	MTS1943	MTS1584*2/Loma	87.6	63.1	164.0	32.3	10.3	13.3
26	MTCL19152	MT0871/(06X445B1-2, SY Clearstone sib)	86.5	64.2	158.7	29.5	10.0	13.9
29	MT19173	HV9W04-1594R/Accipiter	86.3	64.4	158.7	29.0	9.9	14.1
28 a	MT19159	Northern//02X22cE38/MT10121	85.8	63.1	164.0	28.4	10.6	14.3
35	MT19193	Yellowstone/SD08W015	85.8	64.8	158.0	30.4	10.2	14.2
1	Yellowstone	check	85.7	62.8	162.0	33.3	10.7	13.7
31	MT19176	MTW1098//Yellowstone-Lr41/Decade	85.0	64.1	157.0	30.0	10.3	15.7
36	MT19196	Northern//Yellowstone/MTW0880	84.9	62.8	162.7	30.7	10.6	14.4
23	MT19142	MT1332/DecadeFhb1-DH17	84.7	62.6	162.0	32.2	9.6	13.7
34	MT19189	MT1084/MT08184/CO04575(cl)	84.3	63.5	164.3	30.1	11.0	13.8
8 i	MTS1915	MTS1596//Emerson/Spur	84.1	63.9	164.0	28.5	10.4	13.9
27	MTCL19153	MT0871/(06X445B1-2, SY Clearstone sib)	82.2	63.6	160.7	28.4	10.1	14.3
21 i	MT19132	MT1078//Colter/Emerson	82.1	63.0	159.3	33.9	10.1	14.4
9	MTS1916	MTS1596//Emerson/Spur	81.9	63.2	163.7	28.7	10.5	15.3
7	MTS1914	MTS1585//Loma/AAC Gateway	81.4	61.6	163.0	26.9	9.6	13.4
10	MTS1918	Judee//MTS0907/MTS0827	81.0	63.2	161.0	31.3	9.7	14.3
33	MT19186	MT1090//MT08185/MT0742	80.6	63.7	161.0	32.2	10.9	14.1
12	MTS1920	Warhorse*2/Accipiter	80.5	63.4	163.7	30.8	10.9	14.8
18	MTS1976	Loma*2/MTS1574	79.9	62.5	165.0	28.9	10.9	14.2
13	MTS1922	08X350-A6/Warhorse	79.4	63.8	164.3	31.1	12.0	13.8
2	Warhorse	check	79.3	63.0	161.0	31.2	9.9	14.5
15	MTS1945	MTS1584*2/Loma	79.2	62.1	163.7	28.6	10.9	13.8
3	SY Monumer	check	78.7	63.5	158.3	30.6	9.9	13.2
4	Bobcat	check	78.6	63.2	163.7	29.2	10.0	13.9
11	MTS1919	Warhorse*2/Accipiter	78.5	63.4	163.3	30.9	10.9	14.4
16	MTS1954	MTS1584*2/Loma	78.0	61.9	164.7	29.2	10.5	13.9
17	MTS1971	Loma*2/MTS1574	75.1	61.2	164.7	30.4	11.4	13.0
19	MTS19102	MTS1412*2/Warhorse	75.1	62.7	160.7	32.4	10.6	15.3
20	MT19116	DecadeFhb1-DH11/Overland FHB-1	71.9	64.1	154.7	32.9	9.9	15.7
Average			83.3	63.2	161.8	30.7	10.5	14.1
LSD (0.05)			7.5	0.5	1.6	1.6	0.7	0.5
C.V. (%)			5.1	0.5	0.6	3.1	4.3	2.4
P-value (Varieties)			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

i = in 2021 Intrastate Test (all other MT lines dropped from testing); a = returned to 2021 Advanced Test

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 76. 2020 Advanced Yield Nursery (Exp. 1418): Conrad

								Loding	
Entry	ID	Pedigree	Yield bu/ac 3 rep LAT	Yield bu/ac 2 rep LAT	Test weight lb/bu LAT	Heading date Julian no	Plant height in no	Sawfly cutting % LAT	Protein % LAT
w = white									
		lattice efficiency relative to RCB	242%	290%	112%	data	data	106%	123%
29	MT19173	HV9W04-1594R/Accipiter	105.4	<u>114.2</u>	62.8			11	12.6
13	MTS1922	08X350-A6/Warhorse	95.4	109.5	63.2			1	12.3
26	MTCL19152	MT0871/(06X445B1-2, SY Clearstone sib)	99.3	107.7	62.0			9	12.6
23	MT19142	MT1332/DecadeFhb1-DH17	102.8	106.8	61.6			30	12.7
6 i	MTS1908	(Judee sib, MTS0819)//08X350-A6/Warhor:	106.1	103.3	61.9			1	12.4
34	MT19189	MT1084//MT08184/CO04575(cl)	97.6	103.0	61.6			20	12.5
32	MT19183	MT1078//AAC Gateway/MT1265	99.1	102.6	62.8			20	12.8
16	MTS1954	MTS1584*2/Loma	88.6	102.6	60.0			5	12.7
25 i	MTCL19151	MT0871/(06X445B1-2, SY Clearstone sib)	89.2	101.6	62.2			10	12.5
27	MTCL19153	MT0871/(06X445B1-2, SY Clearstone sib)	102.6	101.5	62.1			8	13.0
36	MT19196	Northern//Yellowstone/MTW0880	105.3	99.8	61.8			13	12.8
19	MTS19102	MTS1412*2/Warhorse	92.0	98.8	62.4			4	13.0
5 i	MTS1903	(Judee sib, MTS0819)//08X350-A6/Warhor:	108.3	98.1	62.1			0	12.2
18	MTS1976	Loma*2/MTS1574	102.5	97.7	62.3			2	13.1
28 a	MT19159	Northern//02X22cE38/MT10121	101.5	96.2	62.1			15	12.6
33	MT19186	MT1090//MT08185/MT0742	93.8	96.2	62.4			29	13.1
22	MT19133	MT1078//Judee/Emerson	92.9	95.7	60.4			16	12.3
24 i	MTCL19149	MTCL1125/MT1091	95.9	95.1	61.3			15	12.3
17	MTS1971	Loma*2/MTS1574	93.3	95.0	61.0			5	12.4
4	Bobcat	check	99.9	94.6	62.4			4	13.0
1	Yellowstone	check	102.3	94.3	60.7			33	13.0
30 i	MT19175	SD08198/Northern	101.8	93.4	60.9			10	12.3
14	MTS1943	MTS1584*2/Loma	96.4	92.5	62.6			1	11.8
7	MTS1914	MTS1585//Loma/AAC Gateway	92.7	92.4	59.7			10	12.5
12	MTS1920	Warhorse*2/Accipiter	91.2	91.3	62.1			3	13.2
3	SY Monument	check	91.2	90.4	60.7			20	12.3
31	MT19176	MTW1098//Yellowstone-Lr41/Decade	95.2	90.2	62.5			7	14.4
10	MTS1918	Judee//MTS0907/MTS0827	97.7	90.1	62.0			3	12.7
9	MTS1916	MTS1596//Emerson/Spur	91.5	90.0	61.1			1	12.5
21 i	MT19132	MT1078//Colter/Emerson	92.8	89.3	59.4			35	12.8
8 i	MTS1915	MTS1596//Emerson/Spur	89.9	89.0	61.0			2	12.3
15	MTS1945	MTS1584*2/Loma	88.8	89.0	59.6			4	12.6
2	Warhorse	check	89.8	88.3	60.6			1	12.8
20	MT19116	DecadeFhb1-DH11/Overland FHB-1	83.8	85.1	63.3			7	13.7
35	MT19193	Yellowstone/SD08W015	89.1	83.9	63.4			8	12.8
11	MTS1919	Warhorse*2/Accipiter	83.4	83.4	62.2			3	13.2
Average			95.8	95.9	61.7			10.2	12.7
LSD (0.05)			ns	14.7	1.6			15.7	0.7
C.V. (%)			10.7	6.7	1.5			90.5	3.1
P-value (Varieties)			0.5577	0.0416	<.0001			<.0001	<.0001

i = in 2021 Intrastate Test (all other MT lines dropped from testing); a = returned to 2021 Advanced Test

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 77. 2020 Advanced Yield Nursery (Exp. 14FB): Fort Benton (Northern Seeds)

Entry	ID	Pedigree	Yield bu/ac	Test weight lb/bu	Plant height in	Protein %	
w = white			RCB	RCB	RCB	RCB	
8	i	MTS1915	MTS1596//Emerson/Spur	88.9	63.0	29.7	11.3
12		MTS1920	Warhorse*2/Accipiter	82.8	61.1	32.0	13.9
9		MTS1916	MTS1596//Emerson/Spur	79.9	62.1	31.0	12.7
6	i	MTS1908	(Judee sib, MTS0819)//08X350-A6/Warhorse	79.3	61.0	31.7	13.0
11		MTS1919	Warhorse*2/Accipiter	78.6	61.6	31.7	14.2
23		MT19142	MT1332/DecadeFhb1-DH17	77.4	60.5	32.7	12.3
24	i	MTCL19149	MTCL1125/MT1091	76.8	58.9	30.0	13.2
5	i	MTS1903	(Judee sib, MTS0819)//08X350-A6/Warhorse	76.5	61.7	31.0	12.5
2		Warhorse	check	76.1	61.4	31.7	14.1
28	a	MT19159	Northern//02X22cE38/MT10121	76.1	61.6	30.7	12.5
3		SY Monumer	check	75.8	61.4	30.7	12.4
30	i	MT19175	SD08198/Northern	75.1	60.6	29.3	12.6
7		MTS1914	MTS1585//Loma/AAC Gateway	74.7	60.3	27.0	12.8
13		MTS1922	08X350-A6/Warhorse	74.6	60.7	31.7	14.4
4		Bobcat	check	72.3	61.3	29.7	13.6
34		MT19189	MT1084//MT08184/CO04575(cl)	72.0	60.9	30.0	13.4
17		MTS1971	Loma*2/MTS1574	71.9	59.8	30.7	12.9
29		MT19173	HV9W04-1594R/Accipiter	69.9	63.0	29.0	12.4
35		MT19193	Yellowstone/SD08W015	69.4	62.1	30.3	13.8
27		MTCL19153	MT0871/(06X445B1-2, SY Clearstone sib)	69.1	61.0	28.3	13.8
25	i	MTCL19151	MT0871/(06X445B1-2, SY Clearstone sib)	69.1	61.6	28.7	13.1
36		MT19196	Northern//Yellowstone/MTW0880	68.6	60.6	30.0	12.7
22		MT19133	MT1078//Judee/Emerson	68.1	60.9	33.0	12.9
21	i	MT19132	MT1078//Colter/Emerson	67.7	58.9	32.3	13.5
15		MTS1945	MTS1584*2/Loma	67.1	60.6	28.7	13.1
26		MTCL19152	MT0871/(06X445B1-2, SY Clearstone sib)	66.8	61.6	27.0	12.8
14		MTS1943	MTS1584*2/Loma	65.9	61.3	32.3	13.3
32		MT19183	MT1078//AAC Gateway/MT1265	64.5	61.3	32.7	13.4
18		MTS1976	Loma*2/MTS1574	64.1	61.1	27.7	12.8
10		MTS1918	Judee//MTS0907/MTS0827	63.8	61.4	31.3	13.5
19		MTS19102	MTS1412*2/Warhorse	63.5	60.2	31.7	14.2
16		MTS1954	MTS1584*2/Loma	62.7	60.7	29.0	13.4
33		MT19186	MT1090//MT08185/MT0742	60.6	61.6	32.0	13.8
31		MT19176	MTW1098//Yellowstone-Lr41/Decade	60.0	60.6	28.3	14.5
1		Yellowstone	check	58.3	59.9	32.0	13.7
20		MT19116	DecadeFhb1-DH11/Overland FHB-1	57.7	61.8	31.0	14.9
Average			70.7	61.1	30.5	13.3	
LSD (0.05)			10.7	1.1	2.2	1.1	
C.V. (%)			9.3	1.1	4.4	5.1	
P-value (Varieties)			<.0001	<.0001	<.0001	<.0001	

i = in 2021 Intrastate Test (all other MT lines dropped from testing); a = returned to 2021 Advanced Test

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 78. 2020 Advanced Yield Nursery (Exp. 14WW): Limagrain - Walla Walla, WA

Entry	ID	Pedigree	Yield bu/ac	Test weight lb/bu	Heading date 1-Jan	Plant height in	Stripe rust (0-9, 0 = best)	Lodging score (0-9, 0 = best)
w = white			RCB	RCB	RCB	RCB		
34	MT19189	MT1084//MT08184/CO04575(cl)	140.7		146.0	40.9	1	0.0
5 i	MTS1903	(Judee sib, MTS0819)//08X350-A6/Warhorse	137.9		146.5	40.9	1	0.0
	Keldin	Limagrain check	133.3		136.5	35.4	2	0.0
26	MTCL19152	MT0871/(06X445B1-2, SY Clearstone sib)	129.1		139.0	40.9	4	0.0
4	Bobcat	check	127.7		140.0	37.6	1	0.5
27	MTCL19153	MT0871/(06X445B1-2, SY Clearstone sib)	126.8		143.0	38.6	1	0.0
24 i	MTCL19149	MTCL1125/MT1091	126.7		143.0	42.5	4	7.0
6 i	MTS1908	(Judee sib, MTS0819)//08X350-A6/Warhorse	126.5		146.0	40.6	1	0.0
31	MT19176	MTW1098//Yellowstone-Lr41/Decade	125.3		136.5	39.6	5	0.0
30 i	MT19175	SD08198/Northern	125.1		146.0	38.6	7	0.0
33	MT19186	MT1090//MT08185/MT0742	124.3		139.0	40.9	4	0.0
7	MTS1914	MTS1585//Loma/AAC Gateway	123.3		140.5	36.4	3	0.0
28 a	MT19159	Northern//02X22cE38/MT10121	121.8		146.0	37.6	5	0.0
	Norwest 553	Limagrain check	121.0		141.5	34.4	4	0.0
32	MT19183	MT1078//AAC Gateway/MT1265	120.7		143.5	40.6	4	0.0
13	MTS1922	08X350-A6/Warhorse	120.1		146.0	40.6	1	0.0
25 i	MTCL19151	MT0871/(06X445B1-2, SY Clearstone sib)	120.0		138.5	40.9	6	0.0
21 i	MT19132	MT1078//Colter/Emerson	119.9		142.5	43.5	7	3.0
10	MTS1918	Judee//MTS0907/MTS0827	119.1		141.5	41.9	4	0.5
35	MT19193	Yellowstone/SD08W015	118.7		137.0	39.0	4	2.0
8 i	MTS1915	MTS1596//Emerson/Spur	117.9		146.0	38.2	1	1.0
17	MTS1971	Loma*2/MTS1574	117.4		145.0	38.2	1	0.0
11	MTS1919	Warhorse*2/Accipiter	116.1		146.0	40.9	4	0.5
23	MT19142	MT1332/DecadeFhb1-DH17	115.4		141.5	42.9	5	3.0
36	MT19196	Northern//Yellowstone/MTW0880	115.3		145.5	43.1	5	2.5
	LCS Zoom	Limagrain check	114.6		139.5	40.2	8	0.0
9	MTS1916	MTS1596//Emerson/Spur	114.4		145.5	39.6	4	1.0
1	Yellowstone	check	113.8		143.0	43.5	5	0.0
16	MTS1954	MTS1584*2/Loma	113.3		143.5	35.8	4	3.0
2	Warhorse	check	112.9		145.0	42.1	4	0.5
12	MTS1920	Warhorse*2/Accipiter	112.3		144.5	38.6	1	0.0
19	MTS19102	MTS1412*2/Warhorse	107.0		138.5	39.6	4	1.5
22	MT19133	MT1078//Judee/Emerson	106.5		143.0	43.5	8	0.0
29	MT19173	HV9W04-1594R/Accipiter	99.6		139.0	38.6	3	7.0
18	MTS1976	Loma*2/MTS1574	95.3		145.5	39.0	9	0.0
14	MTS1943	MTS1584*2/Loma	95.0		141.5	40.2	9	0.0
3	SY Monument	check	94.0		134.0	38.6	9	0.0
	LCS Jet	Limagrain check	91.6		135.5	35.8	8	0.0
20	MT19116	DecadeFhb1-DH11/Overland FHB-1	86.0		133.0	40.6	9	0.0
15	MTS1945	MTS1584*2/Loma	71.1		143.0	36.4	9	0.0
Average			115.4		141.9	39.7	4.5	0.8
LSD (0.05)			9.0		1.8	1.6	2.1	1.7
C.V. (%)			3.9		0.6	0.8	14.3	103.2
P-value (Varieties)								

i = in 2021 Intrastate Test (all other MT lines dropped from testing); a = returned to 2021 Advanced Test

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 79. 2020 Advanced Yield Nursery (Exp. 14): All Location Yield (bu/a)

Entry #	ID	Pedigree	Bozeman LAT	Havre LAT	Williston RCB	Moccasin LAT	Huntley LAT	Conrad LAT	Ft Benton RCB	7 Loc Avg	
	w = white										
		lattice efficiency	116%	142%	100%	111%	166%	290%			
30	i	MT19175	SD08198/Northern	98.5	56.0	57.4	70.6	92.2	93.4	75.1	77.6
6	i	MTS1908	(Judee sib, MTS0819)//08X350-A6/Warho	101.6	63.4	48.3	55.4	88.4	103.3	79.3	77.1
23		MT19142	MT1332/DecadeFhb1-DH17	92.6	63.0	47.3	64.4	84.7	106.8	77.4	76.6
22		MT19133	MT1078//Judee/Emerson	101.9	61.6	50.6	58.6	95.3	95.7	68.1	76.0
36		MT19196	Northern//Yellowstone/MTW0880	97.4	62.6	55.6	61.5	84.9	99.8	68.6	75.8
24	i	MTCL19149	MTCL1125/MT1091	95.7	59.5	49.8	58.0	94.9	95.1	76.8	75.7
28	a	MT19159	Northern//02X22cE38/MT10121	93.1	62.1	51.7	65.1	85.8	96.2	76.1	75.7
5	i	MTS1903	(Judee sib, MTS0819)//08X350-A6/Warho	98.3	57.0	50.8	55.8	89.2	98.1	76.5	75.1
34		MT19189	MT1084//MT08184/CO04575(cl)	91.2	68.3	48.3	56.6	84.3	103.0	72.0	74.8
14		MTS1943	MTS1584*2/Loma	97.2	61.2	50.4	64.9	87.6	92.5	65.9	74.2
8	i	MTS1915	MTS1596//Emerson/Spur	89.1	68.6	50.7	48.3	84.1	89.0	88.9	74.1
32		MT19183	MT1078//AAC Gateway/MT1265	101.3	52.6	48.0	59.5	87.8	102.6	64.5	73.8
13		MTS1922	08X350-A6/Warhorse	92.9	58.2	48.0	51.1	79.4	109.5	74.6	73.4
27		MTCL19153	MT0871/(06X445B1-2, SY Clearstone sib)	95.3	60.6	47.2	57.7	82.2	101.5	69.1	73.4
25	i	MTCL19151	MT0871/(06X445B1-2, SY Clearstone sib)	86.4	56.7	55.6	55.4	88.2	101.6	69.1	73.3
29		MT19173	HV9W04-1594R/Accipiter	81.7	60.5	42.8	56.5	86.3	114.2	69.9	73.1
1		Yellowstone	check	89.8	58.7	56.6	64.7	85.7	94.3	58.3	72.6
18		MTS1976	Loma*2/MTS1574	93.0	65.2	47.8	57.9	79.9	97.7	64.1	72.2
26		MTCL19152	MT0871/(06X445B1-2, SY Clearstone sib)	85.8	57.6	47.6	53.2	86.5	107.7	66.8	72.2
17		MTS1971	Loma*2/MTS1574	95.6	54.5	50.6	61.2	75.1	95.0	71.9	72.0
21	i	MT19132	MT1078//Colter/Emerson	93.4	55.2	51.3	62.1	82.1	89.3	67.7	71.6
4		Bobcat	check	85.6	62.7	48.6	58.2	78.6	94.6	72.3	71.5
9		MTS1916	MTS1596//Emerson/Spur	83.3	58.3	49.0	57.7	81.9	90.0	79.9	71.4
7		MTS1914	MTS1585//Loma/AAC Gateway	89.6	51.5	49.5	60.0	81.4	92.4	74.7	71.3
16		MTS1954	MTS1584*2/Loma	91.2	57.8	45.8	59.5	78.0	102.6	62.7	71.1
33		MT19186	MT1090//MT08185/MT0742	91.7	58.8	54.0	54.9	80.6	96.2	60.6	71.0
3		SY Monument	check	85.8	65.0	48.2	52.7	78.7	90.4	75.8	70.9
15		MTS1945	MTS1584*2/Loma	96.2	58.8	52.4	53.7	79.2	89.0	67.1	70.9
12		MTS1920	Warhorse*2/Accipiter	77.1	58.3	48.1	55.3	80.5	91.3	82.8	70.5
35		MT19193	Yellowstone/SD08W015	88.7	62.2	48.3	52.2	85.8	83.9	69.4	70.1
31		MT19176	MTW1098//Yellowstone-Lr41/Decade	91.2	61.3	44.6	52.0	85.0	90.2	60.0	69.2
10		MTS1918	Judee//MTS0907/MTS0827	90.5	51.0	49.9	53.2	81.0	90.1	63.8	68.5
11		MTS1919	Warhorse*2/Accipiter	81.7	55.9	44.3	54.8	78.5	83.4	78.6	68.2
2		Warhorse	check	78.5	57.0	41.6	52.3	79.3	88.3	76.1	67.6
19		MTS19102	MTS1412*2/Warhorse	81.8	57.0	42.4	46.7	75.1	98.8	63.5	66.5
20		MT19116	DecadeFhb1-DH11/Overland FHB-1	71.4	60.6	45.9	43.1	71.9	85.1	57.7	62.2
Average				90.4	59.4	49.1	56.8	83.3	95.9	70.7	72.3
LSD (0.05)				7.2	7.7	9.3	11.1	7.5	14.7	10.7	5.7
C.V. (%)				4.6	7.4	11.6	11.3	5.1	6.7	9.3	7.4
P-value (Varieties)				<.0001	0.0053	0.0027	0.0138	<0.001	0.0416	<.0001	<.0001

i = in 2021 Intrastate Test (all other MT lines dropped from testing); a = returned to 2021 Advanced Test

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 80. 2020 Advanced Yield Nursery (Exp. 14): All Location Test weight (lb/bu)

Entry #	ID	Pedigree	Bozeman LAT	Havre RCB	Williston RCB	Moccasin RCB	Huntley LAT	Conrad LAT	Ft Benton RCB	7 LOC Avg
	w = white									
		lattice efficiency	109%	93%	92%	101%	113%	112%		
29	MT19173	HV9W04-1594R/Accipiter	63.0	62.8	60.6	66.0	64.4	62.8	63.0	63.2
35	MT19193	Yellowstone/SD08W015	63.6	61.8	61.3	64.9	64.8	63.4	62.1	63.1
13	MTS1922	08X350-A6/Warhorse	63.8	62.8	62.0	64.5	63.8	63.2	60.7	63.0
32	MT19183	MT1078//AAC Gateway/MT1265	63.9	62.6	62.1	63.3	64.0	62.8	61.3	62.9
33	MT19186	MT1090//MT08185/MT0742	63.2	62.2	61.8	64.6	63.7	62.4	61.6	62.8
20	MT19116	DecadeFhb1-DH11/Overland FHB-1	63.6	61.3	61.0	64.0	64.1	63.3	61.8	62.7
25	i MTCL19151	MT0871/(06X445B1-2, SY Clearstone sib)	63.3	61.9	60.9	64.3	63.8	62.2	61.6	62.6
26	MTCL19152	MT0871/(06X445B1-2, SY Clearstone sib)	63.3	61.3	61.5	64.3	64.2	62.0	61.6	62.6
5	i MTS1903	(Judee sib, MTS0819)//08X350-A6/Warho	62.7	63.0	60.7	63.3	63.4	62.1	61.7	62.4
8	i MTS1915	MTS1596//Emerson/Spur	62.6	62.0	61.0	63.5	63.9	61.0	63.0	62.4
11	MTS1919	Warhorse*2/Accipiter	62.5	61.9	61.4	63.8	63.4	62.2	61.6	62.4
27	MTCL19153	MT0871/(06X445B1-2, SY Clearstone sib)	63.1	61.8	61.5	63.6	63.6	62.1	61.0	62.4
4	Bobcat	check	62.7	63.1	60.4	63.3	63.2	62.4	61.3	62.3
14	MTS1943	MTS1584*2/Loma	63.0	62.6	60.0	63.3	63.1	62.6	61.3	62.3
28	a MT19159	Northern//02X22cE38/MT10121	62.0	62.4	61.6	63.6	63.1	62.1	61.6	62.3
6	i MTS1908	(Judee sib, MTS0819)//08X350-A6/Warho	62.5	63.3	61.6	62.3	63.1	61.9	61.0	62.2
9	MTS1916	MTS1596//Emerson/Spur	62.1	62.3	61.0	63.7	63.2	61.1	62.1	62.2
10	MTS1918	Judee//MTS0907/MTS0827	62.8	62.0	60.4	63.5	63.2	62.0	61.4	62.2
31	MT19176	MTW1098//Yellowstone-Lr41/Decade	63.4	60.7	60.8	63.4	64.1	62.5	60.6	62.2
34	MT19189	MT1084//MT08184/CO04575(cl)	63.1	62.2	61.3	63.1	63.5	61.6	60.9	62.2
18	MTS1976	Loma*2/MTS1574	62.5	62.4	60.7	63.0	62.5	62.3	61.1	62.1
12	MTS1920	Warhorse*2/Accipiter	61.6	62.0	60.6	63.4	63.4	62.1	61.1	62.0
36	MT19196	Northern//Yellowstone/MTW0880	62.3	62.7	60.4	62.4	62.8	61.8	60.6	61.9
1	Yellowstone	check	61.9	62.6	60.7	63.1	62.8	60.7	59.9	61.7
3	SY Monument	check	62.5	62.4	58.5	62.9	63.5	60.7	61.4	61.7
19	MTS19102	MTS1412*2/Warhorse	62.3	61.6	60.0	62.7	62.7	62.4	60.2	61.7
23	MT19142	MT1332/DecadeFhb1-DH17	62.3	61.7	59.9	63.3	62.6	61.6	60.5	61.7
30	i MT19175	SD08198/Northern	62.1	62.0	60.4	62.8	62.8	60.9	60.6	61.7
2	Warhorse	check	61.6	61.5	59.5	63.9	63.0	60.6	61.4	61.6
16	MTS1954	MTS1584*2/Loma	61.3	62.6	60.1	63.2	61.9	60.0	60.7	61.4
22	MT19133	MT1078//Judee/Emerson	62.6	61.5	59.7	62.2	62.7	60.4	60.9	61.4
24	i MTCL19149	MTCL1125/MT1091	62.0	61.6	60.5	62.6	63.0	61.3	58.9	61.4
15	MTS1945	MTS1584*2/Loma	62.3	61.7	58.5	63.5	62.1	59.6	60.6	61.2
17	MTS1971	Loma*2/MTS1574	61.5	62.6	58.9	62.1	61.2	61.0	59.8	61.0
21	i MT19132	MT1078//Colter/Emerson	62.4	61.8	58.7	62.6	63.0	59.4	58.9	61.0
7	MTS1914	MTS1585//Loma/AAC Gateway	60.9	62.5	57.1	62.5	61.6	59.7	60.3	60.7
Average			62.6	62.1	60.5	63.4	63.2	61.7	61.1	62.1
LSD (0.05)			0.5	1.2	0.8	0.9	0.5	1.6	1.1	0.7
C.V. (%)			0.5	1.2	0.8	0.9	0.5	1.5	1.1	1.0
P-value (Varieties)			<.0001	0.0074	<.0001	<.0001	<0.001	<.0001	<.0001	<.0001

i = in 2021 Intrastate Test (all other MT lines dropped from testing); a = returned to 2021 Advanced Test

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 81. 2020 Advanced Yield Nursery (Exp. 14): All Location Heading date (days from Jan 1)

Entry #	ID	Pedigree	Bozeman RCB	Havre LAT	Williston RCB	Moccasin RCB	Huntley RCB	Conrad no	Ft Benton no	5 Loc Avg
	w = white									
		lattice efficiency	104%	106%	87%	94%	100%	data	data	
20	MT19116	DecadeFhb1-DH11/Overland FHB-1	164.0	159.1	157.3	162.0	154.7			159.4
3	SY Monument	check	168.0	160.7	158.3	165.0	158.3			162.1
31	MT19176	MTW1098//Yellowstone-Lr41/Decade	167.0	162.9	158.7	165.0	157.0			162.1
26	MTCL19152	MT0871/(06X445B1-2, SY Clearstone sib)	168.0	160.2	159.0	165.0	158.7			162.2
35	MT19193	Yellowstone/SD08W015	167.7	162.1	158.3	165.0	158.0			162.2
25 i	MTCL19151	MT0871/(06X445B1-2, SY Clearstone sib)	170.3	162.5	158.3	165.3	158.7			163.0
19	MTS19102	MTS1412*2/Warhorse	170.0	162.0	159.3	165.0	160.7			163.4
21 i	MT19132	MT1078//Colter/Emerson	171.3	161.5	159.3	166.3	159.3			163.5
29	MT19173	HV9W04-1594R/Accipiter	170.3	163.2	160.3	165.3	158.7			163.6
10	MTS1918	Judee//MTS0907/MTS0827	172.7	158.5	160.3	168.3	161.0			164.2
33	MT19186	MT1090/MT08185/MT0742	172.3	163.7	158.7	166.0	161.0			164.3
7	MTS1914	MTS1585//Loma/AAC Gateway	172.7	154.9	159.7	173.0	163.0			164.7
23	MT19142	MT1332/DecadeFhb1-DH17	172.0	162.8	161.0	168.3	162.0			165.2
32	MT19183	MT1078//AAC Gateway/MT1265	174.3	160.3	162.3	169.0	161.0			165.4
1	Yellowstone	check	174.3	163.6	160.3	168.7	162.0			165.8
2	Warhorse	check	174.0	162.5	162.3	169.0	161.0			165.8
22	MT19133	MT1078//Judee/Emerson	171.7	164.2	162.7	171.0	159.7			165.9
15	MTS1945	MTS1584*2/Loma	172.7	160.2	160.3	173.0	163.7			166.0
24 i	MTCL19149	MTCL1125/MT1091	172.0	164.3	161.7	173.0	160.0			166.2
27	MTCL19153	MT0871/(06X445B1-2, SY Clearstone sib)	173.3	163.4	161.3	173.0	160.7			166.3
16	MTS1954	MTS1584*2/Loma	173.3	159.6	163.0	173.3	164.7			166.8
5 i	MTS1903	(Judee sib, MTS0819)//08X350-A6/Warho	175.7	157.9	163.3	173.3	164.3			166.9
9	MTS1916	MTS1596//Emerson/Spur	174.3	161.9	162.3	173.0	163.7			167.0
36	MT19196	Northern//Yellowstone/MTW0880	174.0	161.8	163.3	173.0	162.7			167.0
14	MTS1943	MTS1584*2/Loma	172.3	164.3	162.0	173.3	164.0			167.2
4	Bobcat	check	174.3	162.3	163.0	173.3	163.7			167.3
17	MTS1971	Loma*2/MTS1574	174.3	161.7	163.0	173.0	164.7			167.3
11	MTS1919	Warhorse*2/Accipiter	175.0	160.7	165.0	173.3	163.3			167.5
34	MT19189	MT1084/MT08184/CO04575(cl)	173.3	161.8	164.3	173.7	164.3			167.5
30 i	MT19175	SD08198/Northern	174.0	162.6	163.0	173.3	165.0			167.6
12	MTS1920	Warhorse*2/Accipiter	174.7	163.3	163.7	173.0	163.7			167.7
28 a	MT19159	Northern//02X22cE38/MT10121	174.3	163.6	164.3	173.3	164.0			167.9
8 i	MTS1915	MTS1596//Emerson/Spur	174.0	164.2	164.3	173.7	164.0			168.0
18	MTS1976	Loma*2/MTS1574	174.7	163.4	163.3	173.7	165.0			168.0
13	MTS1922	08X350-A6/Warhorse	174.7	164.1	164.3	173.3	164.3			168.1
6 i	MTS1908	(Judee sib, MTS0819)//08X350-A6/Warho	174.7	164.5	165.0	174.3	164.7			168.6
Average			172.4	162.0	161.6	170.3	161.8			165.6
LSD (0.05)			1.4	1.5	2.4	2.7	1.6			2.2
C.V. (%)			0.5	0.5	0.9	1.0	0.6			1.1
P-value (Varieties)			<.0001	<.0001	<.0001	<.0001	<.0001			<.0001

i = in 2021 Intrastate Test (all other MT lines dropped from testing); a = returned to 2021 Advanced Test

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 82. 2020 Advanced Yield Nursery (Exp. 14): All Location Plant Height (in)

Entry #	ID	Pedigree	Bozeman RCB	Havre RCB	Williston RCB	Moccasin LAT	Huntley RCB	Conrad no	Ft Benton RCB	6 Loc Avg
	w = white									
		lattice efficiency	97%	100%	101%	106%	104%	data		
7	MTS1914	MTS1585//Loma/AAC Gateway	27.2	26.1	19.0	22.5	26.9		27.0	24.8
27	MTCL19153	MT0871/(06X445B1-2, SY Clearstone sib)	29.0	24.5	19.4	22.1	28.4		28.3	25.3
26	MTCL19152	MT0871/(06X445B1-2, SY Clearstone sib)	27.3	28.6	19.0	21.8	29.5		27.0	25.5
25 i	MTCL19151	MT0871/(06X445B1-2, SY Clearstone sib)	27.6	24.0	20.6	22.8	30.3		28.7	25.7
29	MT19173	HV9W04-1594R/Accipiter	28.9	23.8	20.3	23.7	29.0		29.0	25.8
16	MTS1954	MTS1584*2/Loma	29.3	24.1	19.7	24.1	29.2		29.0	25.9
15	MTS1945	MTS1584*2/Loma	29.1	26.3	20.1	23.1	28.6		28.7	26.0
31	MT19176	MTW1098//Yellowstone-Lr41/Decade	30.2	22.6	21.8	23.1	30.0		28.3	26.0
18	MTS1976	Loma*2/MTS1574	29.8	27.2	19.7	23.7	28.9		27.7	26.2
3	SY Monument	check	29.7	22.4	20.9	24.1	30.6		30.7	26.4
8 i	MTS1915	MTS1596//Emerson/Spur	29.8	26.2	19.8	24.9	28.5		29.7	26.5
9	MTS1916	MTS1596//Emerson/Spur	29.5	24.7	21.0	24.1	28.7		31.0	26.5
17	MTS1971	Loma*2/MTS1574	29.5	26.0	19.9	23.0	30.4		30.7	26.6
28 a	MT19159	Northern//02X22cE38/MT10121	31.0	23.9	21.3	24.0	28.4		30.7	26.6
30 i	MT19175	SD08198/Northern	29.9	25.4	20.3	25.6	29.2		29.3	26.6
34	MT19189	MT1084//MT08184/CO04575(cl)	29.5	25.0	20.7	24.4	30.1		30.0	26.6
4	Bobcat	check	29.3	26.6	21.5	24.3	29.2		29.7	26.8
24 i	MTCL19149	MTCL1125/MT1091	30.7	25.3	21.7	23.8	31.7		30.0	27.2
35	MT19193	Yellowstone/SD08W015	29.8	27.8	21.4	23.7	30.4		30.3	27.2
12	MTS1920	Warhorse*2/Accipiter	31.4	23.4	21.3	24.7	30.8		32.0	27.3
20	MT19116	DecadeFhb1-DH11/Overland FHB-1	30.4	23.7	21.5	25.0	32.9		31.0	27.4
11	MTS1919	Warhorse*2/Accipiter	31.1	25.1	21.9	24.4	30.9		31.7	27.5
2	Warhorse	check	31.9	23.0	22.8	25.0	31.2		31.7	27.6
5 i	MTS1903	(Judee sib, MTS0819)//08X350-A6/Warho	31.6	23.2	22.7	25.7	31.4		31.0	27.6
10	MTS1918	Judee//MTS0907/MTS0827	32.4	23.6	22.3	26.6	31.3		31.3	27.9
13	MTS1922	08X350-A6/Warhorse	32.5	24.3	22.3	25.3	31.1		31.7	27.9
14	MTS1943	MTS1584*2/Loma	32.3	23.7	23.0	26.4	32.3		32.3	28.3
6 i	MTS1908	(Judee sib, MTS0819)//08X350-A6/Warho	31.9	24.4	24.0	26.5	31.8		31.7	28.4
33	MT19186	MT1090//MT08185/MT0742	32.5	23.5	23.1	27.6	32.2		32.0	28.5
19	MTS19102	MTS1412*2/Warhorse	32.4	26.2	23.5	25.4	32.4		31.7	28.6
23	MT19142	MT1332/DecadeFhb1-DH17	33.6	23.4	22.3	27.7	32.2		32.7	28.7
1	Yellowstone	check	33.5	23.8	24.1	27.8	33.3		32.0	29.1
32	MT19183	MT1078//AAC Gateway/MT1265	33.1	25.2	24.5	27.6	32.5		32.7	29.3
21 i	MT19132	MT1078//Colter/Emerson	35.0	28.1	24.0	28.0	33.9		32.3	30.2
22	MT19133	MT1078//Judee/Emerson	34.5	26.3	24.3	28.6	34.8		33.0	30.3
36	MT19196	Northern//Yellowstone/MTW0880	30.6	28.3	21.3	25.2	30.7		30.0	27.7
Average			30.8	25.0	21.6	24.9	30.7		30.5	27.2
LSD (0.05)			1.5	2.2	2.0	1.5	1.6		2.2	1.4
C.V. (%)			1.6	5.5	5.7	3.5	3.1		4.4	4.4
P-value (Varieties)			<.0001	<.0001	<.0001	<.0001	<.0001		<.0001	<.0001

i = in 2021 Intrastate Test (all other MT lines dropped from testing); a = returned to 2021 Advanced Test

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 83. 2020 Advanced Yield Nursery (Exp. 14): All Location Sawfly Cutting (%)

Entry #	ID	Pedigree	Havre LAT	Conrad LAT	2 Loc Avg
	w = white				
		lattice efficiency	123%	106%	
5	i	MTS1903 (Judee sib, MTS0819)//08X350-A6/Warho	15	0	8
6	i	MTS1908 (Judee sib, MTS0819)//08X350-A6/Warho	16	1	8
13		MTS1922 08X350-A6/Warhorse	18	1	9
18		MTS1976 Loma*2/MTS1574	22	2	12
30	i	MT19175 SD08198/Northern	15	10	12
14		MTS1943 MTS1584*2/Loma	24	1	12
9		MTS1916 MTS1596//Emerson/Spur	26	1	14
29		MT19173 HV9W04-1594R/Accipiter	17	11	14
2		Warhorse check	29	1	15
8	i	MTS1915 MTS1596//Emerson/Spur	27	2	15
17		MTS1971 Loma*2/MTS1574	28	5	17
20		MT19116 DecadeFhb1-DH11/Overland FHB-1	27	7	17
22		MT19133 MT1078//Judee/Emerson	19	16	18
27		MTCL19153 MT0871/(06X445B1-2, SY Clearstone sib)	28	8	18
19		MTS19102 MTS1412*2/Warhorse	32	4	18
4		Bobcat check	33	4	19
10		MTS1918 Judee//MTS0907/MTS0827	35	3	19
11		MTS1919 Warhorse*2/Accipiter	38	3	20
36		MT19196 Northern//Yellowstone/MTW0880	28	13	20
7		MTS1914 MTS1585//Loma/AAC Gateway	32	10	21
28	a	MT19159 Northern//02X22cE38/MT10121	26	15	21
34		MT19189 MT1084//MT08184/CO04575(cl)	22	20	21
12		MTS1920 Warhorse*2/Accipiter	40	3	21
25	i	MTCL19151 MT0871/(06X445B1-2, SY Clearstone sib)	34	10	22
35		MT19193 Yellowstone/SD08W015	37	8	23
16		MTS1954 MTS1584*2/Loma	41	5	23
33		MT19186 MT1090//MT08185/MT0742	20	29	24
15		MTS1945 MTS1584*2/Loma	44	4	24
31		MT19176 MTW1098//Yellowstone-Lr41/Decade	45	7	26
1		Yellowstone check	19	33	26
32		MT19183 MT1078//AAC Gateway/MT1265	36	20	28
26		MTCL19152 MT0871/(06X445B1-2, SY Clearstone sib)	50	9	30
23		MT19142 MT1332/DecadeFhb1-DH17	33	30	31
24	i	MTCL19149 MTCL1125/MT1091	51	15	33
3		SY Monument check	47	20	34
21	i	MT19132 MT1078//Colter/Emerson	38	35	37
Average			30.3	10.2	20.2
LSD (0.05)			15.7	15.7	ns
C.V. (%)			29.6	90.5	48.0
P-value (Varieties)			<.0001	<.0001	0.4070

i = in 2021 Intrastate Test (all other MT lines dropped from testing); a = returned to 2021 Advanced Test

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD ($p = 0.05$)

Table 84. 2019 Advanced Yield Nursery (Exp. 14): All Location Protein (%)

Entry #	ID w = white	Pedigree	Bozeman bulk	Havre LAT	Williston LAT	Moccasin LAT	Huntley RCB	Conrad LAT	Ft Benton RCB	7 Loc Avg
		lattice efficiency		111%	123%	175%	100%	123%		
20	MT19116	DecadeFhb1-DH11/Overland FHB-1	15.5	13.4	13.2	14.0	15.7	13.7	14.9	14.3
31	MT19176	MTW1098//Yellowstone-Lr41/Decade	14.3	14.4	13.8	12.0	15.7	14.4	14.5	14.2
19	MTS19102	MTS1412*2/Warhorse	14.7	14.4	13.8	12.1	15.3	13.0	14.2	13.9
11	MTS1919	Warhorse*2/Accipiter	14.0	14.1	14.7	11.1	14.4	13.2	14.2	13.7
12	MTS1920	Warhorse*2/Accipiter	13.9	14.0	15.1	10.8	14.8	13.2	13.9	13.7
10	MTS1918	Judee//MTS0907/MTS0827	13.5	14.8	15.3	11.1	14.3	12.7	13.5	13.6
2	Warhorse	check	14.0	14.0	13.9	11.1	14.5	12.8	14.1	13.5
27	MTCL19153	MT0871/(06X445B1-2, SY Clearstone sib)	13.2	14.4	15.0	11.1	14.3	13.0	13.8	13.5
35	MT19193	Yellowstone/SD08W015	13.4	14.2	14.1	11.9	14.2	12.8	13.8	13.5
13	MTS1922	08X350-A6/Warhorse	13.0	14.6	15.4	10.6	13.8	12.3	14.4	13.4
32	MT19183	MT1078//AAC Gateway/MT1265	12.5	14.2	15.2	11.4	14.0	12.8	13.4	13.4
33	MT19186	MT1090//MT08185/MT0742	13.6	14.2	14.6	10.5	14.1	13.1	13.8	13.4
9	MTS1916	MTS1596//Emerson/Spur	13.6	14.1	14.5	10.4	15.3	12.5	12.7	13.3
34	MT19189	MT1084//MT08184/CO04575(cl)	13.0	14.0	15.6	10.7	13.8	12.5	13.4	13.3
1	Yellowstone	check	13.1	14.2	13.9	11.1	13.7	13.0	13.7	13.2
4	Bobcat	check	13.0	13.6	14.8	10.6	13.9	13.0	13.6	13.2
18	MTS1976	Loma*2/MTS1574	13.1	13.5	14.9	10.9	14.2	13.1	12.8	13.2
21 i	MT19132	MT1078//Colter/Emerson	13.1	14.0	14.3	10.1	14.4	12.8	13.5	13.2
36	MT19196	Northern//Yellowstone/MTW0880	12.6	14.1	14.8	10.9	14.4	12.8	12.7	13.2
6 i	MTS1908	(Judee sib, MTS0819)//08X350-A6/Warho	12.6	14.1	15.0	10.9	13.6	12.4	13.0	13.1
16	MTS1954	MTS1584*2/Loma	12.9	14.4	13.7	10.4	13.9	12.7	13.4	13.1
24 i	MTCL19149	MTCL1125/MT1091	12.8	14.2	14.8	9.7	14.4	12.3	13.2	13.1
15	MTS1945	MTS1584*2/Loma	13.0	14.4	13.5	10.5	13.8	12.6	13.1	13.0
25 i	MTCL19151	MT0871/(06X445B1-2, SY Clearstone sib)	13.2	14.1	13.5	10.9	13.8	12.5	13.1	13.0
26	MTCL19152	MT0871/(06X445B1-2, SY Clearstone sib)	13.1	14.2	13.2	10.9	13.9	12.6	12.8	13.0
29	MT19173	HV9W04-1594R/Accipiter	13.4	14.2	13.6	10.7	14.1	12.6	12.4	13.0
28 a	MT19159	Northern//02X22cE38/MT10121	12.9	13.9	13.9	10.4	14.3	12.6	12.5	12.9
5 i	MTS1903	(Judee sib, MTS0819)//08X350-A6/Warho	12.5	13.8	14.2	10.0	13.8	12.2	12.5	12.7
17	MTS1971	Loma*2/MTS1574	12.2	14.1	14.0	10.6	13.0	12.4	12.9	12.7
23	MT19142	MT1332/DecadeFhb1-DH17	13.1	14.2	13.2	9.9	13.7	12.7	12.3	12.7
7	MTS1914	MTS1585//Loma/AAC Gateway	12.3	14.3	12.7	10.1	13.4	12.5	12.8	12.6
8 i	MTS1915	MTS1596//Emerson/Spur	13.0	13.5	14.2	10.3	13.9	12.3	11.3	12.6
14	MTS1943	MTS1584*2/Loma	12.2	14.8	12.8	10.0	13.3	11.8	13.3	12.6
3	SY Monument	check	12.8	14.0	11.9	10.8	13.2	12.3	12.4	12.5
22	MT19133	MT1078//Judee/Emerson	12.4	13.7	12.8	10.2	13.4	12.3	12.9	12.5
30 i	MT19175	SD08198/Northern	12.3	13.9	13.2	10.2	13.3	12.3	12.6	12.5
Average			13.2	14.1	14.1	10.8	14.1	12.7	13.3	13.2
LSD (0.05)				ns	0.8	0.6	0.5	0.7	1.1	0.6
C.V. (%)				3.0	3.5	3.4	2.4	3.1	5.1	4.1
P-value (Varieties)				0.0728	<.0001	<.0001	<0.001	<.0001	<.0001	<.0001

i = in 2021 Intrastate Test (all other MT lines dropped from testing); a = returned to 2021 Advanced Test

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 85. 2020 Advanced Winter Wheat Test (Exp. 14): Plant Disease Assessment

Cultivar/Line		Stripe Rust						Stem Rust	
		Pullman, WA		MT. Vernon, WA				St. Paul, MN	
		Flowering IT ^{1/} %		Stem elong. IT ^{1/} %		Milk IT ^{1/} %		Gene postulation	Sr Field
									%-R/S
1	Yellowstone	8	20	2	15	2	10		40MS
2	Warhorse	5	5	3	20	2	10	Sr7a,24	10MR-MS
3	SY Monument	8	80	2	5	2	10	Sr38	TMS
4	Bobcat	5	30	2	10	2	5		60MS-S
5 i	MTS1903	5	5	2	10	2	5	SrTmp	20MR
6 i	MTS1908	2	5	2	5	2	5	SrTmp	30MR
7	MTS1914	5	5	2	10	2	5	Sr36	10S
8 i	MTS1915	5	5	2	5	2	5	Sr7a	60S
9	MTS1916	5	5	2	10	2	5	Sr7a	60S
10	MTS1918	5	10	2	15	2	10	Sr7a	60S
11	MTS1919	5	10	2	15	2	10	Sr7a,24	0
12	MTS1920	5	10	2	15	2	10	Sr7a,24	0
13	MTS1922	5	5	2	15	2	5	Sr7a,Tmp	50MS-S
14	MTS1943	5	50	3	20	2	10		70S
15	MTS1945	5	50	3	20	3	20	Sr36	10MS
16	MTS1954	5	10	2	15	2	10	Sr24?36	0
17	MTS1971	5	10	2	10	2	10	Sr2,36,Tmp	0
18	MTS1976	5	25	2	10	5	30	Sr24?36	0
19	MTS19102	5	10	2	15	2	5	Sr7a,24	10MR-MS
20	MT19116	8	50	5	50	8	90	Sr38?	20MS
21 i	MT19132	5	20	2	15	3	20	Sr7a?Tmp	10MR
22	MT19133	5	30	2	15	2	10		50S
23	MT19142	5	10	2	15	2	5		30MS-S
24 i	MTCL19149	5	5	2	15	2	10	Sr36	20MS
25 i	MTCL19151	5	10	2	15	2	15	Sr36	30MS-S
26	MTCL19152	5	15	3	20	2	15	Sr36	30MS-S
27	MTCL19153	5	15	2	10	2	10	Sr36	30MS-S
28 a	MT19159	5	15	2	10	2	5	Sr36	20MS
29	MT19173	5	50	3	30	2	10	Sr2,36,38	5R
30 i	MT19175	5	25	2	15	2	10	Sr36,38	TS
31	MT19176	5	30	2	15	2	10	Sr31	5R
32	MT19183	5	15	2	10	3	20	Sr24	10R
33	MT19186	5	20	2	10	2	10		50MS
34	MT19189	5	15	2	15	2	5	Sr2,36,38	5MR
35	MT19193	5	15	2	15	2	5	Sr31?	0
36	MT19196	5	25	3	15	2	15	Sr36	30S
Average		20		15		12			

¹ = in 2021 Intrastate Test (all other MT lines dropped from testing); a = returned to 2021 Advanced Test

^{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 86. 2020 Sawfly Yield Test: All Location Summary

Entry #	ID	Pedigree	Yield bu/ac	Test weight lb/bu	Heading date Julian	Plant height in	Stem solid (5-25)	Stems infested (0-5)	Sawfly cutting %	Protein %
w = white										
Locations			5	5	2	5	5	3	1	3
5	Bobcat	check	65.3	62.1	167.5	24.7	24.3	1.2	26	13.7
33 a	MTS2068	(Judee sib, MTS0819)//08X350-A6/Wa	65.3	62.0	169.5	25.9	23.9	1.6	30	13.1
11 i	MTS1903	(Judee sib, MTS0819)//08X350-A6/Wa	64.6	61.8	169.7	26.1	23.5	1.8	26	13.5
12 i	MTS1908	(Judee sib, MTS0819)//08X350-A6/Wa	64.3	61.7	169.8	26.1	23.8	1.9	25	13.1
9 i	MTS18116	Loma*2/Warhorse	63.4	63.0	169.6	23.9	23.7	1.8	16	12.8
14 i	MTS1915	MTS1596//Emerson/Spur	63.4	62.7	169.5	25.1	24.1	0.6	12	13.6
35 a	MTS2070	Decade/(MTS0819, Judee sib)	63.3	61.3	168.3	25.0	23.3	1.9	21	13.8
8 i	MTS1831	MTS0907/MTS0827	62.7	63.2	169.3	24.3	23.9	1.0	5	12.8
23	MTS1971	Loma*2/MTS1574	61.7	61.0	168.5	24.2	20.7	1.4	25	13.0
24	MTS1976	Loma*2/MTS1574	61.7	61.4	169.7	24.4	23.4	1.2	22	13.8
39 a	MTS2074	(Colter sib, MT08177)/MTS0916//MTS	61.7	63.0	169.8	22.9	23.1	0.8	23	13.6
46	MTS2081	Judee/MTS1014	61.5	62.9	165.4	25.8	22.6	2.0	43	13.9
17	MTS1919	Warhorse*2/Accipiter	61.1	62.6	169.9	25.5	24.3	1.3	14	14.2
10 i	MTS18149	Loma*2/AAC Gateway	61.0	61.8	169.8	24.3	22.7	0.9	22	14.0
15	MTS1916	MTS1596//Emerson/Spur	60.9	62.2	168.7	24.5	23.8	1.1	22	14.2
4	Loma	check	60.8	61.9	168.8	24.8	21.6	1.9	31	13.9
34 a	MTS2069	(Judee sib, MTS0819)/MV17-04//Judee	60.6	62.2	168.9	24.2	22.4	1.8	22	13.7
13	MTS1914	MTS1585//Loma/AAC Gateway	60.5	60.5	166.8	23.4	22.9	1.9	39	13.5
30	MTS2065	Warhorse//MTS1028/MTS1030	60.5	61.1	167.8	26.6	21.7	2.4	59	13.8
36 a	MTS2071	Decade/(MTS0819, Judee sib)	60.5	61.2	168.9	25.6	22.5	1.2	12	14.6
6	StandClear C	check	60.1	62.6	166.9	26.4	22.1	1.9	59	13.5
2	Judee	check	60.0	63.0	166.2	25.2	21.9	1.9	21	14.4
20	MTS1943	MTS1584*2/Loma	60.0	62.3	167.3	25.9	23.7	1.6	18	13.0
25	MTS19102	MTS1412*2/Warhorse	59.6	61.5	164.8	26.1	21.3	1.9	32	14.2
48	MTS2083	Warhorse*2/Accipiter	59.6	62.1	168.3	24.1	23.4	1.1	18	13.8
40	MTS2075	MT10105/Warhorse//MTS1011	59.4	62.0	166.5	26.0	23.6	1.1	19	14.1
18	MTS1920	Warhorse*2/Accipiter	59.1	61.7	169.7	24.8	24.2	1.0	19	14.1
19	MTS1922	08X350-A6/Warhorse	59.0	62.7	168.9	25.7	24.2	0.8	18	13.8
28	MTCS2063	MTCS1203//MTS1021/MTCL1003	59.0	60.7	167.2	25.4	23.7	0.4	25	13.9
38	MTS2073	MTS1054//Warhorse/MTS1008	58.9	62.9	163.7	25.8	24.5	0.5	24	14.2
21	MTS1945	MTS1584*2/Loma	58.6	61.2	167.7	23.3	24.3	2.2	21	13.8
26	MTCS2061	Warhorse/MTCS1203	58.4	61.3	167.9	23.7	23.1	2.0	33	14.2
41	MTS2076	MT10105/Warhorse//MTS1011	58.3	61.9	168.1	25.0	22.9	2.3	26	13.8
32	MTS2067	Warhorse/Loma//MTS1594	58.2	61.0	168.9	25.2	22.8	1.8	39	13.5
45	MTS2080	Decade/(MTS0819, Judee sib)	58.2	61.6	169.3	24.3	22.8	1.8	14	14.8
22	MTS1954	MTS1584*2/Loma	58.1	61.2	168.2	24.2	23.5	2.1	33	13.6
7	MTS1810	08X350-A6/Warhorse	58.0	62.7	169.5	25.7	24.5	1.1	4	14.4
16	MTS1918	Judee//MTS0907/MTS0827	58.0	61.7	166.7	25.9	22.6	1.5	20	14.1
27	MTCS2062	Warhorse/MTCS1203	57.9	61.0	166.8	24.0	23.2	2.0	27	14.3
42	MTS2077	Judee//16FAWWON-Irr-87/(MT0977, N	57.1	62.2	169.0	23.9	22.3	1.7	30	13.9
44	MTS2079	(Judee sib, MTS0819)/MV17-04//Judee	56.8	61.8	167.8	24.3	21.7	2.3	19	13.9
29	MTS2064	(Judee sib, MTS0819-98)//MTS1017/M	56.5	63.5	163.3	23.5	22.8	2.4	25	14.1
43	MTS2078	Judee//MTS1023/16FAWWON-Irr-87	56.5	62.2	167.5	23.6	23.3	1.3	26	13.3
47	MTS2082	Warhorse*2/Accipiter	56.1	61.3	167.2	24.6	23.8	1.6	22	14.8
3	Warhorse	check	55.5	61.7	166.9	26.2	23.1	1.6	18	14.2
37	MTS2072	MTS0832/Spur	55.4	62.0	168.6	25.6	23.7	1.1	28	13.8
1	Yellowstone	check	55.1	61.0	169.4	26.3	10.2	1.8	29	13.9
49	MTS2084	Warhorse*2/Accipiter	55.0	61.3	168.1	24.8	23.0	2.0	11	14.8
31	MTS2066	Warhorse*2/Loma	53.9	61.2	165.0	25.5	23.6	1.4	13	14.6
Average			59.6	61.9	168.0	24.9	22.9	1.5	24.2	13.9
LSD (0.05)			5.0	0.8	1.4	1.4	1.2	ns	19.3	0.6
C.V. (%)			6.8	1.0	0.4	4.4	4.4	59.4	36.3	2.5

i = in 2021 Intrastate and Sawfly tests, a = lines in 2021 Advanced and Sawfly tests (all other MT lines dropped from testing)

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 87. 2020 Sawfly Yield Test (Exp. 5801): Bozeman

Entry #	ID	Pedigree	Yield bu/ac	Test weight lb/bu	Heading date Julian	Plant height in	Stem solid (5-25) RCB	Protein %
			LAT	LAT	RCB	RCB	RCB	bulk
		w = white						
		Lattice efficiency over RCB (%)	127%	121%	100%	92%	104%	
33 a	MTS2068	(Judee sib, MTS0819)//08X350-A6/Wa	102.6	62.9	175.0	31.9	23.9	12.4
12 i	MTS1908	(Judee sib, MTS0819)//08X350-A6/Wa	101.3	62.5	175.5	32.9	24.6	12.7
23	MTS1971	Loma*2/MTS1574	94.6	61.7	174.0	30.3	18.3	12.2
46	MTS2081	Judee/MTS1014	93.8	64.1	171.0	30.9	24.4	13.3
36 a	MTS2071	Decade/(MTS0819, Judee sib)	92.9	62.7	174.0	31.5	21.5	13.7
20	MTS1943	MTS1584*2/Loma	92.4	63.1	172.5	32.5	24.0	12.3
5	Bobcat	check	92.1	63.3	173.5	29.7	24.8	12.8
19	MTS1922	08X350-A6/Warhorse	91.9	64.1	174.5	32.5	24.9	13.0
9 i	MTS18116	Loma*2/Warhorse	91.6	63.0	175.0	28.9	24.8	12.5
22	MTS1954	MTS1584*2/Loma	91.4	61.2	174.0	28.7	24.8	13.1
8 i	MTS1831	MTS0907/MTS0827	91.2	63.5	175.0	29.3	24.7	12.2
11 i	MTS1903	(Judee sib, MTS0819)//08X350-A6/Wa	90.9	61.9	175.5	31.3	24.4	13.2
41	MTS2076	MT10105/Warhorse//MTS1011	90.5	63.3	174.0	30.9	23.4	13.2
21	MTS1945	MTS1584*2/Loma	90.5	62.1	172.0	27.6	24.8	13.0
30	MTS2065	Warhorse//MTS1028/MTS1030	89.9	61.9	173.0	31.3	22.8	13.3
2	Judee	check	89.8	63.5	171.0	33.3	23.2	13.7
27	MTCS2062	Warhorse/MTCS1203	89.7	62.1	173.0	28.9	23.3	14.1
34 a	MTS2069	(Judee sib, MTS0819)/MV17-04//Judee	89.5	62.6	174.0	28.7	22.7	13.5
6	StandClear C	check	88.7	63.7	173.5	32.7	23.1	13.4
4	Loma	check	88.6	61.7	174.0	30.3	19.4	12.9
37	MTS2072	MTS0832/Spur	88.6	62.6	174.0	32.7	24.6	13.2
16	MTS1918	Judee//MTS0907/MTS0827	88.2	62.9	172.0	32.7	23.4	13.4
24	MTS1976	Loma*2/MTS1574	88.0	62.0	175.0	30.3	23.4	13.1
10 i	MTS18149	Loma*2/AAC Gateway	87.9	61.5	175.5	28.7	21.8	13.4
26	MTCS2061	Warhorse/MTCS1203	87.8	62.7	173.0	29.5	23.8	13.9
35 a	MTS2070	Decade/(MTS0819, Judee sib)	87.5	62.2	174.0	29.9	24.6	13.0
39 a	MTS2074	(Colter sib, MT08177)/MTS0916//MTS1	86.2	63.1	175.0	27.6	23.3	13.2
13	MTS1914	MTS1585//Loma/AAC Gateway	86.2	61.1	171.5	27.4	24.0	12.6
45	MTS2080	Decade/(MTS0819, Judee sib)	85.9	62.4	174.0	29.9	23.0	14.0
28	MTCS2063	MTCS1203//MTS1021/MTCL1003	85.9	61.6	172.5	29.9	24.0	13.5
7	MTS1810	08X350-A6/Warhorse	84.8	63.7	175.5	32.1	24.8	13.8
15	MTS1916	MTS1596//Emerson/Spur	84.7	62.1	174.0	29.9	24.4	13.6
18	MTS1920	Warhorse*2/Accipiter	84.7	61.8	175.5	30.9	24.9	14.0
29	MTS2064	(Judee sib, MTS0819-98)//MTS1017/N	83.0	64.4	167.5	28.1	24.2	13.9
44	MTS2079	(Judee sib, MTS0819)/MV17-04//Judee	82.7	62.6	173.5	28.7	21.8	13.6
25	MTS19102	MTS1412*2/Warhorse	82.7	62.1	169.5	30.9	22.0	14.5
40	MTS2075	MT10105/Warhorse//MTS1011	82.7	61.8	171.5	31.1	24.2	13.8
17	MTS1919	Warhorse*2/Accipiter	82.6	62.7	175.5	30.7	25.0	14.0
32	MTS2067	Warhorse/Loma//MTS1594	82.4	61.1	174.5	30.3	23.6	13.3
48	MTS2083	Warhorse*2/Accipiter	82.2	62.3	174.5	29.7	24.3	13.2
14 i	MTS1915	MTS1596//Emerson/Spur	81.6	61.9	175.0	29.7	24.7	13.6
38	MTS2073	MTS1054//Warhorse/MTS1008	80.7	63.4	168.0	30.3	25.0	14.1
42	MTS2077	Judee//16FAWWON-Irr-87/(MT0977, f	80.1	63.1	174.0	28.1	22.4	13.1
43	MTS2078	Judee//MTS1023/16FAWWON-Irr-87	80.0	62.9	172.5	28.3	24.1	12.7
49	MTS2084	Warhorse*2/Accipiter	77.5	61.0	174.0	31.5	24.3	14.8
47	MTS2082	Warhorse*2/Accipiter	77.4	61.6	173.0	31.1	24.4	14.5
31	MTS2066	Warhorse*2/Loma	75.4	61.3	170.0	31.5	24.3	14.5
3	Warhorse	check	74.9	61.0	172.0	31.5	24.2	14.1
1	Yellowstone	check	71.7	61.0	175.5	33.5	8.7	13.4
Average			86.7	62.4	173.4	30.4	23.4	13.4
LSD (0.05)			8.5	0.9	2.0	1.5	1.4	
C.V. (%)			4.5	0.6	0.6	4.0	3.0	
P-value (Varieties)			<.0001	<.0001	<.0001	<.0001	<.0001	

i = in 2021 Intrastate and Sawfly tests, a = lines in 2021 Advanced and Sawfly tests (all other MT lines dropped from testing)

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 88. 2020 Sawfly Yield Test (Exp. 5802): Havre

Table 66. 2020 Sawfly field test (Exp. 5562). - Native					July 2nd = 43% sawfly infested stems					
Entry #	ID	Pedigree	Yield bu/ac	Test weight lb/bu	Heading date Julian	Plant height in	Stem solid (5-25)	Stems infested (0-5)	Sawfly cutting %	Protein %
w = white			LAT	LAT	LAT	LAT	LAT	LAT	LAT	LAT
Lattice efficiency over RCB (%)			217%	164%	118%	107%	142%	141%	138%	199%
11 i	MTS1903	(Judee sib, MTS0819)//08X350-A6/Warhc	64.3	62.8	163.8	25.0	22.5	1.8	26	13.6
12 i	MTS1908	(Judee sib, MTS0819)//08X350-A6/Warhc	60.9	62.2	164.1	25.2	23.5	3.2	25	13.8
24	MTS1976	Loma*2/MTS1574	60.3	62.5	164.4	24.2	22.2	1.6	22	14.5
33 a	MTS2068	(Judee sib, MTS0819)//08X350-A6/Warhc	59.6	62.6	163.9	24.8	23.3	1.7	30	13.4
9 i	MTS18116	Loma*2/Warhorse	59.6	63.8	164.1	21.0	22.6	1.8	16	13.0
19	MTS1922	08X350-A6/Warhorse	59.3	63.5	163.2	25.5	23.7	0.8	18	14.3
41	MTS2076	MT10105/Warhorse//MTS1011	59.1	62.6	162.2	24.5	21.2	2.9	26	14.0
17	MTS1919	Warhorse*2/Accipiter	59.0	63.4	164.3	23.6	24.3	1.0	14	14.6
5	Bobcat	check	58.6	62.6	161.4	22.6	24.5	2.2	26	14.6
23	MTS1971	Loma*2/MTS1574	58.4	61.5	163.0	20.9	20.4	2.3	25	13.7
8 i	MTS1831	MTS0907/MTS0827	57.8	63.8	163.6	23.2	22.9	1.9	5	13.0
40	MTS2075	MT10105/Warhorse//MTS1011	57.4	62.8	161.4	24.0	23.5	1.7	19	14.5
30	MTS2065	Warhorse//MTS1028/MTS1030	57.1	61.6	162.5	28.0	19.4	2.7	59	13.9
34 a	MTS2069	(Judee sib, MTS0819)/MV17-04//Judee	57.0	62.6	163.7	24.1	21.4	2.8	22	14.1
7	MTS1810	08X350-A6/Warhorse	56.9	63.6	163.5	23.8	23.6	1.9	4	14.6
39 a	MTS2074	(Colter sib, MT08177)/MTS0916//MTS082	56.8	63.4	164.5	20.6	22.0	1.8	23	13.4
20	MTS1943	MTS1584*2/Loma	56.2	62.2	162.0	26.5	23.2	2.3	18	13.3
14 i	MTS1915	MTS1596//Emerson/Spur	56.1	62.9	164.0	23.1	23.2	0.7	12	13.9
21	MTS1945	MTS1584*2/Loma	56.0	62.1	163.3	24.5	23.9	2.2	21	14.4
48	MTS2083	Warhorse*2/Accipiter	55.9	63.1	162.1	22.7	22.3	1.8	18	14.1
26	MTCS2061	Warhorse/MTCS1203	55.7	61.8	162.8	21.6	21.3	2.9	33	14.9
38	MTS2073	MTS1054//Warhorse/MTS1008	54.7	63.3	159.3	25.8	24.8	0.0	24	14.3
32	MTS2067	Warhorse/Loma//MTS1594	54.3	62.0	163.3	24.5	23.7	3.9	39	13.8
44	MTS2079	(Judee sib, MTS0819)/MV17-04//Judee	54.3	62.5	162.0	23.9	18.7	3.5	19	14.3
1	Yellowstone	check	54.1	61.9	163.3	26.2	11.2	3.3	29	14.2
2	Judee	check	54.1	63.1	161.3	21.4	19.6	2.6	21	14.9
35 a	MTS2070	Decade/(MTS0819, Judee sib)	54.0	62.2	162.6	24.5	22.2	1.6	21	14.4
36 a	MTS2071	Decade/(MTS0819, Judee sib)	53.9	61.9	163.7	24.8	22.3	2.7	12	15.1
27	MTCS2062	Warhorse/MTCS1203	53.7	61.6	160.5	21.8	22.1	2.9	27	14.7
25	MTS19102	MTS1412*2/Warhorse	53.7	61.5	160.1	24.4	19.8	2.7	32	14.7
37	MTS2072	MTS0832/Spur	53.5	62.4	163.2	24.4	22.5	1.4	28	14.1
45	MTS2080	Decade/(MTS0819, Judee sib)	53.4	62.2	164.6	22.6	22.1	1.8	14	15.3
28	MTCS2063	MTCS1203//MTS1021/MTCL1003	52.8	60.9	161.9	25.1	22.7	0.8	25	14.6
15	MTS1916	MTS1596//Emerson/Spur	52.8	61.8	163.3	23.1	23.2	2.2	22	14.6
3	Warhorse	check	52.6	62.2	161.7	24.6	21.3	1.4	18	14.5
47	MTS2082	Warhorse*2/Accipiter	52.5	62.0	161.4	23.7	23.0	2.4	22	15.2
18	MTS1920	Warhorse*2/Accipiter	52.3	62.8	163.8	21.5	24.2	1.0	19	14.3
49	MTS2084	Warhorse*2/Accipiter	52.0	62.2	162.1	23.6	18.9	3.4	11	15.2
4	Loma	check	51.7	62.6	163.5	25.0	23.1	1.7	31	14.9
6	StandClear C	check	51.5	62.5	160.3	25.2	19.7	3.6	59	14.2
46	MTS2081	Judee/MTS1014	51.1	63.2	159.8	25.7	20.0	4.9	43	14.8
29	MTS2064	(Judee sib, MTS0819-98)//MTS1017/MTS	51.1	63.5	159.1	22.4	20.7	1.3	25	14.6
10 i	MTS18149	Loma*2/AAC Gateway	50.4	62.6	164.1	22.9	23.4	1.7	22	15.0
13	MTS1914	MTS1585//Loma/AAC Gateway	50.0	60.4	162.0	23.8	20.0	1.7	39	14.4
31	MTS2066	Warhorse*2/Loma	49.8	62.2	160.0	26.3	23.1	1.3	13	15.2
42	MTS2077	Judee//16FAWWON-Irr-87/(MT0977, Nort	49.6	62.7	164.0	23.5	21.8	2.6	30	14.9
16	MTS1918	Judee//MTS0907/MTS0827	49.2	62.1	161.3	23.6	21.4	2.6	20	14.6
22	MTS1954	MTS1584*2/Loma	49.1	62.1	162.4	22.7	23.2	3.2	33	13.9
43	MTS2078	Judee//MTS1023/16FAWWON-Irr-87	48.3	62.7	162.4	21.4	21.9	2.3	26	13.8
Average			54.7	62.5	162.5	23.8	21.9	2.2	24.2	14.3
LSD (0.05)			4.7	0.7	1.7	2.9	2.6	ns	19.3	0.5
C.V. (%)			4.0	1.3	0.8	7.2	5.3	45.4	36.3	1.5
P-value (Varieties)			<.0001	<.0001	<.0001	0.0014	<.0001	0.0769	0.0008	<.0001

i = in 2021 Intrastate and Sawfly tests, a = lines in 2021 Advanced and Sawfly tests (all other MT lines dropped from testing)

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 89. 2020 Sawfly Yield Test (Exp. 5852): Big Sandy

Entry #	ID	Pedigree	June 25th = 20% sawfly infested stems							
			Yield	Test	Stand	Plant	Stem	Stems	Stem	Protein
			bu/ac	weight	%	height	solid	infested	cutting	%
			lb/bu			in	(5-25)	(0-5)	%	
			LAT	LAT	LAT	RCB	LAT	RCB	RCB	LAT
		Lattice efficiency over RCB (%)	109%	133%	109%	98%	111%	102%	101%	115%
6	StandClear C	check	62.8	62.4	93.1	24.1	24.6	1.0	1	12.8
28	MTCS2063	MTCS1203//MTS1021/MTCL1003	60.4	60.6	92.8	22.7	24.7	0.0	1	13.6
46	MTS2081	Judee//MTS1014	60.4	61.2	99.9	23.6	24.0	0.5	1	13.7
5	Bobcat	check	60.3	60.4	95.6	22.1	24.2	1.0	0	13.8
13	MTS1914	MTS1585//Loma/AAC Gateway	60.2	58.9	95.2	21.3	23.8	0.5	0	13.4
35 a	MTS2070	Decade/(MTS0819, Judee sib)	59.6	60.3	94.7	21.7	23.9	1.0	3	13.9
48	MTS2083	Warhorse*2/Accipiter	58.4	60.6	97.4	20.9	24.7	0.0	1	14.0
25	MTS19102	MTS1412*2/Warhorse	58.3	60.7	97.2	24.1	22.9	1.5	1	13.4
38	MTS2073	MTS1054//Warhorse/MTS1008	58.2	60.6	96.5	24.0	24.7	0.5	0	14.2
24	MTS1976	Loma*2/MTS1574	57.7	60.8	91.8	20.0	23.8	0.5	0	13.8
12 i	MTS1908	(Judee sib, MTS0819)//08X350-A6/Warhorse	57.0	61.2	98.4	23.5	24.4	0.5	0	12.9
34 a	MTS2069	(Judee sib, MTS0819)/MV17-04//Judee	56.9	61.8	87.0	20.9	23.2	1.0	0	13.4
36 a	MTS2071	Decade/(MTS0819, Judee sib)	56.2	59.1	99.0	25.7	22.5	1.0	1	15.1
39 a	MTS2074	(Colter sib, MT08177)/MTS0916//MTS0826	55.9	61.8	95.1	23.6	23.9	0.0	1	14.1
14 i	MTS1915	MTS1596//Emerson/Spur	55.9	61.9	94.9	23.5	24.4	0.0	0	13.3
10 i	MTS18149	Loma*2/AAC Gateway	55.6	60.8	99.7	22.3	24.3	0.0	0	13.7
9 i	MTS18116	Loma*2/Warhorse	55.6	62.7	96.0	21.5	23.8	1.5	0	13.0
42	MTS2077	Judee//16FAWWON-Irr-87/(MT0977, Northern	55.1	62.0	96.7	20.9	24.0	1.5	1	13.7
33 a	MTS2068	(Judee sib, MTS0819)//08X350-A6/Warhorse	54.4	61.3	95.0	23.9	24.8	0.5	1	13.5
22	MTS1954	MTS1584*2/Loma	54.4	60.5	97.3	22.1	23.9	0.5	1	13.7
21	MTS1945	MTS1584*2/Loma	54.3	59.7	90.9	21.5	23.9	1.5	1	14.0
30	MTS2065	Warhorse//MTS1028/MTS1030	54.1	59.2	94.9	23.6	24.6	0.5	5	14.1
29	MTS2064	(Judee sib, MTS0819-98)//MTS1017/MTS1177	54.1	62.5	82.5	21.8	24.2	2.5	1	13.8
23	MTS1971	Loma*2/MTS1574	53.7	60.3	97.8	21.5	24.3	1.5	1	13.0
26	MTCS2061	Warhorse/MTCS1203	53.6	61.1	95.6	21.4	24.2	1.5	0	13.9
17	MTS1919	Warhorse*2/Accipiter	53.5	60.5	94.2	23.1	24.8	0.5	0	14.0
8 i	MTS1831	MTS0907/MTS0827	53.3	62.3	97.3	22.3	24.2	0.0	1	13.3
40	MTS2075	MT10105/Warhorse//MTS1011	53.1	60.7	92.8	23.8	24.4	0.5	3	14.1
4	Loma	check	52.9	60.5	98.5	21.0	22.9	3.5	3	13.8
18	MTS1920	Warhorse*2/Accipiter	52.7	61.0	96.3	22.5	24.5	0.0	1	14.1
43	MTS2078	Judee//MTS1023/16FAWWON-Irr-87	52.1	61.3	96.1	20.2	24.4	1.0	1	13.4
11 i	MTS1903	(Judee sib, MTS0819)//08X350-A6/Warhorse	52.1	60.4	95.9	23.9	24.4	1.0	1	13.7
47	MTS2082	Warhorse*2/Accipiter	51.9	60.3	95.8	20.6	24.6	1.0	0	14.7
2	Judee	check	51.8	61.9	94.9	22.1	22.6	2.5	1	14.5
49	MTS2084	Warhorse*2/Accipiter	51.6	59.9	96.7	21.3	24.8	0.5	0	14.4
15	MTS1916	MTS1596//Emerson/Spur	51.5	61.6	95.3	22.1	24.4	0.5	1	14.3
16	MTS1918	Judee//MTS0907/MTS0827	50.8	60.7	94.5	23.2	23.4	1.5	0	14.2
19	MTS1922	08X350-A6/Warhorse	50.5	61.9	96.6	22.6	24.4	0.5	0	14.0
44	MTS2079	(Judee sib, MTS0819)/MV17-04//Judee	50.4	60.8	95.9	21.3	23.1	2.5	1	13.8
20	MTS1943	MTS1584*2/Loma	50.1	60.5	92.1	23.1	24.8	1.0	0	13.3
27	MTCS2062	Warhorse/MTCS1203	49.9	59.7	94.9	21.7	24.5	0.5	1	14.2
45	MTS2080	Decade/(MTS0819, Judee sib)	49.6	60.3	99.6	20.3	23.3	3.0	1	15.1
1	Yellowstone	check	49.2	59.9	67.3	21.8	11.4	1.5	8	14.0
31	MTS2066	Warhorse*2/Loma	48.9	60.4	96.6	21.3	23.8	2.0	0	14.2
3	Warhorse	check	48.4	61.4	92.8	23.8	24.4	1.0	1	13.9
41	MTS2076	MT10105/Warhorse//MTS1011	47.7	61.2	95.9	22.0	23.8	2.0	0	14.1
32	MTS2067	Warhorse/Loma//MTS1594	46.8	60.1	95.9	20.7	24.8	0.0	1	13.5
37	MTS2072	MTS0832/Spur	46.5	61.2	97.0	23.8	23.9	1.0	1	14.2
7	MTS1810	08X350-A6/Warhorse	45.7	62.3	93.3	23.4	24.7	1.0	0	14.8
Average			53.8	60.9	94.7	22.3	23.8	1.0	0.7	13.9
LSD (0.05)			7.3	1.1	9.9	2.2	1.3	ns	2.0	0.5
C.V. (%)			6.4	0.8	4.9	4.8	2.6	91.8	140.7	1.6
P-value (Varieties)			0.0024	<.0001	0.0075	0.0005	<.0001	0.1036	<.0001	<.0001

i = in 2021 Intrastate and Sawfly tests, a = lines in 2021 Advanced and Sawfly tests (all other MT lines dropped from testing)

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 90. 2020 Sawfly Yield Test (Exp. 58FB): Fort Benton (Northern Seeds)

June 25th = 29% sawfly infested stems								
Entry #	ID	Pedigree	Yield bu/ac	Test weight lb/bu	Plant height in	Stem solid (5-25)	Stems infested (0-5)	Protein %
w = white			RCB	RCB	RCB	RCB	RCB	no
Sawfly infestation of clipped stems = 29%								data
14 i	MTS1915	MTS1596//Emerson/Spur	73.4	63.4	28.5	23.6	1.0	
11 i	MTS1903	(Judee sib, MTS0819)//08X350-A6/Warhorse	73.0	62.4	30.0	22.9	2.5	
15	MTS1916	MTS1596//Emerson/Spur	71.6	62.6	30.0	22.7	0.5	
9 i	MTS18116	Loma*2/Warhorse	71.5	63.0	30.0	23.2	2.0	
5	Bobcat	check	71.1	62.8	28.5	24.4	0.5	
39 a	MTS2074	(Colter sib, MT08177)/MTS0916//MTS0826	70.1	63.0	26.0	23.7	0.5	
35 a	MTS2070	Decade/(MTS0819, Judee sib)	69.3	61.2	29.5	22.4	3.0	
30	MTS2065	Warhorse//MTS1028/MTS1030	68.1	61.6	30.5	21.8	4.0	
40	MTS2075	MT10105/Warhorse//MTS1011	67.9	62.6	30.0	22.5	1.0	
4	Loma	check	67.3	61.9	27.5	20.7	0.5	
8 i	MTS1831	MTS0907/MTS0827	67.3	63.0	28.5	22.6	1.0	
13	MTS1914	MTS1585//Loma/AAC Gateway	66.0	60.8	27.0	22.6	3.5	
48	MTS2083	Warhorse*2/Accipiter	65.6	62.7	29.0	21.8	1.5	
7	MTS1810	08X350-A6/Warhorse	65.6	62.2	29.5	24.8	0.5	
20	MTS1943	MTS1584*2/Loma	65.5	61.7	29.5	22.5	1.5	
3	Warhorse	check	65.0	62.2	31.5	21.1	2.5	
33 a	MTS2068	(Judee sib, MTS0819)//08X350-A6/Warhorse	64.9	61.8	28.5	22.8	2.5	
16	MTS1918	Judee//MTS0907/MTS0827	64.9	61.7	30.5	20.6	0.5	
10 i	MTS18149	Loma*2/AAC Gateway	64.8	61.4	29.0	20.6	1.0	
18	MTS1920	Warhorse*2/Accipiter	64.6	62.2	29.5	23.0	2.0	
12 i	MTS1908	(Judee sib, MTS0819)//08X350-A6/Warhorse	64.6	62.0	30.0	23.0	2.0	
36 a	MTS2071	Decade/(MTS0819, Judee sib)	64.6	61.8	28.0	21.2	0.0	
46	MTS2081	Judee/MTS1014	64.1	63.3	31.0	22.7	0.5	
32	MTS2067	Warhorse/Loma//MTS1594	63.9	61.2	30.5	17.8	1.5	
24	MTS1976	Loma*2/MTS1574	63.6	61.3	28.5	24.1	1.5	
45	MTS2080	Decade/(MTS0819, Judee sib)	63.5	61.1	28.5	21.2	0.5	
17	MTS1919	Warhorse*2/Accipiter	63.4	62.6	28.5	23.0	2.5	
42	MTS2077	Judee//16FAWWON-Irr-87/(MT0977, Northern	63.3	62.0	28.5	21.4	1.0	
41	MTS2076	MT10105/Warhorse//MTS1011	62.9	60.9	29.5	22.7	2.0	
25	MTS19102	MTS1412*2/Warhorse	62.7	61.7	30.5	18.8	1.5	
38	MTS2073	MTS1054/Warhorse/MTS1008	62.5	62.3	30.0	24.3	1.0	
27	MTCS2062	Warhorse/MTCS1203	62.5	61.3	29.0	22.5	2.5	
43	MTS2078	Judee//MTS1023/16FAWWON-Irr-87	62.4	62.2	29.5	22.2	0.5	
23	MTS1971	Loma*2/MTS1574	62.2	61.1	30.0	20.9	0.5	
21	MTS1945	MTS1584*2/Loma	62.1	61.8	27.0	25.0	3.0	
19	MTS1922	08X350-A6/Warhorse	62.0	62.5	30.0	23.5	1.0	
6	StandClear C	check	61.3	62.1	30.0	20.3	1.0	
1	Yellowstone	check	60.4	61.1	31.0	8.4	0.5	
2	Judee	check	60.4	63.2	28.5	20.4	0.5	
47	MTS2082	Warhorse*2/Accipiter	60.2	61.7	28.5	22.7	1.5	
44	MTS2079	(Judee sib, MTS0819)/MV17-04//Judee	60.1	62.3	28.5	20.9	1.0	
34 a	MTS2069	(Judee sib, MTS0819)/MV17-04//Judee	59.6	62.1	28.0	21.6	1.5	
49	MTS2084	Warhorse*2/Accipiter	59.3	61.5	29.5	23.0	2.0	
31	MTS2066	Warhorse*2/Loma	59.2	61.3	30.0	22.4	1.0	
26	MTCS2061	Warhorse/MTCS1203	59.0	61.0	28.0	22.5	1.5	
29	MTS2064	(Judee sib, MTS0819-98)//MTS1017/MTS1177	58.8	64.4	27.5	21.7	3.5	
28	MTCS2063	MTCS1203//MTS1021/MTCL1003	58.5	60.7	30.0	23.4	0.5	
22	MTS1954	MTS1584*2/Loma	57.9	61.5	28.5	21.7	2.5	
37	MTS2072	MTS0832/Spur	57.2	62.2	28.5	23.8	1.0	
Average			64.1	62.0	29.2	22.0	1.5	
LSD (0.05)			8.1	0.7	2.5	1.8	1.7	
C.V. (%)			6.3	0.5	4.3	4.0	57.4	
P-value (Varieties)			0.0079	<.0001	0.0414	<.0001	0.0006	

i = in 2021 Intrastate and Sawfly tests, a = lines in 2021 Advanced and Sawfly tests (all other MT lines dropped from testing)

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 91. 2020 Sawfly Yield Test (Exp. 58HH): Hingham (Second Nature)

Entry #	ID	Pedigree	Yield bu/ac	Test weight lb/bu	Plant height in	Stem solid (5-25)	Grain moisture %	Protein %
	w = white		RCB	RCB	RCB	RCB	RCB	no
Sawfly infestation of clipped stems = 6%			data					
14 i	MTS1915	MTS1596//Emerson/Spur	50.2	63.5	20.5	24.4	9.7	
17	MTS1919	Warhorse*2//Accipiter	47.2	63.8	21.5	24.6	9.7	
10 i	MTS18149	Loma*2//AAC Gateway	46.2	62.9	18.5	23.6	10.8	
35 a	MTS2070	Decade/(MTS0819, Judee sib)	46.1	60.4	19.5	23.3	9.5	
33 a	MTS2068	(Judee sib, MTS0819)//08X350-A6/Warhorse	44.9	61.6	20.5	24.5	10.2	
5	Bobcat	check	44.3	61.2	20.5	23.8	8.8	
15	MTS1916	MTS1596//Emerson/Spur	44.0	63.1	17.5	24.1	9.6	
2	Judee	check	43.7	63.1	20.5	23.7	9.4	
8 i	MTS1831	MTS0907/MTS0827	43.7	63.5	18.0	24.9	9.7	
4	Loma	check	43.7	62.7	20.0	21.9	9.2	
32	MTS2067	Warhorse/Loma//MTS1594	43.6	60.4	20.0	24.0	11.6	
11 i	MTS1903	(Judee sib, MTS0819)//08X350-A6/Warhorse	42.9	61.3	20.5	23.4	9.5	
18	MTS1920	Warhorse*2//Accipiter	41.2	60.5	19.5	24.6	8.8	
25	MTS19102	MTS1412*2//Warhorse	40.4	61.4	20.5	22.9	8.6	
13	MTS1914	MTS1585//Loma/AAC Gateway	40.3	61.4	17.5	24.2	8.3	
1	Yellowstone	check	40.2	60.9	19.0	11.4	8.9	
34 a	MTS2069	(Judee sib, MTS0819)/MV17-04//Judee	40.1	62.1	19.5	23.2	8.9	
43	MTS2078	Judee//MTS1023/16FAWWON-Irr-87	39.6	61.9	18.5	23.8	8.8	
39 a	MTS2074	(Colter sib, MT08177)/MTS0916//MTS0826	39.6	63.6	16.5	22.8	9.5	
23	MTS1971	Loma*2//MTS1574	39.6	60.3	18.5	19.7	8.7	
24	MTS1976	Loma*2//MTS1574	39.0	60.5	19.0	23.5	8.7	
9 i	MTS18116	Loma*2//Warhorse	38.8	62.3	18.0	24.2	9.4	
45	MTS2080	Decade/(MTS0819, Judee sib)	38.7	61.9	20.0	24.4	8.6	
38	MTS2073	MTS1054//Warhorse/MTS1008	38.6	64.8	19.0	23.8	9.0	
47	MTS2082	Warhorse*2//Accipiter	38.6	61.0	19.0	24.1	8.4	
46	MTS2081	Judee/MTS1014	38.1	62.8	18.0	22.0	9.0	
22	MTS1954	MTS1584*2//Loma	37.7	60.9	19.0	23.7	8.7	
42	MTS2077	Judee//16FAWWON-Irr-87/(MT0977, Northern	37.6	61.2	18.5	21.8	9.9	
28	MTCS2063	MTCS1203//MTS1021/MTCL1003	37.5	59.6	19.5	23.5	7.8	
12 i	MTS1908	(Judee sib, MTS0819)//08X350-A6/Warhorse	37.5	60.6	19.0	23.5	8.9	
7	MTS1810	08X350-A6/Warhorse	37.0	61.8	19.5	24.5	9.4	
16	MTS1918	Judee//MTS0907/MTS0827	36.9	60.9	19.5	24.1	8.4	
31	MTS2066	Warhorse*2//Loma	36.4	61.0	18.5	24.5	8.7	
3	Warhorse	check	36.4	61.8	19.5	24.3	8.9	
6	StandClear C	check	36.3	62.4	20.0	22.6	9.2	
44	MTS2079	(Judee sib, MTS0819)/MV17-04//Judee	36.3	60.8	19.0	23.8	8.4	
20	MTS1943	MTS1584*2//Loma	36.0	63.9	18.0	24.2	9.8	
48	MTS2083	Warhorse*2//Accipiter	35.8	61.8	18.0	24.1	9.5	
29	MTS2064	(Judee sib, MTS0819-98)//MTS1017/MTS1177	35.7	62.5	17.5	23.2	10.2	
40	MTS2075	MT10105/Warhorse//MTS1011	35.7	62.2	21.0	23.5	8.9	
26	MTCS2061	Warhorse/MTCS1203	35.7	59.8	18.0	23.5	8.0	
36 a	MTS2071	Decade/(MTS0819, Judee sib)	34.8	60.7	18.0	24.8	8.5	
49	MTS2084	Warhorse*2//Accipiter	34.7	61.7	18.0	24.1	8.5	
27	MTCS2062	Warhorse/MTCS1203	33.6	60.5	18.5	23.6	8.4	
30	MTS2065	Warhorse//MTS1028/MTS1030	33.2	61.4	19.5	20.0	9.1	
41	MTS2076	MT10105/Warhorse//MTS1011	31.5	61.4	18.0	23.6	8.7	
37	MTS2072	MTS0832/Spur	31.2	61.8	18.5	23.6	9.0	
19	MTS1922	08X350-A6/Warhorse	31.2	61.6	18.0	24.5	9.1	
21	MTS1945	MTS1584*2//Loma	30.0	60.2	16.0	24.0	8.5	
Average			38.8	61.7	19.0	23.4	9.1	
LSD (0.05)			7.2	2.3	2.2	1.7	ns	
C.V. (%)			9.2	1.8	5.8	3.7	10.0	
P-value (Varieties)			<.0001	0.0042	0.0037	<.0001	0.2806	

i = in 2021 Intrastate and Sawfly tests, a = lines in 2021 Advanced and Sawfly tests (all other MT lines dropped from testing)

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 92. 2020 Sawfly Yield Test (Exp. 5804): Williston Single Rows

Entry #	ID	Pedigree	Winter Survival %
	w = white		RCB
		Lattice efficiency over RCB (%)	21-May
44	MTS2079	(Judee sib, MTS0819)/MV17-04/Judee	98
8 i	MTS1831	MTS0907/MTS0827	95
11 i	MTS1903	(Judee sib, MTS0819)//08X350-A6/Warhorse	95
25	MTS19102	MTS1412*2/Warhorse	95
39 a	MTS2074	(Colter sib, MT08177)/MTS0916/MTS0826	95
46	MTS2081	Judee/MTS1014	95
49	MTS2084	Warhorse*2/Accipiter	95
15	MTS1916	MTS1596//Emerson/Spur	93
17	MTS1919	Warhorse*2/Accipiter	93
27	MTCS2062	Warhorse/MTCS1203	93
40	MTS2075	MT10105/Warhorse//MTS1011	93
47	MTS2082	Warhorse*2/Accipiter	93
1	Yellowstone	check	90
9 i	MTS18116	Loma*2/Warhorse	90
29	MTS2064	(Judee sib, MTS0819-98)//MTS1017/MTS1177	90
34 a	MTS2069	(Judee sib, MTS0819)/MV17-04/Judee	90
10 i	MTS18149	Loma*2/AAC Gateway	88
14 i	MTS1915	MTS1596//Emerson/Spur	88
21	MTS1945	MTS1584*2/Loma	88
23	MTS1971	Loma*2/MTS1574	88
36 a	MTS2071	Decade/(MTS0819, Judee sib)	88
45	MTS2080	Decade/(MTS0819, Judee sib)	88
19	MTS1922	08X350-A6/Warhorse	85
20	MTS1943	MTS1584*2/Loma	85
24	MTS1976	Loma*2/MTS1574	85
38	MTS2073	MTS1054/Warhorse/MTS1008	85
4	Loma	check	83
7	MTS1810	08X350-A6/Warhorse	83
26	MTCS2061	Warhorse/MTCS1203	83
28	MTCS2063	MTCS1203//MTS1021/MTCL1003	83
41	MTS2076	MT10105/Warhorse//MTS1011	83
48	MTS2083	Warhorse*2/Accipiter	83
3	Warhorse	check	80
13	MTS1914	MTS1585/Loma/AAC Gateway	80
37	MTS2072	MTS0832/Spur	80
2	Judee	check	78
30	MTS2065	Warhorse//MTS1028/MTS1030	78
31	MTS2066	Warhorse*2/Loma	78
35 a	MTS2070	Decade/(MTS0819, Judee sib)	78
6	StandClear C	check	75
12 i	MTS1908	(Judee sib, MTS0819)//08X350-A6/Warhorse	75
43	MTS2078	Judee//MTS1023/16FAWWON-Irr-87	75
5	Bobcat	check	73
32	MTS2067	Warhorse/Loma//MTS1594	68
33 a	MTS2068	(Judee sib, MTS0819)//08X350-A6/Warhorse	68
22	MTS1954	MTS1584*2/Loma	63
18	MTS1920	Warhorse*2/Accipiter	60
42	MTS2077	Judee//16FAWWON-Irr-87/(MT0977, Northern sib)	50
16	MTS1918	Judee//MTS0907/MTS0827	30
Average			82.3
LSD (0.05)			ns
C.V. (%)			17
P-value (Varieties)			0.0516

i = in 2021 Intrastate and Sawfly tests, a = lines in 2021 Advanced and Sawfly tests (all other MT lines dropped from testing)

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 93. 2020 Sawfly Yield Test (Exp. 58): All Location Yield (bu/a)

Entry	ID	Pedigree	Bozeman LAT	Havre LAT	Big Sandy LAT	Ft Benton RCB	Hingham RCB	5 Loc Avg
	w = white							
		Lattice efficiency over RCB (%)	127%	217%	109%			
5	Bobcat	check	92.1	58.6	60.3	71.1	44.3	65.3
33 a	MTS2068	(Judee sib, MTS0819)//08X350-A6/Warhors	102.6	59.6	54.4	64.9	44.9	65.3
11 i	MTS1903	(Judee sib, MTS0819)//08X350-A6/Warhors	90.9	64.3	52.1	73.0	42.9	64.6
12 i	MTS1908	(Judee sib, MTS0819)//08X350-A6/Warhors	101.3	60.9	57.0	64.6	37.5	64.3
9 i	MTS18116	Loma*2/Warhorse	91.6	59.6	55.6	71.5	38.8	63.4
14 i	MTS1915	MTS1596//Emerson/Spur	81.6	56.1	55.9	73.4	50.2	63.4
35 a	MTS2070	Decade/(MTS0819, Judee sib)	87.5	54.0	59.6	69.3	46.1	63.3
8 i	MTS1831	MTS0907/MTS0827	91.2	57.8	53.3	67.3	43.7	62.7
23	MTS1971	Loma*2/MTS1574	94.6	58.4	53.7	62.2	39.6	61.7
24	MTS1976	Loma*2/MTS1574	88.0	60.3	57.7	63.6	39.0	61.7
39 a	MTS2074	(Colter sib, MT08177)/MTS0916/MTS0826	86.2	56.8	55.9	70.1	39.6	61.7
46	MTS2081	Judee/MTS1014	93.8	51.1	60.4	64.1	38.1	61.5
17	MTS1919	Warhorse*2/Accipiter	82.6	59.0	53.5	63.4	47.2	61.1
10 i	MTS18149	Loma*2/AAC Gateway	87.9	50.4	55.6	64.8	46.2	61.0
15	MTS1916	MTS1596//Emerson/Spur	84.7	52.8	51.5	71.6	44.0	60.9
4	Loma	check	88.6	51.7	52.9	67.3	43.7	60.8
34 a	MTS2069	(Judee sib, MTS0819)/MV17-04//Judee	89.5	57.0	56.9	59.6	40.1	60.6
13	MTS1914	MTS1585//Loma/AAC Gateway	86.2	50.0	60.2	66.0	40.3	60.5
30	MTS2065	Warhorse//MTS1028/MTS1030	89.9	57.1	54.1	68.1	33.2	60.5
36 a	MTS2071	Decade/(MTS0819, Judee sib)	92.9	53.9	56.2	64.6	34.8	60.5
6	StandClear C	check	88.7	51.5	62.8	61.3	36.3	60.1
2	Judee	check	89.8	54.1	51.8	60.4	43.7	60.0
20	MTS1943	MTS1584*2/Loma	92.4	56.2	50.1	65.5	36.0	60.0
25	MTS19102	MTS1412*2/Warhorse	82.7	53.7	58.3	62.7	40.4	59.6
48	MTS2083	Warhorse*2/Accipiter	82.2	55.9	58.4	65.6	35.8	59.6
40	MTS2075	MT10105/Warhorse//MTS1011	82.7	57.4	53.1	67.9	35.7	59.4
18	MTS1920	Warhorse*2/Accipiter	84.7	52.3	52.7	64.6	41.2	59.1
19	MTS1922	08X350-A6/Warhorse	91.9	59.3	50.5	62.0	31.2	59.0
28	MTCS2063	MTCS1203//MTS1021/MTCL1003	85.9	52.8	60.4	58.5	37.5	59.0
38	MTS2073	MTS1054//Warhorse/MTS1008	80.7	54.7	58.2	62.5	38.6	58.9
21	MTS1945	MTS1584*2/Loma	90.5	56.0	54.3	62.1	30.0	58.6
26	MTCS2061	Warhorse/MTCS1203	87.8	55.7	53.6	59.0	35.7	58.4
41	MTS2076	MT10105/Warhorse//MTS1011	90.5	59.1	47.7	62.9	31.5	58.3
32	MTS2067	Warhorse/Loma//MTS1594	82.4	54.3	46.8	63.9	43.6	58.2
45	MTS2080	Decade/(MTS0819, Judee sib)	85.9	53.4	49.6	63.5	38.7	58.2
22	MTS1954	MTS1584*2/Loma	91.4	49.1	54.4	57.9	37.7	58.1
7	MTS1810	08X350-A6/Warhorse	84.8	56.9	45.7	65.6	37.0	58.0
16	MTS1918	Judee//MTS0907/MTS0827	88.2	49.2	50.8	64.9	36.9	58.0
27	MTCS2062	Warhorse/MTCS1203	89.7	53.7	49.9	62.5	33.6	57.9
42	MTS2077	Judee//16FAWWON-Irr-87/(MT0977, North)	80.1	49.6	55.1	63.3	37.6	57.1
44	MTS2079	(Judee sib, MTS0819)/MV17-04//Judee	82.7	54.3	50.4	60.1	36.3	56.8
29	MTS2064	(Judee sib, MTS0819-98)//MTS1017/MTS1:	83.0	51.1	54.1	58.8	35.7	56.5
43	MTS2078	Judee//MTS1023/16FAWWON-Irr-87	80.0	48.3	52.1	62.4	39.6	56.5
47	MTS2082	Warhorse*2/Accipiter	77.4	52.5	51.9	60.2	38.6	56.1
3	Warhorse	check	74.9	52.6	48.4	65.0	36.4	55.5
37	MTS2072	MTS0832/Spur	88.6	53.5	46.5	57.2	31.2	55.4
1	Yellowstone	check	71.7	54.1	49.2	60.4	40.2	55.1
49	MTS2084	Warhorse*2/Accipiter	77.5	52.0	51.6	59.3	34.7	55.0
31	MTS2066	Warhorse*2/Loma	75.4	49.8	48.9	59.2	36.4	53.9
Average			86.7	54.7	53.8	64.1	38.8	59.6
LSD (0.05)			8.5	4.7	7.3	8.1	7.2	5.0
C.V. (%)			4.5	4.0	6.4	6.3	9.2	6.8
P-value (Varieties)			<.0001	<.0001	0.0024	0.0079	<.0001	<.0001

i = in 2021 Intrastate and Sawfly tests, a = lines in 2021 Advanced and Sawfly tests (all other MT lines dropped from testing)

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 94. 2020 Sawfly Yield Test (Exp. 58): All Location Test weight (lb/bu)

Entry	ID	Pedigree	Bozeman LAT	Havre LAT	Big Sandy LAT	Ft Benton RCB	Hingham RCB	5 Loc Avg
		Lattice efficiency over RCB (%)	121%	164%	133%			
29	MTS2064	(Judee sib, MTS0819-98)//MTS1017/MTS1:	64.4	63.5	62.5	64.4	62.5	63.5
8 i	MTS1831	MTS0907/MTS0827	63.5	63.8	62.3	63.0	63.5	63.2
2	Judee	check	63.5	63.1	61.9	63.2	63.1	63.0
9 i	MTS18116	Loma*2/Warhorse	63.0	63.8	62.7	63.0	62.3	63.0
39 a	MTS2074	(Colter sib, MT08177)//MTS0916//MTS0826	63.1	63.4	61.8	63.0	63.6	63.0
38	MTS2073	MTS1054//Warhorse/MTS1008	63.4	63.3	60.6	62.3	64.8	62.9
46	MTS2081	Judee/MTS1014	64.1	63.2	61.2	63.3	62.8	62.9
7	MTS1810	08X350-A6/Warhorse	63.7	63.6	62.3	62.2	61.8	62.7
14 i	MTS1915	MTS1596//Emerson/Spur	61.9	62.9	61.9	63.4	63.5	62.7
19	MTS1922	08X350-A6/Warhorse	64.1	63.5	61.9	62.5	61.6	62.7
6	StandClear C	check	63.7	62.5	62.4	62.1	62.4	62.6
17	MTS1919	Warhorse*2/Accipiter	62.7	63.4	60.5	62.6	63.8	62.6
20	MTS1943	MTS1584*2/Loma	63.1	62.2	60.5	61.7	63.9	62.3
15	MTS1916	MTS1596//Emerson/Spur	62.1	61.8	61.6	62.6	63.1	62.2
34 a	MTS2069	(Judee sib, MTS0819)/MV17-04//Judee	62.6	62.6	61.8	62.1	62.1	62.2
42	MTS2077	Judee//16FAWWON-Irr-87/(MT0977, North	63.1	62.7	62.0	62.0	61.2	62.2
43	MTS2078	Judee//MTS1023/16FAWWON-Irr-87	62.9	62.7	61.3	62.2	61.9	62.2
5	Bobcat	check	63.3	62.6	60.4	62.8	61.2	62.1
48	MTS2083	Warhorse*2/Accipiter	62.3	63.1	60.6	62.7	61.8	62.1
33 a	MTS2068	(Judee sib, MTS0819)//08X350-A6/Warhors	62.9	62.6	61.3	61.8	61.6	62.0
37	MTS2072	MTS0832/Spur	62.6	62.4	61.2	62.2	61.8	62.0
40	MTS2075	MT10105/Warhorse//MTS1011	61.8	62.8	60.7	62.6	62.2	62.0
4	Loma	check	61.7	62.6	60.5	61.9	62.7	61.9
41	MTS2076	MT10105/Warhorse//MTS1011	63.3	62.6	61.2	60.9	61.4	61.9
10 i	MTS18149	Loma*2/AAC Gateway	61.5	62.6	60.8	61.4	62.9	61.8
11 i	MTS1903	(Judee sib, MTS0819)//08X350-A6/Warhors	61.9	62.8	60.4	62.4	61.3	61.8
44	MTS2079	(Judee sib, MTS0819)/MV17-04//Judee	62.6	62.5	60.8	62.3	60.8	61.8
3	Warhorse	check	61.0	62.2	61.4	62.2	61.8	61.7
12 i	MTS1908	(Judee sib, MTS0819)//08X350-A6/Warhors	62.5	62.2	61.2	62.0	60.6	61.7
16	MTS1918	Judee//MTS0907/MTS0827	62.9	62.1	60.7	61.7	60.9	61.7
18	MTS1920	Warhorse*2/Accipiter	61.8	62.8	61.0	62.2	60.5	61.7
45	MTS2080	Decade/(MTS0819, Judee sib)	62.4	62.2	60.3	61.1	61.9	61.6
25	MTS19102	MTS1412*2/Warhorse	62.1	61.5	60.7	61.7	61.4	61.5
24	MTS1976	Loma*2/MTS1574	62.0	62.5	60.8	61.3	60.5	61.4
26	MTCS2061	Warhorse/MTCS1203	62.7	61.8	61.1	61.0	59.8	61.3
35 a	MTS2070	Decade/(MTS0819, Judee sib)	62.2	62.2	60.3	61.2	60.4	61.3
47	MTS2082	Warhorse*2/Accipiter	61.6	62.0	60.3	61.7	61.0	61.3
49	MTS2084	Warhorse*2/Accipiter	61.0	62.2	59.9	61.5	61.7	61.3
21	MTS1945	MTS1584*2/Loma	62.1	62.1	59.7	61.8	60.2	61.2
22	MTS1954	MTS1584*2/Loma	61.2	62.1	60.5	61.5	60.9	61.2
31	MTS2066	Warhorse*2/Loma	61.3	62.2	60.4	61.3	61.0	61.2
36 a	MTS2071	Decade/(MTS0819, Judee sib)	62.7	61.9	59.1	61.8	60.7	61.2
30	MTS2065	Warhorse//MTS1028/MTS1030	61.9	61.6	59.2	61.6	61.4	61.1
1	Yellowstone	check	61.0	61.9	59.9	61.1	60.9	61.0
23	MTS1971	Loma*2/MTS1574	61.7	61.5	60.3	61.1	60.3	61.0
27	MTCS2062	Warhorse/MTCS1203	62.1	61.6	59.7	61.3	60.5	61.0
32	MTS2067	Warhorse/Loma//MTS1594	61.1	62.0	60.1	61.2	60.4	61.0
28	MTCS2063	MTCS1203//MTS1021/MTCL1003	61.6	60.9	60.6	60.7	59.6	60.7
13	MTS1914	MTS1585//Loma/AAC Gateway	61.1	60.4	58.9	60.8	61.4	60.5
Average			62.4	62.5	60.9	62.0	61.7	61.9
LSD (0.05)			0.9	0.7	1.1	0.7	2.3	0.8
C.V. (%)			0.6	1.3	0.8	0.5	1.8	1.0
P-value (Varieties)			<.0001	<.0001	<.0001	<.0001	0.0042	<.0001

i = in 2021 Intrastate and Sawfly tests, a = lines in 2021 Advanced and Sawfly tests (all other MT lines dropped from testing)

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p=0.05)

Table 95. 2020 Sawfly Yield Test (Exp. 58): All Location Heading date (days from Jan 1)

Entry	ID	Pedigree	Bozeman RCB	Havre LAT	2 Loc Avg
		Lattice efficiency over RCB (%)	100%	118%	
29	MTS2064	(Judee sib, MTS0819-98)//MTS1017/MTS1011	167.5	159.1	163.3
38	MTS2073	MTS1054//Warhorse/MTS1008	168.0	159.3	163.7
25	MTS19102	MTS1412*2/Warhorse	169.5	160.1	164.8
31	MTS2066	Warhorse*2/Loma	170.0	160.0	165.0
46	MTS2081	Judee/MTS1014	171.0	159.8	165.4
2	Judee	check	171.0	161.3	166.2
40	MTS2075	MT10105/Warhorse//MTS1011	171.5	161.4	166.5
16	MTS1918	Judee//MTS0907/MTS0827	172.0	161.3	166.7
13	MTS1914	MTS1585//Loma/AAC Gateway	171.5	162.0	166.8
27	MTCS2062	Warhorse/MTCS1203	173.0	160.5	166.8
3	Warhorse	check	172.0	161.7	166.9
6	StandClear C	check	173.5	160.3	166.9
28	MTCS2063	MTCS1203//MTS1021/MTCL1003	172.5	161.9	167.2
47	MTS2082	Warhorse*2/Accipiter	173.0	161.4	167.2
20	MTS1943	MTS1584*2/Loma	172.5	162.0	167.3
5	Bobcat	check	173.5	161.4	167.5
43	MTS2078	Judee//MTS1023/16FAWWON-Irr-87	172.5	162.4	167.5
21	MTS1945	MTS1584*2/Loma	172.0	163.3	167.7
30	MTS2065	Warhorse//MTS1028/MTS1030	173.0	162.5	167.8
44	MTS2079	(Judee sib, MTS0819)/MV17-04//Judee	173.5	162.0	167.8
26	MTCS2061	Warhorse/MTCS1203	173.0	162.8	167.9
41	MTS2076	MT10105/Warhorse//MTS1011	174.0	162.2	168.1
49	MTS2084	Warhorse*2/Accipiter	174.0	162.1	168.1
22	MTS1954	MTS1584*2/Loma	174.0	162.4	168.2
35 a	MTS2070	Decade/(MTS0819, Judee sib)	174.0	162.6	168.3
48	MTS2083	Warhorse*2/Accipiter	174.5	162.1	168.3
23	MTS1971	Loma*2/MTS1574	174.0	163.0	168.5
37	MTS2072	MTS0832/Spur	174.0	163.2	168.6
15	MTS1916	MTS1596//Emerson/Spur	174.0	163.3	168.7
4	Loma	check	174.0	163.5	168.8
19	MTS1922	08X350-A6/Warhorse	174.5	163.2	168.9
32	MTS2067	Warhorse/Loma//MTS1594	174.5	163.3	168.9
34 a	MTS2069	(Judee sib, MTS0819)/MV17-04//Judee	174.0	163.7	168.9
36 a	MTS2071	Decade/(MTS0819, Judee sib)	174.0	163.7	168.9
42	MTS2077	Judee//16FAWWON-Irr-87/(MT0977, North)	174.0	164.0	169.0
8 i	MTS1831	MTS0907/MTS0827	175.0	163.6	169.3
45	MTS2080	Decade/(MTS0819, Judee sib)	174.0	164.6	169.3
1	Yellowstone	check	175.5	163.3	169.4
7	MTS1810	08X350-A6/Warhorse	175.5	163.5	169.5
14 i	MTS1915	MTS1596//Emerson/Spur	175.0	164.0	169.5
33 a	MTS2068	(Judee sib, MTS0819)//08X350-A6/Warhorse	175.0	163.9	169.5
9 i	MTS18116	Loma*2/Warhorse	175.0	164.1	169.6
11 i	MTS1903	(Judee sib, MTS0819)//08X350-A6/Warhorse	175.5	163.8	169.7
18	MTS1920	Warhorse*2/Accipiter	175.5	163.8	169.7
24	MTS1976	Loma*2/MTS1574	175.0	164.4	169.7
10 i	MTS18149	Loma*2/AAC Gateway	175.5	164.1	169.8
12 i	MTS1908	(Judee sib, MTS0819)//08X350-A6/Warhorse	175.5	164.1	169.8
39 a	MTS2074	(Colter sib, MT08177)/MTS0916/MTS0826	175.0	164.5	169.8
17	MTS1919	Warhorse*2/Accipiter	175.5	164.3	169.9
Average			173.4	162.5	168.0
LSD (0.05)			2.0	1.7	1.4
C.V. (%)			0.6	0.8	0.4
P-value (Varieties)			<.0001	<.0001	<.0001

i = in 2021 Intrastate and Sawfly tests, a = lines in 2021 Advanced and Sawfly tests (all other MT lines dropped from testing)

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD ($p = 0.05$)

Table 96. 2020 Sawfly Yield Test (Exp. 58): All Location Plant height (in)

Entry	ID	Pedigree	Bozeman RCB	Havre LAT	Big Sandy RCB	Ft Benton RCB	Hingham RCB	5 Loc Avg
	w = white							
		Lattice efficiency over RCB (%)	92%	107%	98%			
39 a	MTS2074	(Colter sib, MT08177)/MTS0916//MTS0826	27.6	20.6	23.6	26.0	16.5	22.9
21	MTS1945	MTS1584*2/Loma	27.6	24.5	21.5	27.0	16.0	23.3
13	MTS1914	MTS1585//Loma/AAC Gateway	27.4	23.8	21.3	27.0	17.5	23.4
29	MTS2064	(Judee sib, MTS0819-98)//MTS1017/MTS1	28.1	22.4	21.8	27.5	17.5	23.5
43	MTS2078	Judee//MTS1023/16FAWWON-Irr-87	28.3	21.4	20.2	29.5	18.5	23.6
26	MTCS2061	Warhorse/MTCS1203	29.5	21.6	21.4	28.0	18.0	23.7
9 i	MTS18116	Loma*2/Warhorse	28.9	21.0	21.5	30.0	18.0	23.9
42	MTS2077	Judee//16FAWWON-Irr-87/(MT0977, North	28.1	23.5	20.9	28.5	18.5	23.9
27	MTCS2062	Warhorse/MTCS1203	28.9	21.8	21.7	29.0	18.5	24.0
48	MTS2083	Warhorse*2/Accipiter	29.7	22.7	20.9	29.0	18.0	24.1
22	MTS1954	MTS1584*2/Loma	28.7	22.7	22.1	28.5	19.0	24.2
23	MTS1971	Loma*2/MTS1574	30.3	20.9	21.5	30.0	18.5	24.2
34 a	MTS2069	(Judee sib, MTS0819)/MV17-04/Judee	28.7	24.1	20.9	28.0	19.5	24.2
8 i	MTS1831	MTS0907/MTS0827	29.3	23.2	22.3	28.5	18.0	24.3
10 i	MTS18149	Loma*2/AAC Gateway	28.7	22.9	22.3	29.0	18.5	24.3
44	MTS2079	(Judee sib, MTS0819)/MV17-04/Judee	28.7	23.9	21.3	28.5	19.0	24.3
45	MTS2080	Decade/(MTS0819, Judee sib)	29.9	22.6	20.3	28.5	20.0	24.3
24	MTS1976	Loma*2/MTS1574	30.3	24.2	20.0	28.5	19.0	24.4
15	MTS1916	MTS1596//Emerson/Spur	29.9	23.1	22.1	30.0	17.5	24.5
47	MTS2082	Warhorse*2/Accipiter	31.1	23.7	20.6	28.5	19.0	24.6
5	Bobcat	check	29.7	22.6	22.1	28.5	20.5	24.7
4	Loma	check	30.3	25.0	21.0	27.5	20.0	24.8
18	MTS1920	Warhorse*2/Accipiter	30.9	21.5	22.5	29.5	19.5	24.8
49	MTS2084	Warhorse*2/Accipiter	31.5	23.6	21.3	29.5	18.0	24.8
35 a	MTS2070	Decade/(MTS0819, Judee sib)	29.9	24.5	21.7	29.5	19.5	25.0
41	MTS2076	MT10105/Warhorse//MTS1011	30.9	24.5	22.0	29.5	18.0	25.0
14 i	MTS1915	MTS1596//Emerson/Spur	29.7	23.1	23.5	28.5	20.5	25.1
2	Judee	check	33.3	21.4	22.1	28.5	20.5	25.2
32	MTS2067	Warhorse/Loma//MTS1594	30.3	24.5	20.7	30.5	20.0	25.2
28	MTCS2063	MTCS1203//MTS1021/MTCL1003	29.9	25.1	22.7	30.0	19.5	25.4
17	MTS1919	Warhorse*2/Accipiter	30.7	23.6	23.1	28.5	21.5	25.5
31	MTS2066	Warhorse*2/Loma	31.5	26.3	21.3	30.0	18.5	25.5
36 a	MTS2071	Decade/(MTS0819, Judee sib)	31.5	24.8	25.7	28.0	18.0	25.6
37	MTS2072	MTS0832/Spur	32.7	24.4	23.8	28.5	18.5	25.6
7	MTS1810	08X350-A6/Warhorse	32.1	23.8	23.4	29.5	19.5	25.7
19	MTS1922	08X350-A6/Warhorse	32.5	25.5	22.6	30.0	18.0	25.7
38	MTS2073	MTS1054//Warhorse/MTS1008	30.3	25.8	24.0	30.0	19.0	25.8
46	MTS2081	Judee/MTS1014	30.9	25.7	23.6	31.0	18.0	25.8
16	MTS1918	Judee//MTS0907/MTS0827	32.7	23.6	23.2	30.5	19.5	25.9
20	MTS1943	MTS1584*2/Loma	32.5	26.5	23.1	29.5	18.0	25.9
33 a	MTS2068	(Judee sib, MTS0819)//08X350-A6/Warhors	31.9	24.8	23.9	28.5	20.5	25.9
40	MTS2075	MT10105/Warhorse//MTS1011	31.1	24.0	23.8	30.0	21.0	26.0
11 i	MTS1903	(Judee sib, MTS0819)//08X350-A6/Warhors	31.3	25.0	23.9	30.0	20.5	26.1
12 i	MTS1908	(Judee sib, MTS0819)//08X350-A6/Warhors	32.9	25.2	23.5	30.0	19.0	26.1
25	MTS19102	MTS1412*2/Warhorse	30.9	24.4	24.1	30.5	20.5	26.1
3	Warhorse	check	31.5	24.6	23.8	31.5	19.5	26.2
1	Yellowstone	check	33.5	26.2	21.8	31.0	19.0	26.3
6	StandClear C	check	32.7	25.2	24.1	30.0	20.0	26.4
30	MTS2065	Warhorse//MTS1028/MTS1030	31.3	28.0	23.6	30.5	19.5	26.6
Average			30.4	23.8	22.3	29.2	19.0	24.9
LSD (0.05)			1.5	2.9	2.2	2.5	2.2	1.4
C.V. (%)			4.0	7.2	4.8	4.3	5.8	4.4
P-value (Varieties)			<.0001	0.0014	0.0005	0.0414	0.0037	<.0001

i = in 2021 Intrastate and Sawfly tests, a = lines in 2021 Advanced and Sawfly tests (all other MT lines dropped from testing)

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p=0.05)

Table 97. 2020 Sawfly Yield Test (Exp. 58): All Location Stem solidness (5 - 25)

Entry	ID	Pedigree	Bozeman RCB	Havre LAT	Big Sandy LAT	Ft Benton RCB	Hingham RCB	5 Loc Avg
		Sawfly infestation of clipped stems	0%	43%	20%	29%	6%	
38	MTS2073	MTS1054/Warhorse/MTS1008	25.0	24.8	24.7	24.3	23.8	24.5
7	MTS1810	08X350-A6/Warhorse	24.8	23.6	24.7	24.8	24.5	24.5
5	Bobcat	check	24.8	24.5	24.2	24.4	23.8	24.3
17	MTS1919	Warhorse*2/Accipiter	25.0	24.3	24.8	23.0	24.6	24.3
21	MTS1945	MTS1584*2/Loma	24.8	23.9	23.9	25.0	24.0	24.3
18	MTS1920	Warhorse*2/Accipiter	24.9	24.2	24.5	23.0	24.6	24.2
19	MTS1922	08X350-A6/Warhorse	24.9	23.7	24.4	23.5	24.5	24.2
14 i	MTS1915	MTS1596//Emerson/Spur	24.7	23.2	24.4	23.6	24.4	24.1
8 i	MTS1831	MTS0907/MTS0827	24.7	22.9	24.2	22.6	24.9	23.9
33 a	MTS2068	(Judee sib, MTS0819)//08X350-A6/Warhors	23.9	23.3	24.8	22.8	24.5	23.9
12 i	MTS1908	(Judee sib, MTS0819)//08X350-A6/Warhors	24.6	23.5	24.4	23.0	23.5	23.8
15	MTS1916	MTS1596//Emerson/Spur	24.4	23.2	24.4	22.7	24.1	23.8
47	MTS2082	Warhorse*2/Accipiter	24.4	23.0	24.6	22.7	24.1	23.8
9 i	MTS18116	Loma*2/Warhorse	24.8	22.6	23.8	23.2	24.2	23.7
20	MTS1943	MTS1584*2/Loma	24.0	23.2	24.8	22.5	24.2	23.7
28	MTCS2063	MTCS1203//MTS1021/MTCL1003	24.0	22.7	24.7	23.4	23.5	23.7
37	MTS2072	MTS0832/Spur	24.6	22.5	23.9	23.8	23.6	23.7
31	MTS2066	Warhorse*2/Loma	24.3	23.1	23.8	22.4	24.5	23.6
40	MTS2075	MT10105/Warhorse//MTS1011	24.2	23.5	24.4	22.5	23.5	23.6
11 i	MTS1903	(Judee sib, MTS0819)//08X350-A6/Warhors	24.4	22.5	24.4	22.9	23.4	23.5
22	MTS1954	MTS1584*2/Loma	24.8	23.2	23.9	21.7	23.7	23.5
24	MTS1976	Loma*2/MTS1574	23.4	22.2	23.8	24.1	23.5	23.4
48	MTS2083	Warhorse*2/Accipiter	24.3	22.3	24.7	21.8	24.1	23.4
35 a	MTS2070	Decade/(MTS0819, Judee sib)	24.6	22.2	23.9	22.4	23.3	23.3
43	MTS2078	Judee//MTS1023/16FAWWON-Irr-87	24.1	21.9	24.4	22.2	23.8	23.3
27	MTCS2062	Warhorse/MTCS1203	23.3	22.1	24.5	22.5	23.6	23.2
3	Warhorse	check	24.2	21.3	24.4	21.1	24.3	23.1
26	MTCS2061	Warhorse/MTCS1203	23.8	21.3	24.2	22.5	23.5	23.1
39 a	MTS2074	(Colter sib, MT08177)/MTS0916//MTS0826	23.3	22.0	23.9	23.7	22.8	23.1
49	MTS2084	Warhorse*2/Accipiter	24.3	18.9	24.8	23.0	24.1	23.0
13	MTS1914	MTS1585//Loma/AAC Gateway	24.0	20.0	23.8	22.6	24.2	22.9
41	MTS2076	MT10105/Warhorse//MTS1011	23.4	21.2	23.8	22.7	23.6	22.9
29	MTS2064	(Judee sib, MTS0819-98)//MTS1017/MTS1011	24.2	20.7	24.2	21.7	23.2	22.8
32	MTS2067	Warhorse/Loma//MTS1594	23.6	23.7	24.8	17.8	24.0	22.8
45	MTS2080	Decade/(MTS0819, Judee sib)	23.0	22.1	23.3	21.2	24.4	22.8
10 i	MTS18149	Loma*2/AAC Gateway	21.8	23.4	24.3	20.6	23.6	22.7
16	MTS1918	Judee//MTS0907/MTS0827	23.4	21.4	23.4	20.6	24.1	22.6
46	MTS2081	Judee/MTS1014	24.4	20.0	24.0	22.7	22.0	22.6
36 a	MTS2071	Decade/(MTS0819, Judee sib)	21.5	22.3	22.5	21.2	24.8	22.5
34 a	MTS2069	(Judee sib, MTS0819)/MV17-04//Judee	22.7	21.4	23.2	21.6	23.2	22.4
42	MTS2077	Judee//16FAWWON-Irr-87/(MT0977, North)	22.4	21.8	24.0	21.4	21.8	22.3
6	StandClear C	check	23.1	19.7	24.6	20.3	22.6	22.1
2	Judee	check	23.2	19.6	22.6	20.4	23.7	21.9
30	MTS2065	Warhorse//MTS1028/MTS1030	22.8	19.4	24.6	21.8	20.0	21.7
44	MTS2079	(Judee sib, MTS0819)/MV17-04//Judee	21.8	18.7	23.1	20.9	23.8	21.7
4	Loma	check	19.4	23.1	22.9	20.7	21.9	21.6
25	MTS19102	MTS1412*2/Warhorse	22.0	19.8	22.9	18.8	22.9	21.3
23	MTS1971	Loma*2/MTS1574	18.3	20.4	24.3	20.9	19.7	20.7
1	Yellowstone	check	8.7	11.2	11.4	8.4	11.4	10.2
Average			23.4	21.9	23.8	22.0	23.4	22.9
LSD (0.05)			1.4	2.6	1.3	1.8	1.7	1.2
C.V. (%)			3.0	5.3	2.6	4.0	3.7	4.4
P-value (Varieties)			<.0001	<.0001	<.0001	<.0001	<.0001	<.0001

i = in 2021 Intrastate and Sawfly tests, a = lines in 2021 Advanced and Sawfly tests (all other MT lines dropped from testing)

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 98. 2020 Sawfly Yield Test (Exp. 58): All Location Sawfly - Infested stems

		Number of stems with tunneling/rep = 0-5				3 loc Avg	Stem solid
Entry	ID	Pedigree	Havre LAT	Big Sandy RCB	Ft Benton RCB		
	w = white						
		Sawfly infestation of clipped stems	43%	20%	29%		5 llocs
28	MTCS2063	MTCS1203//MTS1021/MTCL1003	0.8	0.0	0.5	0.4	23.7
38	MTS2073	MTS1054//Warhorse/MTS1008	0.0	0.5	1.0	0.5	24.5
14 i	MTS1915	MTS1596//Emerson/Spur	0.7	0.0	1.0	0.6	24.1
19	MTS1922	08X350-A6/Warhorse	0.8	0.5	1.0	0.8	24.2
39 a	MTS2074	(Colter sib, MT08177)/MTS0916//MTS0826	1.8	0.0	0.5	0.8	23.1
10 i	MTS18149	Loma*2/AAC Gateway	1.7	0.0	1.0	0.9	22.7
8 i	MTS1831	MTS0907/MTS0827	1.9	0.0	1.0	1.0	23.9
18	MTS1920	Warhorse*2/Accipiter	1.0	0.0	2.0	1.0	24.2
7	MTS1810	08X350-A6/Warhorse	1.9	1.0	0.5	1.1	24.5
15	MTS1916	MTS1596//Emerson/Spur	2.2	0.5	0.5	1.1	23.8
37	MTS2072	MTS0832/Spur	1.4	1.0	1.0	1.1	23.7
40	MTS2075	MT10105/Warhorse//MTS1011	1.7	0.5	1.0	1.1	23.6
48	MTS2083	Warhorse*2/Accipiter	1.8	0.0	1.5	1.1	23.4
5	Bobcat	check	2.2	1.0	0.5	1.2	24.3
24	MTS1976	Loma*2/MTS1574	1.6	0.5	1.5	1.2	23.4
36 a	MTS2071	Decade/(MTS0819, Judee sib)	2.7	1.0	0.0	1.2	22.5
17	MTS1919	Warhorse*2/Accipiter	1.0	0.5	2.5	1.3	24.3
43	MTS2078	Judee//MTS1023/16FAWWON-Irr-87	2.3	1.0	0.5	1.3	23.3
23	MTS1971	Loma*2/MTS1574	2.3	1.5	0.5	1.4	20.7
31	MTS2066	Warhorse*2/Loma	1.3	2.0	1.0	1.4	23.6
16	MTS1918	Judee//MTS0907/MTS0827	2.6	1.5	0.5	1.5	22.6
3	Warhorse	check	1.4	1.0	2.5	1.6	23.1
20	MTS1943	MTS1584*2/Loma	2.3	1.0	1.5	1.6	23.7
33 a	MTS2068	(Judee sib, MTS0819)//08X350-A6/Warhorse	1.7	0.5	2.5	1.6	23.9
47	MTS2082	Warhorse*2/Accipiter	2.4	1.0	1.5	1.6	23.8
42	MTS2077	Judee//16FAWWON-Irr-87/(MT0977, North)	2.6	1.5	1.0	1.7	22.3
1	Yellowstone	check	3.3	1.5	0.5	1.8	10.2
9 i	MTS18116	Loma*2/Warhorse	1.8	1.5	2.0	1.8	23.7
11 i	MTS1903	(Judee sib, MTS0819)//08X350-A6/Warhorse	1.8	1.0	2.5	1.8	23.5
32	MTS2067	Warhorse/Loma//MTS1594	3.9	0.0	1.5	1.8	22.8
34 a	MTS2069	(Judee sib, MTS0819)/MV17-04/Judee	2.8	1.0	1.5	1.8	22.4
45	MTS2080	Decade/(MTS0819, Judee sib)	1.8	3.0	0.5	1.8	22.8
2	Judee	check	2.6	2.5	0.5	1.9	21.9
4	Loma	check	1.7	3.5	0.5	1.9	21.6
6	StandClear C	check	3.6	1.0	1.0	1.9	22.1
12 i	MTS1908	(Judee sib, MTS0819)//08X350-A6/Warhorse	3.2	0.5	2.0	1.9	23.8
13	MTS1914	MTS1585//Loma/AAC Gateway	1.7	0.5	3.5	1.9	22.9
25	MTS19102	MTS1412*2/Warhorse	2.7	1.5	1.5	1.9	21.3
35 a	MTS2070	Decade/(MTS0819, Judee sib)	1.6	1.0	3.0	1.9	23.3
26	MTCS2061	Warhorse/MTCS1203	2.9	1.5	1.5	2.0	23.1
27	MTCS2062	Warhorse/MTCS1203	2.9	0.5	2.5	2.0	23.2
46	MTS2081	Judee/MTS1014	4.9	0.5	0.5	2.0	22.6
49	MTS2084	Warhorse*2/Accipiter	3.4	0.5	2.0	2.0	23.0
22	MTS1954	MTS1584*2/Loma	3.2	0.5	2.5	2.1	23.5
21	MTS1945	MTS1584*2/Loma	2.2	1.5	3.0	2.2	24.3
41	MTS2076	MT10105/Warhorse//MTS1011	2.9	2.0	2.0	2.3	22.9
44	MTS2079	(Judee sib, MTS0819)/MV17-04/Judee	3.5	2.5	1.0	2.3	21.7
29	MTS2064	(Judee sib, MTS0819-98)//MTS1017/MTS1011	1.3	2.5	3.5	2.4	22.8
30	MTS2065	Warhorse//MTS1028/MTS1030	2.7	0.5	4.0	2.4	21.7
Average			2.2	1.0	1.5	1.5	22.9
LSD (0.05)			ns	ns	1.7	ns	1.2
C.V. (%)			45.4	91.8	57.4	59.4	4.4
P-value (Varieties)			0.0769	0.1036	0.0006	0.6240	<.0001

i = in 2021 Intrastate and Sawfly tests, a = lines in 2021 Advanced and Sawfly tests (all other MT lines dropped from testing)

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 99. 2020 Sawfly Yield Test (Exp. 58): All Location Protein (%)

Entry	ID	Pedigree	Bozeman bulk	Havre LAT	Big Sandy LAT	Ft Benton no	3 Loc Avg
		Lattice efficiency over RCB (%)		199%	115%	data	
45	MTS2080	Decade/(MTS0819, Judee sib)	14.0	15.3	15.1		14.8
47	MTS2082	Warhorse*2/Accipiter	14.5	15.2	14.7		14.8
49	MTS2084	Warhorse*2/Accipiter	14.8	15.2	14.4		14.8
31	MTS2066	Warhorse*2/Loma	14.5	15.2	14.2		14.6
36 a	MTS2071	Decade/(MTS0819, Judee sib)	13.7	15.1	15.1		14.6
2	Judee	check	13.7	14.9	14.5		14.4
7	MTS1810	08X350-A6/Warhorse	13.8	14.6	14.8		14.4
27	MTCS2062	Warhorse/MTCS1203	14.1	14.7	14.2		14.3
3	Warhorse	check	14.1	14.5	13.9		14.2
15	MTS1916	MTS1596//Emerson/Spur	13.6	14.6	14.3		14.2
17	MTS1919	Warhorse*2/Accipiter	14.0	14.6	14.0		14.2
25	MTS19102	MTS1412*2/Warhorse	14.5	14.7	13.4		14.2
26	MTCS2061	Warhorse/MTCS1203	13.9	14.9	13.9		14.2
38	MTS2073	MTS1054/Warhorse/MTS1008	14.1	14.3	14.2		14.2
16	MTS1918	Judee//MTS0907/MTS0827	13.4	14.6	14.2		14.1
18	MTS1920	Warhorse*2/Accipiter	14.0	14.3	14.1		14.1
29	MTS2064	(Judee sib, MTS0819-98)//MTS1017/MTS1011	13.9	14.6	13.8		14.1
40	MTS2075	MT10105/Warhorse//MTS1011	13.8	14.5	14.1		14.1
10 i	MTS18149	Loma*2/AAC Gateway	13.4	15.0	13.7		14.0
1	Yellowstone	check	13.4	14.2	14.0		13.9
4	Loma	check	12.9	14.9	13.8		13.9
28	MTCS2063	MTCS1203//MTS1021/MTCL1003	13.5	14.6	13.6		13.9
42	MTS2077	Judee//16FAWWON-Irr-87/(MT0977, North)	13.1	14.9	13.7		13.9
44	MTS2079	(Judee sib, MTS0819)/MV17-04//Judee	13.6	14.3	13.8		13.9
46	MTS2081	Judee/MTS1014	13.3	14.8	13.7		13.9
19	MTS1922	08X350-A6/Warhorse	13.0	14.3	14.0		13.8
21	MTS1945	MTS1584*2/Loma	13.0	14.4	14.0		13.8
24	MTS1976	Loma*2/MTS1574	13.1	14.5	13.8		13.8
30	MTS2065	Warhorse//MTS1028/MTS1030	13.3	13.9	14.1		13.8
35 a	MTS2070	Decade/(MTS0819, Judee sib)	13.0	14.4	13.9		13.8
37	MTS2072	MTS0832/Spur	13.2	14.1	14.2		13.8
41	MTS2076	MT10105/Warhorse//MTS1011	13.2	14.0	14.1		13.8
48	MTS2083	Warhorse*2/Accipiter	13.2	14.1	14.0		13.8
5	Bobcat	check	12.8	14.6	13.8		13.7
34 a	MTS2069	(Judee sib, MTS0819)/MV17-04//Judee	13.5	14.1	13.4		13.7
14 i	MTS1915	MTS1596//Emerson/Spur	13.6	13.9	13.3		13.6
22	MTS1954	MTS1584*2/Loma	13.1	13.9	13.7		13.6
39 a	MTS2074	(Colter sib, MT08177)/MTS0916//MTS0826	13.2	13.4	14.1		13.6
6	StandClear C	check	13.4	14.2	12.8		13.5
11 i	MTS1903	(Judee sib, MTS0819)//08X350-A6/Warhorse	13.2	13.6	13.7		13.5
13	MTS1914	MTS1585//Loma/AAC Gateway	12.6	14.4	13.4		13.5
32	MTS2067	Warhorse/Loma//MTS1594	13.3	13.8	13.5		13.5
43	MTS2078	Judee//MTS1023/16FAWWON-Irr-87	12.7	13.8	13.4		13.3
12 i	MTS1908	(Judee sib, MTS0819)//08X350-A6/Warhorse	12.7	13.8	12.9		13.1
33 a	MTS2068	(Judee sib, MTS0819)//08X350-A6/Warhorse	12.4	13.4	13.5		13.1
20	MTS1943	MTS1584*2/Loma	12.3	13.3	13.3		13.0
23	MTS1971	Loma*2/MTS1574	12.2	13.7	13.0		13.0
8 i	MTS1831	MTS0907/MTS0827	12.2	13.0	13.3		12.8
9 i	MTS18116	Loma*2/Warhorse	12.5	13.0	13.0		12.8
Average			13.4	14.3	13.9		13.9
LSD (0.05)				0.5	0.5		0.6
C.V. (%)				1.5	1.6		2.5
P-value (Varieties)				<.0001	<.0001		<.0001

i = in 2021 Intrastate and Sawfly tests, a = lines in 2021 Advanced and Sawfly tests (all other MT lines dropped from testing)

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 100. 2020 Sawfly Winter Wheat Test (Exp. 58): Plant Disease Assessment

Cultivar/Line		Stripe Rust					
		Pullman, WA		MT. Vernon, WA			
		Flowering IT ^{1/} %		Stem elong. IT ^{1/} %		Milk IT ^{1/} %	
1 i	Yellowstone	5	30	2	10	2	10
2 i	Judee	5	20	3	15	3	20
3 i	Warhorse	5	15	2	10	3	15
4 i	Loma	5	15	2	10	2	10
5 i	Bobcat	5	20	2	10	2	5
6 i	StandClear CLP	5	35	2	10	2	10
7	MTS1810	5	10	2	10	2	5
8 i	MTS1831	5	5	2	10	2	5
9 i	MTS18116	5	10	2	5	2	5
10 i	MTS18149	5	5	2	10	2	5
11 i	MTS1903	5	5	2	10	2	5
12 i	MTS1908	2	5	2	10	2	5
13	MTS1914	5	15	3	15	2	5
14 i	MTS1915	5	5	2	10	2	5
15	MTS1916	5	5	2	10	2	5
16	MTS1918	5	5	2	10	2	10
17	MTS1919	5	5	2	10	2	5
18	MTS1920	5	10	2	10	2	5
19	MTS1922	5	5	2	10	2	5
20	MTS1943	5	50	2	15	2	10
21	MTS1945	8	50	2	15	3	20
22	MTS1954	5	5	2	10	2	5
23	MTS1971	5	10	2	15	2	10
24	MTS1976	5	30	2	15	2	10
25	MTS19102	5	5	2	20	2	10
26	MTCS2061	5	15	2	10	2	10
27	MTCS2062	5	5	2	10	2	10
28	MTCS2063	5	5	2	10	2	15
29	MTS2064	5	20	2	20	2	10
30	MTS2065	8	40	2	15	2	10
31	MTS2066	5	5	2	15	2	5
32	MTS2067	5	20	2	10	2	10
33 a	MTS2068	2	2	2	15	2	5
34 a	MTS2069	5	20	2	10	2	5
35 a	MTS2070	5	5	2	5	2	5
36 a	MTS2071	5	5	2	5	2	5
37	MTS2072	5	10	3	20	3	15
38	MTS2073	5	10	3	20	3	15
39 a	MTS2074	5	5	2	5	2	5
40	MTS2075	3	2	2	10	2	10
41	MTS2076	5	5	2	15	2	5
42	MTS2077	5	5	2	5	2	10
43	MTS2078	5	5	2	10	2	5
44	MTS2079	5	15	2	10	2	10
45	MTS2080	5	5	2	5	2	5
46	MTS2081	5	15	2	15	3	15
47	MTS2082	5	5	2	5	2	5
48	MTS2083	5	5	2	15	2	5
49	MTS2084	5	5	2	10	2	5
Average		12		11		8	

i = in 2021 Intrastate and Sawfly tests, a = lines in 2021 Advanced and Sawfly tests (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 IT 0-3 are considered resistant, 4-6 intermediate, and 7-9 susceptible. Heterogenous reactions of an entry were indicated by two separated by "," for most plants with the first IT and few plants with the second IT or connected with "-" for entries containing pla continuous ITs.

Table 101. 2020 Preliminary A Test: All location Summary

Entry #	ID	Pedigree	Yield bu/ac	Test weight lb/bu	Heading date Julian	Plant height in	Protein %
w = white							
		locations	5	3	3	5	3
11 a	MTCL2007	MTCL1125/MT1091	81.6	62.2	168.4	29.6	11.7
42 a	MT2038	MT1088*2/SY Wolf	80.0	61.4	169.6	29.5	11.1
13 a	MTCL2009	MTCL1125/MT1091	79.3	61.9	168.5	28.4	11.3
47 a	MT2043	MT1105/MT1156	77.0	61.8	170.8	27.2	11.5
52	MT2048	Northern//02X22cE38/MT10121	77.0	63.4	169.8	26.3	11.2
34 w1	MTW2030	Northern//03X378cE8/MT0990	76.9	62.0	167.7	27.7	11.3
18 a	MTCL2014	MT0871/(06X445B1-2, SY Clearstone si	76.8	62.3	170.6	26.7	11.4
12 a	MTCL2008	MTCL1125/MT1091	76.0	62.5	167.2	28.5	11.8
60 a	MT2056	(Northern sib, MT0977)//MT0859/MT093	76.0	62.9	171.2	27.5	11.0
35 a w1	MTW2031	Northern//03X378cE8/MT0990	75.7	61.9	169.2	26.6	11.4
14 a	MTCL2010	MT0871/(06X445B1-2, SY Clearstone si	75.7	63.0	164.5	25.9	11.9
49	MT2045	MT0871/NI10712	75.6	62.1	169.2	26.4	11.4
23 a	MT2019	MT10114/MT10128//MTW1251	75.4	62.1	168.8	26.9	11.0
51	MT2047	Yellowstone//(493-22, Reeder/6*Paul)/3/	74.7	62.5	170.2	26.0	11.9
28 a	MT2024	Northern//(10K1676w, Yellowstone white	73.7	61.7	171.0	26.6	11.0
5 a SM1	MT2001	Yellowstone*4//Cap19/Vida/3/MT08185	72.8	61.9	167.9	28.8	11.4
43	MT2039	Colter/MT1105	72.3	62.8	168.7	27.8	11.4
19	MTCL2015	MT0871/(06X445B1-2, SY Clearstone si	72.1	63.4	165.5	26.0	12.0
46	MT2042	MT1090/MT1276	72.0	61.7	168.5	29.4	11.7
17	MTCL2013	MT0871/(06X445B1-2, SY Clearstone si	71.7	62.5	166.5	26.3	11.7
37	MT2033	MT1285//03X378cE8/MT10102	71.3	61.8	167.4	28.6	11.3
41	MT2037	Northern//MT1088/SY Wolf	71.3	62.9	168.4	30.0	11.9
20	MT2016	MT1137/MT1078//MT1149	71.3	62.7	166.3	27.2	10.9
16	MTCL2012	MT0871/(06X445B1-2, SY Clearstone si	71.3	62.9	165.3	25.5	11.9
53	MT2049	Colter//03X273cEx/MT10105	71.0	63.2	168.3	26.8	11.6
45	MT2041	MT1088/MT1156	70.7	62.2	170.0	27.0	12.1
4	SY Monument	check	70.7	62.1	163.7	27.4	11.1
2	Decade	check	70.6	62.5	165.4	29.8	11.9
38	MT2034	MT1285//03X378cE8/MT10102	70.5	62.2	167.6	27.4	11.3
57	MT2053	HV9W04-1594R/Accipiter	70.2	63.6	167.7	26.4	11.8
26	MT2022	Overland//(457-12, winter McNeal)/MT10	69.7	62.0	164.6	28.2	11.4
25	MT2021	MT10113/(474-23, winter McNeal)/MT10	69.5	61.8	166.8	27.5	12.2
48	MT2044	MT1285/OK08539	69.2	63.4	167.5	27.2	11.6
1	Yellowstone	check	68.9	61.3	170.1	29.1	11.2
29	MT2025	YLL//Cap19/Vida	68.9	62.9	165.9	26.1	11.8
15	MTCL2011	MT0871/(06X445B1-2, SY Clearstone si	68.8	62.8	166.2	27.2	11.6
32	MT2028	MT10113/MT0871/MT1151	68.8	62.4	163.4	26.3	12.0
36	MT2032	MT1285//03X378cE8/MT10102	68.6	60.4	167.8	28.2	11.5
31	MT2027	YLL//Cap19/Vida	68.6	62.7	166.0	25.9	11.6
24	MT2020	Northern//MT1143/06X424B6	68.2	62.9	164.9	26.0	12.3
8	MT2004	MT1088*2/Decade	67.8	62.6	167.5	28.1	12.4
27 w2	MTW2023	WB3768*2/(10K1726w, Yellowstone whi	67.7	61.3	170.3	26.3	11.3
54	MT2050	MT10121//Yellowstone/SD08W015	67.7	62.5	164.3	27.1	11.6
56	MT2052	Judith/OK06332//MT0990	67.4	63.6	162.9	25.9	11.8
10	MTCL2006	MT1137/MTCL1067	67.4	62.2	166.3	27.2	11.9
33	MT2029	MT1240//MT1088/02X172E31-4	67.1	62.1	167.0	26.6	12.6
40 w1	MTW2036	MT1235//KS09HW140/MT10122	66.7	63.6	170.5	27.0	11.2
6	MT2002	MT0871//MT1088/Decade	66.7	61.3	166.5	26.6	12.2
30	MT2026	YLL//Cap19/Vida	66.4	63.1	165.2	26.1	11.7
9	MTCL2005	MTCL1260//MTCL1125/MT1091	66.3	61.7	164.4	30.8	12.3
22	MT2018	MT1149//MT10102/MT10116	66.1	62.5	171.4	27.6	11.3
59	MT2055	MT10104//MTW0785/Yellowstone-Lr41	66.1	62.2	162.9	25.0	12.7

Table 101. 2020 Preliminary A Test: All location Summary

Entry #	ID	Pedigree	Yield bu/ac	Test weight lb/bu	Heading date Julian	Plant height in	Protein %
	w = white						
		locations	5	3	3	5	3
61	MT2057	Robidoux//MT08185/MT0861	65.8	63.3	169.6	27.0	12.2
3	Warhorse	check	65.7	62.1	167.5	28.3	12.0
63	MT2059	MT08185//YLL*2/PI640431/3/PROM/3*\	65.6	61.8	164.6	27.2	11.7
62	MT2058	MT10116//MT0861/MTW0785	65.6	63.5	168.6	25.7	12.1
7	MT2003	MT1088*2/Decade	65.5	62.4	167.4	28.9	12.4
55	MT2051	Overland//MTW1098/KS08HW88	65.3	62.9	164.3	26.5	12.4
21	MT2017	MT10113//MT1145/MT10102	65.3	63.0	163.1	26.2	<u>13.1</u>
58	MT2054	MT10104//MTW0785/Yellowstone-Lr41	64.8	62.6	167.9	26.6	12.6
44	MT2040	MT1088/MT1156	64.5	62.3	166.2	28.2	12.0
39	MT2035	MT1235//KS09HW140/MT10122	64.1	<u>64.0</u>	165.8	27.6	12.1
64	MT2060	MT08185//YLL*2/PI640431/3/PROM/3*\	63.3	61.9	163.4	27.4	11.7
50	MT2046	MT1240/Redfield	59.3	61.5	165.0	27.7	12.5
Average			70.1	62.4	167.2	27.3	11.8
LSD (0.05)			7.2	1.3	2.3	1.3	0.9
C.V. (%)			8.3	1.5	0.9	3.8	5.0

a = lines in 2021 Advanced Test (all other MT lines dropped from testing)

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 102. 2020 Preliminary A Test (Exp. 3601): Bozeman

Entry #	ID	Pedigree	Yield bu/ac	Test weight lb/bu	Stand %	Heading date	Plant height in	Protein %
	w = white		LAT	LAT	5-May LAT	Julian LAT	LAT	Bulk
		lattice efficiency relative to RCB	288%	367%	113%	132%		
60 a	MT2056	(Northern sib, MT0977)//MT0859/MT093	125.4	65.0	100	175.6	33.2	12.1
42 a	MT2038	MT1088*2/SY Wolf	122.1	61.5	100	173.9	32.3	12.1
13 a	MTCL2009	MTCL1125/MT1091	118.1	62.6	98	172.5	32.8	12.6
49	MT2045	MT0871/NI10712	114.5	62.4	98	173.1	30.2	12.8
38	MT2034	MT1285//03X378cE8/MT10102	114.3	63.3	99	171.9	31.8	12.5
11 a	MTCL2007	MTCL1125/MT1091	113.6	63.1	99	171.6	33.0	12.5
35 a w1	MTW2031	Northern//03X378cE8/MT0990	113.5	63.1	99	171.7	29.7	12.8
53	MT2049	Colter//03X273cEx/MT10105	113.1	64.3	99	173.4	31.3	13.1
45	MT2041	MT1088/MT1156	112.6	62.7	99	173.9	31.9	13.7
22	MT2018	MT1149//MT10102/MT10116	112.0	64.0	100	176.3	32.6	12.4
36	MT2032	MT1285//03X378cE8/MT10102	111.9	63.1	96	171.9	32.5	12.8
28 a	MT2024	Northern//(10K1676w, Yellowstone white	111.3	63.0	94	174.9	30.7	12.4
20	MT2016	MT1137/MT1078//MT1149	109.8	64.2	100	170.4	30.8	12.4
37	MT2033	MT1285//03X378cE8/MT10102	109.5	63.2	91	172.8	33.2	12.4
12 a	MTCL2008	MTCL1125/MT1091	108.7	62.8	97	171.7	33.2	13.8
18 a	MTCL2014	MT0871/(06X445B1-2, SY Clearstone si	108.6	63.2	100	174.3	29.9	12.2
5 a SM1	MT2001	Yellowstone*4//Cap19/Vida/3/MT08185	108.2	62.7	95	172.8	32.3	12.4
26	MT2022	Overland//(457-12, winter McNeal)/MT1(	108.2	63.1	100	167.7	32.4	13.4
25	MT2021	MT10113//(474-23, winter McNeal)/MT1(	107.6	62.4	99	169.4	32.0	13.6
52	MT2048	Northern//02X22cE38/MT10121	107.2	63.7	100	172.4	30.4	12.2
2	Decade	check	106.7	63.5	100	170.3	34.8	13.5
47 a	MT2043	MT1105//MT1156	106.3	62.2	92	174.8	30.8	12.7
51	MT2047	Yellowstone//(493-22, Reeder/6*Paul)/3(	105.5	62.7	100	173.6	30.6	13.7
46	MT2042	MT1090/MT1276	105.2	62.7	97	173.1	32.3	13.1
24	MT2020	Northern//MT1143/06X424B6	105.0	63.4	91	171.6	29.1	13.4
44	MT2040	MT1088/MT1156	105.0	63.6	99	172.7	33.0	14.1
10	MTCL2006	MT1137/MTCL1067	104.6	63.0	100	171.4	32.5	13.3
31	MT2027	YLL//Cap19/Vida	104.6	64.5	99	170.1	30.2	13.2
34	w1 MTW2030	Northern//03X378cE8/MT0990	104.4	61.9	94	173.6	32.4	12.6
43	MT2039	Colter/MT1105	104.0	63.7	97	173.1	31.4	12.6
29	MT2025	YLL//Cap19/Vida	102.3	63.2	95	171.1	29.6	13.7
23 a	MT2019	MT10114/MT10128//MTW1251	101.9	62.7	97	173.5	29.3	12.4
1	Yellowstone	check	101.6	62.2	83	174.7	33.3	12.7
40	w1 MTW2036	MT1235//KS09HW140/MT10122	101.0	64.2	96	174.4	31.3	12.5
48	MT2044	MT1285/OK08539	100.6	65.0	98	171.6	30.5	12.6
32	MT2028	MT10113//MT0871/MT1151	100.2	63.7	97	166.7	31.4	13.9
4	SY Monument	check	100.0	62.8	100	167.1	30.8	12.7
8	MT2004	MT1088*2/Decade	99.8	63.9	93	173.6	31.3	13.6
61	MT2057	Robidoux//MT08185/MT0861	99.7	64.1	96	174.2	31.5	13.3
30	MT2026	YLL//Cap19/Vida	99.7	64.2	93	169.0	30.1	13.5
39	MT2035	MT1235//KS09HW140/MT10122	99.4	64.5	95	171.5	31.7	14.1
9	MTCL2005	MTCL1260//MTCL1125/MT1091	98.8	62.1	95	170.3	32.7	14.5
21	MT2017	MT10113//MT1145/MT10102	98.6	64.0	96	166.2	30.4	15.4
17	MTCL2013	MT0871/(06X445B1-2, SY Clearstone si	97.9	63.1	94	171.0	29.7	12.7
57	MT2053	HV9W04-1594R/Accipiter	97.8	64.0	99	170.7	29.3	13.4
59	MT2055	MT10104//MTW0785/Yellowstone-Lr41	97.5	63.5	97	167.2	29.1	14.3
14 a	MTCL2010	MT0871/(06X445B1-2, SY Clearstone si	96.9	63.6	96	169.6	27.7	12.8
41	MT2037	Northern//MT1088/SY Wolf	96.5	63.5	94	172.7	33.5	13.5
15	MTCL2011	MT0871/(06X445B1-2, SY Clearstone si	96.0	63.2	96	171.6	29.8	13.0
62	MT2058	MT10116//MT0861/MTW0785	95.8	63.7	92	173.8	29.2	13.9
33	MT2029	MT1240//MT1088/02X172E31-4	95.3	62.7	95	173.1	30.5	14.8

Table 102. 2020 Preliminary A Test (Exp. 3601): Bozeman

Entry #	ID	Pedigree	Yield bu/ac	Test weight lb/bu	Stand % 5-May	Heading date Julian	Plant height in	Protein %
	w = white		LAT	LAT	LAT	LAT	LAT	Bulk
		lattice efficiency relative to RCB	288%	367%	113%	132%		
56	MT2052	Judith/OK06332//MT0990	95.2	64.8	99	166.3	29.8	13.4
58	MT2054	MT10104//MTW0785/Yellowstone-Lr41	94.7	64.0	93	173.3	29.6	14.1
6	MT2002	MT0871//MT1088/Decade	94.6	63.2	92	171.4	29.4	13.5
63	MT2059	MT08185/YLL*2/PI640431/3/PROM/3*\	94.4	63.0	93	167.7	30.4	12.8
54	MT2050	MT10121//Yellowstone/SD08W015	94.4	63.3	98	168.3	31.9	13.2
7	MT2003	MT1088*2/Decade	93.7	64.0	88	171.2	32.2	13.9
55	MT2051	Overland//MTW1098/KS08HW88	93.5	63.7	88	170.3	29.7	14.0
27	w2 MTW2023	WB3768*2/(10K1726w, Yellowstone whi	93.4	62.6	90	174.8	29.2	12.8
16	MTCL2012	MT0871/(06X445B1-2, SY Clearstone si	93.2	63.5	92	170.4	28.7	12.6
19	MTCL2015	MT0871/(06X445B1-2, SY Clearstone si	93.0	63.8	92	171.9	28.2	12.9
3	Warhorse	check	90.7	62.5	99	172.1	31.9	13.9
50	MT2046	MT1240/Redfield	84.3	62.7	96	167.1	32.2	15.1
64	MT2060	MT08185/YLL*2/PI640431/3/PROM/3*\	83.9	62.5	88	166.6	29.7	13.3
Average			102.8	63.3	96.0	171.6	31.1	13.2
LSD (0.05)			12.0	0.8	ns	2.3	1.6	
C.V. (%)			5.3	0.6	5.0	0.6	2.4	
P-value (Varieties)			<.0001	<.0001	0.3821	<.0001	<.0001	

a = lines in 2021 Advanced Test (all other MT lines dropped from testing)

bold = indicates highest value within a column

Table 103. 2020 Preliminary A Test (Exp. 3607): Moccasin

Entry #	ID	Pedigree	Yield bu/ac	Test weight lb/bu	Heading date Julian	Plant height in	Grain moisture %	Protein %
w = white			RCB	RCB	RCB	RCB	RCB	RCB
lattice efficiency relative to RCB								
46	MT2042	MT1090/MT1276	76.2	63.4	170.5	30.5	9.9	12.0
51	MT2047	Yellowstone/(493-22, Reeder/6*Paul)/3/	73.9	63.8	173.0	25.5	10.1	11.8
57	MT2053	HV9W04-1594R/Accipiter	73.3	64.2	173.0	26.0	10.3	11.7
43	MT2039	Colter/MT1105	73.2	64.2	170.5	27.5	10.1	11.1
34	w1 MTW2030	Northern//03X378cE8/MT0990	72.8	63.9	168.0	25.5	10.0	11.4
23 a	MT2019	MT10114/MT10128//MTW1251	72.4	63.3	173.0	24.5	10.3	11.0
63	MT2059	MT08185//YLL*2/PI640431/3/PROM/3*Y	72.3	63.1	166.5	26.5	10.1	11.4
11 a	MTCL2007	MTCL1125/MT1091	71.6	63.0	173.0	26.5	10.3	11.2
41	MT2037	Northern//MT1088/SY Wolf	71.1	63.4	173.0	27.5	10.1	11.9
64	MT2060	MT08185//YLL*2/PI640431/3/PROM/3*Y	70.8	63.0	166.0	28.5	10.0	11.8
47 a	MT2043	MT1105//MT1156	70.2	63.1	173.0	26.0	10.8	11.0
13 a	MTCL2009	MTCL1125/MT1091	69.8	62.3	173.0	26.0	10.1	10.9
26	MT2022	Overland/(457-12, winter McNeal)/MT10	69.8	63.3	166.5	28.0	10.0	11.0
35 a w1	MTW2031	Northern//03X378cE8/MT0990	69.6	63.2	173.0	25.5	9.9	10.8
20	MT2016	MT1137/MT1078//MT1149	69.1	64.8	170.5	25.5	10.7	10.2
5 a SM1	MT2001	Yellowstone*4//Cap19/Vida/3/MT08185	68.3	63.4	168.0	27.5	10.5	11.3
48	MT2044	MT1285/OK08539	67.4	64.9	170.5	25.5	10.2	11.3
31	MT2027	YLL//Cap19/Vida	67.1	64.9	167.5	23.5	10.1	11.5
52	MT2048	Northern//02X22cE38/MT10121	67.0	64.4	173.0	24.5	10.6	10.6
17	MTCL2013	MT0871/(06X445B1-2, SY Clearstone si	66.3	63.4	168.0	25.5	10.4	11.5
18 a	MTCL2014	MT0871/(06X445B1-2, SY Clearstone si	66.0	63.2	174.5	24.5	11.2	10.8
14 a	MTCL2010	MT0871/(06X445B1-2, SY Clearstone si	65.7	63.8	165.0	24.5	10.1	12.4
27 w2	MTW2023	WB3768*2/(10K1726w, Yellowstone whi	65.5	63.4	173.0	24.5	10.3	10.7
42 a	MT2038	MT1088*2/SY Wolf	65.3	62.0	173.0	26.5	10.3	11.1
55	MT2051	Overland//MTW1098/KS08HW88	64.9	63.9	165.0	26.0	10.1	12.5
4	SY Monument	check	64.5	63.3	166.0	26.0	10.2	10.8
28 a	MT2024	Northern/(10K1676w, Yellowstone white	64.3	63.4	173.5	25.0	10.3	10.5
29	MT2025	YLL//Cap19/Vida	64.3	64.5	166.5	25.5	10.1	11.1
49	MT2045	MT0871/NI10712	64.3	63.1	170.5	25.5	10.3	11.2
59	MT2055	MT10104//MTW0785/Yellowstone-Lr41	64.3	63.1	165.0	24.0	9.7	14.4
19	MTCL2015	MT0871/(06X445B1-2, SY Clearstone si	63.9	63.9	166.5	24.5	10.5	11.6
16	MTCL2012	MT0871/(06X445B1-2, SY Clearstone si	62.6	63.8	168.0	23.5	10.2	11.7
36	MT2032	MT1285//03X378cE8/MT10102	62.5	63.2	168.0	26.0	10.4	11.4
56	MT2052	Judith/OK06332//MT0990	62.1	65.2	165.0	24.0	10.2	11.9
60 a	MT2056	(Northern sib, MT0977)//MT0859/MT093	62.0	65.0	174.0	25.0	11.3	9.8
8	MT2004	MT1088*2/Decade	61.7	63.6	168.0	28.0	10.1	13.0
6	MT2002	MT0871//MT1088/Decade	61.5	63.8	168.0	25.5	10.4	11.9
12 a	MTCL2008	MTCL1125/MT1091	61.5	63.0	169.0	26.0	10.3	11.4
7	MT2003	MT1088*2/Decade	61.0	63.6	170.5	28.0	10.0	12.6
10	MTCL2006	MT1137/MTCL1067	60.7	63.8	168.0	24.5	10.8	11.6
2	Decade	check	60.6	63.8	166.5	28.5	10.5	11.8
37	MT2033	MT1285//03X378cE8/MT10102	60.2	63.3	168.0	26.0	10.7	11.1
3	Warhorse	check	60.0	63.2	168.0	26.0	10.6	11.7
53	MT2049	Colter//03X273cEx/MT10105	59.9	64.4	168.0	25.0	10.0	11.2
62	MT2058	MT10116//MT0861/MTW0785	59.9	64.1	170.5	24.0	10.2	12.4
22	MT2018	MT1149//MT10102/MT10116	59.4	64.1	173.5	25.5	10.2	11.4
1	Yellowstone	check	59.3	63.4	173.0	27.0	10.5	10.8
25	MT2021	MT10113/(474-23, winter McNeal)/MT1	59.3	63.2	168.0	25.0	10.5	11.9
33	MT2029	MT1240//MT1088/02X172E31-4	59.0	63.1	167.5	24.5	10.1	12.8
61	MT2057	Robidoux//MT08185/MT0861	58.8	64.0	170.5	26.5	10.8	13.1
44	MT2040	MT1088/MT1156	58.4	64.0	166.5	25.0	10.5	11.7

Table 103. 2020 Preliminary A Test (Exp. 3607): Moccasin

Entry #	ID	Pedigree	Yield bu/ac	Test weight lb/bu	Heading date Julian	Plant height in	Grain moisture %	Protein %
	w = white		RCB	RCB	RCB	RCB	RCB	RCB
lattice efficiency relative to RCB								
15	MTCL2011	MT0871/(06X445B1-2, SY Clearstone si	58.0	63.6	168.0	24.5	10.6	12.1
32	MT2028	MT10113/MT0871/MT1151	58.0	64.0	165.0	25.0	10.1	12.1
54	MT2050	MT10121//Yellowstone/SD08W015	57.8	64.3	165.0	25.5	10.4	11.4
38	MT2034	MT1285//03X378cE8/MT10102	57.4	63.2	168.0	25.0	10.4	11.1
30	MT2026	YLL//Cap19/Vida	57.3	64.7	167.5	24.5	10.2	11.5
39	MT2035	MT1235//KS09HW140/MT10122	56.1	65.2	166.5	25.0	10.4	12.3
45	MT2041	MT1088/MT1156	56.0	63.0	173.0	23.0	10.8	11.4
58	MT2054	MT10104//MTW0785/Yellowstone-Lr41	55.3	64.3	170.5	25.0	10.2	13.2
40	w1 MTW2036	MT1235//KS09HW140/MT10122	55.1	64.3	173.0	23.5	10.5	10.6
9	MTCL2005	MTCL1260//MTCL1125/MT1091	54.2	62.9	165.0	29.0	10.2	12.0
21	MT2017	MT10113//MT1145/MT10102	52.2	64.1	165.0	23.5	9.9	13.1
24	MT2020	Northern//MT1143/06X424B6	51.3	64.2	165.0	23.0	10.4	12.6
50	MT2046	MT1240/Redfield	46.5	63.2	166.5	26.5	10.3	12.1
Average			63.3	63.7	169.1	25.6	10.3	11.6
LSD (0.05)			ns	0.7	3.4	2.2	0.7	1.0
C.V. (%)			11.7	0.6	1.0	4.4	3.3	4.4
P-value (Varieties)			0.0892	<.0001	<.0001	<.0001	0.0330	<.0001

a = lines in 2021 Advanced Test (all other MT lines dropped from testing)

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 104. 2020 Preliminary A Test (Exp. 3608): Huntley

Entry #	ID	Pedigree	Yield bu/ac	Test weight lb/bu	Heading date Julian	Plant height in	Lodging %	Protein %
w = white			LAT	not	RCB	RCB	RCB	RCB
		lattice efficiency relative to RCB	184%	used	100%	103%	100%	100%
11 a	MTCL2007	MTCL1125/MT1091	99.2		160.5	32.7	4	11.3
12 a	MTCL2008	MTCL1125/MT1091	95.1		161.0	32.3	0	10.2
34 w1	MTW2030	Northern//03X378cE8/MT0990	94.7		161.5	31.4	0	10.0
14 a	MTCL2010	MT0871/(06X445B1-2, SY Clearstone si	89.7		159.0	30.4	0	10.5
23 a	MT2019	MT10114/MT10128//MTW1251	88.7		160.0	30.0	0	9.6
35 a w1	MTW2031	Northern//03X378cE8/MT0990	88.4		163.0	30.0	0	10.7
13 a	MTCL2009	MTCL1125/MT1091	88.1		160.0	33.0	0	10.5
42 a	MT2038	MT1088*2/SY Wolf	88.1		162.0	32.6	0	10.0
32	MT2028	MT10113//MT0871/MT1151	87.7		158.5	29.1	25	10.1
28 a	MT2024	Northern//(10K1676w, Yellowstone white	87.5		164.5	29.2	4	10.0
52	MT2048	Northern//02X22cE38/MT10121	86.6		164.0	28.8	4	10.7
37	MT2033	MT1285//03X378cE8/MT10102	86.3		161.5	32.7	4	10.4
38	MT2034	MT1285//03X378cE8/MT10102	86.0		163.0	30.3	0	10.2
54	MT2050	MT10121//Yellowstone/SD08W015	86.0		159.5	31.0	0	10.1
60 a	MT2056	(Northern sib, MT0977)//MT0859/MT093	85.7		164.0	30.3	0	11.2
47 a	MT2043	MT1105//MT1156	85.6		164.5	29.1	0	10.9
18 a	MTCL2014	MT0871/(06X445B1-2, SY Clearstone si	85.2		163.0	28.9	0	11.1
6	MT2002	MT0871//MT1088/Decade	85.1		160.0	31.1	0	11.1
16	MTCL2012	MT0871/(06X445B1-2, SY Clearstone si	85.1		157.5	28.9	0	11.3
56	MT2052	Judith/OK06332//MT0990	83.8		157.5	29.7	4	10.2
4	SY Monument	check	83.5		158.0	31.2	4	9.9
40 w1	MTW2036	MT1235//KS09HW140/MT10122	83.4		164.0	32.1	0	10.5
49	MT2045	MT0871/NI10712	82.9		164.0	29.1	0	10.2
46	MT2042	MT1090/MT1276	82.8		162.0	32.6	0	9.9
2	Decade	check	82.5		159.5	32.9	0	10.5
19	MTCL2015	MT0871/(06X445B1-2, SY Clearstone si	81.6		158.0	29.5	4	11.4
57	MT2053	HV9W04-1594R/Accipiter	81.5		159.5	30.2	0	10.2
9	MTCL2005	MTCL1260//MTCL1125/MT1091	81.2		158.0	35.5	4	10.5
41	MT2037	Northern//MT1088/SY Wolf	81.2		159.5	33.6	14	10.2
5 a SM1	MT2001	Yellowstone*4//Cap19/Vida/3/MT08185	80.9		163.0	30.1	0	10.6
8	MT2004	MT1088*2/Decade	80.4		161.0	31.4	0	10.6
15	MTCL2011	MT0871/(06X445B1-2, SY Clearstone si	79.6		159.0	31.3	0	9.8
26	MT2022	Overland//(457-12, winter McNeal)/MT1	79.4		159.5	32.3	0	9.8
51	MT2047	Yellowstone//(493-22, Reeder/6*Paul)/3/	79.4		164.0	27.7	0	10.3
7	MT2003	MT1088*2/Decade	79.2		160.5	32.8	0	10.7
62	MT2058	MT10116//MT0861/MTW0785	79.2		161.5	30.1	0	10.1
17	MTCL2013	MT0871/(06X445B1-2, SY Clearstone si	79.1		160.5	29.7	0	10.9
36	MT2032	MT1285//03X378cE8/MT10102	78.4		163.5	31.9	0	10.3
1	Yellowstone	check	78.3		162.5	31.7	0	10.1
24	MT2020	Northern//MT1143/06X424B6	78.2		158.0	29.6	0	10.8
25	MT2021	MT10113//(474-23, winter McNeal)/MT1	78.2		163.0	30.7	7	11.0
39	MT2035	MT1235//KS09HW140/MT10122	78.1		159.5	31.7	0	10.0
10	MTCL2006	MT1137/MTCL1067	77.9		159.5	30.3	0	10.8
53	MT2049	Colter//03X273cEx/MT10105	77.9		163.5	29.4	14	10.5
63	MT2059	MT08185//YLL*2/PI640431/3/PROM/3*\	77.5		159.5	31.3	0	10.9
45	MT2041	MT1088/MT1156	77.1		163.0	30.3	0	11.2
58	MT2054	MT10104//MTW0785/Yellowstone-Lr41	76.9		160.0	29.0	0	10.6
20	MT2016	MT1137/MT1078//MT1149	76.8		158.0	30.9	0	10.0
27 w2	MTW2023	WB3768*2/(10K1726w, Yellowstone whi	76.3		163.0	28.2	0	10.5
30	MT2026	YLL//Cap19/Vida	76.3		159.0	28.5	4	10.2
31	MT2027	YLL//Cap19/Vida	75.3		160.5	29.1	10	10.1

Table 104. 2020 Preliminary A Test (Exp. 3608): Huntley

Entry #	ID	Pedigree	Yield bu/ac	Test weight lb/bu	Heading date Julian	Plant height in RCB	Lodging % RCB	Protein % RCB
	w = white		LAT	not	RCB	RCB	RCB	RCB
		lattice efficiency relative to RCB	184%	used	100%	103%	100%	100%
21	MT2017	MT10113//MT1145/MT10102	75.0		158.0	29.5	0	10.8
64	MT2060	MT08185//YLL*2/PI640431/3/PROM/3*Y	74.8		157.5	32.1	0	10.1
48	MT2044	MT1285/OK08539	74.7		160.5	29.3	0	10.8
22	MT2018	MT1149//MT10102/MT10116	74.0		164.5	30.3	0	10.0
33	MT2029	MT1240//MT1088/02X172E31-4	73.7		160.5	28.9	4	10.2
61	MT2057	Robidoux//MT08185/MT0861	73.6		164.0	30.7	0	10.1
50	MT2046	MT1240/Redfield	73.2		161.5	29.6	4	10.3
29	MT2025	YLL//Cap19/Vida	72.8		160.0	28.6	0	10.7
43	MT2039	Colter/MT1105	72.8		162.5	30.5	0	10.6
3	Warhorse	check	71.9		162.5	31.4	4	10.5
55	MT2051	Overland//MTW1098/KS08HW88	71.1		157.5	29.1	0	10.6
59	MT2055	MT10104//MTW0785/Yellowstone-Lr41	70.7		156.5	28.6	0	9.5
44	MT2040	MT1088/MT1156	70.2		159.5	30.9	0	10.2
Average			80.8		160.8	30.6	2	10.4
LSD (0.05)			10.5		2.6	2.6	7.2	0.6
C.V. (%)			5.9		0.8	4.1	204.6	2.8
P-value (Varieties)			<0.001		<0.001	<0.001	0.013	<0.001

a = lines in 2021 Advanced Test (all other MT lines dropped from testing)

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 105. 2020 Preliminary A Test (Exp. 36HH): Hingham (Second Nature)

Entry #	ID	Pedigree	Yield bu/ac	Test weight lb/bu	Plant height in	Grain moisture %	Protein %
w = white			RCB	RCB	RCB	RCB	no
lattice efficiency relative to RCB							data
18 a	MTCL2014	MT0871/(06X445B1-2, SY Clearstone sib)	57.3	61.2	21.5	9.6	
47 a	MT2043	MT1105//MT1156	54.8	60.9	19.5	10.8	
14 a	MTCL2010	MT0871/(06X445B1-2, SY Clearstone sib)	53.6	62.4	18.0	9.7	
52	MT2048	Northern//02X22cE38/MT10121	53.6	62.7	18.0	9.4	
11 a	MTCL2007	MTCL1125/MT1091	52.8	61.3	24.0	12.5	
19	MTCL2015	MT0871/(06X445B1-2, SY Clearstone sib)	52.7	62.9	19.0	9.4	
16	MTCL2012	MT0871/(06X445B1-2, SY Clearstone sib)	51.5	62.3	19.0	9.2	
13 a	MTCL2009	MTCL1125/MT1091	51.0	61.4	19.5	10.7	
12 a	MTCL2008	MTCL1125/MT1091	50.9	62.7	20.5	9.9	
42 a	MT2038	MT1088*2/SY Wolf	49.9	61.4	24.0	8.4	
43	MT2039	Colter/MT1105	49.0	61.2	20.5	10.1	
24	MT2020	Northern//MT1143/06X424B6	48.3	62.1	20.5	8.9	
23 a	MT2019	MT10114/MT10128//MTW1251	48.0	60.8	22.0	10.8	
15	MTCL2011	MT0871/(06X445B1-2, SY Clearstone sib)	47.3	62.7	21.0	9.4	
49	MT2045	MT0871/NI10712	46.9	61.4	17.0	10.1	
5 a	SM1 MT2001	Yellowstone*4//Cap19/Vida/3/MT08185	46.4	59.4	22.5	9.5	
17	MTCL2013	MT0871/(06X445B1-2, SY Clearstone sib)	46.2	61.5	17.5	11.1	
35 a	w1 MTW2031	Northern//03X378cE8/MT0990	45.5	60.3	19.0	10.3	
51	MT2047	Yellowstone/(493-22, Reeder/6*Paul)/3/MT08	45.5	61.7	17.5	11.2	
41	MT2037	Northern//MT1088/SY Wolf	44.8	62.8	21.5	9.2	
33	MT2029	MT1240//MT1088/02X172E31-4	44.4	60.8	19.0	9.1	
45	MT2041	MT1088/MT1156	44.3	61.2	20.5	12.2	
28 a	MT2024	Northern/(10K1676w, Yellowstone white)/WB:	43.1	58.5	19.0	14.2	
34	w1 MTW2030	Northern//03X378cE8/MT0990	42.7	60.7	19.0	9.8	
1	Yellowstone	check	42.7	58.5	21.0	13.6	
3	Warhorse	check	42.4	61.0	21.5	8.9	
25	MT2021	MT10113/(474-23, winter McNeal)/MT10121	41.9	60.6	20.5	10.2	
40	w1 MTW2036	MT1235//KS09HW140/MT10122	41.4	62.7	19.5	10.9	
2	Decade	check	41.2	60.6	21.0	10.5	
9	MTCL2005	MTCL1260//MTCL1125/MT1091	41.0	60.5	25.0	8.5	
61	MT2057	Robidoux//MT08185/MT0861	40.9	63.2	17.5	13.1	
38	MT2034	MT1285//03X378cE8/MT10102	40.8	61.1	20.5	8.9	
60 a	MT2056	(Northern sib, MT0977)//MT0859/MT0938	40.4	58.5	19.5	17.1	
21	MT2017	MT10113//MT1145/MT10102	40.3	61.9	19.5	9.7	
59	MT2055	MT10104//MTW0785/Yellowstone-Lr41	40.1	61.3	17.0	12.6	
62	MT2058	MT10116//MT0861/MTW0785	39.5	64.2	17.5	10.4	
8	MT2004	MT1088*2/Decade	39.3	61.4	19.5	9.5	
10	MTCL2006	MT1137/MTCL1067	39.1	60.5	19.0	8.6	
44	MT2040	MT1088/MT1156	38.9	59.4	21.0	13.0	
58	MT2054	MT10104//MTW0785/Yellowstone-Lr41	38.9	60.0	20.0	12.4	
53	MT2049	Colter//03X273cEx/MT10105	38.7	62.4	18.0	9.1	
48	MT2044	MT1285//OK08539	38.7	60.5	20.5	11.9	
46	MT2042	MT1090/MT1276	38.6	59.6	21.5	10.9	
37	MT2033	MT1285//03X378cE8/MT10102	38.0	59.4	20.5	12.2	
20	MT2016	MT1137/MT1078//MT1149	37.2	59.8	19.5	10.2	
54	MT2050	MT10121//Yellowstone/SD08W015	37.1	61.0	18.0	8.8	
64	MT2060	MT08185//YLL*2/PI640431/3/PROM/3*YLL/Y	36.7	61.2	18.0	8.9	
63	MT2059	MT08185//YLL*2/PI640431/3/PROM/3*YLL/Y	36.1	60.3	19.0	8.8	
4	SY Monument	check	36.0	60.7	19.0	10.5	
7	MT2003	MT1088*2/Decade	35.6	60.7	19.5	9.1	
39	MT2035	MT1235//KS09HW140/MT10122	35.4	62.7	20.0	10.7	

Table 105. 2020 Preliminary A Test (Exp. 36HH): Hingham (Second Nature)

Entry #	ID	Pedigree	Yield bu/ac	Test weight lb/bu	Plant height in	Grain moisture %	Protein %
	w = white		RCB	RCB	RCB	RCB	no
		lattice efficiency relative to RCB					data
29	MT2025	YLL//Cap19/Vida	34.5	60.5	18.0	10.7	
27	w2 MTW2023	WB3768*2/(10K1726w, Yellowstone white)	33.9	56.7	18.5	20.8	
55	MT2051	Overland//MTW1098/KS08HW88	33.6	61.7	18.0	9.3	
56	MT2052	Judith/OK06332//MT0990	33.2	61.1	17.0	9.7	
32	MT2028	MT10113//MT0871/MT1151	32.8	60.6	17.0	10.5	
57	MT2053	HV9W04-1594R/Accipiter	31.9	63.1	18.0	10.1	
50	MT2046	MT1240/Redfield	31.7	59.1	19.0	9.9	
36	MT2032	MT1285//03X378cE8/MT10102	30.9	54.1	19.5	15.1	
22	MT2018	MT1149//MT10102/MT10116	29.8	59.8	20.0	10.0	
31	MT2027	YLL//Cap19/Vida	27.9	58.3	17.0	14.4	
30	MT2026	YLL//Cap19/Vida	27.6	60.1	18.5	8.2	
26	MT2022	Overland//(457-12, winter McNeal)/MT10128	27.6	60.5	19.0	9.0	
6	MT2002	MT0871//MT1088/Decade	27.0	56.2	19.0	15.5	
Average			41.1	60.8	19.5	10.7	
LSD (0.05)			10.8	ns	3.3	5.0	
C.V. (%)			13.2	3.3	8.4	23.4	
P-value (Varieties)			<.0001	0.0696	0.0009	0.0316	

a = lines in 2021 Advanced Test (all other MT lines dropped from testing)

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 106. 2020 Preliminary A Test (Exp. 36BI): Ft. Benton (Northern Seeds)

Entry #	ID	Pedigree	Yield bu/ac	Test weight lb/bu	Plant height in	Protein %
	w = white		RCB	RCB	RCB	no
						data
42 a	MT2038	MT1088*2/SY Wolf	74.5	60.8	32.0	
14 a	MTCL2010	MT0871/(06X445B1-2, SY Clearstone sib)	72.5	62.2	29.0	
30	MT2026	YLL/Cap19/Vida	71.1	63.2	29.0	
11 a	MTCL2007	MTCL1125/MT1091	71.0	61.5	32.0	
29	MT2025	YLL/Cap19/Vida	70.7	63.2	29.0	
52	MT2048	Northern//02X22cE38/MT10121	70.6	62.8	30.0	
34 w1	MTW2030	Northern//03X378cE8/MT0990	69.9	61.5	30.0	
13 a	MTCL2009	MTCL1125/MT1091	69.6	61.4	30.5	
4	SY Monument	check	69.4	61.6	30.0	
49	MT2045	MT0871/NI10712	69.4	61.4	30.0	
27 w2	MTW2023	WB3768*2/(10K1726w, Yellowstone white)	69.4	62.4	31.0	
19	MTCL2015	MT0871/(06X445B1-2, SY Clearstone sib)	69.2	62.8	29.0	
51	MT2047	Yellowstone//((493-22, Reeder/6*Paul)/3/MT08	69.0	61.7	28.5	
17	MTCL2013	MT0871/(06X445B1-2, SY Clearstone sib)	68.9	62.0	29.0	
47 a	MT2043	MT1105/MT1156	68.2	61.1	30.5	
31	MT2027	YLL/Cap19/Vida	68.0	63.0	29.5	
18 a	MTCL2014	MT0871/(06X445B1-2, SY Clearstone sib)	66.7	61.7	28.5	
57	MT2053	HV9W04-1594R/Accipiter	66.6	62.9	28.5	
60 a	MT2056	(Northern sib, MT0977)//MT0859/MT0938	66.6	62.9	29.5	
23 a	MT2019	MT10114/MT10128//MTW1251	65.9	61.7	28.5	
53	MT2049	Colter//03X273cEx/MT10105	65.5	61.8	30.5	
6	MT2002	MT0871/MT1088/Decade	65.3	61.9	28.0	
32	MT2028	MT10113/MT0871/MT1151	65.1	61.4	29.0	
48	MT2044	MT1285/OK08539	64.7	63.1	30.0	
16	MTCL2012	MT0871/(06X445B1-2, SY Clearstone sib)	64.0	62.0	27.5	
12 a	MTCL2008	MTCL1125/MT1091	63.9	61.6	30.5	
3	Warhorse	check	63.7	61.8	30.5	
26	MT2022	Overland//((457-12, winter McNeal)/MT10128	63.7	61.0	29.5	
20	MT2016	MT1137/MT1078/MT1149	63.6	62.1	29.5	
45	MT2041	MT1088/MT1156	63.5	61.9	29.5	
15	MTCL2011	MT0871/(06X445B1-2, SY Clearstone sib)	63.3	61.6	29.5	
55	MT2051	Overland//MTW1098/KS08HW88	63.3	62.4	29.5	
33	MT2029	MT1240//MT1088/02X172E31-4	63.1	61.6	30.0	
54	MT2050	MT10121//Yellowstone/SD08W015	63.1	61.3	29.0	
41	MT2037	Northern//MT1088/SY Wolf	63.0	62.0	34.0	
56	MT2052	Judith/OK06332//MT0990	62.9	63.1	29.0	
1	Yellowstone	check	62.7	61.0	32.5	
37	MT2033	MT1285//03X378cE8/MT10102	62.6	61.1	30.5	
28 a	MT2024	Northern//((10K1676w, Yellowstone white)/WB:	62.5	61.7	29.0	
43	MT2039	Colter/MT1105	62.4	61.9	29.0	
2	Decade	check	62.2	61.9	32.0	
35 a w1	MTW2031	Northern//03X378cE8/MT0990	61.5	61.1	29.0	
50	MT2046	MT1240/Redfield	61.0	60.9	31.0	
5 a SM1	MT2001	Yellowstone*4//Cap19/Vida/3/MT08185	60.4	61.9	31.5	
25	MT2021	MT10113//((474-23, winter McNeal)/MT10121	60.3	61.1	29.5	
21	MT2017	MT10113/MT1145/MT10102	60.2	61.8	28.0	
36	MT2032	MT1285//03X378cE8/MT10102	59.4	61.1	31.0	
24	MT2020	Northern//MT1143/06X424B6	58.3	61.7	28.0	
58	MT2054	MT10104//MTW0785/Yellowstone-Lr41	58.3	62.1	29.5	
7	MT2003	MT1088*2/Decade	58.0	61.4	32.0	
8	MT2004	MT1088*2/Decade	57.9	61.6	30.5	

Table 106. 2020 Preliminary A Test (Exp. 36BI): Ft. Benton (Northern Seeds)

Entry #	ID	Pedigree	Yield bu/ac	Test weight lb/bu	Plant height in	Protein %
	w = white		RCB	RCB	RCB	no
						data
59	MT2055	MT10104//MTW0785/Yellowstone-Lr41	57.7	60.8	26.5	
46	MT2042	MT1090/MT1276	57.4	61.0	30.0	
9	MTCL2005	MTCL1260//MTCL1125/MT1091	56.3	61.1	32.0	
61	MT2057	Robidoux//MT08185/MT0861	56.0	61.9	29.0	
22	MT2018	MT1149//MT10102/MT10116	55.4	62.2	29.5	
10	MTCL2006	MT1137/MTCL1067	54.6	61.4	29.5	
38	MT2034	MT1285//03X378cE8/MT10102	54.0	61.2	29.5	
62	MT2058	MT10116//MT0861/MTW0785	53.4	61.8	27.5	
40	w1 MTW2036	MT1235//KS09HW140/MT10122	52.8	63.3	28.5	
39	MT2035	MT1235//KS09HW140/MT10122	51.6	63.4	29.5	
64	MT2060	MT08185//YLL*2/PI640431/3/PROM/3*YLL//Y	50.3	60.7	28.5	
44	MT2040	MT1088/MT1156	49.8	62.0	31.0	
63	MT2059	MT08185//YLL*2/PI640431/3/PROM/3*YLL//Y	47.7	60.7	29.0	
Average			62.7	61.8	29.7	
LSD (0.05)			9.9	0.7	2.4	
C.V. (%)			7.9	0.5	4.1	
P-value (Varieties)			<.0001	<.0001	0.0003	

a = lines in 2021 Advanced Test (all other MT lines dropped from testing)

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 107. 2020 Preliminary A Test (Exp. 3604): Williston Single Rows

Entry #	ID	Pedigree	Winter survival % RCB
w = white			21-May
44	MT2040	MT1088/MT1156	100
16	MTCL2012	MT0871/(06X445B1-2, SY Clearstone sib)	95
26	MT2022	Overland/(457-12, winter McNeal)/MT10128	95
34	w1 MTW2030	Northern//03X378cE8/MT0990	95
20	MT2016	MT1137/MT1078/MT1149	93
1	Yellowstone	check	90
18 a	MTCL2014	MT0871/(06X445B1-2, SY Clearstone sib)	90
2	Decade	check	88
15	MTCL2011	MT0871/(06X445B1-2, SY Clearstone sib)	88
29	MT2025	YLL//Cap19/Vida	88
53	MT2049	Colter//03X273cEx/MT10105	88
64	MT2060	MT08185/YLL*2/PI640431/3/PROM/3*YLL/Y	88
6	MT2002	MT0871/MT1088/Decade	85
31	MT2027	YLL//Cap19/Vida	85
39	MT2035	MT1235/KS09HW140/MT10122	85
49	MT2045	MT0871/NI10712	85
54	MT2050	MT10121//Yellowstone/SD08W015	85
59	MT2055	MT10104//MTW0785/Yellowstone-Lr41	85
12 a	MTCL2008	MTCL1125/MT1091	83
52	MT2048	Northern//02X22cE38/MT10121	83
62	MT2058	MT10116//MT0861/MTW0785	83
11 a	MTCL2007	MTCL1125/MT1091	80
14 a	MTCL2010	MT0871/(06X445B1-2, SY Clearstone sib)	80
46	MT2042	MT1090/MT1276	80
47 a	MT2043	MT1105/MT1156	80
48	MT2044	MT1285/OK08539	80
61	MT2057	Robidoux//MT08185/MT0861	80
3	Warhorse	check	78
33	MT2029	MT1240/MT1088/02X172E31-4	78
37	MT2033	MT1285//03X378cE8/MT10102	78
57	MT2053	HV9W04-1594R/Accipiter	78
58	MT2054	MT10104//MTW0785/Yellowstone-Lr41	78
9	MTCL2005	MTCL1260//MTCL1125/MT1091	75
17	MTCL2013	MT0871/(06X445B1-2, SY Clearstone sib)	75
19	MTCL2015	MT0871/(06X445B1-2, SY Clearstone sib)	75
22	MT2018	MT1149//MT10102/MT10116	75
50	MT2046	MT1240/Redfield	75
51	MT2047	Yellowstone/(493-22, Reeder/6*Paul)/3/MT08	75
7	MT2003	MT1088*2/Decade	73
56	MT2052	Judith/OK06332//MT0990	73
4	SY Monument	check	70
30	MT2026	YLL//Cap19/Vida	70
43	MT2039	Colter/MT1105	70
45	MT2041	MT1088/MT1156	70
8	MT2004	MT1088*2/Decade	68
23 a	MT2019	MT10114/MT10128//MTW1251	68
28 a	MT2024	Northern/(10K1676w, Yellowstone white)/WB:	68
55	MT2051	Overland//MTW1098/KS08HW88	68
5 a	SM1 MT2001	Yellowstone*4//Cap19/Vida/3/MT08185	65
13 a	MTCL2009	MTCL1125/MT1091	65
27	w2 MTW2023	WB3768*2/(10K1726w, Yellowstone white)	65

Table 107. 2020 Preliminary A Test (Exp. 3604): Williston Single Rows

Entry #	ID	Pedigree	Winter survival % RCB
w = white			21-May
36	MT2032	MT1285//03X378cE8/MT10102	65
60 a	MT2056	(Northern sib, MT0977)//MT0859/MT0938	65
32	MT2028	MT10113//MT0871/MT1151	63
35 a w1	MTW2031	Northern//03X378cE8/MT0990	63
21	MT2017	MT10113//MT1145/MT10102	60
24	MT2020	Northern//MT1143/06X424B6	60
25	MT2021	MT10113//(474-23, winter McNeal)/MT10121	60
10	MTCL2006	MT1137/MTCL1067	55
38	MT2034	MT1285//03X378cE8/MT10102	53
40 w1	MTW2036	MT1235//KS09HW140/MT10122	50
42 a	MT2038	MT1088*2/SY Wolf	50
41	MT2037	Northern//MT1088/SY Wolf	48
63	MT2059	MT08185//YLL*2/PI640431/3/PROM/3*YLL//Y	43
Average			74.9
LSD (0.05)			ns
C.V. (%)			22.8
P-value (Varieties)			0.3566

a = lines in 2021 Advanced Test (all other MT lines dropped from testing)

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protection

Table 108. 2020 Preliminary A Test (Exp. 36): All Location Yield (bu/a)

Entry	ID	Pedigree	Bozeman LAT	Moccasin RCB	Huntley LAT	Hingham RCB	Ft. Benton RCB	5 Loc avg
	w = white							
		lattice efficiency relative to RCB	288%		184%			
11 a	MTCL2007	MTCL1125/MT1091	113.6	71.6	99.2	52.8	71.0	81.6
42 a	MT2038	MT1088*2/SY Wolf	122.1	65.3	88.1	49.9	74.5	80.0
13 a	MTCL2009	MTCL1125/MT1091	118.1	69.8	88.1	51.0	69.6	79.3
47 a	MT2043	MT1105/MT1156	106.3	70.2	85.6	54.8	68.2	77.0
52	MT2048	Northern//02X22cE38/MT10121	107.2	67.0	86.6	53.6	70.6	77.0
34 w1	MTW2030	Northern//03X378cE8/MT0990	104.4	72.8	94.7	42.7	69.9	76.9
18 a	MTCL2014	MT0871/(06X445B1-2, SY Clearstone sib)	108.6	66.0	85.2	57.3	66.7	76.8
12 a	MTCL2008	MTCL1125/MT1091	108.7	61.5	95.1	50.9	63.9	76.0
60 a	MT2056	(Northern sib, MT0977)//MT0859/MT0938	125.4	62.0	85.7	40.4	66.6	76.0
35 a w1	MTW2031	Northern//03X378cE8/MT0990	113.5	69.6	88.4	45.5	61.5	75.7
14 a	MTCL2010	MT0871/(06X445B1-2, SY Clearstone sib)	96.9	65.7	89.7	53.6	72.5	75.7
49	MT2045	MT0871/NI10712	114.5	64.3	82.9	46.9	69.4	75.6
23 a	MT2019	MT10114/MT10128/MTW1251	101.9	72.4	88.7	48.0	65.9	75.4
51	MT2047	Yellowstone/(493-22, Reeder/6*Paul)/3/MT08	105.5	73.9	79.4	45.5	69.0	74.7
28 a	MT2024	Northern/(10K1676w, Yellowstone white)/WB3	111.3	64.3	87.5	43.1	62.5	73.7
5 a SM1	MT2001	Yellowstone*4//Cap19/Vida/3/MT08185	108.2	68.3	80.9	46.4	60.4	72.8
43	MT2039	Colter/MT1105	104.0	73.2	72.8	49.0	62.4	72.3
19	MTCL2015	MT0871/(06X445B1-2, SY Clearstone sib)	93.0	63.9	81.6	52.7	69.2	72.1
46	MT2042	MT1090/MT1276	105.2	76.2	82.8	38.6	57.4	72.0
17	MTCL2013	MT0871/(06X445B1-2, SY Clearstone sib)	97.9	66.3	79.1	46.2	68.9	71.7
37	MT2033	MT1285//03X378cE8/MT10102	109.5	60.2	86.3	38.0	62.6	71.3
41	MT2037	Northern//MT1088/SY Wolf	96.5	71.1	81.2	44.8	63.0	71.3
20	MT2016	MT1137/MT1078/MT1149	109.8	69.1	76.8	37.2	63.6	71.3
16	MTCL2012	MT0871/(06X445B1-2, SY Clearstone sib)	93.2	62.6	85.1	51.5	64.0	71.3
53	MT2049	Colter//03X273cEx/MT10105	113.1	59.9	77.9	38.7	65.5	71.0
45	MT2041	MT1088/MT1156	112.6	56.0	77.1	44.3	63.5	70.7
4	SY Monument	check	100.0	64.5	83.5	36.0	69.4	70.7
2	Decade	check	106.7	60.6	82.5	41.2	62.2	70.6
38	MT2034	MT1285//03X378cE8/MT10102	114.3	57.4	86.0	40.8	54.0	70.5
57	MT2053	HV9W04-1594R/Accipiter	97.8	73.3	81.5	31.9	66.6	70.2
26	MT2022	Overland/(457-12, winter McNeal)/MT10128	108.2	69.8	79.4	27.6	63.7	69.7
25	MT2021	MT10113/(474-23, winter McNeal)/MT10121	107.6	59.3	78.2	41.9	60.3	69.5
48	MT2044	MT1285/OK08539	100.6	67.4	74.7	38.7	64.7	69.2
1	Yellowstone	check	101.6	59.3	78.3	42.7	62.7	68.9
29	MT2025	YLL//Cap19/Vida	102.3	64.3	72.8	34.5	70.7	68.9
15	MTCL2011	MT0871/(06X445B1-2, SY Clearstone sib)	96.0	58.0	79.6	47.3	63.3	68.8
32	MT2028	MT10113/MT0871/MT1151	100.2	58.0	87.7	32.8	65.1	68.8
36	MT2032	MT1285//03X378cE8/MT10102	111.9	62.5	78.4	30.9	59.4	68.6
31	MT2027	YLL//Cap19/Vida	104.6	67.1	75.3	27.9	68.0	68.6
24	MT2020	Northern//MT1143/06X424B6	105.0	51.3	78.2	48.3	58.3	68.2
8	MT2004	MT1088*2/Decade	99.8	61.7	80.4	39.3	57.9	67.8
27 w2	MTW2023	WB3768*2/(10K1726w, Yellowstone white)	93.4	65.5	76.3	33.9	69.4	67.7
54	MT2050	MT10121//Yellowstone/SD08W015	94.4	57.8	86.0	37.1	63.1	67.7
56	MT2052	Judith/OK06332//MT0990	95.2	62.1	83.8	33.2	62.9	67.4
10	MTCL2006	MT1137/MTCL1067	104.6	60.7	77.9	39.1	54.6	67.4
33	MT2029	MT1240//MT1088/02X172E31-4	95.3	59.0	73.7	44.4	63.1	67.1
40 w1	MTW2036	MT1235//KS09HW140/MT10122	101.0	55.1	83.4	41.4	52.8	66.7
6	MT2002	MT0871//MT1088/Decade	94.6	61.5	85.1	27.0	65.3	66.7
30	MT2026	YLL//Cap19/Vida	99.7	57.3	76.3	27.6	71.1	66.4
9	MTCL2005	MTCL1260//MTCL1125/MT1091	98.8	54.2	81.2	41.0	56.3	66.3
22	MT2018	MT1149//MT10102/MT10116	112.0	59.4	74.0	29.8	55.4	66.1
59	MT2055	MT10104//MTW0785/Yellowstone-Lr41	97.5	64.3	70.7	40.1	57.7	66.1
61	MT2057	Robidoux//MT08185/MT0861	99.7	58.8	73.6	40.9	56.0	65.8
3	Warhorse	check	90.7	60.0	71.9	42.4	63.7	65.7
63	MT2059	MT08185//YLL*2//PI640431/3/PROM/3*YLL//Y	94.4	72.3	77.5	36.1	47.7	65.6
62	MT2058	MT10116//MT0861/MTW0785	95.8	59.9	79.2	39.5	53.4	65.6

Table 108. 2020 Preliminary A Test (Exp. 36): All Location Yield (bu/a)

Entry	ID	Pedigree	Bozeman LAT	Moccasin RCB	Huntley LAT	Hingham RCB	Ft. Benton RCB	5 Loc avg
	w = white							
		lattice efficiency relative to RCB	288%		184%			
7	MT2003	MT1088*2/Decade	93.7	61.0	79.2	35.6	58.0	65.5
55	MT2051	Overland//MTW1098/KS08HW88	93.5	64.9	71.1	33.6	63.3	65.3
21	MT2017	MT10113//MT1145/MT10102	98.6	52.2	75.0	40.3	60.2	65.3
58	MT2054	MT10104//MTW0785/Yellowstone-Lr41	94.7	55.3	76.9	38.9	58.3	64.8
44	MT2040	MT1088/MT1156	105.0	58.4	70.2	38.9	49.8	64.5
39	MT2035	MT1235//KS09HW140/MT10122	99.4	56.1	78.1	35.4	51.6	64.1
64	MT2060	MT08185//YLL*2/PI640431/3/PROM/3*YLL//Y	83.9	70.8	74.8	36.7	50.3	63.3
50	MT2046	MT1240/Redfield	84.3	46.5	73.2	31.7	61.0	59.3
Average			102.8	63.3	80.8	41.1	62.7	70.1
LSD (0.05)			12.0	ns	10.5	10.8	9.9	7.2
C.V. (%)			5.3	11.7	5.9	13.2	7.9	8.3
P-value (Varieties)			<.0001	0.0892	<0.001	<.0001	<.0001	<.0001

a = lines in 2021 Advanced Test (all other MT lines dropped from testing)

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 109. 2020 Preliminary A Test (Exp. 36): All Location Test weight (lb/bu)

Entry	ID	Pedigree	Bozeman LAT	Moccasin RCB	Huntley not	Hingham RCB	Ft. Benton no	3 Loc avg
	w = white							
		lattice efficiency relative to RCB	367%		used		data	
39	MT2035	MT1235//KS09HW140/MT10122	64.5	65.2		62.7		64.0
40	w1 MTW2036	MT1235//KS09HW140/MT10122	64.2	64.3		62.7		63.6
56	MT2052	Judith//OK06332//MT0990	64.8	65.2		61.1		63.6
57	MT2053	HV9W04-1594R//Accipiter	64.0	64.2		63.1		63.6
62	MT2058	MT10116//MT0861/MTW0785	63.7	64.1		64.2		63.5
52	MT2048	Northern//02X22cE38/MT10121	63.7	64.4		62.7		63.4
48	MT2044	MT1285//OK08539	65.0	64.9		60.5		63.4
19	MTCL2015	MT0871/(06X445B1-2, SY Clearstone sib)	63.8	63.9		62.9		63.4
61	MT2057	Robidoux//MT08185/MT0861	64.1	64.0		63.2		63.3
53	MT2049	Colter//03X273cEx/MT10105	64.3	64.4		62.4		63.2
30	MT2026	YLL//Cap19/Vida	64.2	64.7		60.1		63.1
14	a MTCL2010	MT0871/(06X445B1-2, SY Clearstone sib)	63.6	63.8		62.4		63.0
21	MT2017	MT10113//MT1145/MT10102	64.0	64.1		61.9		63.0
41	MT2037	Northern//MT1088/SY Wolf	63.5	63.4		62.8		62.9
55	MT2051	Overland//MTW1098/KS08HW88	63.7	63.9		61.7		62.9
16	MTCL2012	MT0871/(06X445B1-2, SY Clearstone sib)	63.5	63.8		62.3		62.9
24	MT2020	Northern//MT1143/06X424B6	63.4	64.2		62.1		62.9
29	MT2025	YLL//Cap19/Vida	63.2	64.5		60.5		62.9
60	a MT2056	(Northern sib, MT0977)//MT0859/MT0938	65.0	65.0		58.5		62.9
15	MTCL2011	MT0871/(06X445B1-2, SY Clearstone sib)	63.2	63.6		62.7		62.8
43	MT2039	Colter/MT1105	63.7	64.2		61.2		62.8
20	MT2016	MT1137/MT1078//MT1149	64.2	64.8		59.8		62.7
31	MT2027	YLL//Cap19/Vida	64.5	64.9		58.3		62.7
8	MT2004	MT1088*2/Decade	63.9	63.6		61.4		62.6
58	MT2054	MT10104//MTW0785/Yellowstone-Lr41	64.0	64.3		60.0		62.6
12	a MTCL2008	MTCL1125/MT1091	62.8	63.0		62.7		62.5
22	MT2018	MT1149//MT10102/MT10116	64.0	64.1		59.8		62.5
17	MTCL2013	MT0871/(06X445B1-2, SY Clearstone sib)	63.1	63.4		61.5		62.5
51	MT2047	Yellowstone//((493-22, Reeder/6*Paul)/3/MT08	62.7	63.8		61.7		62.5
54	MT2050	MT10121//Yellowstone/SD08W015	63.3	64.3		61.0		62.5
2	Decade	check	63.5	63.8		60.6		62.5
7	MT2003	MT1088*2/Decade	64.0	63.6		60.7		62.4
32	MT2028	MT10113//MT0871/MT1151	63.7	64.0		60.6		62.4
18	a MTCL2014	MT0871/(06X445B1-2, SY Clearstone sib)	63.2	63.2		61.2		62.3
44	MT2040	MT1088/MT1156	63.6	64.0		59.4		62.3
11	a MTCL2007	MTCL1125/MT1091	63.1	63.0		61.3		62.2
38	MT2034	MT1285//03X378cE8/MT10102	63.3	63.2		61.1		62.2
45	MT2041	MT1088/MT1156	62.7	63.0		61.2		62.2
10	MTCL2006	MT1137/MTCL1067	63.0	63.8		60.5		62.2
59	MT2055	MT10104//MTW0785/Yellowstone-Lr41	63.5	63.1		61.3		62.2
3	Warhorse	check	62.5	63.2		61.0		62.1
23	a MT2019	MT10114/MT10128//MTW1251	62.7	63.3		60.8		62.1
4	SY Monument	check	62.8	63.3		60.7		62.1
49	MT2045	MT0871/NI10712	62.4	63.1		61.4		62.1
33	MT2029	MT1240//MT1088/02X172E31-4	62.7	63.1		60.8		62.1
34	w1 MTW2030	Northern//03X378cE8/MT0990	61.9	63.9		60.7		62.0
26	MT2022	Overland//((457-12, winter McNeal)/MT10128	63.1	63.3		60.5		62.0
13	a MTCL2009	MTCL1125/MT1091	62.6	62.3		61.4		61.9
35	a w1 MTW2031	Northern//03X378cE8/MT0990	63.1	63.2		60.3		61.9
5	a SM1 MT2001	Yellowstone*4//Cap19/Vida/3/MT08185	62.7	63.4		59.4		61.9
64	MT2060	MT08185//YLL*2//PI640431/3/PROM/3*YLL//Y	62.5	63.0		61.2		61.9
25	MT2021	MT10113//((474-23, winter McNeal)/MT10121	62.4	63.2		60.6		61.8
47	a MT2043	MT1105//MT1156	62.2	63.1		60.9		61.8
63	MT2059	MT08185//YLL*2//PI640431/3/PROM/3*YLL//Y	63.0	63.1		60.3		61.8
37	MT2033	MT1285//03X378cE8/MT10102	63.2	63.3		59.4		61.8
46	MT2042	MT1090/MT1276	62.7	63.4		59.6		61.7

Table 109. 2020 Preliminary A Test (Exp. 36): All Location Test weight (lb/bu)

Entry	ID	Pedigree	Bozeman	Moccasin	Huntley	Hingham	Ft. Benton	3 Loc
w = white			LAT	RCB	not	RCB	no	avg
		lattice efficiency relative to RCB	367%		used		data	
9	MTCL2005	MTCL1260//MTCL1125/MT1091	62.1	62.9		60.5		61.7
28 a	MT2024	Northern/(10K1676w, Yellowstone white)/WB3	63.0	63.4		58.5		61.7
50	MT2046	MT1240/Redfield	62.7	63.2		59.1		61.5
42 a	MT2038	MT1088*2/SY Wolf	61.5	62.0		61.4		61.4
1	Yellowstone	check	62.2	63.4		58.5		61.3
6	MT2002	MT0871//MT1088/Decade	63.2	63.8		56.2		61.3
27 w2	MTW2023	WB3768*2/(10K1726w, Yellowstone white)	62.6	63.4		56.7		61.3
36	MT2032	MT1285//03X378cE8/MT10102	63.1	63.2		54.1		60.4
Average			63.3	63.7		60.8		62.4
LSD (0.05)			0.8	0.7		ns		1.3
C.V. (%)			0.6	0.6		3.3		1.5
P-value (Varieties)			<.0001	<.0001		0.0696		<.0001

a = lines in 2021 Advanced Test (all other MT lines dropped from testing)

bold = indicates highest value within a column

1/ = data not in multi-location analysis

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 110. 2020 Preliminary A Test (Exp. 36): All Location Heading date (days from Jan 1)

Entry	ID	Pedigree	Bozeman LAT	Moccasin RCB	Huntley RCB	3 Loc avg
		lattice efficiency relative to RCB	132%		100%	
59	MT2055	MT10104//MTW0785/Yellowstone-Lr41	167.2	165.0	156.5	162.9
56	MT2052	Judith/OK06332//MT0990	166.3	165.0	157.5	162.9
21	MT2017	MT10113//MT1145/MT10102	166.2	165.0	158.0	163.1
64	MT2060	MT08185//YLL*2/PI640431/3/PROM/3*YLL//Y	166.6	166.0	157.5	163.4
32	MT2028	MT10113//MT0871/MT1151	166.7	165.0	158.5	163.4
4	SY Monument	check	167.1	166.0	158.0	163.7
54	MT2050	MT10121//Yellowstone/SD08W015	168.3	165.0	159.5	164.3
55	MT2051	Overland//MTW1098/KS08HW88	170.3	165.0	157.5	164.3
9	MTCL2005	MTCL1260//MTCL1125/MT1091	170.3	165.0	158.0	164.4
14 a	MTCL2010	MT0871/(06X445B1-2, SY Clearstone sib)	169.6	165.0	159.0	164.5
26	MT2022	Overland/(457-12, winter McNeal)/MT10128	167.7	166.5	159.5	164.6
63	MT2059	MT08185//YLL*2/PI640431/3/PROM/3*YLL//Y	167.7	166.5	159.5	164.6
24	MT2020	Northern//MT1143/06X424B6	171.6	165.0	158.0	164.9
50	MT2046	MT1240/Redfield	167.1	166.5	161.5	165.0
30	MT2026	YLL//Cap19/Vida	169.0	167.5	159.0	165.2
16	MTCL2012	MT0871/(06X445B1-2, SY Clearstone sib)	170.4	168.0	157.5	165.3
2	Decade	check	170.3	166.5	159.5	165.4
19	MTCL2015	MT0871/(06X445B1-2, SY Clearstone sib)	171.9	166.5	158.0	165.5
39	MT2035	MT1235//KS09HW140/MT10122	171.5	166.5	159.5	165.8
29	MT2025	YLL//Cap19/Vida	171.1	166.5	160.0	165.9
31	MT2027	YLL//Cap19/Vida	170.1	167.5	160.5	166.0
15	MTCL2011	MT0871/(06X445B1-2, SY Clearstone sib)	171.6	168.0	159.0	166.2
44	MT2040	MT1088/MT1156	172.7	166.5	159.5	166.2
10	MTCL2006	MT1137/MTCL1067	171.4	168.0	159.5	166.3
20	MT2016	MT1137/MT1078//MT1149	170.4	170.5	158.0	166.3
6	MT2002	MT0871//MT1088/Decade	171.4	168.0	160.0	166.5
17	MTCL2013	MT0871/(06X445B1-2, SY Clearstone sib)	171.0	168.0	160.5	166.5
25	MT2021	MT10113/(474-23, winter McNeal)/MT10121	169.4	168.0	163.0	166.8
33	MT2029	MT1240//MT1088/02X172E31-4	173.1	167.5	160.5	167.0
12 a	MTCL2008	MTCL1125/MT1091	171.7	169.0	161.0	167.2
7	MT2003	MT1088*2/Decade	171.2	170.5	160.5	167.4
37	MT2033	MT1285//03X378cE8/MT10102	172.8	168.0	161.5	167.4
3	Warhorse	check	172.1	168.0	162.5	167.5
8	MT2004	MT1088*2/Decade	173.6	168.0	161.0	167.5
48	MT2044	MT1285/OK08539	171.6	170.5	160.5	167.5
38	MT2034	MT1285//03X378cE8/MT10102	171.9	168.0	163.0	167.6
34	w1 MTW2030	Northern//03X378cE8/MT0990	173.6	168.0	161.5	167.7
57	MT2053	HV9W04-1594R/Accipiter	170.7	173.0	159.5	167.7
36	MT2032	MT1285//03X378cE8/MT10102	171.9	168.0	163.5	167.8
5 a SM1	MT2001	Yellowstone*4//Cap19/Vida/3/MT08185	172.8	168.0	163.0	167.9
58	MT2054	MT10104//MTW0785/Yellowstone-Lr41	173.3	170.5	160.0	167.9
53	MT2049	Colter//03X273cEx/MT10105	173.4	168.0	163.5	168.3
11 a	MTCL2007	MTCL1125/MT1091	171.6	173.0	160.5	168.4
41	MT2037	Northern//MT1088/SY Wolf	172.7	173.0	159.5	168.4
13 a	MTCL2009	MTCL1125/MT1091	172.5	173.0	160.0	168.5
46	MT2042	MT1090/MT1276	173.1	170.5	162.0	168.5
62	MT2058	MT10116//MT0861/MTW0785	173.8	170.5	161.5	168.6
43	MT2039	Colter/MT1105	173.1	170.5	162.5	168.7
23 a	MT2019	MT10114/MT10128//MTW1251	173.5	173.0	160.0	168.8
49	MT2045	MT0871/NI10712	173.1	170.5	164.0	169.2
35 a w1	MTW2031	Northern//03X378cE8/MT0990	171.7	173.0	163.0	169.2
61	MT2057	Robidoux//MT08185/MT0861	174.2	170.5	164.0	169.6
42 a	MT2038	MT1088*2/SY Wolf	173.9	173.0	162.0	169.6

Table 110. 2020 Preliminary A Test (Exp. 36): All Location Heading date (days from Jan 1)

Entry	ID	Pedigree	Bozeman LAT	Moccasin RCB	Huntley RCB	3 Loc avg
	w = white					
		lattice efficiency relative to RCB	132%		100%	
52	MT2048	Northern//02X22cE38/MT10121	172.4	173.0	164.0	169.8
45	MT2041	MT1088/MT1156	173.9	173.0	163.0	170.0
1	Yellowstone	check	174.7	173.0	162.5	170.1
51	MT2047	Yellowstone//(493-22, Reeder/6*Paul)/3/MT08	173.6	173.0	164.0	170.2
27	w2 MTW2023	WB3768*2/(10K1726w, Yellowstone white)	174.8	173.0	163.0	170.3
40	w1 MTW2036	MT1235//KS09HW140/MT10122	174.4	173.0	164.0	170.5
18 a	MTCL2014	MT0871/(06X445B1-2, SY Clearstone sib)	174.3	174.5	163.0	170.6
47 a	MT2043	MT1105//MT1156	174.8	173.0	164.5	170.8
28 a	MT2024	Northern//(10K1676w, Yellowstone white)/WB:	174.9	173.5	164.5	171.0
60 a	MT2056	(Northern sib, MT0977)//MT0859/MT0938	175.6	174.0	164.0	171.2
22	MT2018	MT1149//MT10102/MT10116	176.3	173.5	164.5	171.4
Average			171.6	169.1	160.8	167.2
LSD (0.05)			2.3	3.4	2.6	2.3
C.V. (%)			0.6	1.0	0.8	0.9
P-value (Varieties)			<.0001	<.0001	<0.001	<.0001

a = lines in 2021 Advanced Test (all other MT lines dropped from testing)

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD ($p=0.05$)

Table 111. 2020 Preliminary A Test (Exp. 36): All Location Plant height (in)

Entry	ID	Pedigree	Bozeman LAT	Moccasin RCB	Huntley RCB	Hingham RCB
	w = white					
		lattice efficiency relative to RCB			103%	
59	MT2055	MT10104//MTW0785/Yellowstone-Lr41	29.1	24.0	28.6	17.0
16	MTCL2012	MT0871/(06X445B1-2, SY Clearstone sib)	28.7	23.5	28.9	19.0
62	MT2058	MT10116//MT0861/MTW0785	29.2	24.0	30.1	17.5
31	MT2027	YLL//Cap19/Vida	30.2	23.5	29.1	17.0
56	MT2052	Judith/OK06332//MT0990	29.8	24.0	29.7	17.0
14 a	MTCL2010	MT0871/(06X445B1-2, SY Clearstone sib)	27.7	24.5	30.4	18.0
51	MT2047	Yellowstone/(493-22, Reeder/6*Paul)/3/MT08	30.6	25.5	27.7	17.5
19	MTCL2015	MT0871/(06X445B1-2, SY Clearstone sib)	28.2	24.5	29.5	19.0
24	MT2020	Northern//MT1143/06X424B6	29.1	23.0	29.6	20.5
30	MT2026	YLL//Cap19/Vida	30.1	24.5	28.5	18.5
29	MT2025	YLL//Cap19/Vida	29.6	25.5	28.6	18.0
21	MT2017	MT10113//MT1145/MT10102	30.4	23.5	29.5	19.5
17	MTCL2013	MT0871/(06X445B1-2, SY Clearstone sib)	29.7	25.5	29.7	17.5
27	w2 MTW2023	WB3768*2/(10K1726w, Yellowstone white)	29.2	24.5	28.2	18.5
32	MT2028	MT10113//MT0871/MT1151	31.4	25.0	29.1	17.0
52	MT2048	Northern//02X22cE38/MT10121	30.4	24.5	28.8	18.0
49	MT2045	MT0871/NI10712	30.2	25.5	29.1	17.0
57	MT2053	HV9W04-1594R/Accipiter	29.3	26.0	30.2	18.0
55	MT2051	Overland//MTW1098/KS08HW88	29.7	26.0	29.1	18.0
28 a	MT2024	Northern//(10K1676w, Yellowstone white)/WB:	30.7	25.0	29.2	19.0
33	MT2029	MT1240//MT1088/02X172E31-4	30.5	24.5	28.9	19.0
6	MT2002	MT0871//MT1088/Decade	29.4	25.5	31.1	19.0
58	MT2054	MT10104//MTW0785/Yellowstone-Lr41	29.6	25.0	29.0	20.0
35 a w1	MTW2031	Northern//03X378cE8/MT0990	29.7	25.5	30.0	19.0
18 a	MTCL2014	MT0871/(06X445B1-2, SY Clearstone sib)	29.9	24.5	28.9	21.5
53	MT2049	Colter//03X273cEx/MT10105	31.3	25.0	29.4	18.0
23 a	MT2019	MT10114/MT10128//MTW1251	29.3	24.5	30.0	22.0
40	w1 MTW2036	MT1235//KS09HW140/MT10122	31.3	23.5	32.1	19.5
45	MT2041	MT1088/MT1156	31.9	23.0	30.3	20.5
61	MT2057	Robidoux//MT08185/MT0861	31.5	26.5	30.7	17.5
54	MT2050	MT10121//Yellowstone/SD08W015	31.9	25.5	31.0	18.0
10	MTCL2006	MT1137/MTCL1067	32.5	24.5	30.3	19.0
48	MT2044	MT1285/OK08539	30.5	25.5	29.3	20.5
47 a	MT2043	MT1105//MT1156	30.8	26.0	29.1	19.5
15	MTCL2011	MT0871/(06X445B1-2, SY Clearstone sib)	29.8	24.5	31.3	21.0
20	MT2016	MT1137/MT1078//MT1149	30.8	25.5	30.9	19.5
63	MT2059	MT08185//YLL*2/PI640431/3/PROM/3*YLL//Y	30.4	26.5	31.3	19.0
64	MT2060	MT08185//YLL*2/PI640431/3/PROM/3*YLL//Y	29.7	28.5	32.1	18.0
4	SY Monument	check	30.8	26.0	31.2	19.0
38	MT2034	MT1285//03X378cE8/MT10102	31.8	25.0	30.3	20.5
60 a	MT2056	(Northern sib, MT0977)//MT0859/MT0938	33.2	25.0	30.3	19.5
25	MT2021	MT10113/(474-23, winter McNeal)/MT10121	32.0	25.0	30.7	20.5
22	MT2018	MT1149//MT10102/MT10116	32.6	25.5	30.3	20.0
39	MT2035	MT1235//KS09HW140/MT10122	31.7	25.0	31.7	20.0
34	w1 MTW2030	Northern//03X378cE8/MT0990	32.4	25.5	31.4	19.0
50	MT2046	MT1240/Redfield	32.2	26.5	29.6	19.0
43	MT2039	Colter/MT1105	31.4	27.5	30.5	20.5
8	MT2004	MT1088*2/Decade	31.3	28.0	31.4	19.5
36	MT2032	MT1285//03X378cE8/MT10102	32.5	26.0	31.9	19.5
44	MT2040	MT1088/MT1156	33.0	25.0	30.9	21.0
26	MT2022	Overland/(457-12, winter McNeal)/MT10128	32.4	28.0	32.3	19.0
3	Warhorse	check	31.9	26.0	31.4	21.5
13 a	MTCL2009	MTCL1125/MT1091	32.8	26.0	33.0	19.5

Table 111. 2020 Preliminary A Test (Exp. 36): All Location Plant height (in)

Entry	ID	Pedigree	Bozeman	Moccasin	Huntley	Hingham	
	w = white		LAT	RCB	RCB	RCB	
		lattice efficiency relative to RCB			103%		
12	a	MTCL2008	MTCL1125/MT1091	33.2	26.0	32.3	20.5
37		MT2033	MT1285//03X378cE8/MT10102	33.2	26.0	32.7	20.5
5	a	MT2001	Yellowstone*4//Cap19/Vida/3/MT08185	32.3	27.5	30.1	22.5
7		MT2003	MT1088*2/Decade	32.2	28.0	32.8	19.5
1		Yellowstone	check	33.3	27.0	31.7	21.0
46		MT2042	MT1090/MT1276	32.3	30.5	32.6	21.5
42	a	MT2038	MT1088*2/SY Wolf	32.3	26.5	32.6	24.0
11	a	MTCL2007	MTCL1125/MT1091	33.0	26.5	32.7	24.0
2		Decade	check	34.8	28.5	32.9	21.0
41		MT2037	Northern//MT1088/SY Wolf	33.5	27.5	33.6	21.5
9		MTCL2005	MTCL1260//MTCL1125/MT1091	32.7	29.0	35.5	25.0
		Average	31.1	25.6	30.6	19.5	
		LSD (0.05)	1.6	2.2	2.6	3.3	
		C.V. (%)	2.4	4.4	4.1	8.4	
		P-value (Varieties)	<.0001	<.0001	<0.001	0.0009	

a = lines in 2021 Advanced Test (all other MT lines dropped from testing)

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 112. 2020 Preliminary A Test (Exp. 36): All Location Protein (%)

Entry	ID	Pedigree	Bozeman Bulk	Moccasin RCB	Huntley RCB	Hingham no	Ft. Benton no	3 Loc avg
		lattice efficiency relative to RCB			100%	data	data	
21	MT2017	MT10113//MT1145/MT10102	15.4	13.1	10.8			13.1
59	MT2055	MT10104//MTW0785/Yellowstone-Lr41	14.3	14.4	9.5			12.7
58	MT2054	MT10104//MTW0785/Yellowstone-Lr41	14.1	13.2	10.6			12.6
33	MT2029	MT1240//MT1088/02X172E31-4	14.8	12.8	10.2			12.6
50	MT2046	MT1240/Redfield	15.1	12.1	10.3			12.5
7	MT2003	MT1088*2/Decade	13.9	12.6	10.7			12.4
8	MT2004	MT1088*2/Decade	13.6	13.0	10.6			12.4
55	MT2051	Overland//MTW1098/KS08HW88	14.0	12.5	10.6			12.4
9	MTCL2005	MTCL1260//MTCL1125/MT1091	14.5	12.0	10.5			12.3
24	MT2020	Northern//MT1143/06X424B6	13.4	12.6	10.8			12.3
6	MT2002	MT0871//MT1088/Decade	13.5	11.9	11.1			12.2
25	MT2021	MT10113//((474-23, winter McNeal)/MT10121	13.6	11.9	11.0			12.2
61	MT2057	Robidoux//MT08185/MT0861	13.3	13.1	10.1			12.2
39	MT2035	MT1235//KS09HW140/MT10122	14.1	12.3	10.0			12.1
62	MT2058	MT10116//MT0861/MTW0785	13.9	12.4	10.1			12.1
45	MT2041	MT1088/MT1156	13.7	11.4	11.2			12.1
3	Warhorse	check	13.9	11.7	10.5			12.0
32	MT2028	MT10113//MT0871/MT1151	13.9	12.1	10.1			12.0
44	MT2040	MT1088/MT1156	14.1	11.7	10.2			12.0
19	MTCL2015	MT0871/(06X445B1-2, SY Clearstone sib)	12.9	11.6	11.4			12.0
2	Decade	check	13.5	11.8	10.5			11.9
51	MT2047	Yellowstone//((493-22, Reeder/6*Paul)/3/MT08	13.7	11.8	10.3			11.9
10	MTCL2006	MT1137/MTCL1067	13.3	11.6	10.8			11.9
14 a	MTCL2010	MT0871/(06X445B1-2, SY Clearstone sib)	12.8	12.4	10.5			11.9
16	MTCL2012	MT0871/(06X445B1-2, SY Clearstone sib)	12.6	11.7	11.3			11.9
41	MT2037	Northern//MT1088/SY Wolf	13.5	11.9	10.2			11.9
29	MT2025	YLL//Cap19/Vida	13.7	11.1	10.7			11.8
56	MT2052	Judith/OK06332//MT0990	13.4	11.9	10.2			11.8
12 a	MTCL2008	MTCL1125/MT1091	13.8	11.4	10.2			11.8
57	MT2053	HV9W04-1594R/Accipiter	13.4	11.7	10.2			11.8
30	MT2026	YLL//Cap19/Vida	13.5	11.5	10.2			11.7
64	MT2060	MT08185//YLL*2/PI640431/3/PROM/3*YLL/Y	13.3	11.8	10.1			11.7
17	MTCL2013	MT0871/(06X445B1-2, SY Clearstone sib)	12.7	11.5	10.9			11.7
63	MT2059	MT08185//YLL*2/PI640431/3/PROM/3*YLL/Y	12.8	11.4	10.9			11.7
11 a	MTCL2007	MTCL1125/MT1091	12.5	11.2	11.3			11.7
46	MT2042	MT1090/MT1276	13.1	12.0	9.9			11.7
15	MTCL2011	MT0871/(06X445B1-2, SY Clearstone sib)	13.0	12.1	9.8			11.6
31	MT2027	YLL//Cap19/Vida	13.2	11.5	10.1			11.6
53	MT2049	Colter//03X273cEx/MT10105	13.1	11.2	10.5			11.6
48	MT2044	MT1285/OK08539	12.6	11.3	10.8			11.6
54	MT2050	MT10121//Yellowstone/SD08W015	13.2	11.4	10.1			11.6
47 a	MT2043	MT1105//MT1156	12.7	11.0	10.9			11.5
36	MT2032	MT1285//03X378cE8/MT10102	12.8	11.4	10.3			11.5
5 a SM1	MT2001	Yellowstone*4//Cap19/Vida/3/MT08185	12.4	11.3	10.6			11.4
35 a w1	MTW2031	Northern//03X378cE8/MT0990	12.8	10.8	10.7			11.4
43	MT2039	Colter/MT1105	12.6	11.1	10.6			11.4
26	MT2022	Overland//((457-12, winter McNeal)/MT10128	13.4	11.0	9.8			11.4
49	MT2045	MT0871/NI10712	12.8	11.2	10.2			11.4
18 a	MTCL2014	MT0871/(06X445B1-2, SY Clearstone sib)	12.2	10.8	11.1			11.4
13 a	MTCL2009	MTCL1125/MT1091	12.6	10.9	10.5			11.3
27	w2 MTW2023	WB3768*2/(10K1726w, Yellowstone white)	12.8	10.7	10.5			11.3
34	w1 MTW2030	Northern//03X378cE8/MT0990	12.6	11.4	10.0			11.3
37	MT2033	MT1285//03X378cE8/MT10102	12.4	11.1	10.4			11.3
22	MT2018	MT1149//MT10102/MT10116	12.4	11.4	10.0			11.3
38	MT2034	MT1285//03X378cE8/MT10102	12.5	11.1	10.2			11.3
1	Yellowstone	check	12.7	10.8	10.1			11.2

Table 112. 2020 Preliminary A Test (Exp. 36): All Location Protein (%)

Entry	ID	Pedigree	Bozeman Bulk	Moccasin RCB	Huntley RCB	Hingham no	Ft. Benton no	3 Loc avg
	w = white							
		lattice efficiency relative to RCB			100%	data	data	
40	w1 MTW2036	MT1235//KS09HW140/MT10122	12.5	10.6	10.5			11.2
52	MT2048	Northern//02X22cE38/MT10121	12.2	10.6	10.7			11.2
4	SY Monument	check	12.7	10.8	9.9			11.1
42 a	MT2038	MT1088*2/SY Wolf	12.1	11.1	10.0			11.1
60 a	MT2056	(Northern sib, MT0977)//MT0859/MT0938	12.1	9.8	11.2			11.0
23 a	MT2019	MT10114/MT10128//MTW1251	12.4	11.0	9.6			11.0
28 a	MT2024	Northern//(10K1676w, Yellowstone white)/WB:	12.4	10.5	10.0			11.0
20	MT2016	MT1137/MT1078//MT1149	12.4	10.2	10.0			10.9
Average			13.2	11.6	10.4			11.8
LSD (0.05)				1.0	0.6			0.9
C.V. (%)				4.4	2.8			5.0
P-value (Varieties)				<.0001	<0.001			0.0005

a = lines in 2021 Advanced Test (all other MT lines dropped from testing)

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 113. 2020 Preliminary A Test (Exp. 36): Rust Disease Evaluations

		Stripe Rust					
Entry	ID	Pullman, WA		MT. Vernon, WA			
		Flowering		Stem elong.		Milk	
	w = white	IT ^{1/}	%	IT ^{1/}	%	IT ^{1/}	%
1	Yellowstone	8	10	2	15	3	10
2	Decade	-	-	-	-	-	-
3	Warhorse	8	5	2	20	2	10
4	SY Monument	8	15	2	10	2	5
5	a SM1 MT2001	5	5	2	15	2	5
6	MT2002	5	5	3	20	2	10
7	MT2003	5	20	3	20	2	5
8	MT2004	8	10	2	15	2	5
9	MTCL2005	8	10	2	15	2	10
10	MTCL2006	8	15	2	15	3	30
11	a MTCL2007	5	15	2	10	2	5
12	a MTCL2008	5	15	2	15	2	10
13	a MTCL2009	5	10	2	15	2	5
14	a MTCL2010	5	10	2	15	2	10
15	MTCL2011	5	10	2	15	2	10
16	MTCL2012	5	20	2	15	2	10
17	MTCL2013	5	20	2	15	2	10
18	a MTCL2014	5	20	2	15	2	5
19	MTCL2015	5	15	2	15	2	10
20	MT2016	5	5	2	15	2	10
21	MT2017	5	5	2	15	2	5
22	MT2018	5	10	2	10	2	5
23	a MT2019	5	10	2	5	2	5
24	MT2020	5	5	2	10	2	5
25	MT2021	8	20	8	50	8	70
26	MT2022	8	20	2	20	3	20
27	w2 MTW2023	5	10	2	15	2	10
28	a MT2024	5	25	2	20	2	10
29	MT2025	5	60	2	15	2	10
30	MT2026	5	60	2	15	2	10
31	MT2027	5	10	3	20	2	10
32	MT2028	8	15	3	30	8	70
33	MT2029	5	10	3	20	2	10
34	w1 MTW2030	3	2	2	20	2	10
35	a w1 MTW2031	3	5	3	20	2	10
36	MT2032	5	10	3	20	2	10
37	MT2033	5	15	3	30	2	10
38	MT2034	5	20	3	30	2	10
39	MT2035	5	15	2	15	2	10
40	w1 MTW2036	5	20	2	15	2	10
41	MT2037	8	15	2	15	2	10
42	a MT2038	8	25	2	5	2	5
43	MT2039	5	20	2	20	2	5
44	MT2040	5	10	2	20	5	40
45	MT2041	5	10	2	20	2	10
46	MT2042	5	15	2	20	2	10
47	a MT2043	5	10	2	20	2	5
48	MT2044	5	10	2	20	2	5
49	MT2045	3	2	2	15	2	5
50	MT2046	5	20	3	30	5	50

Table 113. 2020 Preliminary A Test (Exp. 36): Rust Disease Evaluations

		Stripe Rust					
Entry	ID	Pullman, WA		MT. Vernon, WA			
		Flowering		Stem elong.		Milk	
	w = white	IT ^{1/}	%	IT ^{1/}	%	IT ^{1/}	%
51	MT2047	5	10	2	10	2	5
52	MT2048	5	10	2	10	2	5
53	MT2049	5	15	2	10	2	5
54	MT2050	8	20	2	15	2	15
55	MT2051	5	10	2	20	2	10
56	MT2052	5	10	2	15	2	15
57	MT2053	8	60	3	30	2	10
58	MT2054	3	5	2	10	2	5
59	MT2055	5	10	2	10	2	5
60 a	MT2056	5	10	2	15	2	5
61	MT2057	8	10	2	15	2	10
62	MT2058	8	15	2	5	2	10
63	MT2059	5	20	2	5	2	10
64	MT2060	5	25	2	5	2	10
Average		15		17		12	

a = lines in 2020 Advanced Test (all other MT lines dropped from testing)

separated by "," for most plants with the first IT and few plants with the second IT or connected with "-" for entries containing continuous ITs.

** = indicates highest value within a column

* = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 114. 2020 Preliminary B Fhb Test: All location Summary

Entry #	ID	Pedigree	Yield bu/ac	Test weight lb/bu	Heading date Julian	Plant height in	FHB %	Protein %
	d = lines with low SDS w = white							
		locations	3	3	3	3	1	3
33	MT20175	MT1332/DecadeFhb1-DH17	81.9	58.2	165.5	34.0	49.4	12.7
21 a	MT20163	DecadeFhb1-DH11/Overland FHB-1	80.7	60.8	162.6	33.4	39.4	14.3
32	MT20174	MT1332/DecadeFhb1-DH17	80.7	58.5	164.5	35.3	41.3	13.1
9	MT19132	MT1078//Colter/Emerson	80.0	59.2	167.4	34.8	29.9	13.5
35	MT20177	MT1332/DecadeFhb1-DH17	78.8	58.1	165.8	34.4	47.8	12.8
24 a d	MT20166	DecadeFhb1-DH11/Overland FHB-1	77.0	60.2	165.6	32.4	33.7	14.6
28 a	MT20170	09x257cD9-2/DecadeFhb1-DH7	76.2	60.6	166.1	32.5	28.7	14.2
22 a d	MT20164	DecadeFhb1-DH11/Overland FHB-1	76.1	60.2	167.5	33.6	29.1	14.0
4	MT19106	09x257cD9-2/DecadeFhb1-DH7	75.8	58.0	168.8	33.3	42.6	13.2
30	MT20172	09x257cD9-2/DecadeFhb1-DH7	75.7	58.0	165.5	30.4	48.3	14.9
7	MT19122	DecadeFhb1-DH11/Overland FHB-1	75.1	60.2	165.4	32.3	34.3	14.7
10	MT19133	MT1078//Judee/Emerson	74.5	58.3	167.5	35.5	47.1	13.1
34	MT20176	MT1332/DecadeFhb1-DH17	73.4	59.3	162.4	33.1	62.8	13.7
46	MT19115	DecadeFhb1-DH11/Overland FHB-1	73.1	60.8	164.4	33.2	51.8	14.3
18	MT20160	DecadeFhb1-DH11/Overland FHB-1	72.8	57.7	168.2	31.6	57.1	13.8
42	MT20184	MT1444*2/Decade Fhb1-DH9	72.5	58.5	168.6	34.8	37.8	13.5
2	MT1793	Decade/WesleyFHB1-106BC2F4-10	71.8	59.5	164.4	31.6	37.8	14.9
44	MT19123	DecadeFhb1-DH13//MT1078/Langin	71.7	59.0	170.1	34.3	33.9	14.7
17	Emerson	check	71.5	61.1	169.0	36.1	19.8	14.6
23 d	MT20165	DecadeFhb1-DH11/Overland FHB-1	71.0	59.9	163.0	31.4	42.8	13.8
25	MT20167	09x257cD9-2/DecadeFhb1-DH7	70.7	58.3	166.8	30.9	44.1	14.6
31	MT20173	MT1332/DecadeFhb1-DH17	70.7	57.5	167.8	35.2	50.7	12.9
39	MT20181	MT1444*2/Decade Fhb1-DH9	70.5	57.1	169.1	33.6	57.7	13.0
15	MT19183	MT1078//AAC Gateway/MT1265	69.7	57.8	169.9	34.0	43.7	13.6
5	MT19116	DecadeFhb1-DH11/Overland FHB-1	69.0	61.3	160.4	32.0	44.3	14.9
12	MT19142	MT1332/DecadeFhb1-DH17	68.8	57.7	168.3	34.1	58.7	13.1
20	MT20162	DecadeFhb1-DH11/Overland FHB-1	67.7	57.6	168.7	31.0	62.5	13.3
6	MT19117	DecadeFhb1-DH11/Overland FHB-1	67.4	57.7	166.4	33.5	54.5	14.0
1	Decade	Check	67.3	57.8	166.7	33.8	44.7	13.7
45	MT19134	MT1078//Judee/Emerson	67.2	56.0	168.7	32.4	61.7	13.5
8	MT19128	DecadeFhb1-DH13//MT1078/Langin	66.5	56.8	170.3	32.9	45.5	13.9
19	MT20161	DecadeFhb1-DH11/Overland FHB-1	65.7	57.7	165.3	30.9	54.8	14.7
27	MT20169	09x257cD9-2/DecadeFhb1-DH7	64.6	58.1	166.0	28.7	52.1	14.8
36	MT20178	MT1444*2/Decade Fhb1-DH9	64.1	57.7	168.5	30.4	46.4	14.0
41 d	MT20183	MT1444*2/Decade Fhb1-DH9	63.5	57.8	171.9	34.7	43.7	12.7
11	MT19135	MT1078//Judee/Emerson	63.4	55.8	171.4	34.4	60.4	14.5
47	MT19143	MTS1596//Emerson/Spur	63.4	59.5	167.0	29.8	55.1	15.4
40	MT20182	MT1444*2/Decade Fhb1-DH9	63.1	59.0	168.2	32.7	39.4	13.6
38	MT20180	MT1444*2/Decade Fhb1-DH9	62.9	59.2	167.1	31.3	42.8	13.7
26 d	MT20168	09x257cD9-2/DecadeFhb1-DH7	62.3	57.0	167.9	32.4	56.8	14.5
13	MT1915	MTS1596//Emerson/Spur	61.7	57.1	171.1	30.9	56.9	13.4
49	MT19145	MTS1596//Emerson/Spur	61.7	55.7	170.4	28.7	64.8	14.0
3	MTS18149	Loma*2/AAC Gateway	61.4	56.8	172.2	31.4	50.3	13.9
43	MT20185	MT1444*2/Decade Fhb1-DH9	61.1	58.3	169.2	33.7	42.2	13.8
29	MT20171	09x257cD9-2/DecadeFhb1-DH7	60.2	58.1	167.0	30.0	51.3	15.0
37	MT20179	MT1444*2/Decade Fhb1-DH9	60.0	59.0	165.4	30.5	50.4	14.6
16	Yellowstone	check	58.4	56.1	170.4	33.4	55.0	12.9
48	MT19144	MTS1596//Emerson/Spur	58.3	57.8	171.5	31.5	52.7	14.1
14	MT1916	MTS1596//Emerson/Spur	55.3	56.0	170.0	30.1	52.9	14.7
Average			68.9	58.3	167.5	32.6	47.2	13.9
LSD (0.05)			ns	3.0	1.9	1.7	10.1	0.9
C.V. (%)			14.5	3.2	0.7	3.2	8.1	3.9

a = lines in 2021 Advanced Test (all other MT lines dropped from testing)

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p=0.05)

Table 115. 2020 Preliminary B FHB Test: Bozeman

Entry #	ID	Pedigree	Yield bu/ac	Test weight lb/bu	Heading date Julian	Plant height in	Protein %
		w = white d = lines with low SDS	LAT	LAT	LAT	RCB	bulk
		Lattice efficiency over RCB (%)	153%	209%	124%	99%	
45	MT19134	MT1078/Judee/Emerson	103.8	62.6	172.0	32.1	12.9
12	MT19142	MT1332/DecadeFhb1-DH17	97.3	62.4	172.3	35.4	13.2
15	MT19183	MT1078/AAC Gateway/MT1265	96.7	63.5	173.9	33.3	13.3
39	MT20181	MT1444*2/Decade Fhb1-DH9	96.5	62.3	173.8	33.5	13.0
33	MT20175	MT1332/DecadeFhb1-DH17	96.3	62.2	168.8	32.9	13.0
42	MT20184	MT1444*2/Decade Fhb1-DH9	96.0	63.5	173.7	34.8	13.5
10	MT19133	MT1078/Judee/Emerson	95.9	62.2	171.9	35.6	12.5
4	MT19106	09x257cD9-2/DecadeFhb1-DH7	95.6	61.4	172.8	32.5	13.6
18	MT20160	DecadeFhb1-DH11/Overland FHB-1	95.3	62.7	172.3	30.9	13.5
11	MT19135	MT1078/Judee/Emerson	94.8	61.7	175.1	33.3	14.2
22 a d	MT20164	DecadeFhb1-DH11/Overland FHB-1	94.0	63.4	171.8	32.5	13.8
8	MT19128	DecadeFhb1-DH13//MT1078/Langin	93.4	62.2	173.5	32.3	13.8
24 a d	MT20166	DecadeFhb1-DH11/Overland FHB-1	93.3	63.0	168.1	31.7	14.5
20	MT20162	DecadeFhb1-DH11/Overland FHB-1	92.8	62.5	172.1	29.5	13.1
6	MT19117	DecadeFhb1-DH11/Overland FHB-1	92.8	62.9	170.9	32.1	14.2
7	MT19122	DecadeFhb1-DH11/Overland FHB-1	92.1	63.3	167.4	32.7	14.6
31	MT20173	MT1332/DecadeFhb1-DH17	91.9	61.2	173.0	36.2	12.9
35	MT20177	MT1332/DecadeFhb1-DH17	91.8	62.0	169.3	33.9	12.9
13	MT1915	MTS1596//Emerson/Spur	91.0	63.0	175.2	29.7	13.2
44	MT19123	DecadeFhb1-DH13//MT1078/Langin	91.0	62.9	174.3	33.1	13.9
9	MT19132	MT1078/Colter/Emerson	90.9	62.5	171.9	33.5	13.3
30	MT20172	09x257cD9-2/DecadeFhb1-DH7	90.7	62.2	168.5	29.9	14.3
49	MT19145	MTS1596//Emerson/Spur	89.9	61.1	173.5	27.2	13.3
21 a	MT20163	DecadeFhb1-DH11/Overland FHB-1	89.7	63.7	165.7	33.5	14.7
25	MT20167	09x257cD9-2/DecadeFhb1-DH7	89.6	62.1	169.7	30.1	14.3
46	MT19115	DecadeFhb1-DH11/Overland FHB-1	89.4	64.6	167.5	32.5	14.5
32	MT20174	MT1332/DecadeFhb1-DH17	88.7	61.7	168.4	32.9	13.3
28 a	MT20170	09x257cD9-2/DecadeFhb1-DH7	88.6	63.6	171.7	32.5	14.2
26 d	MT20168	09x257cD9-2/DecadeFhb1-DH7	88.4	62.7	172.6	31.3	13.9
36	MT20178	MT1444*2/Decade Fhb1-DH9	88.3	63.2	173.7	29.7	14.1
1	Decade	Check	87.9	62.6	169.4	33.1	14.1
3	MTS18149	Loma*2/AAC Gateway	86.0	61.2	175.4	30.5	13.0
14	MT1916	MTS1596//Emerson/Spur	85.2	62.6	173.1	28.9	13.5
19	MT20161	DecadeFhb1-DH11/Overland FHB-1	84.9	63.7	168.2	31.1	14.5
34	MT20176	MT1332/DecadeFhb1-DH17	84.8	63.0	166.1	32.1	14.2
47	MT19143	MTS1596//Emerson/Spur	84.7	63.4	171.0	29.5	14.7
41 d	MT20183	MT1444*2/Decade Fhb1-DH9	84.6	62.0	175.5	34.3	12.7
17	Emerson	check	84.2	63.6	174.6	36.0	14.1
27	MT20169	09x257cD9-2/DecadeFhb1-DH7	83.4	63.1	168.2	28.7	14.8
29	MT20171	09x257cD9-2/DecadeFhb1-DH7	82.3	62.6	171.1	30.5	14.8
2	MT1793	Decade/WesleyFHB1-106BC2F4-10	80.8	63.1	167.9	31.3	15.2
43	MT20185	MT1444*2/Decade Fhb1-DH9	79.7	63.3	174.5	33.3	13.8
16	Yellowstone	check	79.3	61.2	174.5	32.1	13.2
48	MT19144	MTS1596//Emerson/Spur	78.3	64.0	175.0	30.5	13.9
38	MT20180	MT1444*2/Decade Fhb1-DH9	76.5	63.3	171.0	30.9	14.5
40	MT20182	MT1444*2/Decade Fhb1-DH9	76.2	63.8	172.8	30.9	13.9
37	MT20179	MT1444*2/Decade Fhb1-DH9	75.1	63.5	171.6	29.3	14.9
23 d	MT20165	DecadeFhb1-DH11/Overland FHB-1	74.9	63.0	165.9	30.9	14.3
5	MT19116	DecadeFhb1-DH11/Overland FHB-1	69.8	63.6	164.0	31.5	15.6
Average			88.3	62.7	171.3	32.0	13.9
LSD (0.05)			10.4	0.9	1.9	2.5	
C.V. (%)			5.3	0.6	0.5	3.8	
P-value (Varieties)			<.0001	<.0001	<.0001	<.0001	

a = lines in 2021 Advanced Test (all other MT lines dropped from testing)

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 116. 2020 Preliminary B FHB Test: Huntley

Entry #	ID	Pedigree	Yield bu/ac	Test weight lb/bu	Winter Survival (0-9)	Heading date Julian	Plant height in	Foliar disease rating ^{1/} 13-Jul	FHB %	DON ppm	Grain moisture %	Protein %
w = white d = lines with low SDS			LAT	LAT	LAT	LAT	RCB	LAT	LAT	LAT	RCB	LAT
Lattice efficiency over RCB (%)			110%	107%	116%	118%	100%	97%	118%	119%	100%	119%
21 a	MT20163	DecadeFhb1-DH11/Overland FHB-1	78.0	57.6	8.2	157.0	38.9	2.7	39.4	5	9.5	14.7
32	MT20174	MT1332/DecadeFhb1-DH17	72.9	53.7	8.0	157.8	39.3	4.7	41.3	26	9.4	13.6
24 a d	MT20166	DecadeFhb1-DH11/Overland FHB-1	69.0	55.7	7.3	159.8	37.3	2.0	33.7	11	9.6	15.5
9	MT19132	MT1078/Colter/Emerson	68.5	54.8	7.7	162.4	40.6	2.7	29.9	25	10.1	14.8
28 a	MT20170	09x257cD9-2/DecadeFhb1-DH7	66.4	56.5	8.1	157.8	37.4	3.0	28.7	12	9.3	14.9
5	MT19116	DecadeFhb1-DH11/Overland FHB-1	66.2	58.2	7.9	154.4	37.2	3.3	44.3	4	9.5	15.1
33	MT20175	MT1332/DecadeFhb1-DH17	66.0	53.3	8.3	159.4	38.4	3.3	49.4	28	8.7	13.1
35	MT20177	MT1332/DecadeFhb1-DH17	63.7	52.6	7.8	158.1	37.3	5.0	47.8	23	9.6	13.5
2	MT1793	Decade/WesleyFHB1-106BC2F4-10	62.8	54.0	7.9	160.0	36.6	5.0	37.8	19	8.5	15.8
22 a d	MT20164	DecadeFhb1-DH11/Overland FHB-1	62.6	55.6	7.6	162.5	39.3	2.0	29.1	20	9.9	14.9
34	MT20176	MT1332/DecadeFhb1-DH17	61.5	53.6	8.2	156.0	38.6	5.0	62.8	22	9.0	14.0
23 d	MT20165	DecadeFhb1-DH11/Overland FHB-1	61.2	55.3	7.6	157.9	35.8	4.0	42.8	18	9.5	14.4
30	MT20172	09x257cD9-2/DecadeFhb1-DH7	61.1	53.2	7.9	160.4	34.1	3.0	48.3	18	9.5	16.0
7	MT19122	DecadeFhb1-DH11/Overland FHB-1	60.3	55.8	7.3	159.9	36.5	2.0	34.3	13	9.7	15.5
17	Emerson	check	55.7	58.0	7.8	163.5	40.0	2.7	19.8	20	9.8	15.7
44	MT19123	DecadeFhb1-DH13/MT1078/Langin	53.9	53.6	8.5	163.1	39.2	3.0	33.9	22	8.9	16.4
46	MT19115	DecadeFhb1-DH11/Overland FHB-1	53.8	55.5	8.3	158.6	38.5	1.7	51.8	12	9.2	14.4
10	MT19133	MT1078/Judee/Emerson	52.8	52.2	8.3	161.7	38.3	2.7	47.1	28	9.6	14.8
25	MT20167	09x257cD9-2/DecadeFhb1-DH7	52.4	53.0	7.8	161.7	35.1	2.7	44.1	23	9.3	16.0
4	MT19106	09x257cD9-2/DecadeFhb1-DH7	49.1	52.9	7.7	162.8	37.0	2.7	42.6	18	9.4	14.3
31	MT20173	MT1332/DecadeFhb1-DH17	46.2	50.8	7.5	161.5	38.7	4.0	50.7	37	8.7	14.1
38	MT20180	MT1444*2/Decade Fhb1-DH9	44.0	52.8	7.6	160.4	35.0	4.7	42.8	26	8.9	14.3
40	MT20182	MT1444*2/Decade Fhb1-DH9	43.8	51.8	7.3	161.4	37.8	3.7	39.4	28	8.9	14.1
42	MT20184	MT1444*2/Decade Fhb1-DH9	43.4	50.9	7.5	162.0	39.3	4.0	37.8	35	9.4	14.8
18	MT20160	DecadeFhb1-DH11/Overland FHB-1	42.8	49.6	7.7	162.2	35.7	1.0	57.1	31	9.0	14.8
37	MT20179	MT1444*2/Decade Fhb1-DH9	42.2	52.5	7.3	156.6	34.1	5.0	50.4	21	9.1	15.0
1	Decade	Check	38.8	49.8	8.0	161.7	38.8	2.3	44.7	34	8.8	15.1
27	MT20169	09x257cD9-2/DecadeFhb1-DH7	38.5	51.4	7.7	160.1	31.5	5.0	52.1	17	8.8	16.6
15	MT19183	MT1078/AAC Gateway/MT1265	38.2	48.8	8.3	163.5	37.5	3.0	43.7	43	8.6	14.6
20	MT20162	DecadeFhb1-DH11/Overland FHB-1	37.3	49.2	8.2	162.1	35.2	2.3	62.5	20	8.7	14.6
19	MT20161	DecadeFhb1-DH11/Overland FHB-1	37.2	48.2	7.4	160.0	33.9	2.0	54.8	16	8.6	16.4
39	MT20181	MT1444*2/Decade Fhb1-DH9	35.9	49.0	8.3	162.8	38.5	4.0	57.7	55	9.2	13.7
47	MT19143	MTS1596/Emerson/Spur	35.9	53.0	7.1	161.4	33.0	2.0	55.1	17	9.5	17.4
43	MT20185	MT1444*2/Decade Fhb1-DH9	35.7	50.3	7.9	163.5	38.1	2.7	42.2	41	9.3	14.6
36	MT20178	MT1444*2/Decade Fhb1-DH9	35.0	50.0	7.7	162.5	36.0	4.0	46.4	26	9.3	14.7
6	MT19117	DecadeFhb1-DH11/Overland FHB-1	35.0	48.9	8.2	160.9	39.9	1.3	54.5	40	8.2	14.9
41	MT20183	MT1444*2/Decade Fhb1-DH9	34.0	51.2	7.4	165.0	39.5	3.7	43.7	42	9.8	13.6
29	MT20171	09x257cD9-2/DecadeFhb1-DH7	33.2	50.6	6.9	160.6	31.8	5.0	51.3	21	9.3	17.0
8	MT19128	DecadeFhb1-DH13/MT1078/Langin	31.5	47.9	8.4	164.3	38.2	3.7	45.5	49	9.6	15.0
12	MT19142	MT1332/DecadeFhb1-DH17	30.7	50.1	7.6	163.6	37.5	3.0	58.7	50	9.1	14.1
26 d	MT20168	09x257cD9-2/DecadeFhb1-DH7	29.0	48.2	8.0	161.8	35.8	3.0	56.8	50	9.2	16.0

Table 116. 2020 Preliminary B FHB Test: Huntley

Entry #	ID	Pedigree	Yield bu/ac	Test weight lb/bu	Winter Survival (0-9)	Heading date Julian	Plant height in	Foliar disease rating ^{1/} 13-Jul	FHB % LAT	DON ppm LAT	Grain moist- ure % RCB	Protein % LAT
		Lattice efficiency over RCB (%)	LAT	LAT	LAT	LAT	RCB	97%	118%	119%	100%	119%
49	MT19145	MTS1596//Emerson/Spur	27.6	46.6	7.4	163.7	33.0	2.0	64.8	27	10.0	15.7
45	MT19134	MT1078//Judee/Emerson	27.6	44.9	7.4	163.5	37.1	4.0	61.7	61	10.4	15.2
16	Yellowstone	check	24.2	46.6	7.4	164.5	38.7	3.7	55.0	73	9.3	13.6
13	MT1915	MTS1596//Emerson/Spur	23.2	47.4	8.2	164.5	36.1	3.3	56.9	33	9.5	15.0
48	MT19144	MTS1596//Emerson/Spur	22.7	48.3	8.0	165.6	35.4	4.0	52.7	33	10.4	15.5
3	MTS18149	Loma*2/AAC Gateway	20.9	50.3	7.5	165.8	35.7	3.3	50.3	34	9.8	16.2
11	MT19135	MT1078//Judee/Emerson	19.7	44.9	7.3	166.2	38.7	1.3	60.4	63	9.8	16.1
14	MT1916	MTS1596//Emerson/Spur	12.8	45.2	7.8	166.8	35.0	3.3	52.9	37	8.6	17.3
Average			45.0	51.5	7.8	161.5	37.0	3.2	47.2	29.0	9.3	15.0
LSD (0.05)			10.0	2.7	0.1	1.9	2.0	0.9	10.1	14.6	0.8	0.4
C.V. (%)			13.0	3.1	6.2	0.7	3.4	17.1	8.1	11.7	2.8	1.5
P-value (Varieties)			<0.001	<0.001	0.052	<0.001	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.001

a = lines in 2021 Advanced Test (all other MT lines dropped from testing)

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 117. 2020 Preliminary B FHB Test: Minot, ND

Entry #	ID	Pedigree	Yield bu/ac	Test weight lb/bu	Stand %	Heading date Julian	Plant height in	Visual Scab %	Grain moisture %	Protein %
	w = white d = lines with low SDS		RCB	RCB	RCB	RCB	RCB	RCB	RCB	RCB
33	MT20175	MT1332/DecadeFhb1-DH17	83.5	59.2	92	168.3	30.6	1.0	11.9	12.0
4	MT19106	09x257cD9-2/DecadeFhb1-DH7	82.7	59.7	90	170.7	30.3	1.7	13.3	11.7
35	MT20177	MT1332/DecadeFhb1-DH17	80.8	59.6	90	170.0	31.9	2.0	13.1	12.1
9	MT19132	MT1078//Colter/Emerson	80.6	60.4	97	168.0	30.3	3.0	12.6	12.4
18	MT20160	DecadeFhb1-DH11/Overland FHB-1	80.4	60.7	96	170.0	28.2	2.3	12.4	13.0
32	MT20174	MT1332/DecadeFhb1-DH17	80.4	60.0	90	167.3	33.7	2.3	12.3	12.3
39	MT20181	MT1444*2/Decade Fhb1-DH9	79.1	60.0	94	170.7	28.9	1.7	12.9	12.3
12	MT19142	MT1332/DecadeFhb1-DH17	78.5	60.6	95	169.0	29.4	1.0	12.3	12.0
42	MT20184	MT1444*2/Decade Fhb1-DH9	78.2	61.1	95	170.0	30.4	1.7	14.2	12.3
3	MTS18149	Loma*2/AAC Gateway	77.3	59.0	93	175.3	28.1	2.0	14.0	12.4
23	d MT20165	DecadeFhb1-DH11/Overland FHB-1	76.9	61.3	93	165.3	27.6	2.3	12.2	12.6
46	MT19115	DecadeFhb1-DH11/Overland FHB-1	76.0	62.4	99	167.0	28.7	1.3	13.1	13.9
11	MT19135	MT1078//Judee/Emerson	75.7	60.9	99	173.0	31.2	3.0	12.8	13.2
30	MT20172	09x257cD9-2/DecadeFhb1-DH7	75.3	58.7	96	167.7	27.2	3.7	12.1	14.3
1	Decade	check	75.1	61.1	98	169.0	29.4	2.7	13.0	12.0
19	MT20161	DecadeFhb1-DH11/Overland FHB-1	74.9	61.2	92	167.7	27.6	1.3	12.4	13.3
10	MT19133	MT1078//Judee/Emerson	74.7	60.5	94	169.0	32.5	2.0	16.0	12.0
6	MT19117	DecadeFhb1-DH11/Overland FHB-1	74.5	61.2	99	167.3	28.6	1.0	13.2	12.9
8	MT19128	DecadeFhb1-DH13//MT1078/Langin	74.5	60.4	94	173.0	28.2	1.0	12.7	12.8
17	Emerson	check	74.5	61.8	93	169.0	32.4	1.7	13.8	14.0
21	a MT20163	DecadeFhb1-DH11/Overland FHB-1	74.5	61.2	89	165.0	27.7	1.7	13.2	13.5
15	MT19183	MT1078//AAC Gateway/MT1265	74.3	61.2	91	172.3	31.1	2.3	13.9	12.9
31	MT20173	MT1332/DecadeFhb1-DH17	74.0	60.4	92	169.0	30.7	1.3	12.2	11.8
34	MT20176	MT1332/DecadeFhb1-DH17	74.0	61.2	96	165.0	28.5	1.0	12.6	13.0
48	MT19144	MTS1596//Emerson/Spur	73.8	61.0	93	174.0	28.5	1.0	14.5	13.0
28	a MT20170	09x257cD9-2/DecadeFhb1-DH7	73.6	61.8	93	168.7	27.6	2.0	12.1	13.6
20	MT20162	DecadeFhb1-DH11/Overland FHB-1	73.1	61.0	92	172.0	28.3	1.3	12.1	12.3
7	MT19122	DecadeFhb1-DH11/Overland FHB-1	72.8	61.6	93	169.0	27.7	1.3	13.5	14.0
41	d MT20183	MT1444*2/Decade Fhb1-DH9	71.9	60.1	82	175.3	30.4	1.7	15.0	11.7
16	Yellowstone	check	71.8	60.4	85	172.3	29.3	3.0	13.0	12.0
22	a d MT20164	DecadeFhb1-DH11/Overland FHB-1	71.8	61.7	92	168.3	29.0	1.3	14.0	13.4
27	MT20169	09x257cD9-2/DecadeFhb1-DH7	71.8	59.9	93	169.7	25.9	2.3	12.0	13.1
2	MT1793	Decade/WesleyFHB1-106BC2F4-10	71.7	61.5	94	165.3	27.0	4.0	12.6	13.7
5	MT19116	DecadeFhb1-DH11/Overland FHB-1	71.1	62.0	98	162.7	27.2	1.0	11.7	14.0
13	MT1915	MTS1596//Emerson/Spur	70.9	61.0	93	173.7	26.9	2.3	14.6	11.9
45	MT19134	MT1078//Judee/Emerson	70.3	60.5	93	170.7	28.0	3.7	13.2	12.3
44	MT19123	DecadeFhb1-DH13//MT1078/Langin	70.2	60.4	91	173.0	30.6	1.7	14.1	13.8
25	MT20167	09x257cD9-2/DecadeFhb1-DH7	70.1	59.8	92	169.0	27.6	3.3	12.7	13.6
26	d MT20168	09x257cD9-2/DecadeFhb1-DH7	69.6	60.0	78	169.3	30.1	1.7	12.9	13.7
47	MT19143	MTS1596//Emerson/Spur	69.5	62.1	91	168.7	26.9	1.7	13.3	14.0
40	MT20182	MT1444*2/Decade Fhb1-DH9	69.2	61.4	77	170.3	29.3	1.0	13.5	12.9
36	MT20178	MT1444*2/Decade Fhb1-DH9	68.9	59.8	80	169.3	25.5	1.0	12.7	13.1
24	a d MT20166	DecadeFhb1-DH11/Overland FHB-1	68.8	61.9	80	169.0	28.1	1.3	13.2	13.9
38	MT20180	MT1444*2/Decade Fhb1-DH9	68.3	61.4	95	170.0	28.1	2.3	12.9	12.4
14	MT1916	MTS1596//Emerson/Spur	67.9	60.2	97	170.0	26.5	4.3	12.2	13.3
43	MT20185	MT1444*2/Decade Fhb1-DH9	67.9	61.4	65	169.7	29.7	1.0	12.7	13.0
49	MT19145	MTS1596//Emerson/Spur	67.7	59.5	88	174.0	25.9	1.7	13.4	13.1
29	MT20171	09x257cD9-2/DecadeFhb1-DH7	65.1	61.1	99	169.3	27.6	2.7	12.4	13.2
37	MT20179	MT1444*2/Decade Fhb1-DH9	62.8	61.0	82	168.0	28.1	1.7	12.4	14.0
Average			73.5	60.7	91.2	169.6	28.8	1.9	13.0	12.9
LSD (0.05)			6.3	1.0	15.0	1.7	1.8	ns	1.3	1.2
C.V. (%)			5.3	1.0	10.2	0.6	3.9	80.4	6.2	5.7
P-value (Varieties)			<.0001	<.0001	0.0379	<.0001	<.0001	0.6336	<.0001	<.0001

a = lines in 2021 Advanced Test (all other MT lines dropped from testing)

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 118. 2020 Preliminary B FHB Test: Williston Single Rows

Entry #	ID	Pedigree	Winter survival % RCB
	w = white d = lines with low SDS		21-May
46	MT19115	DecadeFhb1-DH11/Overland FHB-1	97.5
23	d MT20165	DecadeFhb1-DH11/Overland FHB-1	95.0
24	a d MT20166	DecadeFhb1-DH11/Overland FHB-1	95.0
7	MT19122	DecadeFhb1-DH11/Overland FHB-1	92.5
10	MT19133	MT1078/Judee/Emerson	90.0
15	MT19183	MT1078/AAC Gateway/MT1265	90.0
19	MT20161	DecadeFhb1-DH11/Overland FHB-1	90.0
40	MT20182	MT1444*2/Decade Fhb1-DH9	90.0
47	MT19143	MTS1596/Emerson/Spur	90.0
11	MT19135	MT1078/Judee/Emerson	85.0
29	MT20171	09x257cD9-2/DecadeFhb1-DH7	85.0
37	MT20179	MT1444*2/Decade Fhb1-DH9	85.0
38	MT20180	MT1444*2/Decade Fhb1-DH9	85.0
44	MT19123	DecadeFhb1-DH13/MT1078/Langin	85.0
49	MT19145	MTS1596/Emerson/Spur	85.0
41	d MT20183	MT1444*2/Decade Fhb1-DH9	82.5
48	MT19144	MTS1596/Emerson/Spur	82.5
21	a MT20163	DecadeFhb1-DH11/Overland FHB-1	80.0
4	MT19106	09x257cD9-2/DecadeFhb1-DH7	77.5
5	MT19116	DecadeFhb1-DH11/Overland FHB-1	77.5
8	MT19128	DecadeFhb1-DH13/MT1078/Langin	77.5
9	MT19132	MT1078/Colter/Emerson	77.5
14	MT1916	MTS1596/Emerson/Spur	77.5
18	MT20160	DecadeFhb1-DH11/Overland FHB-1	77.5
35	MT20177	MT1332/DecadeFhb1-DH17	77.5
13	MT1915	MTS1596/Emerson/Spur	75.0
3	MTS18149	Loma*2/AAC Gateway	72.5
17	Emerson	check	72.5
32	MT20174	MT1332/DecadeFhb1-DH17	72.5
22	a d MT20164	DecadeFhb1-DH11/Overland FHB-1	70.0
25	MT20167	09x257cD9-2/DecadeFhb1-DH7	70.0
43	MT20185	MT1444*2/Decade Fhb1-DH9	70.0
6	MT19117	DecadeFhb1-DH11/Overland FHB-1	65.0
20	MT20162	DecadeFhb1-DH11/Overland FHB-1	65.0
28	a MT20170	09x257cD9-2/DecadeFhb1-DH7	65.0
31	MT20173	MT1332/DecadeFhb1-DH17	65.0
42	MT20184	MT1444*2/Decade Fhb1-DH9	65.0
12	MT19142	MT1332/DecadeFhb1-DH17	62.5
1	Decade	Check	60.0
33	MT20175	MT1332/DecadeFhb1-DH17	60.0
34	MT20176	MT1332/DecadeFhb1-DH17	60.0
39	MT20181	MT1444*2/Decade Fhb1-DH9	60.0
2	MT1793	Decade/WesleyFHB1-106BC2F4-10	57.5
26	d MT20168	09x257cD9-2/DecadeFhb1-DH7	57.5
36	MT20178	MT1444*2/Decade Fhb1-DH9	55.0
45	MT19134	MT1078/Judee/Emerson	52.5
30	MT20172	09x257cD9-2/DecadeFhb1-DH7	50.0
27	MT20169	09x257cD9-2/DecadeFhb1-DH7	47.5
16	Yellowstone	check	45.0
Average			73.9
LSD (0.05)			ns
C.V. (%)			25.3
P-value (Varieties)			0.4216

a = lines in 2021 Advanced Test (all other MT lines dropped from testing)

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 119. 2020 Preliminary B Fhb Test: All location Yield (bu/a)

Entry	ID	Pedigree	Bozeman LAT	Huntley LAT	Minot RCB	3 Loc avg
	d = lines with low SDS					
		lattice efficiency relative to RCB	153%	110%		
33	MT20175	MT1332/DecadeFhb1-DH17	96.3	66.0	83.5	81.9
21 a	MT20163	DecadeFhb1-DH11/Overland FHB-1	89.7	78.0	74.5	80.7
32	MT20174	MT1332/DecadeFhb1-DH17	88.7	72.9	80.4	80.7
9	MT19132	MT1078//Colter/Emerson	90.9	68.5	80.6	80.0
35	MT20177	MT1332/DecadeFhb1-DH17	91.8	63.7	80.8	78.8
24 a d	MT20166	DecadeFhb1-DH11/Overland FHB-1	93.3	69.0	68.8	77.0
28 a	MT20170	09x257cD9-2/DecadeFhb1-DH7	88.6	66.4	73.6	76.2
22 a d	MT20164	DecadeFhb1-DH11/Overland FHB-1	94.0	62.6	71.8	76.1
4	MT19106	09x257cD9-2/DecadeFhb1-DH7	95.6	49.1	82.7	75.8
30	MT20172	09x257cD9-2/DecadeFhb1-DH7	90.7	61.1	75.3	75.7
7	MT19122	DecadeFhb1-DH11/Overland FHB-1	92.1	60.3	72.8	75.1
10	MT19133	MT1078//Judee/Emerson	95.9	52.8	74.7	74.5
34	MT20176	MT1332/DecadeFhb1-DH17	84.8	61.5	74.0	73.4
46	MT19115	DecadeFhb1-DH11/Overland FHB-1	89.4	53.8	76.0	73.1
18	MT20160	DecadeFhb1-DH11/Overland FHB-1	95.3	42.8	80.4	72.8
42	MT20184	MT1444*2/Decade Fhb1-DH9	96.0	43.4	78.2	72.5
2	MT1793	Decade/WesleyFHB1-106BC2F4-10	80.8	62.8	71.7	71.8
44	MT19123	DecadeFhb1-DH13//MT1078/Langin	91.0	53.9	70.2	71.7
17	Emerson	check	84.2	55.7	74.5	71.5
23 d	MT20165	DecadeFhb1-DH11/Overland FHB-1	74.9	61.2	76.9	71.0
25	MT20167	09x257cD9-2/DecadeFhb1-DH7	89.6	52.4	70.1	70.7
31	MT20173	MT1332/DecadeFhb1-DH17	91.9	46.2	74.0	70.7
39	MT20181	MT1444*2/Decade Fhb1-DH9	96.5	35.9	79.1	70.5
15	MT19183	MT1078//AAC Gateway/MT1265	96.7	38.2	74.3	69.7
5	MT19116	DecadeFhb1-DH11/Overland FHB-1	69.8	66.2	71.1	69.0
12	MT19142	MT1332/DecadeFhb1-DH17	97.3	30.7	78.5	68.8
20	MT20162	DecadeFhb1-DH11/Overland FHB-1	92.8	37.3	73.1	67.7
6	MT19117	DecadeFhb1-DH11/Overland FHB-1	92.8	35.0	74.5	67.4
1	Decade	Check	87.9	38.8	75.1	67.3
45	MT19134	MT1078//Judee/Emerson	103.8	27.6	70.3	67.2
8	MT19128	DecadeFhb1-DH13//MT1078/Langin	93.4	31.5	74.5	66.5
19	MT20161	DecadeFhb1-DH11/Overland FHB-1	84.9	37.2	74.9	65.7
27	MT20169	09x257cD9-2/DecadeFhb1-DH7	83.4	38.5	71.8	64.6
36	MT20178	MT1444*2/Decade Fhb1-DH9	88.3	35.0	68.9	64.1
41 d	MT20183	MT1444*2/Decade Fhb1-DH9	84.6	34.0	71.9	63.5
11	MT19135	MT1078//Judee/Emerson	94.8	19.7	75.7	63.4
47	MT19143	MTS1596//Emerson/Spur	84.7	35.9	69.5	63.4
40	MT20182	MT1444*2/Decade Fhb1-DH9	76.2	43.8	69.2	63.1
38	MT20180	MT1444*2/Decade Fhb1-DH9	76.5	44.0	68.3	62.9
26 d	MT20168	09x257cD9-2/DecadeFhb1-DH7	88.4	29.0	69.6	62.3
13	MT1915	MTS1596//Emerson/Spur	91.0	23.2	70.9	61.7
49	MT19145	MTS1596//Emerson/Spur	89.9	27.6	67.7	61.7
3	MTS18149	Loma*2/AAC Gateway	86.0	20.9	77.3	61.4
43	MT20185	MT1444*2/Decade Fhb1-DH9	79.7	35.7	67.9	61.1
29	MT20171	09x257cD9-2/DecadeFhb1-DH7	82.3	33.2	65.1	60.2
37	MT20179	MT1444*2/Decade Fhb1-DH9	75.1	42.2	62.8	60.0
16	Yellowstone	check	79.3	24.2	71.8	58.4
48	MT19144	MTS1596//Emerson/Spur	78.3	22.7	73.8	58.3
14	MT1916	MTS1596//Emerson/Spur	85.2	12.8	67.9	55.3
Average			88.3	45.0	73.5	68.9
LSD (0.05)			10.4	10.0	6.3	ns
C.V. (%)			5.3	13.0	5.3	14.5
P-value (Varieties)			<.0001	<.0001	<.0001	0.1040

a = lines in 2021 Advanced Test (all other MT lines dropped from testing)

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 120. 2020 Preliminary B Fhb Test: All location Test Weight (lb/bu)

Entry	ID	Pedigree	Bozeman LAT	Huntley LAT	Minot RCB	3 Loc avg
		d = lines with low SDS				
		lattice efficiency relative to RCB	209%	107%		
5	MT19116	DecadeFhb1-DH11/Overland FHB-1	63.6	58.2	62.0	61.3
17	Emerson	check	63.6	58.0	61.8	61.1
46	MT19115	DecadeFhb1-DH11/Overland FHB-1	64.6	55.5	62.4	60.8
21 a	MT20163	DecadeFhb1-DH11/Overland FHB-1	63.7	57.6	61.2	60.8
28 a	MT20170	09x257cD9-2/DecadeFhb1-DH7	63.6	56.5	61.8	60.6
24 a d	MT20166	DecadeFhb1-DH11/Overland FHB-1	63.0	55.7	61.9	60.2
22 a d	MT20164	DecadeFhb1-DH11/Overland FHB-1	63.4	55.6	61.7	60.2
7	MT19122	DecadeFhb1-DH11/Overland FHB-1	63.3	55.8	61.6	60.2
23 d	MT20165	DecadeFhb1-DH11/Overland FHB-1	63.0	55.3	61.3	59.9
47	MT19143	MTS1596//Emerson/Spur	63.4	53.0	62.1	59.5
2	MT1793	Decade/WesleyFHB1-106BC2F4-10	63.1	54.0	61.5	59.5
34	MT20176	MT1332/DecadeFhb1-DH17	63.0	53.6	61.2	59.3
38	MT20180	MT1444*2/Decade Fhb1-DH9	63.3	52.8	61.4	59.2
9	MT19132	MT1078//Colter/Emerson	62.5	54.8	60.4	59.2
44	MT19123	DecadeFhb1-DH13//MT1078/Langin	62.9	53.6	60.4	59.0
40	MT20182	MT1444*2/Decade Fhb1-DH9	63.8	51.8	61.4	59.0
37	MT20179	MT1444*2/Decade Fhb1-DH9	63.5	52.5	61.0	59.0
42	MT20184	MT1444*2/Decade Fhb1-DH9	63.5	50.9	61.1	58.5
32	MT20174	MT1332/DecadeFhb1-DH17	61.7	53.7	60.0	58.5
43	MT20185	MT1444*2/Decade Fhb1-DH9	63.3	50.3	61.4	58.3
25	MT20167	09x257cD9-2/DecadeFhb1-DH7	62.1	53.0	59.8	58.3
10	MT19133	MT1078//Judee/Emerson	62.2	52.2	60.5	58.3
33	MT20175	MT1332/DecadeFhb1-DH17	62.2	53.3	59.2	58.2
35	MT20177	MT1332/DecadeFhb1-DH17	62.0	52.6	59.6	58.1
29	MT20171	09x257cD9-2/DecadeFhb1-DH7	62.6	50.6	61.1	58.1
27	MT20169	09x257cD9-2/DecadeFhb1-DH7	63.1	51.4	59.9	58.1
30	MT20172	09x257cD9-2/DecadeFhb1-DH7	62.2	53.2	58.7	58.0
4	MT19106	09x257cD9-2/DecadeFhb1-DH7	61.4	52.9	59.7	58.0
48	MT19144	MTS1596//Emerson/Spur	64.0	48.3	61.0	57.8
41 d	MT20183	MT1444*2/Decade Fhb1-DH9	62.0	51.2	60.1	57.8
15	MT19183	MT1078//AAC Gateway/MT1265	63.5	48.8	61.2	57.8
1	Decade	Check	62.6	49.8	61.1	57.8
36	MT20178	MT1444*2/Decade Fhb1-DH9	63.2	50.0	59.8	57.7
19	MT20161	DecadeFhb1-DH11/Overland FHB-1	63.7	48.2	61.2	57.7
18	MT20160	DecadeFhb1-DH11/Overland FHB-1	62.7	49.6	60.7	57.7
12	MT19142	MT1332/DecadeFhb1-DH17	62.4	50.1	60.6	57.7
6	MT19117	DecadeFhb1-DH11/Overland FHB-1	62.9	48.9	61.2	57.7
20	MT20162	DecadeFhb1-DH11/Overland FHB-1	62.5	49.2	61.0	57.6
31	MT20173	MT1332/DecadeFhb1-DH17	61.2	50.8	60.4	57.5
39	MT20181	MT1444*2/Decade Fhb1-DH9	62.3	49.0	60.0	57.1
13	MT1915	MTS1596//Emerson/Spur	63.0	47.4	61.0	57.1
26 d	MT20168	09x257cD9-2/DecadeFhb1-DH7	62.7	48.2	60.0	57.0
8	MT19128	DecadeFhb1-DH13//MT1078/Langin	62.2	47.9	60.4	56.8
3	MTS18149	Loma*2//AAC Gateway	61.2	50.3	59.0	56.8
16	Yellowstone	check	61.2	46.6	60.4	56.1
45	MT19134	MT1078//Judee/Emerson	62.6	44.9	60.5	56.0
14	MT1916	MTS1596//Emerson/Spur	62.6	45.2	60.2	56.0
11	MT19135	MT1078//Judee/Emerson	61.7	44.9	60.9	55.8
49	MT19145	MTS1596//Emerson/Spur	61.1	46.6	59.5	55.7
Average			62.7	51.5	60.7	58.3
LSD (0.05)			0.9	2.7	1.0	3.0
C.V. (%)			0.6	3.1	1.0	3.2
P-value (Varieties)			<.0001	<0.001	<.0001	0.0101

a = lines in 2021 Advanced Test (all other MT lines dropped from testing)

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 121. 2020 Preliminary B Fhb Test: All location Heading Date (days from Jan 1)

Entry	ID	Pedigree	Bozeman LAT	Huntley LAT	Minot RCB	3 Loc avg
		d = lines with low SDS				
		lattice efficiency relative to RCB	124%	118%		
5	MT19116	DecadeFhb1-DH11/Overland FHB-1	164.0	154.4	162.7	160.4
34	MT20176	MT1332/DecadeFhb1-DH17	166.1	156.0	165.0	162.4
21 a	MT20163	DecadeFhb1-DH11/Overland FHB-1	165.7	157.0	165.0	162.6
23 d	MT20165	DecadeFhb1-DH11/Overland FHB-1	165.9	157.9	165.3	163.0
2	MT1793	Decade/WesleyFHB1-106BC2F4-10	167.9	160.0	165.3	164.4
46	MT19115	DecadeFhb1-DH11/Overland FHB-1	167.5	158.6	167.0	164.4
32	MT20174	MT1332/DecadeFhb1-DH17	168.4	157.8	167.3	164.5
19	MT20161	DecadeFhb1-DH11/Overland FHB-1	168.2	160.0	167.7	165.3
7	MT19122	DecadeFhb1-DH11/Overland FHB-1	167.4	159.9	169.0	165.4
37	MT20179	MT1444*2/Decade Fhb1-DH9	171.6	156.6	168.0	165.4
30	MT20172	09x257cD9-2/DecadeFhb1-DH7	168.5	160.4	167.7	165.5
33	MT20175	MT1332/DecadeFhb1-DH17	168.8	159.4	168.3	165.5
24 a d	MT20166	DecadeFhb1-DH11/Overland FHB-1	168.1	159.8	169.0	165.6
35	MT20177	MT1332/DecadeFhb1-DH17	169.3	158.1	170.0	165.8
27	MT20169	09x257cD9-2/DecadeFhb1-DH7	168.2	160.1	169.7	166.0
28 a	MT20170	09x257cD9-2/DecadeFhb1-DH7	171.7	157.8	168.7	166.1
6	MT19117	DecadeFhb1-DH11/Overland FHB-1	170.9	160.9	167.3	166.4
1	Decade	Check	169.4	161.7	169.0	166.7
25	MT20167	09x257cD9-2/DecadeFhb1-DH7	169.7	161.7	169.0	166.8
29	MT20171	09x257cD9-2/DecadeFhb1-DH7	171.1	160.6	169.3	167.0
47	MT19143	MTS1596/Emerson/Spur	171.0	161.4	168.7	167.0
38	MT20180	MT1444*2/Decade Fhb1-DH9	171.0	160.4	170.0	167.1
9	MT19132	MT1078/Colter/Emerson	171.9	162.4	168.0	167.4
10	MT19133	MT1078/Judee/Emerson	171.9	161.7	169.0	167.5
22 a d	MT20164	DecadeFhb1-DH11/Overland FHB-1	171.8	162.5	168.3	167.5
31	MT20173	MT1332/DecadeFhb1-DH17	173.0	161.5	169.0	167.8
26 d	MT20168	09x257cD9-2/DecadeFhb1-DH7	172.6	161.8	169.3	167.9
18	MT20160	DecadeFhb1-DH11/Overland FHB-1	172.3	162.2	170.0	168.2
40	MT20182	MT1444*2/Decade Fhb1-DH9	172.8	161.4	170.3	168.2
12	MT19142	MT1332/DecadeFhb1-DH17	172.3	163.6	169.0	168.3
36	MT20178	MT1444*2/Decade Fhb1-DH9	173.7	162.5	169.3	168.5
42	MT20184	MT1444*2/Decade Fhb1-DH9	173.7	162.0	170.0	168.6
20	MT20162	DecadeFhb1-DH11/Overland FHB-1	172.1	162.1	172.0	168.7
45	MT19134	MT1078/Judee/Emerson	172.0	163.5	170.7	168.7
4	MT19106	09x257cD9-2/DecadeFhb1-DH7	172.8	162.8	170.7	168.8
17	Emerson	check	174.6	163.5	169.0	169.0
39	MT20181	MT1444*2/Decade Fhb1-DH9	173.8	162.8	170.7	169.1
43	MT20185	MT1444*2/Decade Fhb1-DH9	174.5	163.5	169.7	169.2
15	MT19183	MT1078/AAC Gateway/MT1265	173.9	163.5	172.3	169.9
14	MT1916	MTS1596/Emerson/Spur	173.1	166.8	170.0	170.0
44	MT19123	DecadeFhb1-DH13/MT1078/Langin	174.3	163.1	173.0	170.1
8	MT19128	DecadeFhb1-DH13/MT1078/Langin	173.5	164.3	173.0	170.3
16	Yellowstone	check	174.5	164.5	172.3	170.4
49	MT19145	MTS1596/Emerson/Spur	173.5	163.7	174.0	170.4
13	MT1915	MTS1596/Emerson/Spur	175.2	164.5	173.7	171.1
11	MT19135	MT1078/Judee/Emerson	175.1	166.2	173.0	171.4
48	MT19144	MTS1596/Emerson/Spur	175.0	165.6	174.0	171.5
41 d	MT20183	MT1444*2/Decade Fhb1-DH9	175.5	165.0	175.3	171.9
3	MTS18149	Loma*2/AAC Gateway	175.4	165.8	175.3	172.2
Average			171.3	161.5	169.6	167.5
LSD (0.05)			1.9	1.9	1.7	1.9
C.V. (%)			0.5	0.7	0.6	0.7
P-value (Varieties)			<.0001	<0.001	<.0001	<.0001

a = lines in 2021 Advanced Test (all other MT lines dropped from testing)

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 122. 2020 Preliminary B Fhb Test: All location Plant Height (in)

Entry	ID	Pedigree	Bozeman RCB	Huntley RCB	Minot RCB	3 Loc avg
		d = lines with low SDS				
		lattice efficiency relative to RCB	99%	100%		
27	MT20169	09x257cD9-2/DecadeFhb1-DH7	28.7	31.5	25.9	28.7
49	MT19145	MTS1596//Emerson/Spur	27.2	33.0	25.9	28.7
47	MT19143	MTS1596//Emerson/Spur	29.5	33.0	26.9	29.8
29	MT20171	09x257cD9-2/DecadeFhb1-DH7	30.5	31.8	27.6	30.0
14	MT1916	MTS1596//Emerson/Spur	28.9	35.0	26.5	30.1
30	MT20172	09x257cD9-2/DecadeFhb1-DH7	29.9	34.1	27.2	30.4
36	MT20178	MT1444*2/Decade Fhb1-DH9	29.7	36.0	25.5	30.4
37	MT20179	MT1444*2/Decade Fhb1-DH9	29.3	34.1	28.1	30.5
13	MT1915	MTS1596//Emerson/Spur	29.7	36.1	26.9	30.9
19	MT20161	DecadeFhb1-DH11/Overland FHB-1	31.1	33.9	27.6	30.9
25	MT20167	09x257cD9-2/DecadeFhb1-DH7	30.1	35.1	27.6	30.9
20	MT20162	DecadeFhb1-DH11/Overland FHB-1	29.5	35.2	28.3	31.0
38	MT20180	MT1444*2/Decade Fhb1-DH9	30.9	35.0	28.1	31.3
3	MTS18149	Loma*2/AAC Gateway	30.5	35.7	28.1	31.4
23	d MT20165	DecadeFhb1-DH11/Overland FHB-1	30.9	35.8	27.6	31.4
48	MT19144	MTS1596//Emerson/Spur	30.5	35.4	28.5	31.5
2	MT1793	Decade/WesleyFHB1-106BC2F4-10	31.3	36.6	27.0	31.6
18	MT20160	DecadeFhb1-DH11/Overland FHB-1	30.9	35.7	28.2	31.6
5	MT19116	DecadeFhb1-DH11/Overland FHB-1	31.5	37.2	27.2	32.0
7	MT19122	DecadeFhb1-DH11/Overland FHB-1	32.7	36.5	27.7	32.3
24	a d MT20166	DecadeFhb1-DH11/Overland FHB-1	31.7	37.3	28.1	32.4
26	d MT20168	09x257cD9-2/DecadeFhb1-DH7	31.3	35.8	30.1	32.4
45	MT19134	MT1078//Judee/Emerson	32.1	37.1	28.0	32.4
28	a MT20170	09x257cD9-2/DecadeFhb1-DH7	32.5	37.4	27.6	32.5
40	MT20182	MT1444*2/Decade Fhb1-DH9	30.9	37.8	29.3	32.7
8	MT19128	DecadeFhb1-DH13//MT1078/Langin	32.3	38.2	28.2	32.9
34	MT20176	MT1332/DecadeFhb1-DH17	32.1	38.6	28.5	33.1
46	MT19115	DecadeFhb1-DH11/Overland FHB-1	32.5	38.5	28.7	33.2
4	MT19106	09x257cD9-2/DecadeFhb1-DH7	32.5	37.0	30.3	33.3
16	Yellowstone	check	32.1	38.7	29.3	33.4
21	a MT20163	DecadeFhb1-DH11/Overland FHB-1	33.5	38.9	27.7	33.4
6	MT19117	DecadeFhb1-DH11/Overland FHB-1	32.1	39.9	28.6	33.5
22	a d MT20164	DecadeFhb1-DH11/Overland FHB-1	32.5	39.3	29.0	33.6
39	MT20181	MT1444*2/Decade Fhb1-DH9	33.5	38.5	28.9	33.6
43	MT20185	MT1444*2/Decade Fhb1-DH9	33.3	38.1	29.7	33.7
1	Decade	Check	33.1	38.8	29.4	33.8
15	MT19183	MT1078//AAC Gateway/MT1265	33.3	37.5	31.1	34.0
33	MT20175	MT1332/DecadeFhb1-DH17	32.9	38.4	30.6	34.0
12	MT19142	MT1332/DecadeFhb1-DH17	35.4	37.5	29.4	34.1
44	MT19123	DecadeFhb1-DH13//MT1078/Langin	33.1	39.2	30.6	34.3
11	MT19135	MT1078//Judee/Emerson	33.3	38.7	31.2	34.4
35	MT20177	MT1332/DecadeFhb1-DH17	33.9	37.3	31.9	34.4
41	d MT20183	MT1444*2/Decade Fhb1-DH9	34.3	39.5	30.4	34.7
9	MT19132	MT1078//Colter/Emerson	33.5	40.6	30.3	34.8
42	MT20184	MT1444*2/Decade Fhb1-DH9	34.8	39.3	30.4	34.8
31	MT20173	MT1332/DecadeFhb1-DH17	36.2	38.7	30.7	35.2
32	MT20174	MT1332/DecadeFhb1-DH17	32.9	39.3	33.7	35.3
10	MT19133	MT1078//Judee/Emerson	35.6	38.3	32.5	35.5
17	Emerson	check	36.0	40.0	32.4	36.1
Average			32.0	37.0	28.8	32.6
LSD (0.05)			2.5	2.0	1.8	1.7
C.V. (%)			3.8	3.4	3.9	3.2
P-value (Varieties)			<.0001	<0.001	<.0001	<.0001

a = lines in 2021 Advanced Test (all other MT lines dropped from testing)

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 123. 2020 Preliminary B Fhb Test: All location Protein (%)

Entry	ID	Pedigree	Bozeman bulk	Huntley LAT	Minot RCB	3 Loc avg
		d = lines with low SDS				
		lattice efficiency relative to RCB		119%		
47	MT19143	MTS1596//Emerson/Spur	14.7	17.4	14.0	15.4
29	MT20171	09x257cD9-2/DecadeFhb1-DH7	14.8	17.0	13.2	15.0
2	MT1793	Decade/WesleyFHB1-106BC2F4-10	15.2	15.8	13.7	14.9
5	MT19116	DecadeFhb1-DH11/Overland FHB-1	15.6	15.1	14.0	14.9
30	MT20172	09x257cD9-2/DecadeFhb1-DH7	14.3	16.0	14.3	14.9
27	MT20169	09x257cD9-2/DecadeFhb1-DH7	14.8	16.6	13.1	14.8
19	MT20161	DecadeFhb1-DH11/Overland FHB-1	14.5	16.4	13.3	14.7
7	MT19122	DecadeFhb1-DH11/Overland FHB-1	14.6	15.5	14.0	14.7
14	MT1916	MTS1596//Emerson/Spur	13.5	17.3	13.3	14.7
44	MT19123	DecadeFhb1-DH13//MT1078/Langin	13.9	16.4	13.8	14.7
24 a d	MT20166	DecadeFhb1-DH11/Overland FHB-1	14.5	15.5	13.9	14.6
25	MT20167	09x257cD9-2/DecadeFhb1-DH7	14.3	16.0	13.6	14.6
37	MT20179	MT1444*2/Decade Fhb1-DH9	14.9	15.0	14.0	14.6
17	Emerson	check	14.1	15.7	14.0	14.6
26 d	MT20168	09x257cD9-2/DecadeFhb1-DH7	13.9	16.0	13.7	14.5
11	MT19135	MT1078//Judee/Emerson	14.2	16.1	13.2	14.5
21 a	MT20163	DecadeFhb1-DH11/Overland FHB-1	14.7	14.7	13.5	14.3
46	MT19115	DecadeFhb1-DH11/Overland FHB-1	14.5	14.4	13.9	14.3
28 a	MT20170	09x257cD9-2/DecadeFhb1-DH7	14.2	14.9	13.6	14.2
48	MT19144	MTS1596//Emerson/Spur	13.9	15.5	13.0	14.1
22 a d	MT20164	DecadeFhb1-DH11/Overland FHB-1	13.8	14.9	13.4	14.0
49	MT19145	MTS1596//Emerson/Spur	13.3	15.7	13.1	14.0
6	MT19117	DecadeFhb1-DH11/Overland FHB-1	14.2	14.9	12.9	14.0
36	MT20178	MT1444*2/Decade Fhb1-DH9	14.1	14.7	13.1	14.0
3	MTS18149	Loma*2/AAC Gateway	13.0	16.2	12.4	13.9
8	MT19128	DecadeFhb1-DH13//MT1078/Langin	13.8	15.0	12.8	13.9
43	MT20185	MT1444*2/Decade Fhb1-DH9	13.8	14.6	13.0	13.8
18	MT20160	DecadeFhb1-DH11/Overland FHB-1	13.5	14.8	13.0	13.8
23 d	MT20165	DecadeFhb1-DH11/Overland FHB-1	14.3	14.4	12.6	13.8
1	Decade	Check	14.1	15.1	12.0	13.7
34	MT20176	MT1332/DecadeFhb1-DH17	14.2	14.0	13.0	13.7
38	MT20180	MT1444*2/Decade Fhb1-DH9	14.5	14.3	12.4	13.7
40	MT20182	MT1444*2/Decade Fhb1-DH9	13.9	14.1	12.9	13.6
15	MT19183	MT1078//AAC Gateway/MT1265	13.3	14.6	12.9	13.6
42	MT20184	MT1444*2/Decade Fhb1-DH9	13.5	14.8	12.3	13.5
9	MT19132	MT1078//Colter/Emerson	13.3	14.8	12.4	13.5
45	MT19134	MT1078//Judee/Emerson	12.9	15.2	12.3	13.5
13	MT1915	MTS1596//Emerson/Spur	13.2	15.0	11.9	13.4
20	MT20162	DecadeFhb1-DH11/Overland FHB-1	13.1	14.6	12.3	13.3
4	MT19106	09x257cD9-2/DecadeFhb1-DH7	13.6	14.3	11.7	13.2
10	MT19133	MT1078//Judee/Emerson	12.5	14.8	12.0	13.1
12	MT19142	MT1332/DecadeFhb1-DH17	13.2	14.1	12.0	13.1
32	MT20174	MT1332/DecadeFhb1-DH17	13.3	13.6	12.3	13.1
39	MT20181	MT1444*2/Decade Fhb1-DH9	13.0	13.7	12.3	13.0
16	Yellowstone	check	13.2	13.6	12.0	12.9
31	MT20173	MT1332/DecadeFhb1-DH17	12.9	14.1	11.8	12.9
35	MT20177	MT1332/DecadeFhb1-DH17	12.9	13.5	12.1	12.8
33	MT20175	MT1332/DecadeFhb1-DH17	13.0	13.1	12.0	12.7
41 d	MT20183	MT1444*2/Decade Fhb1-DH9	12.7	13.6	11.7	12.7
Average			13.9	15.0	12.9	13.9
LSD (0.05)				0.4	1.2	0.9
C.V. (%)				1.5	5.7	3.9
P-value (Varieties)				<0.001	<.0001	<.0001

a = lines in 2021 Advanced Test (all other MT lines dropped from testing)

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 124. 2020 Preliminary C Sawfly Test: All location Summary

Entry #	ID	Pedigree	Yield bu/ac	Test weight lb/bu	Heading date Julian	Plant height in	Stem solid (5-25)	Protein %
d = SDS discard								
		locations	2	2	1	2	2	2
42 a	MTS20122	MTS1704//Denali/(MTS1589, Bobcat sib)	80.1	62.9	171.5	27.4	23.2	13.2
3	Loma	check	78.4	61.0	174.0	25.7	22.5	13.4
20 a	MTS20100	MTS1584/2*Loma	78.2	60.2	174.0	27.2	24.2	12.9
14 a	MTS2094	MTS1584/2*Loma	78.1	61.3	172.0	23.5	23.7	12.7
13	MTS2093	MTS1584/2*Loma	76.4	61.5	174.5	24.9	21.5	13.0
10	MTS2090	MTS1584/2*Loma	75.5	60.4	172.0	24.7	22.4	14.0
24	MTS20104	Loma*2/MTS1574	75.3	59.8	174.5	25.9	22.6	13.1
8	MTS2088	MTS1584/2*Loma	75.0	59.0	174.0	27.5	21.7	14.0
22	MTS20102	Loma*2/MTS1574	74.5	60.3	172.5	27.1	21.6	13.6
19	d MTS2099	MTS1584/2*Loma	74.2	61.3	174.5	24.9	23.0	13.1
25	MTS20105	Loma*2/MTS1574	73.6	60.0	174.0	24.4	21.9	13.2
45	MTS20125	MTS1704//Denali/(MTS1589, Bobcat sib)	73.5	63.2	171.5	25.6	22.7	13.0
4	Bobcat	check	73.4	62.1	173.5	24.2	24.7	13.2
6	MTS2086	Warhorse/MT1078	73.0	61.6	172.0	26.0	23.9	13.6
16	MTS2096	MTS1584/2*Loma	72.8	60.3	173.5	26.0	23.8	12.8
23	MTS20103	Loma*2/MTS1574	72.3	60.4	174.5	26.2	21.3	12.8
21	MTS20101	MTS1584*2/Loma	71.7	61.9	173.5	26.4	24.2	13.5
26	MTS20106	Loma*2/MTS1574	71.6	61.8	172.0	26.4	20.8	14.0
18	MTS2098	MTS1584/2*Loma	71.5	60.9	174.0	26.7	23.4	13.4
27	MTS20107	MT1332//Loma/MTS1574	71.3	63.1	173.0	27.1	18.0	13.7
33	MTS20113	MTS1584/07x76cF90	71.2	59.9	171.0	26.5	22.7	13.0
36	MTS20116	MTS1704//Denali/(MTS1589, Bobcat sib)	71.1	63.6	169.5	26.8	22.3	13.7
5	w4 d MTS2085	Warhorse/MT1078	70.7	60.3	173.0	29.1	24.3	13.7
46	MTS20126	MTS1704//Denali/(MTS1589, Bobcat sib)	70.6	62.1	167.5	26.3	20.7	13.3
30	MTS20110	MTS1584/07x76cF90	70.3	62.2	171.5	27.2	21.4	14.0
32	MTS20112	MTS1584/07x76cF90	70.1	61.0	167.5	26.8	24.0	13.5
15	MTS2095	MTS1584/2*Loma	69.5	61.8	174.0	26.3	22.4	13.8
12	MTS2092	MTS1584/2*Loma	69.4	61.9	175.0	25.0	22.4	13.4
17	MTS2097	MTS1584/2*Loma	69.0	59.3	174.0	27.2	21.2	14.1
1	Yellowstone	check	68.9	60.6	175.0	28.0	8.5	13.5
38	MTS20118	MTS1704//Denali/(MTS1589, Bobcat sib)	68.8	61.8	172.5	24.4	22.2	13.8
11	MTS2091	MTS1584/2*Loma	68.6	59.7	172.0	26.0	23.7	13.5
37	MTS20117	MTS1704//Denali/(MTS1589, Bobcat sib)	68.5	63.1	166.5	26.3	22.7	13.9
39	MTS20119	MTS1704//Denali/(MTS1589, Bobcat sib)	67.2	62.6	169.0	27.9	23.2	13.7
28	MTS20108	MT1332//Loma/MTS1574	66.9	60.8	174.0	26.4	20.5	13.8
40	MTS20120	MTS1704//Denali/(MTS1589, Bobcat sib)	66.8	61.5	174.0	25.2	20.2	14.5
43	MTS20123	MTS1704//Denali/(MTS1589, Bobcat sib)	66.7	62.1	165.0	24.8	22.5	14.0
29	MTS20109	MT1332//Loma/MTS1574	66.0	61.4	172.5	24.4	21.5	14.1
2	Warhorse	check	65.9	61.0	172.0	26.5	24.2	14.2
47	MTS20127	MTS1704//Denali/(MTS1589, Bobcat sib)	65.8	61.5	171.0	23.5	23.2	14.3
34	MTS20114	MTS1584/07x76cF90	64.5	63.0	171.5	26.6	24.8	14.3
35	MTS20115	MTS1704//Denali/(MTS1589, Bobcat sib)	64.3	63.1	169.5	23.9	21.1	14.7
9	MTS2089	MTS1584/2*Loma	64.3	60.5	173.0	28.2	23.8	14.1
31	MTS20111	MTS1584/07x76cF90	64.2	63.0	172.0	26.8	23.5	14.3
41	MTS20121	MTS1704//Denali/(MTS1589, Bobcat sib)	62.3	62.8	169.0	23.5	23.8	14.3
44	d MTS20124	MTS1704//Denali/(MTS1589, Bobcat sib)	60.7	62.9	169.5	22.0	23.9	14.6
49	MTS20129	MTS1704//Denali/(MTS1589, Bobcat sib)	59.1	63.0	166.0	25.5	23.6	14.1
48	MTS20128	MTS1704//Denali/(MTS1589, Bobcat sib)	58.0	61.3	173.0	23.8	24.2	14.1
7	MTS2087	Warhorse/MT1078	56.3	61.3	171.0	26.0	24.6	14.1
Average			69.7	61.4	172.0	25.9	22.4	13.7
LSD (0.05)			10.4	1.1	2.0	2.6	2.0	0.7
C.V. (%)			7.4	0.9	0.6	5.0	4.5	2.6

a = lines in 2021 Advanced Test (all other MT lines dropped from testing)

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 125. 2020 Preliminary C Sawfly Test: Bozeman

Entry #	ID	Pedigree	Yield bu/ac	Test weight lb/bu	Heading date Julian	Plant height in	Stem solid (5-25)	Protein %
	d = SDS discard		LAT	LAT	RCB	LAT	LAT	bulk
		Lattice efficiency over RCB (%)	108%	144%	101%	107%	116%	
14 a	MTS2094	MTS1584/2*Loma	98.9	61.8	172.0	28.3	23.3	12.5
20 a	MTS20100	MTS1584/2*Loma	98.3	60.9	174.0	30.9	23.8	12.5
3	Loma	check	96.2	61.6	174.0	30.0	21.1	13.2
13	MTS2093	MTS1584/2*Loma	95.6	62.0	174.5	28.2	21.9	12.7
8	MTS2088	MTS1584/2*Loma	94.0	61.2	174.0	30.6	20.0	13.6
24	MTS20104	Loma*2/MTS1574	93.7	60.4	174.5	30.0	20.7	12.7
11	MTS2091	MTS1584/2*Loma	93.2	60.8	172.0	30.0	23.5	12.9
15	MTS2095	MTS1584/2*Loma	92.9	62.9	174.0	30.7	21.0	13.1
25	MTS20105	Loma*2/MTS1574	92.9	60.9	174.0	28.1	20.5	12.9
42 a	MTS20122	MTS1704//Denali/(MTS1589, Bobcat sib)	92.6	63.3	171.5	29.1	22.3	13.4
12	MTS2092	MTS1584/2*Loma	92.4	62.4	175.0	30.0	20.6	12.8
18	MTS2098	MTS1584/2*Loma	91.3	61.8	174.0	30.1	22.6	13.0
19	d MTS2099	MTS1584/2*Loma	90.2	61.3	174.5	27.3	21.6	13.0
17	MTS2097	MTS1584/2*Loma	90.0	60.5	174.0	31.3	19.8	13.8
27	MTS20107	MT1332//Loma/MTS1574	89.6	64.3	173.0	29.9	17.1	13.6
10	MTS2090	MTS1584/2*Loma	89.5	61.5	172.0	27.5	21.6	13.6
21	MTS20101	MTS1584*2/Loma	89.4	62.9	173.5	30.4	23.7	13.1
22	MTS20102	Loma*2/MTS1574	88.4	60.8	172.5	30.4	20.3	13.5
16	MTS2096	MTS1584/2*Loma	88.2	60.7	173.5	29.9	22.9	12.9
45	MTS20125	MTS1704//Denali/(MTS1589, Bobcat sib)	87.5	64.1	171.5	28.6	22.3	13.0
23	MTS20103	Loma*2/MTS1574	87.4	61.5	174.5	29.8	19.4	12.6
5	w4 d MTS2085	Warhorse/MT1078	87.1	61.3	173.0	32.5	24.6	13.3
36	MTS20116	MTS1704//Denali/(MTS1589, Bobcat sib)	87.1	64.8	169.5	28.8	21.5	13.8
1	Yellowstone	check	87.0	61.6	175.0	33.0	7.9	13.0
30	MTS20110	MTS1584/07x76cF90	86.7	63.3	171.5	30.6	20.2	13.7
26	MTS20106	Loma*2/MTS1574	86.7	63.0	172.0	30.0	18.4	13.9
37	MTS20117	MTS1704//Denali/(MTS1589, Bobcat sib)	86.3	63.9	166.5	28.3	22.7	14.1
6	MTS2086	Warhorse/MT1078	86.0	62.1	172.0	30.3	22.9	13.8
32	MTS20112	MTS1584/07x76cF90	86.0	62.0	167.5	29.1	24.0	13.5
4	Bobcat	check	85.6	62.7	173.5	29.6	24.6	13.2
29	MTS20109	MT1332//Loma/MTS1574	85.5	62.7	172.5	28.5	21.0	13.7
33	MTS20113	MTS1584/07x76cF90	85.4	60.8	171.0	28.8	22.1	12.7
28	MTS20108	MT1332//Loma/MTS1574	84.8	61.6	174.0	30.2	18.6	13.5
38	MTS20118	MTS1704//Denali/(MTS1589, Bobcat sib)	83.7	63.4	172.5	27.0	21.8	13.6
47	MTS20127	MTS1704//Denali/(MTS1589, Bobcat sib)	83.3	62.4	171.0	26.9	22.5	14.4
39	MTS20119	MTS1704//Denali/(MTS1589, Bobcat sib)	81.8	63.6	169.0	32.2	23.3	13.9
34	MTS20114	MTS1584/07x76cF90	80.3	63.8	171.5	30.4	25.0	14.1
43	MTS20123	MTS1704//Denali/(MTS1589, Bobcat sib)	80.1	62.9	165.0	27.9	21.8	14.2
46	MTS20126	MTS1704//Denali/(MTS1589, Bobcat sib)	80.1	63.2	167.5	28.8	18.4	13.3
31	MTS20111	MTS1584/07x76cF90	79.5	63.5	172.0	30.3	23.0	14.3
9	MTS2089	MTS1584/2*Loma	79.4	61.3	173.0	30.6	23.7	13.9
35	MTS20115	MTS1704//Denali/(MTS1589, Bobcat sib)	78.6	64.1	169.5	25.9	19.3	14.7
40	MTS20120	MTS1704//Denali/(MTS1589, Bobcat sib)	77.5	62.8	174.0	28.4	19.1	14.4
41	MTS20121	MTS1704//Denali/(MTS1589, Bobcat sib)	75.7	63.7	169.0	28.8	24.3	14.3
2	Warhorse	check	74.2	61.3	172.0	30.4	24.1	14.5
44	d MTS20124	MTS1704//Denali/(MTS1589, Bobcat sib)	74.1	63.9	169.5	25.2	23.2	15.0
7	MTS2087	Warhorse/MT1078	70.2	61.6	171.0	30.7	24.5	14.0
48	MTS20128	MTS1704//Denali/(MTS1589, Bobcat sib)	69.8	62.0	173.0	26.4	23.6	14.1
49	MTS20129	MTS1704//Denali/(MTS1589, Bobcat sib)	66.2	63.7	166.0	28.0	23.0	14.5
Average			85.7	62.3	172.0	29.4	21.6	13.5
LSD (0.05)			9.0	0.8	2.0	1.8	2.2	
C.V. (%)			4.9	0.6	0.6	2.9	4.7	
P-value (Varieties)			<.0001	<.0001	<.0001	<.0001	<.0001	

a = lines in 2021 Advanced Test (all other MT lines dropped from testing)

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 126. 2020 Preliminary C Sawfly Test: Big Sandy

Entry #	ID	Pedigree	Stem infestation = 27%							Protein %
			Yield bu/ac	Test weight lb/bu	Stand %	Plant height in	Stem solid (5-25)	Stems infested (0-5)	Sawfly cutting %	
			LAT	LAT	LAT	RCB	LAT	LAT	RCB	
			144%	152%	127%	92%	115%	141%	103%	175%
42 a	MTS20122	MTS1704//Denali/(MTS1589, Bobcat sib)	67.6	62.4	94.1	25.6	24.0	0.9	1	12.9
10	MTS2090	MTS1584/2*Loma	61.4	59.3	90.1	21.9	23.2	3.3	3	14.3
4	Bobcat	check	61.1	61.4	92.8	18.7	24.7	2.1	0	13.2
46	MTS20126	MTS1704//Denali/(MTS1589, Bobcat sib)	61.1	60.9	96.0	23.7	22.9	1.9	0	13.3
3	Loma	check	60.6	60.4	95.4	21.3	23.8	1.1	8	13.5
22	MTS20102	Loma*2/MTS1574	60.5	59.8	91.7	23.7	22.9	1.7	1	13.7
6	MTS2086	Warhorse/MT1078	60.0	61.1	96.4	21.6	24.8	0.7	1	13.4
45	MTS20125	MTS1704//Denali/(MTS1589, Bobcat sib)	59.4	62.2	97.7	22.6	23.1	1.3	1	12.9
19	d MTS2099	MTS1584/2*Loma	58.1	61.3	97.9	22.5	24.4	0.1	3	13.2
20 a	MTS20100	MTS1584/2*Loma	58.0	59.4	97.7	23.5	24.6	0.3	1	13.2
2	Warhorse	check	57.6	60.7	96.2	22.5	24.3	2.4	0	13.8
16	MTS2096	MTS1584/2*Loma	57.3	59.9	97.4	22.1	24.6	0.0	3	12.7
14 a	MTS2094	MTS1584/2*Loma	57.2	60.7	95.3	18.6	24.1	0.1	1	12.9
13	MTS2093	MTS1584/2*Loma	57.2	61.0	93.8	21.6	21.1	1.7	8	13.2
23	MTS20103	Loma*2/MTS1574	57.1	59.2	90.8	22.5	23.2	1.3	1	13.0
33	MTS20113	MTS1584/07x76cF90	57.0	59.0	92.7	24.2	23.3	2.2	5	13.2
24	MTS20104	Loma*2/MTS1574	56.8	59.2	95.9	21.7	24.4	0.3	3	13.5
26	MTS20106	Loma*2/MTS1574	56.5	60.5	96.3	22.7	23.1	1.8	3	14.0
40	MTS20120	MTS1704//Denali/(MTS1589, Bobcat sib)	56.0	60.1	90.1	21.9	21.2	1.9	1	14.6
8	MTS2088	MTS1584/2*Loma	55.9	56.7	92.9	24.3	23.3	1.4	0	14.3
36	MTS20116	MTS1704//Denali/(MTS1589, Bobcat sib)	55.0	62.4	92.8	24.8	23.0	0.0	3	13.6
5 w4 d	MTS2085	Warhorse/MT1078	54.3	59.2	90.6	25.7	24.0	0.0	1	14.0
25	MTS20105	Loma*2/MTS1574	54.3	59.0	97.3	20.7	23.3	3.0	5	13.4
32	MTS20112	MTS1584/07x76cF90	54.1	60.0	95.3	24.4	23.9	2.5	1	13.4
30	MTS20110	MTS1584/07x76cF90	53.9	61.1	95.7	23.7	22.6	0.9	6	14.2
21	MTS20101	MTS1584*2/Loma	53.9	60.9	93.6	22.4	24.6	0.7	1	13.8
38	MTS20118	MTS1704//Denali/(MTS1589, Bobcat sib)	53.8	60.2	94.0	21.8	22.6	3.6	0	13.9
43	MTS20123	MTS1704//Denali/(MTS1589, Bobcat sib)	53.2	61.2	94.0	21.6	23.2	1.5	0	13.7
27	MTS20107	MT1332/Loma/MTS1574	52.9	61.9	93.6	24.3	18.8	2.4	3	13.7
39	MTS20119	MTS1704//Denali/(MTS1589, Bobcat sib)	52.5	61.5	96.0	23.5	23.0	3.7	0	13.5
49	MTS20129	MTS1704//Denali/(MTS1589, Bobcat sib)	51.9	62.2	96.5	22.9	24.2	1.7	0	13.7
18	MTS2098	MTS1584/2*Loma	51.6	59.9	86.2	23.3	24.2	1.5	1	13.7
1	Yellowstone	check	50.8	59.5	82.6	23.0	9.0	1.2	13	13.9
37	MTS20117	MTS1704//Denali/(MTS1589, Bobcat sib)	50.7	62.3	94.6	24.3	22.6	1.2	1	13.7
35	MTS20115	MTS1704//Denali/(MTS1589, Bobcat sib)	49.9	62.0	91.9	21.9	22.9	1.7	1	14.7
9	MTS2089	MTS1584/2*Loma	49.1	59.7	89.7	25.8	23.8	0.9	6	14.2
28	MTS20108	MT1332/Loma/MTS1574	48.9	59.9	97.0	22.6	22.4	0.5	3	14.0
31	MTS20111	MTS1584/07x76cF90	48.9	62.5	92.9	23.3	23.9	1.5	1	14.2
41	MTS20121	MTS1704//Denali/(MTS1589, Bobcat sib)	48.8	61.8	98.0	18.1	23.3	1.2	1	14.2
34	MTS20114	MTS1584/07x76cF90	48.7	62.1	89.9	22.8	24.6	1.3	3	14.5
47	MTS20127	MTS1704//Denali/(MTS1589, Bobcat sib)	48.2	60.6	88.7	20.0	23.8	1.0	0	14.2
17	MTS2097	MTS1584/2*Loma	47.9	58.0	99.5	23.1	22.6	1.4	3	14.4
44	d MTS20124	MTS1704//Denali/(MTS1589, Bobcat sib)	47.3	61.8	93.8	18.8	24.6	1.8	1	14.2
29	MTS20109	MT1332/Loma/MTS1574	46.4	60.1	85.8	20.2	22.0	2.5	3	14.5
12	MTS2092	MTS1584/2*Loma	46.3	61.3	91.2	19.9	24.1	1.6	3	13.9
48	MTS20128	MTS1704//Denali/(MTS1589, Bobcat sib)	46.2	60.5	93.8	21.2	24.8	0.1	1	14.0
15	MTS2095	MTS1584/2*Loma	46.0	60.6	95.5	21.8	23.8	0.8	3	14.4
11	MTS2091	MTS1584/2*Loma	43.9	58.5	95.6	22.0	23.8	1.3	1	14.1
7	MTS2087	Warhorse/MT1078	42.4	60.9	95.3	21.2	24.7	0.8	0	14.1
Average			53.6	60.5	93.7	22.4	23.2	1.4	2.0	13.8
LSD (0.05)			8.3	1.2	ns	3.1	1.9	2.2	4.3	0.5
C.V. (%)			7.0	0.9	4.7	6.8	3.9	71.8	104.9	1.5
P-value (Varieties)			<.0001	<.0001	0.5	<.0001	<.0001	0.0500	0.0012	<.0001

a = lines in 2021 Advanced Test (all other MT lines dropped from testing)

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 127. 2020 Preliminary C Sawfly Test: 2 location Stem Solidness (5-25)

Entry #	ID d = SDS discard	Pedigree	Bozeman solid LAT	Big Sandy LAT	2 Location average
		Sawfly Infestation (tunneling)	1%	27%	
34	MTS20114	MTS1584/07x76cF90	25.0	24.6	24.8
4	Bobcat	check	24.6	24.7	24.7
7	MTS2087	Warhorse/MT1078	24.5	24.7	24.6
5	w4 d MTS2085	Warhorse/MT1078	24.6	24.0	24.3
2	Warhorse	check	24.1	24.3	24.2
20	a MTS20100	MTS1584/2*Loma	23.8	24.6	24.2
48	MTS20128	MTS1704//Denali/(MTS1589, Bobcat sib)	23.6	24.8	24.2
21	MTS20101	MTS1584*2/Loma	23.7	24.6	24.2
32	MTS20112	MTS1584/07x76cF90	24.0	23.9	24.0
44	d MTS20124	MTS1704//Denali/(MTS1589, Bobcat sib)	23.2	24.6	23.9
6	MTS2086	Warhorse/MT1078	22.9	24.8	23.9
41	MTS20121	MTS1704//Denali/(MTS1589, Bobcat sib)	24.3	23.3	23.8
9	MTS2089	MTS1584/2*Loma	23.7	23.8	23.8
16	MTS2096	MTS1584/2*Loma	22.9	24.6	23.8
14	a MTS2094	MTS1584/2*Loma	23.3	24.1	23.7
11	MTS2091	MTS1584/2*Loma	23.5	23.8	23.7
49	MTS20129	MTS1704//Denali/(MTS1589, Bobcat sib)	23.0	24.2	23.6
31	MTS20111	MTS1584/07x76cF90	23.0	23.9	23.5
18	MTS2098	MTS1584/2*Loma	22.6	24.2	23.4
39	MTS20119	MTS1704//Denali/(MTS1589, Bobcat sib)	23.3	23.0	23.2
42	a MTS20122	MTS1704//Denali/(MTS1589, Bobcat sib)	22.3	24.0	23.2
47	MTS20127	MTS1704//Denali/(MTS1589, Bobcat sib)	22.5	23.8	23.2
19	d MTS2099	MTS1584/2*Loma	21.6	24.4	23.0
33	MTS20113	MTS1584/07x76cF90	22.1	23.3	22.7
45	MTS20125	MTS1704//Denali/(MTS1589, Bobcat sib)	22.3	23.1	22.7
37	MTS20117	MTS1704//Denali/(MTS1589, Bobcat sib)	22.7	22.6	22.7
24	MTS20104	Loma*2/MTS1574	20.7	24.4	22.6
43	MTS20123	MTS1704//Denali/(MTS1589, Bobcat sib)	21.8	23.2	22.5
3	Loma	check	21.1	23.8	22.5
10	MTS2090	MTS1584/2*Loma	21.6	23.2	22.4
15	MTS2095	MTS1584/2*Loma	21.0	23.8	22.4
12	MTS2092	MTS1584/2*Loma	20.6	24.1	22.4
36	MTS20116	MTS1704//Denali/(MTS1589, Bobcat sib)	21.5	23.0	22.3
38	MTS20118	MTS1704//Denali/(MTS1589, Bobcat sib)	21.8	22.6	22.2
25	MTS20105	Loma*2/MTS1574	20.5	23.3	21.9
8	MTS2088	MTS1584/2*Loma	20.0	23.3	21.7
22	MTS20102	Loma*2/MTS1574	20.3	22.9	21.6
13	MTS2093	MTS1584/2*Loma	21.9	21.1	21.5
29	MTS20109	MT1332//Loma/MTS1574	21.0	22.0	21.5
30	MTS20110	MTS1584/07x76cF90	20.2	22.6	21.4
23	MTS20103	Loma*2/MTS1574	19.4	23.2	21.3
17	MTS2097	MTS1584/2*Loma	19.8	22.6	21.2
35	MTS20115	MTS1704//Denali/(MTS1589, Bobcat sib)	19.3	22.9	21.1
26	MTS20106	Loma*2/MTS1574	18.4	23.1	20.8
46	MTS20126	MTS1704//Denali/(MTS1589, Bobcat sib)	18.4	22.9	20.7
28	MTS20108	MT1332//Loma/MTS1574	18.6	22.4	20.5
40	MTS20120	MTS1704//Denali/(MTS1589, Bobcat sib)	19.1	21.2	20.2
27	MTS20107	MT1332//Loma/MTS1574	17.1	18.8	18.0
1	Yellowstone	check	7.9	9.0	8.5
Average			21.6	23.2	22.4
LSD (0.05)			2.2	1.9	2.0
C.V. (%)			4.7	3.9	4.5
P-value (Varieties)			<.0001	<.0001	<.0001

a = lines in 2021 Advanced Test (all other MT lines dropped from testing)

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 128. 2020 Preliminary C Sawfly Test: Williston Single Rows

Entry #	ID	Pedigree	Winter survival % RCB
	d = SDS discard		21-May
36	MTS20116	MTS1704//Denali/(MTS1589, Bobcat sib)	100.0
1	Yellowstone	check	97.5
29	MTS20109	MT1332//Loma/MTS1574	92.5
9	MTS2089	MTS1584/2*Loma	90.0
10	MTS2090	MTS1584/2*Loma	90.0
33	MTS20113	MTS1584/07x76cF90	90.0
37	MTS20117	MTS1704//Denali/(MTS1589, Bobcat sib)	90.0
49	MTS20129	MTS1704//Denali/(MTS1589, Bobcat sib)	90.0
12	MTS2092	MTS1584/2*Loma	87.5
25	MTS20105	Loma*2/MTS1574	87.5
30	MTS20110	MTS1584/07x76cF90	87.5
31	MTS20111	MTS1584/07x76cF90	87.5
40	MTS20120	MTS1704//Denali/(MTS1589, Bobcat sib)	87.5
46	MTS20126	MTS1704//Denali/(MTS1589, Bobcat sib)	87.5
14 a	MTS2094	MTS1584/2*Loma	85.0
24	MTS20104	Loma*2/MTS1574	85.0
34	MTS20114	MTS1584/07x76cF90	85.0
45	MTS20125	MTS1704//Denali/(MTS1589, Bobcat sib)	85.0
22	MTS20102	Loma*2/MTS1574	82.5
23	MTS20103	Loma*2/MTS1574	82.5
32	MTS20112	MTS1584/07x76cF90	82.5
42 a	MTS20122	MTS1704//Denali/(MTS1589, Bobcat sib)	82.5
18	MTS2098	MTS1584/2*Loma	80.0
19 d	MTS2099	MTS1584/2*Loma	80.0
20 a	MTS20100	MTS1584/2*Loma	80.0
26	MTS20106	Loma*2/MTS1574	80.0
28	MTS20108	MT1332//Loma/MTS1574	80.0
13	MTS2093	MTS1584/2*Loma	77.5
15	MTS2095	MTS1584/2*Loma	77.5
4	Bobcat	check	75.0
5 w4 d	MTS2085	Warhorse/MT1078	75.0
11	MTS2091	MTS1584/2*Loma	75.0
27	MTS20107	MT1332//Loma/MTS1574	75.0
38	MTS20118	MTS1704//Denali/(MTS1589, Bobcat sib)	75.0
47	MTS20127	MTS1704//Denali/(MTS1589, Bobcat sib)	72.5
21	MTS20101	MTS1584*2/Loma	67.5
35	MTS20115	MTS1704//Denali/(MTS1589, Bobcat sib)	67.5
2	Warhorse	check	65.0
48	MTS20128	MTS1704//Denali/(MTS1589, Bobcat sib)	62.5
3	Loma	check	60.0
43	MTS20123	MTS1704//Denali/(MTS1589, Bobcat sib)	60.0
44 d	MTS20124	MTS1704//Denali/(MTS1589, Bobcat sib)	60.0
6	MTS2086	Warhorse/MT1078	57.5
7	MTS2087	Warhorse/MT1078	57.5
8	MTS2088	MTS1584/2*Loma	57.5
41	MTS20121	MTS1704//Denali/(MTS1589, Bobcat sib)	57.5
17	MTS2097	MTS1584/2*Loma	52.5
39	MTS20119	MTS1704//Denali/(MTS1589, Bobcat sib)	52.5
16	MTS2096	MTS1584/2*Loma	50.0
Average			76.8
LSD (0.05)			ns
C.V. (%)			29.3
P-value (Varieties)			0.9273

a = lines in 2021 Advanced Test (all other MT lines dropped from testing)

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 129. 2020 Preliminary D Sawfly Test: All location Summary

Entry #	ID	Pedigree	Yield bu/ac	Test weight lb/bu	Heading date Julian	Plant height in	Stem solid (5-25)	Protein %
d = SDS discard			2	2	1	2	2	2
26 a	MTCS20151	Loma//((Bobcat sib, MTS1589)/StandClea	86.7	62.7	175.0	32.0	24.4	13.2
19	MTS20144	Yellowstone*4/Conan	86.5	62.2	173.5	34.0	10.3	12.1
3	Loma	check	84.8	61.9	174.7	29.6	21.2	13.1
33 a	MTCS20158	Bobcat//((Bobcat sib, MTS1589)/StandClea	84.6	63.2	174.0	29.1	24.6	13.2
30	MTCS20155	Bobcat//((Bobcat sib, MTS1589)/StandClea	82.7	62.8	174.2	30.3	22.7	13.3
34 a	MTCS20159	Bobcat//((Bobcat sib, MTS1589)/StandClea	81.4	62.8	174.1	28.9	24.1	13.1
31 a	MTCS20156	Bobcat//((Bobcat sib, MTS1589)/StandClea	80.2	62.8	175.2	30.8	23.7	12.9
16 a	MTS20141	Yellowstone*4/Conan	80.1	60.4	175.4	31.2	11.9	13.1
36	MTS1912	MT10105/Warhorse//MTS1011	79.5	62.3	174.6	30.4	23.6	13.0
4	Bobcat	check	78.2	62.6	173.9	29.2	24.6	12.9
29	MTCS20154	Bobcat//((Bobcat sib, MTS1589)/StandClea	78.1	62.4	175.2	29.4	23.7	13.1
25	MTS20150	Yellowstone*4/Conan	77.3	60.4	175.5	30.6	9.5	12.6
27	MTCS20152	Loma//((Bobcat sib, MTS1589)/StandClea	77.2	61.4	174.4	27.1	23.3	12.8
21	MTS20146	Yellowstone*4/Conan	76.7	60.7	172.8	30.2	11.7	13.2
22	MTS20147	Yellowstone*4/Conan	75.8	61.1	173.8	31.2	11.0	12.8
2	Warhorse	check	74.7	62.1	173.0	30.4	23.7	13.6
9 w4	MTS20134	Warhorse/MT1078	74.4	63.1	171.8	30.2	22.0	13.8
32	MTCS20157	Bobcat//((Bobcat sib, MTS1589)/StandClea	74.4	62.9	171.7	30.3	22.5	13.9
5	MTS20130	Warhorse/MT1078	74.2	61.7	171.2	27.7	23.6	13.8
1	Yellowstone	check	74.1	61.6	175.1	32.5	7.3	12.8
8	d MTS20133	Warhorse/MT1078	73.8	61.7	172.8	33.9	23.3	13.9
12 w4	MTS20137	Warhorse/MT1078	73.4	62.0	174.6	30.2	21.0	14.0
17	MTS20142	Yellowstone*4/Conan	73.3	62.0	167.6	31.8	10.3	12.6
13	MTS20138	Warhorse/MT1078	73.1	61.9	170.6	28.3	24.4	13.7
23	MTS20148	Yellowstone*4/Conan	72.9	61.9	169.6	28.3	10.0	12.6
24	MTS20149	Yellowstone*4/Conan	72.4	61.5	175.5	30.5	10.5	12.8
7	MTS20132	Warhorse/MT1078	71.8	62.2	172.4	32.0	23.5	13.5
20	MTS20145	Yellowstone*4/Conan	71.8	61.0	174.2	30.0	10.6	13.4
14 w4	MTS20139	Warhorse/MT1078	71.2	61.5	174.0	30.1	20.2	14.3
10	MTS20135	Warhorse/MT1078	70.8	60.5	174.6	23.9	21.1	13.4
11	MTS20136	Warhorse/MT1078	70.7	60.7	174.1	28.9	23.4	13.7
15 w4	MTS20140	Warhorse/MT1078	70.1	62.0	171.3	29.7	22.2	14.6
18	MTS20143	Yellowstone*4/Conan	68.3	60.9	172.0	31.3	9.0	13.8
35	Hatcher	Colorado, 2004	66.7	62.3	168.3	28.8	8.0	12.5
28	MTCS20153	Loma//((Bobcat sib, MTS1589)/StandClea	65.0	62.1	174.7	28.1	23.4	14.3
6	MTS20131	Warhorse/MT1078	64.4	63.4	166.5	29.1	8.1	14.8
Average			75.3	61.9	173.1	30.0	18.3	13.3
LSD (0.05)			ns	1.4	1.8	1.9	2.1	1.0
C.V. (%)			8.1	1.1	0.5	3.1	5.8	3.9

a = lines in 2021 Advanced Test (all other MT lines dropped from testing)

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 130. 2020 Preliminary D Sawfly Test: Bozeman

Entry #	ID	Pedigree	Yield bu/ac LAT	Test weight lb/bu RCB	Stand % 5-May RCB	Heading date Julian LAT	Plant height in RCB	Stem solid (5-25) RCB	Protein % bulk
		d = SDS discard							
		lattice efficiency relative to RCB	188%	99%	92%	106%	87%	100%	
26 a	MTCS20151	Loma/(Bobcat sib, MTS1589)/StandClea	108.1	63.5	98	175.0	32.5	24.4	12.4
19	MTS20144	Yellowstone*4/Conan	107.4	62.8	95	173.5	35.0	9.4	12.4
3	Loma	check	104.9	61.7	100	174.7	29.1	21.5	13.1
30	MTCS20155	Bobcat/(Bobcat sib, MTS1589)/StandClea	101.7	63.4	100	174.2	31.1	23.3	13.0
33 a	MTCS20158	Bobcat/(Bobcat sib, MTS1589)/StandClea	101.0	63.8	100	174.0	28.7	24.7	12.9
31 a	MTCS20156	Bobcat/(Bobcat sib, MTS1589)/StandClea	97.2	63.1	90	175.2	31.5	23.9	12.9
34 a	MTCS20159	Bobcat/(Bobcat sib, MTS1589)/StandClea	97.2	63.1	95	174.1	29.7	24.1	13.0
29	MTCS20154	Bobcat/(Bobcat sib, MTS1589)/StandClea	96.6	63.3	100	175.2	29.7	23.8	12.5
32	MTCS20157	Bobcat/(Bobcat sib, MTS1589)/StandClea	95.8	63.6	100	171.7	31.1	23.7	13.6
27	MTCS20152	Loma/(Bobcat sib, MTS1589)/StandClea	93.5	62.5	95	174.4	26.8	23.1	12.5
4	Bobcat	check	91.4	63.0	100	173.9	30.3	24.5	12.7
36	MTS1912	MT10105/Warhorse/MTS1011	90.9	62.1	95	174.6	31.3	24.2	13.2
25	MTS20150	Yellowstone*4/Conan	90.4	60.3	90	175.5	31.1	7.7	13.4
16 a	MTS20141	Yellowstone*4/Conan	90.3	60.1	88	175.4	31.9	10.7	13.6
9 w4	MTS20134	Warhorse/MT1078	90.2	63.7	100	171.8	31.9	22.5	14.2
5	MTS20130	Warhorse/MT1078	89.7	61.7	100	171.2	29.3	24.2	14.2
7	MTS20132	Warhorse/MT1078	89.0	62.6	100	172.4	34.1	23.2	14.0
13	MTS20138	Warhorse/MT1078	88.8	62.6	100	170.6	28.5	24.3	14.2
23	MTS20148	Yellowstone*4/Conan	88.1	62.7	95	169.6	29.5	9.7	12.8
22	MTS20147	Yellowstone*4/Conan	87.1	61.6	90	173.8	31.3	11.5	13.0
8 d	MTS20133	Warhorse/MT1078	86.5	61.7	93	172.8	34.3	24.2	14.0
2	Warhorse	check	86.1	61.8	98	173.0	31.9	24.3	13.9
1	Yellowstone	check	86.0	61.8	85	175.1	34.4	7.7	12.7
21	MTS20146	Yellowstone*4/Conan	85.7	60.4	90	172.8	29.9	10.0	13.7
10	MTS20135	Warhorse/MT1078	85.6	60.3	90	174.6	24.2	20.8	13.4
28	MTCS20153	Loma/(Bobcat sib, MTS1589)/StandClea	85.5	62.9	90	174.7	28.7	24.4	14.0
12 w4	MTS20137	Warhorse/MT1078	84.6	61.5	93	174.6	31.9	21.4	14.5
17	MTS20142	Yellowstone*4/Conan	84.0	62.8	98	167.6	32.1	10.2	13.2
18	MTS20143	Yellowstone*4/Conan	83.2	61.3	85	172.0	32.7	9.2	13.5
14 w4	MTS20139	Warhorse/MT1078	81.7	61.5	100	174.0	31.7	20.9	14.6
15 w4	MTS20140	Warhorse/MT1078	80.9	62.4	88	171.3	30.9	23.3	14.9
11	MTS20136	Warhorse/MT1078	80.6	60.2	100	174.1	29.7	24.3	14.1
24	MTS20149	Yellowstone*4/Conan	80.0	61.2	83	175.5	30.9	9.6	12.8
20	MTS20145	Yellowstone*4/Conan	79.9	61.0	95	174.2	30.9	9.8	13.5
6	MTS20131	Warhorse/MT1078	78.3	64.3	93	166.5	29.7	6.9	15.2
35	Hatcher	Colorado, 2004	69.4	63.4	45	168.3	30.1	8.1	12.3
Average			89.4	62.2	93.1	173.1	30.8	18.3	13.4
LSD (0.05)			10.6	0.9	15.1	1.8	1.9	2.0	
C.V. (%)			5.2	0.7	8.0	0.5	3.0	5.4	
P-value (Varieties)			<.0001	<.0001	0.0001	<.0001	<.0001	<.0001	

a = lines in 2021 Advanced Test (all other MT lines dropped from testing)

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 131. 2020 Preliminary D Sawfly Test: Northern Seeds Carter/Fort Benton

Stem infestation = 15%							
Entry #	ID	Pedigree	Yield bu/ac	Test weight lb/bu	Plant height in	Stem solid (5-25)	Protein %
d = SDS discard			RCB	RCB	RCB	RCB	RCB
16 a	MTS20141	Yellowstone*4/Conan	69.9	60.7	30.5	13.0	12.6
33 a	MTCS20158	Bobcat//((Bobcat sib, MTS1589)/StandClea	68.2	62.7	29.5	24.4	13.5
36	MTS1912	MT10105/Warhorse//MTS1011	68.0	62.6	29.5	22.9	12.7
21	MTS20146	Yellowstone*4/Conan	67.6	61.1	30.5	13.4	12.7
19	MTS20144	Yellowstone*4/Conan	65.7	61.5	33.0	11.1	11.8
34 a	MTCS20159	Bobcat//((Bobcat sib, MTS1589)/StandClea	65.6	62.6	28.0	24.1	13.1
26 a	MTCS20151	Loma//((Bobcat sib, MTS1589)/StandClea	65.3	61.9	31.5	24.3	14.0
4	Bobcat	check	65.0	62.2	28.0	24.6	13.1
24	MTS20149	Yellowstone*4/Conan	64.8	61.8	30.0	11.4	12.7
3	Loma	check	64.8	62.2	30.0	20.9	13.0
22	MTS20147	Yellowstone*4/Conan	64.4	60.6	31.0	10.5	12.5
25	MTS20150	Yellowstone*4/Conan	64.3	60.6	30.0	11.3	11.7
35	Hatcher	Colorado, 2004	63.9	61.2	27.5	7.8	12.6
30	MTCS20155	Bobcat//((Bobcat sib, MTS1589)/StandClea	63.7	62.3	29.5	22.0	13.5
20	MTS20145	Yellowstone*4/Conan	63.6	61.0	29.0	11.3	13.3
31 a	MTCS20156	Bobcat//((Bobcat sib, MTS1589)/StandClea	63.3	62.5	30.0	23.4	12.8
2	Warhorse	check	63.2	62.4	29.0	23.1	13.2
17	MTS20142	Yellowstone*4/Conan	62.7	61.1	31.5	10.4	11.9
12 w4	MTS20137	Warhorse/MT1078	62.3	62.5	28.5	20.6	13.5
1	Yellowstone	check	62.2	61.4	30.5	6.9	12.9
8	d MTS20133	Warhorse/MT1078	61.1	61.6	33.5	22.4	13.7
11	MTS20136	Warhorse/MT1078	60.9	61.2	28.0	22.5	13.3
27	MTCS20152	Loma//((Bobcat sib, MTS1589)/StandClea	60.9	60.2	27.5	23.4	13.0
14 w4	MTS20139	Warhorse/MT1078	60.7	61.4	28.5	19.4	14.0
29	MTCS20154	Bobcat//((Bobcat sib, MTS1589)/StandClea	59.6	61.4	29.0	23.6	13.7
15 w4	MTS20140	Warhorse/MT1078	59.4	61.5	28.5	21.1	14.3
5	MTS20130	Warhorse/MT1078	58.7	61.8	26.0	23.0	13.4
9 w4	MTS20134	Warhorse/MT1078	58.6	62.5	28.5	21.5	13.4
23	MTS20148	Yellowstone*4/Conan	57.6	61.2	27.0	10.2	12.3
13	MTS20138	Warhorse/MT1078	57.4	61.2	28.0	24.4	13.2
10	MTS20135	Warhorse/MT1078	56.1	60.8	23.5	21.3	13.3
7	MTS20132	Warhorse/MT1078	54.6	61.8	30.0	23.7	12.9
18	MTS20143	Yellowstone*4/Conan	53.5	60.6	30.0	8.7	14.1
32	MTCS20157	Bobcat//((Bobcat sib, MTS1589)/StandClea	53.1	62.3	29.5	21.3	14.1
6	MTS20131	Warhorse/MT1078	50.5	62.5	28.5	9.2	14.4
28	MTCS20153	Loma//((Bobcat sib, MTS1589)/StandClea	44.6	61.3	27.5	22.3	14.5
Average			61.3	61.6	29.2	18.2	13.2
LSD (0.05)			8.7	1.2	2.2	2.5	1.0
C.V. (%)			7.0	0.9	3.7	6.8	3.9
P-value (Varieties)			0.0006	0.0012	<.0001	<.0001	<.0001

a = lines in 2021 Advanced Test (all other MT lines dropped from testing)

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 132. 2020 Preliminary D Sawfly Test: 2 location Stem Solidness

Entry #	ID d = SDS discard	Pedigree	Bozeman	Fort Benton	2 Location average
		Sawfly Infestation (tunneling)	2%	15%	
4	Bobcat	check	24.5	24.6	24.6
33 a	MTCS20158	Bobcat// (Bobcat sib, MTS1589)/StandClear CLP	24.7	24.4	24.6
13	MTS20138	Warhorse/MT1078	24.3	24.4	24.4
26 a	MTCS20151	Loma// (Bobcat sib, MTS1589)/StandClear CLP	24.4	24.3	24.4
34 a	MTCS20159	Bobcat// (Bobcat sib, MTS1589)/StandClear CLP	24.1	24.1	24.1
2	Warhorse	check	24.3	23.1	23.7
29	MTCS20154	Bobcat// (Bobcat sib, MTS1589)/StandClear CLP	23.8	23.6	23.7
31 a	MTCS20156	Bobcat// (Bobcat sib, MTS1589)/StandClear CLP	23.9	23.4	23.7
5	MTS20130	Warhorse/MT1078	24.2	23.0	23.6
36	MTS1912	MT10105/Warhorse//MTS1011	24.2	22.9	23.6
7	MTS20132	Warhorse/MT1078	23.2	23.7	23.5
11	MTS20136	Warhorse/MT1078	24.3	22.5	23.4
28	MTCS20153	Loma// (Bobcat sib, MTS1589)/StandClear CLP	24.4	22.3	23.4
8 d	MTS20133	Warhorse/MT1078	24.2	22.4	23.3
27	MTCS20152	Loma// (Bobcat sib, MTS1589)/StandClear CLP	23.1	23.4	23.3
30	MTCS20155	Bobcat// (Bobcat sib, MTS1589)/StandClear CLP	23.3	22.0	22.7
32	MTCS20157	Bobcat// (Bobcat sib, MTS1589)/StandClear CLP	23.7	21.3	22.5
15 w4	MTS20140	Warhorse/MT1078	23.3	21.1	22.2
9 w4	MTS20134	Warhorse/MT1078	22.5	21.5	22.0
3	Loma	check	21.5	20.9	21.2
10	MTS20135	Warhorse/MT1078	20.8	21.3	21.1
12 w4	MTS20137	Warhorse/MT1078	21.4	20.6	21.0
14 w4	MTS20139	Warhorse/MT1078	20.9	19.4	20.2
16 a	MTS20141	Yellowstone*4/Conan	10.7	13.0	11.9
21	MTS20146	Yellowstone*4/Conan	10.0	13.4	11.7
22	MTS20147	Yellowstone*4/Conan	11.5	10.5	11.0
20	MTS20145	Yellowstone*4/Conan	9.8	11.3	10.6
24	MTS20149	Yellowstone*4/Conan	9.6	11.4	10.5
17	MTS20142	Yellowstone*4/Conan	10.2	10.4	10.3
19	MTS20144	Yellowstone*4/Conan	9.4	11.1	10.3
23	MTS20148	Yellowstone*4/Conan	9.7	10.2	10.0
25	MTS20150	Yellowstone*4/Conan	7.7	11.3	9.5
18	MTS20143	Yellowstone*4/Conan	9.2	8.7	9.0
6	MTS20131	Warhorse/MT1078	6.9	9.2	8.1
35	Hatcher	Colorado, 2004	8.1	7.8	8.0
1	Yellowstone	check	7.7	6.9	7.3
Average			18.3	18.2	18.3
LSD (0.05)			2.0	2.5	2.1
C.V. (%)			5.4	6.8	5.8
P-value (Varieties)			<.0001	<.0001	<.0001

a = lines in 2021 Advanced Test (all other MT lines dropped from testing)

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 133. 2020 Preliminary D Sawfly Test: Williston Single Rows

Entry #	ID d = SDS discard	Pedigree	Winter survival % RCB
			21-May
7	MTS20132	Warhorse/MT1078	100
32	MTCS20157	Bobcat//((Bobcat sib, MTS1589)/StandClear CLP	100
36	MTS1912	MT10105/Warhorse//MTS1011	98
5	MTS20130	Warhorse/MT1078	95
27	MTCS20152	Loma//((Bobcat sib, MTS1589)/StandClear CLP	93
6	MTS20131	Warhorse/MT1078	90
9 w4	MTS20134	Warhorse/MT1078	90
14 w4	MTS20139	Warhorse/MT1078	90
34 a	MTCS20159	Bobcat//((Bobcat sib, MTS1589)/StandClear CLP	90
11	MTS20136	Warhorse/MT1078	88
19	MTS20144	Yellowstone*4/Conan	88
20	MTS20145	Yellowstone*4/Conan	88
25	MTS20150	Yellowstone*4/Conan	88
10	MTS20135	Warhorse/MT1078	85
15 w4	MTS20140	Warhorse/MT1078	85
21	MTS20146	Yellowstone*4/Conan	85
29	MTCS20154	Bobcat//((Bobcat sib, MTS1589)/StandClear CLP	85
1	Yellowstone	check	83
22	MTS20147	Yellowstone*4/Conan	83
23	MTS20148	Yellowstone*4/Conan	83
8 d	MTS20133	Warhorse/MT1078	80
13	MTS20138	Warhorse/MT1078	80
28	MTCS20153	Loma//((Bobcat sib, MTS1589)/StandClear CLP	80
2	Warhorse	check	78
33 a	MTCS20158	Bobcat//((Bobcat sib, MTS1589)/StandClear CLP	78
4	Bobcat	check	75
16 a	MTS20141	Yellowstone*4/Conan	75
3	Loma	check	73
12 w4	MTS20137	Warhorse/MT1078	70
17	MTS20142	Yellowstone*4/Conan	70
31 a	MTCS20156	Bobcat//((Bobcat sib, MTS1589)/StandClear CLP	70
24	MTS20149	Yellowstone*4/Conan	65
26 a	MTCS20151	Loma//((Bobcat sib, MTS1589)/StandClear CLP	65
18	MTS20143	Yellowstone*4/Conan	60
30	MTCS20155	Bobcat//((Bobcat sib, MTS1589)/StandClear CLP	60
35	Hatcher	Colorado, 2004	48
Average			80.8
LSD (0.05)			24.4
C.V. (%)			14.9
P-value (Varieties)			0.0257

a = lines in 2021 Advanced Test (all other MT lines dropped from testing)

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =

Table 134. 2020 Montana Historical Variety Test: Bozeman

Entry #	ID	Origin	Year of Release	Yield bu/ac LAT	Test weight lb/bu LAT	Stand % 5-May RCB	Heading date Julian RCB	Maturity date Julian RCB	Days to maturity RCB	Plant height in RCB	Lodging index (0-9) LAT	Protein % RCB
				109%	124%	102%	97%			101%	105%	103%
1	Turkey Red	Russia	1870	78.3	61.8	97	175.3	211.0	35.7	47.8	4.0	14.3
2	Montana No. 36	Montana	1915	75.0	61.9	100	173.0	210.0	37.0	45.1	5.6	14.5
3	Karmont	Montana	1921	76.4	62.1	100	175.0	211.0	36.0	47.0	6.4	14.1
4	Newturk	Montana, Oregon	1926	77.3	62.7	100	173.3	208.7	35.3	45.9	5.1	13.7
5	Yogo	Montana	1932	83.8	62.6	98	175.7	211.7	36.0	41.5	3.6	13.2
6	Cheyenne	Nebraska	1933	87.5	63.3	100	173.7	209.3	35.7	44.5	3.5	14.3
7	Itana	Montana, Idaho	1956	79.2	64.2	100	172.7	209.0	36.3	42.7	1.6	14.1
8	Rego	Montana	1956	78.6	61.9	100	171.7	209.7	38.0	44.1	3.5	14.0
9	Westmont	Montana	1956	69.9	62.9	98	168.3	206.7	38.3	39.6	1.0	14.9
10	Warrior	Nebraska	1960	70.9	62.9	95	171.7	206.7	35.0	42.9	2.1	15.1
11	Winalta	Alberta	1962	78.6	63.2	100	174.7	210.3	35.7	45.1	4.3	14.4
12	Sawmont	Montana	1965	83.6	62.9	100	174.3	209.3	35.0	45.9	3.2	14.8
13	Crest	Montana	1967	80.2	63.3	97	171.7	209.3	37.7	37.0	1.3	13.9
14	Froid	Montana	1968	73.9	61.9	100	175.0	209.3	34.3	48.6	4.0	14.9
15	Winoka	South Dakota	1969	89.0	63.4	100	173.3	209.3	36.0	44.9	4.8	14.1
16	Teton	Montana	1971	84.4	62.0	95	174.0	210.3	36.3	46.3	3.9	13.4
17	Centurk	Nebraska	1971	88.6	64.6	100	169.7	205.7	36.0	36.4	0.3	13.6
18	Roughrider	North Dakota	1975	79.4	63.2	100	172.3	208.0	35.7	44.8	1.6	14.2
19	Norstar	Alberta	1977	82.4	63.2	100	176.0	210.3	34.3	48.2	2.4	13.7
20	Rocky	AgriPro	1978	81.5	64.2	93	168.0	208.0	40.0	36.1	0.7	13.1
21	Redwin	Montana	1979	84.8	63.1	100	173.0	212.7	39.7	39.5	0.0	14.8
22	Neeley	Idaho	1980	91.9	62.9	97	174.0	212.0	38.0	36.7	0.2	13.5
23	Winridge	Montana	1981	81.1	62.4	100	174.7	212.7	38.0	38.6	0.4	12.6
24	Rosebud	Montana	1981	79.0	62.4	97	171.3	209.3	38.0	43.3	2.2	14.2
25	Cree	Montana	1983	85.6	63.2	100	173.7	209.3	35.7	42.4	4.3	14.3
26	Tiber	Montana	1988	77.5	63.2	83	174.7	213.7	39.0	39.4	0.0	13.9
27	Judith	Montana	1989	21.8	58.5	2	174.7	.	.	32.9	0.1	13.8
28	NuWest	Montana/General Mills	1994	81.2	62.1	83	173.7	213.3	39.7	36.6	0.0	13.6
29	Vanguard	Montana	1995	78.5	62.6	97	171.3	208.7	37.3	36.5	0.7	14.6
30	Erhardt	Montana	1996	74.4	63.0	88	172.0	211.3	39.3	34.0	0.1	14.5
31	McGuire	Montana	1996	59.8	61.7	83	166.0	209.7	43.7	33.1	0.0	15.4
32	Rampart	Montana	1996	72.4	62.6	100	172.7	210.3	37.7	35.2	0.4	14.3
33	Morgan	Saskatchewan, WestBred	1996	83.3	61.6	85	175.3	213.0	37.7	37.5	0.2	13.3
34	CDC Falcon	Saskatchewan, WestBred	1999	67.9	60.8	65	172.7	211.7	39.0	30.3	0.0	13.2
35	BigSky	Montana	2001	79.1	63.2	92	173.0	212.7	39.7	37.3	0.1	14.3
36	NuSky	Montana	2001	67.9	61.8	50	175.3	214.0	38.7	37.0	0.0	13.8
37	Jerry	North Dakota	2001	78.8	61.5	77	174.0	211.7	37.7	37.9	0.3	13.4
38	Jagalene	AgriPro	2002	79.7	64.8	93	166.3	208.0	41.7	31.8	0.0	14.4
39	Pryor	WestBred	2002	57.7	60.9	23	178.3	215.7	37.3	31.9	0.0	13.3
40	Paul	Montana	2003	81.8	60.9	87	174.7	213.0	38.3	32.4	0.1	13.3
41	Genou	Montana	2004	80.8	62.6	92	172.3	210.7	38.3	35.7	0.2	13.7
42	MT1159CL	Montana/WestBred	2004	68.1	60.8	90	172.0	211.7	39.7	31.9	0.0	13.8
43	Ledger	WestBred	2004	77.8	63.5	95	171.3	210.3	39.0	31.6	0.0	13.3
44	Yellowstone	Montana	2005	95.3	61.8	87	174.3	213.0	38.7	34.6	0.0	12.9
45	Willow Creek	Montana	2005	67.9	62.0	88	178.0	217.3	39.3	49.3	0.8	15.6
46	Norris	Montana/WestBred	2005	79.3	63.4	92	167.0	211.0	44.0	34.5	0.0	13.4
47	Hyalite	Montana/WestBred	2005	76.0	62.9	82	169.0	212.0	43.0	34.1	0.0	14.1
48	Bynum	Montana/WestBred	2006	78.6	63.0	85	171.3	209.3	38.0	35.3	0.0	14.7
49	Decade	Montana, North Dakota	2010	96.0	62.7	100	170.0	209.7	39.7	34.4	0.0	14.1
50	Judee	Montana	2011	93.4	63.4	100	170.7	210.7	40.0	33.9	0.1	13.7
51	Bearpaw	Montana	2011	79.1	62.8	97	170.0	207.0	37.0	29.8	0.1	14.2
52	Brawl CI Plus	Colorado	2011	69.9	63.9	97	163.7	205.0	41.3	30.4	0.1	15.3
53	SY Clearstone 2	Montana/Syngenta	2012	95.3	61.8	100	173.7	210.0	36.3	34.4	0.0	13.3
54	Colter	Montana	2013	91.0	62.7	100	173.3	211.0	37.7	34.1	0.0	13.6
55	Warhorse	Montana	2013	81.3	62.1	100	172.0	208.7	36.7	32.2	0.7	14.1
56	WB3768	Montana/WestBred	2013	88.8	62.1	78	175.7	214.3	38.7	36.4	0.1	13.1
57	Northern	Montana	2015	91.8	62.0	97	174.0	210.3	36.3	32.4	0.2	13.0

Table 134. 2020 Montana Historical Variety Test: Bozeman

Entry #	ID	Origin	Year of Release	Yield bu/ac	Test weight lb/bu	Stand % 5-May	Heading date Julian	Maturity date Julian	Days to maturity	Plant height in RCB	Lodging index (0-9) LAT	Protein % RCB
				LAT	LAT	RCB	RCB	RCB	RCB	RCB	LAT	RCB
				109%	124%	102%	97%			101%	105%	103%
58	Loma	Montana	2016	99.3	61.7	100	174.0	212.7	38.7	30.7	0.2	12.9
59	Spur	Montana: Wyoming, Syngt	2016	98.2	60.9	100	172.7	210.0	37.3	31.6	0.0	12.3
60	FourOsix	Montana	2018	90.4	62.3	92	171.7	213.0	41.3	30.7	0.0	13.1
61	Ray	Montana	2018	96.0	60.5	87	177.0	214.3	37.3	37.5	0.1	13.2
62	MTF1435	Montana: AgWest Seeds,	2018	79.5	61.6	97	175.0	211.0	36.0	39.5	0.0	13.6
63	Bobcat	Montana	2019	80.1	62.4	85	172.7	211.7	39.0	29.4	0.0	13.1
64	Flathead	Montana	2019	75.4	63.2	100	165.3	208.0	42.7	30.1	0.9	13.7
	Average			79.9	62.5	90.8	172.6	210.6	38.0	37.7	1.2	13.9
	LSD (0.05)			10.9	0.6	10.7	2.1	1.8	2.6	1.5	1.1	0.3
	C.V. (%)			8.1	0.6	7.3	0.8	0.5	4.2	2.4	53.9	1.5
	P-value (Varieties)			<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001

bold = indicates highest value within a column

Table 135. Winter Wheat Clearfield Qualification Trial , Bozeman, MT (Exp. CLQ1) for 2020. MSU Lutz Farm site.

Shaded lines are in 2021 Intrastate or Advanced Tests									
Treatment	Yield	Test weight	% Injury rating		Stand %	Heading date	Plant height	Protein	
			day 14	day 28					
	- bu/a -	- lb/bu -	12-Jun	26-Jun	26-May	from 1-Jan	- in -	- % -	
By Rate:									
OX	76.8	61.9	0	0	84	171.6	24.2	12.7	
2XMSO	68.2	61.3	4	5	86	169.6	23.7	13.0	
Rate PLSD (0.05)	ns	ns	3	3	ns	0.9	0.5	ns	
Rate CV%	11.3	0.9	208	199	12.7	0.9	3.3	2.3	
Rate*ID interactions	0.8181	0.5188	0.1623	0.5559	0.8285	0.2169	0.7792	0.1789	
By ID:									
SY Clearstone 2CL	74.2	60.7	1	0	83	172.8	28.0	13.2	
StandClear CLP	66.0	63.0	0	0	79	171.0	26.0	12.8	
MTCL1732	69.1	60.7	7	3	82	171.3	24.3	12.4	
MTCL1737	80.4	61.4	0	2	90	173.2	23.3	12.9	
MTCL19149	80.0	60.7	4	5	87	171.5	25.3	13.3	
MTCL19151	69.9	62.2	1	4	88	167.2	21.2	12.3	
MTCL19152	69.4	62.0	1	2	86	166.7	21.7	12.6	
MTCL19153	71.0	61.8	3	2	85	171.2	21.8	13.1	
ID PLSD (0.05)	9.1	0.6	ns	ns	ns	1.9	0.9	0.4	
ID CV%	10.7	0.9	221	196	12.0	1.0	3.1	2.4	
Grand Mean	72.5	61.6	2.1	2.2	84.9	170.6	23.9	12.8	

Planted: October 25, 2019
Beyond Application: May 29, 2020
Harvested: August 27, 2020

Table 136. Winter Wheat Clearfield Qualification Trial ,Huntley, MT (Exp. CLQ8)

Shaded lines are in 2021 Intrastate or Advanced Tests

Treatment	Yield - bu/a -	Test weight - lb/bu -	% Injury rating		Stand %	Heading date from 1-Jan	Plant height - in -	Protein - % -
			day xx	day xx				
<u>By Rate:</u>			no injury recorded					
OX	85.5	63.2			80	31.3	162.8	13.7
2XMSO	80.9	63.3			80	30.7	162.1	13.9
Rate PLSD (0.05)	ns	ns			ns	ns	ns	ns
Rate CV%	21.8	1.0			1.3	1.8	0.8	3.8
Rate*ID interactions								
<u>By ID:</u>								
SY Clearstone 2CL	82.9	62.5			80	33.9	163.5	14.1
StandClear CLP	79.2	63.9			80	32.1	162.8	14.1
MTCL1732	81.2	62.4			78	29.9	163.0	13.0
MTCL1737	83.3	62.6			80	29.8	164.7	13.6
MTCL19149	88.4	63.2			80	32.0	163.0	14.0
MTCL19151	84.4	64.0			78	31.1	159.3	13.7
MTCL19152	83.3	64.1			80	29.8	160.5	13.8
MTCL19153	82.7	63.6			80	29.2	162.7	14.3
ID PLSD (0.05)	4.9	0.5			ns	1.0	1.0	0.4
ID CV%	5.0	0.6			1.1	2.7	0.5	2.4
Grand Mean	83.2	63.3			79.5	31.0	162.4	13.8

Planted: October 8, 2019
Beyond Application: May 5, 2020
Harvested: July 27, 2020

Table 137. 2020 Clearfield Qualification Test (Exp. CLQ): Means of lines across all locations and treatments
 Shaded lines are in 2021 Intrastate or Advanced Tests

Line	Pedigree	Yield bu/ac	Test weight lb/bu	Heading date 1-Jan	Plant height in	Protein %
	n =	12	12	12	12	12
SY Clearstone 2CL	genetic standard	78.6	61.6	168.2	30.9	13.6
StandClear CLP	Montana: Nutrien Ag Solutions, 2019	72.6	63.5	166.9	29.0	13.4
MTCL1732	AP035-8-1/5/MT08134/4/YLL*4/3/MTCL01158/CDC Teal 11A/JAG	75.1	61.6	167.2	27.1	12.7
MTCL1737	YLL-2CL/3/YLL*2/Pelsart//PROM/3*YLL	81.9	62.0	168.9	26.5	13.2
MTCL19149	MTCL1125/MT1091	84.2	61.9	167.3	28.6	13.6
MTCL19151	MT0871/(06X445B1-2, SY Clearstone sib)	77.1	63.1	163.3	26.1	13.0
MTCL19152	MT0871/(06X445B1-2, SY Clearstone sib)	76.4	63.0	163.6	25.7	13.2
MTCL19153	MT0871/(06X445B1-2, SY Clearstone sib)	76.9	62.7	166.9	25.5	13.7
Average		77.9	62.4	166.5	27.5	13.3
LSD (0.05)		5.1	0.4	1.1	0.8	0.3
C.V. (%)		8.0	0.8	0.8	3.8	2.5
P-value (Varieties)		0.0005	<.0001	<.0001	<.0001	<.0001

Table 138. 2020 Preliminary Clearfield Test Summary: 2 locations

Entry #	Cultivar/Line	Pedigree	Yield bu/ac	Test weight lb/bu	Heading date Julian	Plant height in	Protein %					
locations												
5	a	MTCL2008	MTCL1125/MT1091	87.0	62.4	165.5	28.9	14.2				
4	a	MTCL2007	MTCL1125/MT1091	86.7	62.3	165.0	28.9	13.4				
6	a	MTCL2009	MTCL1125/MT1091	83.9	62.0	165.5	29.6	13.3				
14		MTC2062	Warhorse/MTCS1203	83.3	62.5	165.3	28.1	14.0				
16	a	MTC20151	Loma/(Bobcat sib, MTS1589)/StandClear CLF	82.1	63.5	168.8	28.8	12.9				
13		MTC2061	Warhorse/MTC2015	79.9	62.7	165.5	27.8	14.1				
12		MTCL2015	MT0871/(06X445B1-2, SY Clearstone sib)	79.5	63.5	163.5	25.6	13.0				
23	a	MTC20158	Bobcat/(Bobcat sib, MTS1589)/StandClear CL	79.3	63.8	166.8	26.5	13.6				
21	a	MTC20156	Bobcat/(Bobcat sib, MTS1589)/StandClear CL	79.3	63.1	170.0	27.9	13.4				
11	a	MTCL2014	MT0871/(06X445B1-2, SY Clearstone sib)	79.0	62.3	169.8	26.7	13.1				
1		SY Clearstone 2CL	check	78.6	61.4	167.0	30.4	13.6				
9		MTCL2012	MT0871/(06X445B1-2, SY Clearstone sib)	77.8	63.0	163.5	26.6	13.2				
10		MTCL2013	MT0871/(06X445B1-2, SY Clearstone sib)	77.8	62.4	164.5	28.5	13.2				
3		MTCL2006	MT1137/MTCL1067	76.8	62.1	166.3	28.9	14.2				
22		MTC20157	Bobcat/(Bobcat sib, MTS1589)/StandClear CL	76.0	63.8	163.0	27.6	14.0				
17		MTC20152	Loma/(Bobcat sib, MTS1589)/StandClear CLF	75.8	62.1	166.5	24.6	13.3				
19		MTC20154	Bobcat/(Bobcat sib, MTS1589)/StandClear CL	75.6	63.0	166.3	27.3	13.2				
20		MTC20155	Bobcat/(Bobcat sib, MTS1589)/StandClear CL	74.5	63.0	165.5	28.7	13.5				
7	a	MTCL2010	MT0871/(06X445B1-2, SY Clearstone sib)	74.2	62.9	164.0	26.2	13.0				
24	a	MTC20159	Bobcat/(Bobcat sib, MTS1589)/StandClear CL	74.1	62.7	167.5	27.9	13.8				
15		MTC2063	MTC20159/MTS1021/MTCL1003	73.5	61.1	167.8	27.4	14.2				
8		MTCL2011	MT0871/(06X445B1-2, SY Clearstone sib)	72.7	62.6	164.3	27.9	13.1				
2		MTCL2005	MTCL1260/MTCL1125/MT1091	69.8	61.8	163.0	30.0	14.8				
18		MTC20153	Loma/(Bobcat sib, MTS1589)/StandClear CLF	55.4	62.6	168.5	23.8	14.7				
Average								77.2	62.6	166.0	27.7	13.6
LSD (0.05)								12.7	0.9	2.6	2.0	0.5
C.V. (%)								7.9	0.7	0.8	3.5	1.7

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

a = moved to 2021 Advanced Test

Table 139. 2020 Preliminary Clearfield Test (Exp. PCL1): Lutz Farm

Entry #	Cultivar/Line	Pedigree	Yield bu/ac	Test weight lb/bu	Stand % 26-May	% Injury rating day 14 12-Jun	Plant height in	Protein %
			RCB	RCB	RCB	RCB	RCB	RCB
lattice efficiency relative to RCB								
4	a	MTCL2007	81.5	61.7	90.0	0	167.0	12.9
6	a	MTCL2009	81.3	61.2	80.0	7	168.0	12.7
5	a	MTCL2008	80.9	61.8	82.5	4	168.0	13.6
1		SY Clearstone 2CL check	79.2	61.4	87.5	1	171.0	12.9
14		Warhorse/MTCS1203	78.3	62.1	90.0	0	167.5	13.6
21	a	MTCS20156	78.2	63.1	77.5	8	175.0	12.6
16	a	MTCS20151	75.5	62.9	67.5	35	173.5	12.2
20		MTCS20155	75.2	62.8	87.5	8	168.0	12.6
23	a	MTCS20158	75.1	63.6	87.5	3	170.0	12.8
9		MTCL2012	74.5	62.2	82.5	8	166.5	12.2
12		MTCL2015	73.9	62.7	80.0	6	167.5	12.4
17		MTCS20152	73.8	61.7	87.5	5	170.5	12.5
22		MTCS20157	73.5	63.4	95.0	8	166.5	13.2
10		MTCL2013	72.7	61.9	82.5	6	167.5	12.5
11	a	MTCL2014	71.7	62.0	70.0	6	175.0	12.7
13		MTCS2061	71.1	62.3	87.5	20	167.5	13.6
19		MTCS20154	69.8	63.1	77.5	5	169.5	12.3
7	a	MTCL2010	66.6	61.8	82.5	3	167.0	12.4
3		MTCL2006	66.2	62.0	70.0	3	169.5	13.4
24	a	MTCS20159	65.1	62.4	70.0	8	171.0	13.0
8		MTCL2011	65.0	62.2	50.0	4	168.0	12.5
2		MTCL2005	64.0	60.9	85.0	1	166.0	14.0
15		MTCS2063	63.2	60.8	62.5	5	172.0	13.4
18		MTCS20153	35.1	62.3	65.0	55	172.0	14.2
Average								
LSD (0.05)			71.3	62.2	79.1	8.4	169.3	12.9
C.V. (%)			15.9	0.6	ns	11.3	2.8	0.3
P-value (Varieties)			10.8	0.4	17.4	64.9	0.8	1.2
			0.0045	<.0001	0.3221	<.0001	<.0001	<.0001

bold = indicates highest value within a column

a = moved to 2021 Advanced Test

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

planted: 10/25/2019

Sprayed w/Beyond: 5/29/2020

harvested: 8/27/2020

Table 140. 2020 Preliminary Clearfield Test (Exp. PCL8): Huntley

Entry #	Cultivar/ Line	Pedigree	Yield bu/ac	Test weight lb/bu	Heading date Julian	Plant height in	Lodging %	Protein %
			LAT	LAT	RCB	LAT	RCB	RCB
		lattice efficiency relative to RCB	112%	118%	100%	116%	100%	100%
5	a	MTCL2008	93.0	62.9	163.0	32.3	0	14.7
4	a	MTCL2007	91.9	62.9	163.0	32.2	4	13.8
13		MTCS2061	88.7	63.0	163.5	31.0	0	14.5
16	a	MTCS20151	88.7	64.1	164.0	31.7	0	13.6
14		MTCS2062	88.3	62.9	163.0	30.3	0	14.3
3		MTCL2006	87.3	62.1	163.0	32.3	0	15.0
6	a	MTCL2009	86.5	62.8	163.0	32.7	0	13.9
11	a	MTCL2014	86.2	62.6	164.5	29.6	0	13.4
12		MTCL2015	85.0	64.2	159.5	30.3	0	13.6
15		MTCS2063	83.7	61.4	163.5	30.4	0	14.9
23	a	MTCS20158	83.5	63.9	163.5	29.7	0	14.3
24	a	MTCS20159	83.0	63.0	164.0	31.5	0	14.5
10		MTCL2013	82.8	62.8	161.5	33.0	0	13.8
7	a	MTCL2010	81.7	64.0	161.0	30.0	0	13.5
19		MTCS20154	81.3	62.9	163.0	30.2	0	14.0
9		MTCL2012	81.1	63.7	160.5	30.5	0	14.1
21	a	MTCS20156	80.4	63.1	165.0	30.9	0	14.1
8		MTCL2011	80.3	63.0	160.5	31.4	0	13.7
22		MTCS20157	78.4	64.2	159.5	31.0	0	14.7
1		SY Clearstone 2CL check	78.0	61.3	163.0	34.4	0	14.3
17		MTCS20152	77.8	62.4	162.5	27.7	0	14.0
18		MTCS20153	75.7	62.9	165.0	29.0	0	15.2
2		MTCL2005	75.5	62.6	160.0	34.2	14	15.6
20		MTCS20155	73.8	63.1	163.0	31.4	0	14.4
Average			83.0	63.0	162.6	31.2	1.0	14.2
LSD (0.05)			ns	0.7	1.6	2.1	2.8	0.8
C.V. (%)			8.2	0.5	0.5	3.2	223.9	2.7
P-value (Varieties)			0.398	<0.001	<0.001	0.003	0.001	0.005

bold = indicates highest value within a column
a = moved to 2021 Advanced Test

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

planted: 10/8/2019

Sprayed w/Beyond: 5/5/2020

harvested: 7/27/2020

Table 141. 2020 Zinc Biofortification Winter Wheat Test: 3 Location Summary

Entry #	Cultivar/Line	Treatment	Yield bu/ac	Test weight lb/bu	Heading date Julian	Plant height in	Protein %
			3	3	3	3	3
1	Bobcat	untreated seed	79.9	63.0	171.6	27.2	13.1
2	Bobcat	untreated seed, spring Zn spray	69.4	62.2	171.4	26.5	13.4
3	Bobcat	Zn+ seed	80.4	63.0	170.4	26.5	13.0
4	Flathead	untreated seed	61.8	62.6	165.2	26.6	13.6
5	Flathead	untreated seed, spring Zn spray	53.6	62.2	164.7	25.9	13.9
6	Flathead	Zn+ seed	61.2	62.9	165.1	26.3	13.5
7	FourOsix	untreated seed	70.0	62.0	169.8	26.9	13.4
8	FourOsix	untreated seed, spring Zn spray	71.6	61.8	168.8	27.3	13.5
9	FourOsix	Zn+ seed	76.1	62.2	168.8	27.9	13.3
10	Ray	untreated seed	74.9	61.0	174.7	32.3	13.4
11	Ray	untreated seed, spring Zn spray	61.6	60.0	175.3	31.8	13.7
12	Ray	Zn+ seed	77.1	60.9	175.0	31.8	13.4
Average			69.8	62.0	170.1	28.1	13.4
LSD (0.05)			10.8	0.9	2.0	1.8	ns
C.V. (%)			9.1	0.9	0.7	3.8	2.6

bold = indicates highest value within a column
bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

untreated seed	71.6	62.1	170.3	28.2	13.4
untreated seed, spring Zn spray	64.0	61.5	170.0	27.9	13.7
Zn+ seed	73.7	62.2	169.8	28.1	13.3
LSD (0.05)	ns	ns	ns	ns	ns

Table 142. 2020 Zinc Biofortification Winter Wheat Test (Exp. ZN01): Bozeman Post Farm

Entry #	Cultivar/Line	Treatment	Yield bu/ac	Test weight lb/bu	Heading date Julian	Plant height in	Protein %
			RCB	RCB	RCB	RCB	RCB
1	Bobcat	untreated seed	101.0	63.7	173.5	30.3	12.5
2	Bobcat	untreated seed, spring Zn spray	87.4	62.8	174.0	29.1	13.1
3	Bobcat	Zn+ seed	105.3	64.1	173.0	30.3	12.3
4	Flathead	untreated seed	83.0	63.3	165.8	30.2	13.6
5	Flathead	untreated seed, spring Zn spray	71.2	62.0	165.5	29.9	14.2
6	Flathead	Zn+ seed	88.8	63.5	165.5	30.4	13.2
7	FourOsix	untreated seed	95.7	63.0	171.8	29.7	12.8
8	FourOsix	untreated seed, spring Zn spray	90.9	62.1	171.0	30.6	13.5
9	FourOsix	Zn+ seed	108.4	63.3	170.8	31.9	12.6
10	Ray	untreated seed	105.5	61.9	177.0	37.5	12.7
11	Ray	untreated seed, spring Zn spray	79.4	60.4	176.8	36.2	13.5
12	Ray	Zn+ seed	105.8	61.8	176.8	37.3	12.8
Average			93.5	62.7	171.8	32.0	13.1
LSD (0.05)			11.7	0.6	1.1	1.1	0.3
C.V. (%)			8.7	0.7	0.5	2.3	1.5
P-value (Varieties)			<.0001	<.0001	<.0001	<.0001	<.0001
bold = indicates highest value within a column							
bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)							
untreated seed			96.3	63.0	172.0	31.9	12.9
untreated seed, spring Zn spray			82.2	61.8	171.8	31.5	13.6
Zn+ seed			102.1	63.2	171.5	32.5	12.7
LSD (0.05)			7.9	0.3	ns	ns	0.2

Table 143. 2020 Zinc Biofortification Winter Wheat Test (Exp. ZNLZ): Lutz Farm

Entry #	Cultivar/Line	Treatment	Yield bu/ac	Test weight lb/bu	Stand %	Heading date Julian	Plant height in	Protein %
			RCB	RCB	RCB	RCB	RCB	bulk
1	Bobcat	untreated seed	66.8	61.6	65.0	172.5	24.1	13.2
2	Bobcat	untreated seed, spring Zn spray	49.5	60.7	46.3	173.3	24.5	13.6
3	Bobcat	Zn+ seed	68.6	62.2	68.8	171.8	23.7	12.9
4	Flathead	untreated seed	50.6	61.8	67.5	165.0	24.1	13.2
5	Flathead	untreated seed, spring Zn spray	38.9	61.6	60.0	164.8	22.8	13.5
6	Flathead	Zn+ seed	41.1	62.0	53.8	165.5	23.1	13.2
7	FourOsix	untreated seed	55.1	60.8	45.0	170.5	25.4	13.4
8	FourOsix	untreated seed, spring Zn spray	66.1	61.6	67.5	168.8	24.2	12.8
9	FourOsix	Zn+ seed	62.1	61.2	57.5	170.5	24.7	13.1
10	Ray	untreated seed	61.9	60.5	60.0	176.3	29.6	13.6
11	Ray	untreated seed, spring Zn spray	49.7	59.9	46.3	176.8	29.1	13.8
12	Ray	Zn+ seed	65.7	60.7	63.8	176.3	30.2	13.6
Average			56.3	61.2	58.4	171.0	25.5	13.3
LSD (0.05)			9.0	1.1	15.6	1.4	1.6	0.5
C.V. (%)			11.1	1.2	18.6	0.6	4.3	2.4
P-value (Varieties)			<.0001	0.0022	0.0162	<.0001	<.0001	0.0

bold = indicates highest value within a column
bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

untreated seed	58.6	61.2	59.4	171.1	25.8	13.4
untreated seed, spring Zn spray	51.0	61.0	55.0	170.9	25.2	13.4
Zn+ seed	59.4	61.5	61.0	171.0	25.4	13.2
LSD (0.05)	ns	ns	ns	ns	ns	ns

Table 144. 2020 Zinc Biofortification Winter Wheat Test (Exp. ZN02): Havre

Entry #	Cultivar/Line	Treatment	Yield bu/ac	Test weight lb/bu	Stand %	Heading date Julian	Plant height in	Sawfly cutting %	Protein %
1	Bobcat	untreated seed	72.0	63.7	94.6	168.8	27.1	4.5	13.6
2	Bobcat	untreated seed, spring Zn spray	71.2	63.0	97.2	167.0	25.9	10.5	13.6
3	Bobcat	Zn+ seed	67.4	62.8	97.4	166.5	25.4	11.5	13.8
4	Flathead	untreated seed	51.8	62.7	89.6	164.8	25.5	32.5	14.1
5	Flathead	untreated seed, spring Zn spray	50.8	62.9	92.1	163.8	25.1	38.8	14.1
6	Flathead	Zn+ seed	53.7	63.1	92.4	164.3	25.3	30.0	14.1
7	FourOsix	untreated seed	59.1	62.1	95.7	167.0	25.5	38.8	14.0
8	FourOsix	untreated seed, spring Zn spray	57.9	61.6	95.0	166.5	27.2	50.0	14.3
9	FourOsix	Zn+ seed	57.9	62.0	94.6	165.0	27.0	50.0	14.1
10	Ray	untreated seed	57.2	60.5	90.6	170.8	29.8	36.3	13.9
11	Ray	untreated seed, spring Zn spray	55.7	59.8	93.1	172.3	30.1	27.5	13.9
12	Ray	Zn+ seed	59.9	60.1	91.2	171.8	27.9	36.3	13.9
Average			59.5	62.0	93.6	167.4	26.8	30.5	13.9
LSD (0.05)			6.3	0.8	4.3	1.7	2.0	13.3	0.3
C.V. (%)			7.3	0.9	3.2	0.7	5.3	30.2	1.6
P-value (Varieties)			<.0001	<.0001	0.0092	<.0001	<.0001	<.0001	0.0032
bold = indicates highest value within a column									
bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)									
untreated seed			60.0	62.2	92.6	167.8	27.0	28.0	13.9
untreated seed, spring Zn spray			58.9	61.8	94.3	167.4	27.1	31.7	14.0
Zn+ seed			59.7	62.0	93.9	166.9	26.4	31.9	14.0
LSD (0.05)			ns	ns	ns	ns	ns	ns	ns

Table 145. 2020 Sawfly Observation Nursery (SFO): Lines harvested at the Post Farm, Bozeman

Plot #	2021 ID	Cross ID	Pedigree	Yield bu/a	Test weight lb/bu	Heading date from	Plant height in	2019 HR data		
								Prot- ein	PPO	SDS
2		Warhorse	check	73.2	63.8	172	29.1			
15		13X13cE107	Spur/MTCL1067//MTS1307	77.8		174	30.3	12.4	4	3.8
16		13X13cE114	Spur/MTCL1067//MTS1307	73.6		175	32.3	11.5	4	3.7
39		13X18cE100	MTCS1205/MTS1226//MTCS1202	93.9	63.1	168	28.7	13.6	4	3.4
49		13X22cE4	Warhorse*2/MTCS1203	103.0	62.4	168	27.2	11.9	4	4.0
54	MTCS2101	13X22cE18	Warhorse*2/MTCS1203	106.2	63.2	167	27.2	12.6	5	3.2
59		13X22cE74	Warhorse*2/MTCS1203	89.9		172	28.3	13.1	4	3.2
67	MTCS2102	13X22cE105	Warhorse*2/MTCS1203	114.1	62.0	168	29.9	11.9	4	4.0
70		13X22cE133	Warhorse*2/MTCS1203	94.0	60.0	168	28.0	11.6	4	3.7
82		13X25E60	Warhorse/MTCS1203//MT1156	76.9		174	31.5	13.0	4	3.8
108		13X40cE78	06X70D4/WB3768//MTS1318	101.1	62.7	174	30.7	12.0	4	3.2
117		13X45cE6	Warhorse/04X572D24-2//MTS1327	75.5		168	29.1	13.8	4	3.6
124		13X45cE52	Warhorse/04X572D24-2//MTS1327	81.5		168	30.3	12.7	4	3.9
129		13X45cE86	Warhorse/04X572D24-2//MTS1327	82.1		171	29.9	13.6	4	4.2
138		12X3cE31-1	Spur/MTS1014//MTCS1205	100.7	62.7	171	31.9	12.5	4	4.7
139		12X3cE33-3	Spur/MTS1014//MTCS1205	92.5	62.6	167	31.5	13.0	4	4.1
141		12X3cE44-3	Spur/MTS1014//MTCS1205	97.4	62.5	172	31.9	12.6	4	3.4
143		12X3cE76-4	Spur/MTS1014//MTCS1205	94.0	62.6	168	31.1	12.9	4	3.6
145		12X3cE99-3	Spur/MTS1014//MTCS1205	99.8	60.5	168	32.3	13.5	4	4.2
147		12X157E45-2	MTCS1205/MTS1211	92.6	62.5	171	32.7	13.1	4	3.6
149		12X159E6-3	Warhorse/MTCS1203	87.1		172	32.7	12.4	4	4.0
155		12X159E93-2	Warhorse/MTCS1203	103.8	61.7	171	31.9	13.0	4	3.8
157		12X159E103-2	Warhorse/MTCS1203	90.7		167	33.5	13.0	4	3.4
160	MTCS2103	12X23cE38-2	MTCS1203//MTS1021/MTCL1003	105.3	62.6	171	29.9	13.7	4	4.6
161	MTCS2104	12X23cE39-3	MTCS1203//MTS1021/MTCL1003	129.9	61.8	176	32.3	12.9	4	5.2
162		12X23cE56-2	MTCS1203//MTS1021/MTCL1003	99.1	61.8	171	30.3	12.9	4	4.2
163		12X23cE65-4	MTCS1203//MTS1021/MTCL1003	95.6	61.9	170	29.9	12.8	4	4.2
165	MTCS2105	12X23cE72-3	MTCS1203//MTS1021/MTCL1003	106.4	62.3	172	30.7	12.3	4	4.5
202		Warhorse	check	90.4	60.2	172	33.1			
205	MTS2106	17X3-DH-45	MTS1731//MTS1619/Joe	103.8	63.4	168	31.5	12.4	5	4.2
227	MTS2107	13X50E95	MTS1211*2//Overland	106.4	62.1	172	33.9	12.4	4	3.4
238	MTS2108	13X53cE49	MT1078/MTS1226//Spur	106.4	61.3	171	29.9	12.2	4	4.0
246	MTS2109	13X53cE121	MT1078/MTS1226//Spur	111.1	61.5	171	31.1	12.4	4	4.6
257	MTS2110	13X55cE60	MT1090/WB-Quake//Spur	120.2	61.9	174	32.3	11.8	4	3.2
264		13X55cE122	MT1090/WB-Quake//Spur	129.6		173	32.3	12.1	4	3.1
270		13X58cE51	WB-Quake/MT1286//MTS1211	111.1	60.6	175	33.1	13.8	1	3.6
271	MTS2111	13X58cE66	WB-Quake/MT1286//MTS1211	105.4	62.7	174	30.7	12.4	4	3.7
276		13X60E5	Yellowstone/2*Spur	113.5		174	31.1	11.7	3	3.3
278		13X60E69	Yellowstone/2*Spur	116.8		174	30.3	12.2	4	3.5
284		15X283B57-4	WA 8186/Loma	105.7	60.5	174	31.1	12.8	3	4.2
295		13X61E35	Warhorse//Yellowstone/Spur	94.6		171	31.5	12.5	4	3.6
368		13X70cE27	Warhorse//WB-Quake/MTS1226	96.8	62.9	174	29.5	12.7	4	3.2
380		13X70cE118	Warhorse//WB-Quake/MTS1226	90.8		174	31.5	13.0	4	4.0
386		13X73cE55	WB-Quake/MTS1226//MT1090	99.3		171	31.5	12.2	4	3.2
389		13X75cE7	(Judee sib, MTS0819)/04X56cE71//MTS13	101.7	60.1	171	30.7	11.9	4	3.4
390		13X75cE20	(Judee sib, MTS0819)/04X56cE71//MTS13	106.6	60.9	172	31.9	12.0	4	3.7
393	MTS2112	13X75cE44	(Judee sib, MTS0819)/04X56cE71//MTS13	116.1	62.6	168	29.9	11.8	4	3.2
402		Warhorse	check	89.1	62.7	172	32.7			
403	MTS2113	13X75cE110	(Judee sib, MTS0819)/04X56cE71//MTS13	113.6	61.4	174	31.9	12.5	5	3.5
406	MTS2114	13X75cE136	(Judee sib, MTS0819)/04X56cE71//MTS13	110.4	63.1	173	32.7	12.0	5	3.1
418		13X78cE74	Yellowstone/04X38cE70//MTS0826-63	92.1		167	29.5	12.8	5	3.2
423		13X78cE102	Yellowstone/04X38cE70//MTS0826-63	85.1		172	28.7	12.6	5	3.2
428		13X78cE135	Yellowstone/04X38cE70//MTS0826-63	84.0		172	29.5	12.8	4	3.5
481	MTS2115	13X196E91	MTS1307/08X22cB-85	106.1	62.1	166	28.0	12.1	5	3.4

Table 145. 2020 Sawfly Observation Nursery (SFO): Lines harvested at the Post Farm, Bozeman

Plot #	2021 ID	Cross ID	Pedigree	Yield bu/a	Test weight lb/bu	Heading date from	Plant height in	2019 HR data		
								Prot-ein	PPO	SDS
						1-Jan				
485	MTS2116	13X204E16	MT1138/MTS1318	106.4	63.9	171	30.7	11.5	4	3.8
524		13X229cE94	MTS1305/TCI012160	97.7		171	31.1	11.6	4	3.8
536		12X36E78-3	(Judee sib, MTS0819-98)//10K1734w/WB3	91.6		166	30.7	11.7	5	3.4
543	MTS2117	12X38cE95-3	Decade*2/(MTS0819, Judee sib)	118.8	64.3	165	32.7	12.2	5	3.9
549	MTS2118	12X42cE72-3	MTS1227//Accipiter/MTS0832	109.1	62.4	171	29.5	11.9	4	3.2
557	MTS2119	12X44cE89-3	Judee//MTS0925/MTS1055	117.2	63.8	171	31.9	12.5	4	3.7
572	MTS2120	12X46cE17-1	Judee*2/MTS1014	108.5	65.1	166	31.5	12.4	4	3.9
580	MTS2121	12X47cE107-4	(Judee sib, MTS0819-98)//MTS1017/MTS1	108.6	62.5	172	31.9	14.0	4	3.5
588		12X57cE18-3	Warhorse//MTS1028/MTS1030	105.5		171	31.1	12.1	1	4.1
595 w1		12X58E56-4	MTW1251//MTS1029/MTS1011	118.9		173	31.9	11.9	1	3.3
596	MTS2122	12X67cE4-4	(Judee sib, MTS0819-98)//03X273cE8/MT	108.3	63.8	174	32.3	12.0	4	4.5
598	MTS2123	12X67cE12-3	(Judee sib, MTS0819-98)//03X273cE8/MT	111.9	63.3	174	31.9	12.7	4	3.6
602		Warhorse	check	93.8	62.8	172	32.7			
610		12X71cE7-4	(Judee sib, MTS0819-98)//MTS1166/03X1	100.9	62.5	171	28.3	12.5	2	4.4
622		15X180B38-1	Warhorse*2/Loma	90.5		167	27.2	12.5	4	3.3
631		15X184cB26-4	Warhorse/Loma//MTS1594	97.1		167	29.5	12.3	1	3.9
642		15X187cB45-3	Loma*2/MTS1404	108.3	61.8	174	29.9	12.0	2	3.6
644		15X187cB70-4	Loma*2/MTS1404	108.0	61.4	175	29.9	12.1	2	3.4
Average All				100.6	62.3	171.0	30.8	12.5	3.8	3.7
Average MTS21xx lines				109.0	63.3	170.5	29.6	12.7	4.5	3.4

Table 146. 2020 Sawfly Observation Nursery (SFO): All location data

Row/ Plot	wPPO	ID	Pedigree	Stand				Heading			Plant Height			Spray injury	Agronomic Scores						2019 HR data					
				BZ		Lutz		BZ		Lutz		BZ			Lutz		BZ - SFO		Lutz - CLO		Big Sandy		Sum	Prot-	PPO	SDS
				SFO	CLO	SFO	CLO	SFO	CLO	SFO	CLO	SFO	CLO		PLB	JEB	PLB	JEB	PLB	JEB	PLB	JEB				
1	1	Rampart	check (SY Clearstone 2CL at Lutz)	60	85	174	172	31.5	28.0			4	4			15-Jul	22-Jul	3-Aug		29						
2	h	Warhorse	check	80	50	172		29.1				6	5					5	5	29						
3	w5 d	13X13cE5	Spur/MTCL1067/MTS1307	90	70	168	167	29.5	25.6	10		6	6			4	4	7	6	24						
4	w5 d	13X13cE8	Spur/MTCL1067/MTS1307	75	60	167	166	29.9	24.0			5	5			3	4	6	5	31						
5	w4	13X13cE22	Spur/MTCL1067/MTS1307	80	85	171	166	28.7	25.2	5		5	5			6	5	5	6	27						
6	w4 d	13X13cE42	Spur/MTCL1067/MTS1307	95	90	167	165	30.7	26.0			6	6			6	4	4	5	32						
7	w4 d	13X13cE48	Spur/MTCL1067/MTS1307	100	90	167	165	29.9	26.4	5		5	5			5	4	4	5	31						
8	w4 d	13X13cE57	Spur/MTCL1067/MTS1307	100	65	166	166	29.9	26.8			6	6			3	4	6	6	28						
9		d 13X13cE64	Spur/MTCL1067/MTS1307	100	90	167	165	31.5	26.0			6	5			5	4	6	5	30						
10	w4 d	13X13cE71	Spur/MTCL1067/MTS1307	100	80	167	166	30.3	25.6			6	5			6	5	6	5	33						
11	w4 d	13X13cE72	Spur/MTCL1067/MTS1307	100	75	168	167	29.9	25.2			6	6			4	4	5	5	30						
12	w4 d	13X13cE89	Spur/MTCL1067/MTS1307	100	80	167	166	29.9	25.6			6	6			4	4	3	4	27						
13	w4 d	13X13cE101	Spur/MTCL1067/MTS1307	100	90	168	165	30.7	25.2			5	5			5	5	5	5	30						
14		13X13cE103	Spur/MTCL1067/MTS1307	100	90	171	167	29.9	25.6	5		6	5			5	4	3	4	27						
15	h	13X13cE107	Spur/MTCL1067/MTS1307	100	70	174	171	30.3	26.4			7	6			6	5	7	6	37						
16	h	13X13cE114	Spur/MTCL1067/MTS1307	100	85	175	171	32.3	26.8			7	6			7	6	6	5	37						
17		13X13cE117	Spur/MTCL1067/MTS1307	100	80	172	168	31.1	26.0			5	5			4	4	5	6	29						
18	w4 d	13X13cE119	Spur/MTCL1067/MTS1307	100	90	167	166	30.7	24.8			6	5			5	5	4	4	29						
19		13X13cE128	Spur/MTCL1067/MTS1307	100	60	168	166	31.5	26.4			5	5			4	4	6	5	29						
20	d	13X15E1	MTCS1205/MTS1211/(MTCL1261, SY	90	65	174	172	29.1	25.2			4	5			5	5	5	6	30						
21		13X15E27	MTCS1205/MTS1211/(MTCL1261, SY	100	80	175	174	29.1	24.0			6	6			7	5	5	4	33						
22	d	13X15E32	MTCS1205/MTS1211/(MTCL1261, SY	100	75	172	174	30.3	25.2			6	6			6	6	6	5	35						
23	w4	13X15E36	MTCS1205/MTS1211/(MTCL1261, SY	100	50	172	172	31.9	25.2			5	6			3	3	5	5	27						
24		13X15E44	MTCS1205/MTS1211/(MTCL1261, SY	95	80	168	167	28.3	22.4			6	5			4	4	5	4	28						
25	w4 d	13X15E50	MTCS1205/MTS1211/(MTCL1261, SY	100	80	174	168	31.5	25.6			4	5			4	5	4	5	27						
26		13X18cE8	MTCS1205/MTS1226/MTCS1202	100	90	171	167	28.3	24.0			6	5			5	4	3	4	27						
27	d	13X18cE12	MTCS1205/MTS1226/MTCS1202	100	95	171	167	27.2	24.0	10		6	6			5	4	5	5	31						
28		13X18cE13	MTCS1205/MTS1226/MTCS1202	100	90	167	167	27.2	22.4			5	5			5	4	3	4	26						
29		13X18cE24	MTCS1205/MTS1226/MTCS1202	100	85	158	166	27.6	22.4	5		5	5			4	5	5	5	29						
30		13X18cE27	MTCS1205/MTS1226/MTCS1202	100	60	167	167	29.1	24.8	5		5	6			3	4	5	5	28						
31		13X18cE37	MTCS1205/MTS1226/MTCS1202	100	95	168	166	28.0	23.6	5		6	5			5	5	4	4	29						
32		13X18cE45	MTCS1205/MTS1226/MTCS1202	90	90	171	166	28.0	22.4	10		6	4			6	4	4	3	27						
33		13X18cE56	MTCS1205/MTS1226/MTCS1202	100	85	168	168	28.3	24.0			7	5			5	4	4	5	31						
34		13X18cE57	MTCS1205/MTS1226/MTCS1202	100	80	168	167	28.7	23.2			6	5			4	4	5	5	29						
35		13X18cE62	MTCS1205/MTS1226/MTCS1202	100	85	168	167	28.3	24.0	10		7	6			6	4	4	4	31						
36		13X18cE70	MTCS1205/MTS1226/MTCS1202	100	80	167	167	29.1	24.4			5	5			5	5	5	5	30						
37		13X18cE85	MTCS1205/MTS1226/MTCS1202	100	90	167	165	29.1	25.2	5		6	6			6	6	4	5	32						
38		13X18cE96	MTCS1205/MTS1226/MTCS1202	100	75	168	167	27.2	22.8	10		7	5			4	4	4	4	28						
39	h	13X18cE100	MTCS1205/MTS1226/MTCS1202	100	95	168	166	28.7	23.6			6	6			5	5	6	6	34						
40		13X18cE106	MTCS1205/MTS1226/MTCS1202	100	90	171	167	26.8	24.4	5		6	5			6	5	3	4	29						

Table 146. 2020 Sawfly Observation Nursery (SFO): All location data

Row/ Plot	wppo	ID	Pedigree	Stand			Heading			Plant Height			Spray	Agronomic Scores						2019 HR data	
				BZ	Lutz		BZ	Lutz		BZ	Lutz			BZ - SFO	Lutz - CLO	Big Sandy	Sum				
				SFO	CLO		SFO	CLO		SFO	CLO		injury	PLB	JEB	PLB	JEB		Prot- PPO SDS		
													≥5%					ein			
41	13X18cE111		MTCS1205/MTS1226/MTCS1202	100	80		167	167		28.7	24.4		5	6	5	3	4	27	14.1 4 3.2		
42	13X18cE115		MTCS1205/MTS1226/MTCS1202	100	95		171	167		27.6	25.2		10	5	5	3	4	28	13.2 4 4.2		
43	13X18cE125		MTCS1205/MTS1226/MTCS1202	100	80		168	167		28.3	23.2		10	6	5	3	4	27	13.5 4 3.8		
44	13X18cE129		MTCS1205/MTS1226/MTCS1202	100	90		167	166		27.2	24.0		10	5	6	4	5	31	14.4 4 3.6		
45	13X18cE132		MTCS1205/MTS1226/MTCS1202	100	80		167	167		28.0	22.0			6	5	3	4	26	13.9 4 3.5		
46	13X18cE135		MTCS1205/MTS1226/MTCS1202	90	95		171	167		25.6	24.0		5	6	5	5	5	31	13.2 4 4.0		
47	13X18cE139		MTCS1205/MTS1226/MTCS1202	95	85		168	168		27.2	24.0			6	5	4	5	32	13.1 4 4.0		
48	13X18cE145		MTCS1205/MTS1226/MTCS1202	100	95		167	164		28.7	25.2		5	6	6	5	6	32	12.2 4 3.8		
49	13X22cE4	h	Warhorse*2MTCS1203	100	85		168	168		27.2	24.4		10	7	7	5	6	36	11.9 4 4.0		
50	13X22cE7		Warhorse*2MTCS1203	100	90		168	167		28.7	23.6			5	6	3	4	28	11.7 4 3.8		
51	Rampart		check (SY Clearstone 2CL at Lutz)	100	85		172	172		34.6	26.4		5	5	4	6	5	31			
52	Warhorse		check	100	70		172			31.9				6	5	6	6	23			
53	13X22cE13		Warhorse*2MTCS1203	100	75		168	168		28.3	25.2		15	6	5	4	7	32	11.9 4 4.0		
54	13X22cE18	h	Warhorse*2MTCS1203	100	90		167	167		27.2	24.0		5	7	7	5	6	36	12.6 5 3.2		
55	d 13X22cE20		Warhorse*2MTCS1203	100	80		168	167		28.7	23.2		5	7	6	4	5	33	12.2 4 2.8		
56	13X22cE46	w5	Warhorse*2MTCS1203	85	60		174	172		28.3	24.8			5	5	4	5	28	13.4 5 4.2		
57	13X22cE47		Warhorse*2MTCS1203	100	75		171	168		26.0	23.6		5	7	6	4	5	33	12.3 4 3.4		
58	13X22cE67		Warhorse*2MTCS1203	100	90		171	168		27.6	22.4		5	6	6	6	5	33	11.9 4 3.6		
59	13X22cE74	h	Warhorse*2MTCS1203	100	85		172	168		28.3	25.2		10	7	7	5	6	36	13.1 4 3.2		
60	13X22cE78		Warhorse*2MTCS1203	100	95		168	165		26.8	24.0			6	5	5	5	31	12.2 4 3.7		
61	13X22cE82		Warhorse*2MTCS1203	100	80		168	167		28.0	24.4		5	5	6	4	6	33	12.6 4 3.2		
62	w4 13X22cE87		Warhorse*2MTCS1203	100	95		172	168		28.7	24.4		10	6	6	5	6	33	13.1 4 3.4		
63	w4 13X22cE92		Warhorse*2MTCS1203	100	80		172	167		29.5	24.8		25	5	7	4	4	30	13.2 4 3.2		
64	w4 13X22cE97		Warhorse*2MTCS1203	100	75		172	168		26.8	22.4		10	5	6	4	4	28	13.3 4 3.4		
65	w4 13X22cE99		Warhorse*2MTCS1203	100	50		171	172		26.0	24.4			5	6	3	4	31	12.2 4 3.2		
66	13X22cE102		Warhorse*2MTCS1203	100	85		171	168		26.0	22.4		15	6	5	5	4	30	12.6 4 4.4		
67	h 13X22cE105		Warhorse*2MTCS1203	100	70		168	171		29.9	25.2			7	6	5	5	36	11.9 4 4.0		
68	w4 13X22cE113		Warhorse*2MTCS1203	100	85		167	167		25.2	22.0			6	5	6	5	31	13.9 4 3.8		
69	13X22cE124		Warhorse*2MTCS1203	100	75		168	171		26.8	24.8			7	6	4	5	32	12.5 4 3.7		
70	h 13X22cE133		Warhorse*2MTCS1203	90	85		168	166		28.0	24.4			6	5	6	6	34	11.6 4 3.7		
71	d 13X22cE135		Warhorse*2MTCS1203	95	85		167	167		27.2	25.6			5	6	5	6	33	11.6 4 2.9		
72	13X22cE137		Warhorse*2MTCS1203	100	90		168	167		26.4	24.0		10	7	6	4	4	29	11.8 4 3.9		
73	13X22cE143		Warhorse*2MTCS1203	100	60		171	168		28.7	25.2			5	6	4	6	30	12.4 4 3.8		
74	13X22cE156		Warhorse*2MTCS1203	100	95		171	166		29.1	24.0		15	7	7	6	4	32	12.5 4 4.0		
75	13X25E15		Warhorse/MTCS1203/MT1156	100	75		171	171		25.2	22.4			5	6	4	5	31	12.2 4 3.5		
76	13X25E22		Warhorse/MTCS1203/MT1156	100	95		168	167		28.0	21.7		15	6	6	4	4	30	12.1 4 3.5		
77	13X25E28		Warhorse/MTCS1203/MT1156	95	75		172	172		32.3	26.8			5	5	4	5	31	11.9 4 3.1		
78	13X25E40		Warhorse/MTCS1203/MT1156	100	85		171	168		30.3	24.4			5	5	5	6	32	12.5 4 3.9		
79	13X25E45		Warhorse/MTCS1203/MT1156	100	90		172	168		28.0	22.0		5	5	5	5	4	30	12.4 4 4.2		
80	13X25E55		Warhorse/MTCS1203/MT1156	100	65		171	171		31.5	24.0			6	5	4	4	32	13.6 4 4.0		

Table 146. 2020 Sawfly Observation Nursery (SFO): All location data

Row/ Plot	wPPO h = harvested line d = low SDS and/or high PPO white, possible discard	ID	Pedigree	Stand			Heading			Plant Height			Spray injury	Agronomic Scores						2019 HR data				
				BZ		Lutz	BZ		Lutz	BZ		SFO		CLO	BZ - SFO		Lutz - CLO		Big Sandy		Sum	Prot-	PPO	SDS
				SFO	CLO	SFO	CLO	SFO	CLO	SFO	CLO	PLB		JEB	PLB	JEB	PLB	JEB						
81	13X25E56		Warhorse/MTCS1203//MT1156	100	85	171	171	30.3	22.4		5	5	5	5	6	4	6	6	32	13.5	4	4.0		
82	13X25E60	h	Warhorse/MTCS1203//MT1156	100	60	174	175	31.5	24.8			6	6	6	4	5	7	7	35	13.0	4	3.8		
83	13X25E75		Warhorse/MTCS1203//MT1156	100	85	171	168	31.1	24.0		10	5	6	5	4	4	3	3	27	12.4	4	4.0		
84	13X25E110	d	Warhorse/MTCS1203//MT1156	100	50	168	171	34.3	26.4			5	5	5	3	3	5	5	26	11.6	4	2.8		
85	13X25E125		Warhorse/MTCS1203//MT1156	85	85	171	166	29.1	21.7		20	5	6	4	4	4	6	6	31	13.1	4	3.8		
86	13X25E136		Warhorse/MTCS1203//MT1156	100	70	171	168	30.3	24.0		10	5	6	5	4	5	4	4	29	13.9	4	4.2		
87	13X25E139		Warhorse/MTCS1203//MT1156	100	80	171	168	26.8	21.7		10	5	5	5	4	6	5	5	30	12.9	4	3.8		
88	13X26cE6		WB-Quake/MTCS1205//MTCS1205/MT	100	65	172	172	28.3	22.0			5	6	4	5	5	5	5	30	12.3	4	3.1		
89	13X26cE7		WB-Quake/MTCS1205//MTCS1205/MT	100	85	168	167	30.3	24.0		25	6	7	4	4	4	6	6	33	12.8	4	4.0		
90	13X26cE19		WB-Quake/MTCS1205//MTCS1205/MT	100	75	168	171	30.3	24.8		5	6	6	4	4	5	7	5	33	13.4	4	4.2		
91	13X26cE25		WB-Quake/MTCS1205//MTCS1205/MT	100	80	168	168	31.9	25.2		10	6	5	4	4	4	6	5	30	11.7	4	4.1		
92	13X26cE92		WB-Quake/MTCS1205//MTCS1205/MT	100	40	168	172	31.5	24.0			6	5	3	3	5	5	5	27	13.0	4	3.2		
93	13X26cE97		WB-Quake/MTCS1205//MTCS1205/MT	100	70	168	168	29.5	24.4		10	6	6	4	4	4	5	5	30	13.4	4	3.6		
94	13X26cE117		WB-Quake/MTCS1205//MTCS1205/MT	100	80	171	171	26.8	23.2		15	5	5	5	4	4	6	6	31	11.7	4	4.2		
95	13X26cE123		WB-Quake/MTCS1205//MTCS1205/MT	100	75	172	168	30.3	24.8		30	6	7	5	3	5	5	5	31	11.7	4	4.6		
96	13X26cE125		WB-Quake/MTCS1205//MTCS1205/MT	100	70	172	172	27.6	22.4		15	5	6	4	4	4	6	6	31	12.6	4	4.7		
97	13X28E117		SY Clearstone 2CL//Judee//Spur	90	90	171	166	33.9	24.4		15	6	6	4	4	4	6	7	33	-	3	4.2		
98	13X40cE5		06X70D4//WB3768//MT S1318	100	70	172	168	30.7	26.4		5	7	5	4	4	4	5	5	30	13.4	4	3.8		
99	13X40cE13		06X70D4//WB3768//MT S1318	100	85	172	168	28.7	22.0		20	6	5	4	4	4	5	6	30	13.8	2	4.6		
100	13X40cE25		06X70D4//WB3768//MT S1318	95	50	172	172	28.7	24.0			5	6	3	3	5	5	5	27	12.8	4	3.7		
101	Rampart		check (SY Clearstone 2CL at Lutz)	100	80	171	172	35.8	26.4		2	5	4	5	5	5	5	5	29					
102	Warhorse		check	100	60	172		32.3				6	6			6	6	24						
103	13X40cE48		06X70D4//WB3768//MT S1318	100	75	172	171	30.3	24.4		5	6	6	4	4		5	5	30	13.6	4	3.6		
104	13X40cE58		06X70D4//WB3768//MT S1318	100	70	174	172	32.3	26.0		5	5	5	4	4	4	6	6	30	12.2	4	3.6		
105	13X40cE61		06X70D4//WB3768//MT S1318	100	90	172	172	31.1	26.4			6	6	4	4	5	5	5	31	12.7	4	3.6		
106	13X40cE65		06X70D4//WB3768//MT S1318	100	95	171	168	30.7	26.8		5	6	6	4	4	4	5	5	30	12.7	4	4.0		
107	13X40cE69		06X70D4//WB3768//MT S1318	100	70	168	167	28.3	26.8			4	5	3	4	4	4	4	24	13.7	4	3.8		
108	13X40cE78	h	06X70D4//WB3768//MT S1318	100	85	174	174	30.7	26.4			6	6	5	6	6	5	34	12.0	4	3.2			
109	13X40cE94		06X70D4//WB3768//MT S1318	100	85	172	172	30.3	27.2			5	6	4	5	6	6	32	13.1	4	3.9			
110	13X42cE17		Warhorse//MTS1223//06X70D4	100	90	174	171	33.5	27.6		5	6	6	4	4	4	5	5	30	12.5	4	3.7		
111	13X42cE33		Warhorse//MTS1223//06X70D4	80	75	174	172	34.3	28.3		10	5	5	4	4	4	6	7	31	11.9	4	3.3		
112	13X42cE43		Warhorse//MTS1223//06X70D4	90	70	174	172	33.9	25.2		20	6	5	3	3	3	5	5	27	12.2	4	3.8		
113	13X42cE46		Warhorse//MTS1223//06X70D4	100	70	174	172	33.5	26.8		10	6	6	3	4	7	6	32	11.8	4	3.6			
114	d 13X42cE51		Warhorse//MTS1223//06X70D4	90	80	174	172	33.9	27.6		20	5	5	3	4	6	5	28	12.3	4	2.7			
115	13X42cE62		Warhorse//MTS1223//06X70D4	90	65	174	174	33.1	30.3			6	6	3	5	7	6	33	12.6	4	3.1			
116	13X42cE79		Warhorse//MTS1223//06X70D4	100	85	174	168	35.0	28.0		15	6	5	3	4	6	5	29	12.1	4	3.3			
117	13X45cE6	h	Warhorse//04X572D24-2//MTS1327	100	80	168	167	29.1	28.0			6	5	4	5	7	7	34	13.8	4	3.6			
118	13X45cE7		Warhorse//04X572D24-2//MTS1327	90	85	170	167	29.5	26.8			5	5	4	4	6	6	30	13.5	4	4.4			
119	13X45cE16		Warhorse//04X572D24-2//MTS1327	90	65	174	172	31.9	28.3			5	6	3	5	5	4	28	11.8	4	3.2			
120	13X45cE22		Warhorse//04X572D24-2//MTS1327	100	90	171	166	29.5	26.4			6	5	5	4	6	5	31	12.5	4	3.6			

Table 146. 2020 Sawfly Observation Nursery (SFO): All location data

Row/ Plot	wPPO h = harvested line d = low SDS and/or high PPO white, possible discard	ID	Pedigree	Stand			Heading			Plant Height			Spray injury	Agronomic Scores						2019 HR data				
				BZ	Lutz	SFO	CLO	BZ	Lutz	SFO	CLO	BZ		Lutz	SFO	CLO	Lutz - CLO		Big Sandy		Sum	Prot-	PPO	SDS
																	PLB	JEB	PLB	JEB				
121		13X45cE29	Warhorse/04X572D24-2/MTS1327	95	85	171	168	29.5	25.6	5	7	6	4	5	6	5	33	12.7	4	4.1				
122		13X45cE38	Warhorse/04X572D24-2/MTS1327	100	90	170	167	30.3	27.6		7	7	4	5	5	5	33	12.5	4	3.3				
123		13X45cE45	Warhorse/04X572D24-2/MTS1327	100	70	168	167	30.3	27.6		6	5	4	4	6	5	30	12.2	4	3.1				
124	h	13X45cE52	Warhorse/04X572D24-2/MTS1327	100	100	168	166	30.3	27.6	5	6	6	6	5	6	5	34	12.7	4	3.9				
125		13X45cE55	Warhorse/04X572D24-2/MTS1327	100	90	167	165	28.3	25.6		5	5	5	5	5	5	30	12.6	4	4.4				
126	w4	13X45cE68	Warhorse/04X572D24-2/MTS1327	100	85	168	166	29.1	27.2		5	5	4	4	6	6	30	13.0	4	4.2				
127	w5	13X45cE71	Warhorse/04X572D24-2/MTS1327	100	50	168	167	26.4	26.4		6	6	2	3	6	5	28	13.1	5	4.5				
128		13X45cE72	Warhorse/04X572D24-2/MTS1327	85	80	172	167	29.1	24.4	5	5	6	4	4	6	6	31	12.2	4	3.4				
129	h	13X45cE86	Warhorse/04X572D24-2/MTS1327	80	80	171	167	29.9	26.8	5	6	6	5	5	7	6	35	13.6	4	4.2				
130		13X45cE92	Warhorse/04X572D24-2/MTS1327	100	80	171	166	28.0	24.4		5	5	3	4	5	5	27	12.5	4	3.7				
131		13X45cE97	Warhorse/04X572D24-2/MTS1327	90	60	172	168	30.3	25.6	5	6	6	3	4	5	5	29	12.5	4	3.8				
132	w4	13X45cE105	Warhorse/04X572D24-2/MTS1327	100	75	168	167	30.7	26.4		5	5	4	4	6	6	30	12.7	4	4.2				
133		13X45cE116	Warhorse/04X572D24-2/MTS1327	100	70	174	172	29.9	26.8		5	5	4	5	7	7	33	13.2	4	3.7				
134		13X45cE127	Warhorse/04X572D24-2/MTS1327	100	85	168	167	31.9	26.4		6	6	4	4	5	5	30	13.2	5	4.6				
135		12X3cE2-3	Spur/MTS1014/MTCS1205	100	80	172	168	30.3	25.6		5	5	5	5	7	6	33	13.3	4	3.6				
136		12X3cE7-2	Spur/MTS1014/MTCS1205	100	85	171	168	30.3	27.2		6	6	5	5	5	5	32	12.6	4	3.4				
137		12X3cE19-2	Spur/MTS1014/MTCS1205	100	70	171	171	29.5	24.8		6	5	3	4	6	6	30	12.6	4	3.4				
138	h	12X3cE31-1	Spur/MTS1014/MTCS1205	100	90	171	167	31.9	26.8		6	7	5	5	6	6	35	12.5	4	4.7				
139	h	12X3cE33-3	Spur/MTS1014/MTCS1205	100	80	167	168	31.5	26.4		7	6	4	5	6	7	35	13.0	4	4.1				
140		12X3cE37-3	Spur/MTS1014/MTCS1205	100	85	168	167	30.7	26.4		6	5	5	5	7	7	35	13.4	4	4.2				
141	h	12X3cE44-3	Spur/MTS1014/MTCS1205	100	85	172	167	31.9	26.8		6	6	5	5	6	6	34	12.6	4	3.4				
142		12X3cE48-3	Spur/MTS1014/MTCS1205	95	65	172	168	28.7	26.4		6	6	4	4	6	6	32	13.3	4	4.2				
143	h	12X3cE76-4	Spur/MTS1014/MTCS1205	100	80	168	167	31.1	27.2		7	6	5	5	6	5	34	12.9	4	3.6				
144		12X3cE92-1	Spur/MTS1014/MTCS1205	100	80	171	167	31.9	26.0		6	6	4	4	6	6	32	12.9	4	4.4				
145	h	12X3cE99-3	Spur/MTS1014/MTCS1205	100	85	168	167	32.3	26.0		7	7	5	5	7	6	37	13.5	4	4.2				
146		12X157E5-2	MTCS1205/MTS1211	100	70	168	167	31.1	26.4		5	6	4	4	6	5	30	13.3	4	3.9				
147	h	12X157E45-2	MTCS1205/MTS1211	100	90	171	168	32.7	26.0	10	6	7	5	4	7	5	34	13.1	4	3.6				
148	d	12X157E78-3	MTCS1205/MTS1211	100	85	172	168	29.5	26.8		5	6	6	6	5	4	32	12.9	4	3.0				
149	h	12X159E6-3	Warhorse/MTCS1203	100	90	172	170	32.7	27.2		6	6	7	5	6	5	35	12.4	4	4.0				
150		12X159E19-1	Warhorse/MTCS1203	100	75	171	171	29.9	26.0	5	6	6	4	4	5	6	31	12.4	4	4.2				
151	Rampart		check (SY Clearstone 2CL at Lutz)	100	85	172	171	34.6	27.2	5	5	5	5	5	5	5	30							
152	Warhorse		check	100	40	172		32.7			6	6			7	6	25							
153		12X159E26-3	Warhorse/MTCS1203	100	90	175	172	32.7	24.4	5	6	5	5	4	6	5	31	12.3	4	3.2				
154		12X159E48-3	Warhorse/MTCS1203	100	60	172	168	36.6	24.4		7	6	3	4	7	6	33	12.8	4	3.5				
155	h	12X159E93-2	Warhorse/MTCS1203	100	90	171	167	31.9	25.2	10	7	7	6	4	6	5	35	13.0	4	3.8				
156	w4	12X159E94-3	Warhorse/MTCS1203	95	80	171	168	31.1	26.8	20	6	5	4	4	5	5	29	12.9	4	4.0				
157	h	12X159E103-2	Warhorse/MTCS1203	100	95	167	167	33.5	26.4	5	7	6	7	5	6	6	37	13.0	4	3.4				
158	w4	12X21E52-2	MTCS1205/Judee/MTCL1162	100	80	167	168	33.1	26.8	5	5	5	3	5	5	6	29	11.9	4	3.8				
159		12X22E45-4	MTCS1203/MTS1021/MTCL1003	100	85	172	171	31.9	27.6	5	5	5	5	6	5	5	31	12.1	4	4.2				
160	h	12X23cE38-2	MTCS1203/MTS1021/MTCL1003	95	70	171	172	29.9	24.8	5	7	6	6	5	5	5	34	13.7	4	4.6				

Table 146. 2020 Sawfly Observation Nursery (SFO): All location data

Row/ Plot	wPPO h = harvested line d = low SDS and/or high PPO white, possible discard	ID	Pedigree	Stand			Heading			Plant Height			Spray injury	Agronomic Scores						2019 HR data			
				BZ Lutz CLO			BZ Lutz CLO			BZ Lutz CLO				BZ - SFO		Lutz - CLO		Big Sandy		Sum	Prot-	PPO	SDS
				SFO	CLO		SFO	CLO		SFO	CLO			PLB	JEB	PLB	JEB	PLB	JEB				
				100	95		176	174		32.3	25.6	≥5%	13-Jul	15-Jul	22-Jul	3-Aug		ein					
161	h	12X23cE39-3	MTCS1203//MTS1021/MTCL1003	100	95		176	174		32.3	25.6		6	7	6	7	6	5	37	12.9	4	5.2	
162	h	12X23cE56-2	MTCS1203//MTS1021/MTCL1003	100	80		171	172		30.3	25.2	5	6	6	6	5	6	6	35	12.9	4	4.2	
163	h	12X23cE65-4	MTCS1203//MTS1021/MTCL1003	100	85		170	168		29.9	25.6	10	7	7	5	5	6	5	35	12.8	4	4.2	
164		12X23cE67-2	MTCS1203//MTS1021/MTCL1003	100	70		170	171		30.3	25.6		6	6	6	5	6	6	35	13.3	4	3.9	
165	h	12X23cE72-3	MTCS1203//MTS1021/MTCL1003	100	85		172	168		30.7	24.4	5	8	7	6	5	5	4	35	12.3	4	4.5	
166		12X23cE101-4	MTCS1203//MTS1021/MTCL1003	100	60		171	172		30.3	24.8		6	6	3	4	6	5	30	13.9	4	4.1	
167		12X23cE102-1	MTCS1203//MTS1021/MTCL1003	100	80		168	172		29.5	24.8	5	7	6	5	4	6	5	33	14.6	4	4.2	
168		12X28cE60-4	MTCS1205//MTCL1161/MTS1180	100	85		171	168		29.9	25.2		5	5	5	4	4	4	27	14.1	4	4.6	
169		12X28cE94-4	MTCS1205//MTCL1161/MTS1180	100	90		167	167		30.7	24.8	10	5	6	5	4	5	4	29	13.6	4	5.5	
170		15X39C1-3	Judee//Warhorse/MTCS1204	100	75		172	170		32.3	26.4		5	5	4	5	6	5	30	12.3	4	3.6	
171		15X39C19-1	Judee//Warhorse/MTCS1204	100	90		171	168		29.1	23.2	35	6	6	4	5	6	5	32	14.9	4	4.7	
172		13X181cE5	SY Clearstone 2CL/MTS1311	100	50		167	171		30.3	26.8	30	6	5	2	3	4	4	24	12.7	4	3.6	
173		13X181cE10	SY Clearstone 2CL/MTS1311	100	60		171	172		32.7	16.5	90	6	5	1	2	4	5	23	12.9	5	3.2	
174		13X181cE27	SY Clearstone 2CL/MTS1311	100	75		172	172		29.9	26.8		6	6	3	5	5	5	30	12.8	4	4.4	
175		13X181cE38	SY Clearstone 2CL/MTS1311	100	85		168	171		30.7	27.6		5	5	5	4	5	5	29	12.7	4	3.2	
176		13X181cE50	SY Clearstone 2CL/MTS1311	100	85		167	168		30.3	26.4		6	5	5	5	5	6	32	12.2	4	4.1	
177		13X181cE51	SY Clearstone 2CL/MTS1311	100	80		168	168		31.1	25.6		6	6	5	5	4	4	30	12.2	4	3.2	
178		13X181cE53	SY Clearstone 2CL/MTS1311	100	85		172	170		31.5	20.5	70	6	5	1	3	6	5	26	12.9	4	4.6	
179		13X181cE61	SY Clearstone 2CL/MTS1311	100	65		168	171		30.7	25.6		6	6	3	4	5	5	29	12.2	5	3.7	
180		13X181cE64	SY Clearstone 2CL/MTS1311	100	85		165	168		26.8	21.3	80	6	5	2	2	5	4	24	12.6	4	4.4	
181		13X181cE72	SY Clearstone 2CL/MTS1311	100	80		171	172		30.3	21.3	70	6	6	2	3	6	6	29	13.2	4	4.6	
182		13X181cE77	SY Clearstone 2CL/MTS1311	100	80		172	171		32.7	20.5	80	5	5	2	2	5	5	24	12.3	4	3.6	
183		13X181cE83	SY Clearstone 2CL/MTS1311	100	60		174	174		31.5	24.8		6	6	3	5	5	5	30	12.9	4	4.4	
184		13X181cE90	SY Clearstone 2CL/MTS1311	100	75		166	168		30.7	25.2		6	6	3	4	5	4	28	12.2	4	4.2	
185		13X181cE94	SY Clearstone 2CL/MTS1311	100	65		171	171		32.3	21.7	90	6	5	2	2	6	5	26	13.4	4	4.4	
186		13X181cE99	SY Clearstone 2CL/MTS1311	90	70		167	167		30.7	13.8		5	5	3	4	4	4	25	12.2	4	3.9	
187		13X181cE108	SY Clearstone 2CL/MTS1311	100	60		168	171		31.1	26.8		7	6	3	4	5	5	30	12.3	4	3.6	
188		13X181cE122	SY Clearstone 2CL/MTS1311	100	85		167	168		31.9	28.3		6	6	5	5	4	5	31	12.3	4	3.9	
189		13X181cE125	SY Clearstone 2CL/MTS1311	95	70		172	171		31.5	27.2		5	5	4	4	4	4	26	13.5	4	3.8	
190		13X181cE126	SY Clearstone 2CL/MTS1311	100	65		167	167		31.5	26.0	5	7	6	3	4	5	5	30	12.3	4	4.4	
191		13X181cE137	SY Clearstone 2CL/MTS1311	90	40		171			30.7		100	6	5	0	0	6	5	22	12.2	5	3.4	
192		13X181cE149	SY Clearstone 2CL/MTS1311	85	80		172			31.9		100	6	5	0	0	6	5	22	11.9	4	3.8	
193		13X181cE150	SY Clearstone 2CL/MTS1311	90	60		168	168		31.5	25.6		6	4	3		4	4	24	12.2	4	3.6	
194		16X6-DH8	Loma*2/MTS1574	100			174			30.7			7	6			6	5	24	12.6	2	4.0	
195		17X3-DH-15	MTS1731//MTS1619/Joe	100			172			31.5			6	5			6	6	23	13.6	5	4.4	
196		17X3-DH-19	MTS1731//MTS1619/Joe	100			167			31.9				5			4	4	20	13.2	4	5.3	
197		17X3-DH-25	MTS1731//MTS1619/Joe	90			167			30.7			7	6			5	6	24	13.2	5	4.7	
198		17X3-DH-31	MTS1731//MTS1619/Joe	95			164			28.7			6	5			3	4	18	13.9	5	4.0	
199		17X3-DH-35	MTS1731//MTS1619/Joe	100			165			27.2			5	5			6	5	21	13.4	5	4.0	
200		17X3-DH-37	MTS1731//MTS1619/Joe	100			165			31.5			6	6			5	6	23	12.3	3	4.0	

Table 146. 2020 Sawfly Observation Nursery (SFO): All location data

Row/ Plot	wPPO h = harvested line d = low SDS and/or high PPO white, possible discard	ID	Pedigree	Stand		Heading		Plant Height		Spray injury	Agronomic Scores						2019 HR data		
				BZ SFO	Lutz CLO	BZ SFO	Lutz CLO	BZ SFO	Lutz CLO		BZ - SFO		Lutz - CLO		Big Sandy PLB	Sandy JEB	Sum	Prot- PPO	SDS
											PLB	JEB	PLB	JEB					
201		Rampart	check	100						≥5%	13-Jul	15-Jul	22-Jul	3-Aug		ein			
202	h	Warhorse	check	100		172		35.8			5	4		5	5	19			
203		17X3-DH-40	MTS1731//MTS1619/Joe	100		172		33.1			6	6		7	6	25			
204		17X3-DH-42	MTS1731//MTS1619/Joe	100		168		31.9			5	5		5	5	20	12.6 5 4.8		
205	h	17X3-DH-45	MTS1731//MTS1619/Joe	100		166		29.9			5	4		4	5	18	13.2 5 4.8		
206		17X3-DH-56	MTS1731//MTS1619/Joe	100		168		31.5			7	7		5	6	25	12.4 5 4.2		
207		17X3-DH-60	MTS1731//MTS1619/Joe	100		171		30.7			6	6		5	5	22	12.7 5 4.2		
208		17X3-DH-62	MTS1731//MTS1619/Joe	100		171		29.1			5	5		6	5	21	12.9 5 4.8		
209		17X3-DH-68	MTS1731//MTS1619/Joe	100		165		32.3			7	6		4	5	22	12.3 5 4.2		
210		17X3-DH-70	MTS1731//MTS1619/Joe	85		166		31.1			5	5		5	6	21	12.3 5 4.6		
211		17X3-DH-71	MTS1731//MTS1619/Joe	100		168		28.7			5	6		6	6	23	13.3 5 4.0		
212		17X3-DH-76	MTS1731//MTS1619/Joe	90		165		30.7				4		5	5	14	12.5 5 3.6		
213		17X3-DH-77	MTS1731//MTS1619/Joe	100		168		32.7			6	6		4	6	22	13.5 4 4.3		
214		13X50E8	MTS1211*2//Overland	95		171		31.9			6	6		6	6	24	12.4 5 4.6		
215	d	13X50E20	MTS1211*2//Overland	100		167		34.3			5	5		5	5	20	12.8 4 3.2		
216		13X50E23	MTS1211*2//Overland	100		172		32.7			5	5		6	5	21	12.2 4 3.0		
217		13X50E34	MTS1211*2//Overland	100		171		34.6			6	5		5	5	21	12.4 4 3.7		
218		13X50E37	MTS1211*2//Overland	80		174		32.3			6	6		6	6	24	11.9 4 3.8		
219		13X50E53	MTS1211*2//Overland	100		165		31.1			6	5		4	5	21	12.1 4 3.8		
220		13X50E55	MTS1211*2//Overland	95		165		28.0			5	5		4	5	19	12.7 4 3.3		
221		13X50E62	MTS1211*2//Overland	100		174		30.7			7	6		5	6	24	12.0 4 3.4		
222		13X50E67	MTS1211*2//Overland	95		172		31.9			5	5		6	6	22	11.9 4 3.4		
223	d	13X50E68	MTS1211*2//Overland	100		166		30.3			6	6		4	5	21	13.2 4 4.4		
224	d	13X50E69	MTS1211*2//Overland	100		167		31.5			6	7		6	7	26	12.1 4 3.0		
225	d	13X50E76	MTS1211*2//Overland	100		173		31.9			6	6		5	6	23	12.0 4 2.6		
226		13X50E92	MTS1211*2//Overland	100		171		32.3			5	5		5	6	21	12.5 4 3.0		
227	h	13X50E95	MTS1211*2//Overland	90		164		29.1			6	6		5	6	23	12.9 4 3.6		
228		13X50E103	MTS1211*2//Overland	100		172		33.9			7	7		6	7	27	12.4 4 3.4		
229	d	13X50E108	MTS1211*2//Overland	85		171		34.3			6	6		5	5	22	12.0 4 3.2		
230		13X50E116	MTS1211*2//Overland	95		168		31.9			5	5		5	6	21	12.7 4 3.0		
231	d	13X50E120	MTS1211*2//Overland	100		172		32.3			6	6		5	5	22	13.1 4 3.2		
232	d	13X50E127	MTS1211*2//Overland	100		171		32.3			6	6		6	6	24	12.1 4 3.0		
233		13X50E135	MTS1211*2//Overland	100		172		31.5			6	6		5	5	22	12.3 4 3.0		
234		13X50E142	MTS1211*2//Overland	100		172		32.3			5	6		6	6	23	13.0 4 3.2		
235		13X53cE12	MTS1211*2//Overland	90		172		31.1			6	5		5	5	21	12.7 3 3.2		
236		13X53cE38	MT1078/MTS1226//Spur	100		174		30.7			6	5		5	4	20	12.3 4 4.6		
237		13X53cE44	MT1078/MTS1226//Spur	85		171		30.7			6	6		5	5	22	11.6 3 4.1		
238	h	13X53cE49	MT1078/MTS1226//Spur	100		172		31.9			6	6		4	5	21	11.5 4 4.4		
239		13X53cE66	MT1078/MTS1226//Spur	100		171		29.9			6	6		7	7	26	12.2 4 4.0		
240		13X53cE69	MT1078/MTS1226//Spur	100		166		27.6			6	5		4	5	20	11.9 3 3.6		
			MT1078/MTS1226//Spur	100		167		28.7			6	6		5	5	22	11.9 3 4.2		

Table 146. 2020 Sawfly Observation Nursery (SFO): All location data

Row/ Plot	wppo	ID	Pedigree	Stand		Heading		Plant Height		Spray injury	Agronomic Scores						2019 HR data	
				BZ	Lutz	BZ	Lutz	BZ	Lutz		BZ	Lutz	BZ	Lutz	Sum	ein		
																	SFO	CLO
h = harvested line d = low SDS and/or high PPO white, possible discard				SFO	CLO	SFO	CLO	SFO	CLO	≥5%	13-Jul	15-Jul	22-Jul	3-Aug	Sum	Prot-	PPO	SDS
241		13X53cE81	MT1078/MTS1226//Spur	100		173		30.3			6	6		6	24	11.7	4	4.0
242		13X53cE84	MT1078/MTS1226//Spur	100		172		30.7			6	5		4	20	12.6	4	3.8
243		13X53cE89	MT1078/MTS1226//Spur	100		167		32.3			7	6		5	23	11.6	3	4.0
244		13X53cE106	MT1078/MTS1226//Spur	85		172		28.3			5	5		4	18	12.1	3	4.4
245		13X53cE110	MT1078/MTS1226//Spur	100		168		31.5			5	6		6	23	11.9	4	4.0
246	h	13X53cE121	MT1078/MTS1226//Spur	100		171		31.1			7	6		6	25	12.4	4	4.6
247		13X53cE131	MT1078/MTS1226//Spur	100		166		29.5			6	7		5	23	12.1	3	4.0
248		13X53cE139	MT1078/MTS1226//Spur	100		171		27.6			6	5		6	22	11.5	3	4.0
249		13X55cE10	MT1090/WB-Quake//Spur	100		175		35.4			5	5		5	20	11.7	3	3.2
250		13X55cE15	MT1090/WB-Quake//Spur	95		174		34.6			6	6		6	23	11.6	3	3.2
251		Rampart	check	100		173		36.2			5	4		5	19			
252		Warhorse	check	100		172		32.3			6	6		6	24			
253		13X55cE16	MT1090/WB-Quake//Spur	100		174		32.7			6	6		6	23	12.1	3	3.6
254		13X55cE44	MT1090/WB-Quake//Spur	100		175		32.7			5	5		5	20	11.9	3	3.6
255		13X55cE50	MT1090/WB-Quake//Spur	100		174		32.3			6	6		7	24	12.0	4	3.4
256		13X55cE51	MT1090/WB-Quake//Spur	100		174		32.7			6	6		6	23	12.0	4	3.5
257	h	13X55cE60	MT1090/WB-Quake//Spur	100		174		32.3			6	6		7	25	11.8	4	3.2
258		13X55cE69	MT1090/WB-Quake//Spur	100		174		32.7			5	5		6	22	11.8	4	3.2
259		13X55cE75	MT1090/WB-Quake//Spur	100		174		33.5			6	7		6	24	11.8	4	3.4
260		d 13X55cE87	MT1090/WB-Quake//Spur	80		174		31.5			6	5		5	22	11.7	3	2.9
261		13X55cE93	MT1090/WB-Quake//Spur	100		175		32.7			5	6		7	24	11.6	4	3.1
262		13X55cE112	MT1090/WB-Quake//Spur	90		172		30.3			4	6		6	22	11.9	4	3.1
263		d 13X55cE118	MT1090/WB-Quake//Spur	100		174		33.9			5	6		5	21	11.6	4	2.6
264	h	13X55cE122	MT1090/WB-Quake//Spur	100		173		32.3			6	6		6	25	12.1	4	3.1
265		d 13X55cE126	MT1090/WB-Quake//Spur	95		174		33.5			5	6		6	23	11.7	4	2.8
266		d 13X55cE135	MT1090/WB-Quake//Spur	100		174		34.3			5	7		6	23	11.7	4	3.0
267		d 13X55cE144	MT1090/WB-Quake//Spur	100		174		34.3			6	6		5	22	11.8	4	2.5
268		13X55cE148	MT1090/WB-Quake//Spur	100		172		32.3			6	7		5	23	11.9	4	3.1
269		d 13X58cE4	WB-Quake/MT1286/MTS1211	100		168		32.7			5	6		7	25	11.8	4	2.5
270	h	13X58cE51	WB-Quake/MT1286/MTS1211	100		175		33.1			6	7		6	25	13.8	1	3.6
271	h	13X58cE66	WB-Quake/MT1286/MTS1211	100		174		30.7			6	6		7	25	12.4	4	3.7
272		13X58cE81	WB-Quake/MT1286/MTS1211	90		174		34.6			6	6		8	27	12.7	4	4.4
273		d 13X58cE90	WB-Quake/MT1286/MTS1211	95		172		33.5			5	6		5	21	11.7	4	2.7
274		d 13X58cE94	WB-Quake/MT1286/MTS1211	100		171		31.5			6	5		7	24	12.2	4	2.8
275		13X60E1	Yellowstone/2*Spur	100		171		32.3			5	5		5	21	11.5	4	3.3
276	h	13X60E5	Yellowstone/2*Spur	100		174		31.1			7	7		6	25	11.7	3	3.3
277		13X60E52	Yellowstone/2*Spur	100		174		31.5			6	6		6	24	11.8	4	3.4
278	h	13X60E69	Yellowstone/2*Spur	100		174		30.3			6	7		6	25	12.2	4	3.5
279		13X60E77	Yellowstone/2*Spur	100		168		29.9			5	6		6	23	11.8	5	4.0
280		13X221cD60-1	MTS1211/CIMMYT30798	100		172		33.1			5	5		6	22	12.3	4	3.8

Table 146. 2020 Sawfly Observation Nursery (SFO): All location data

Row/ Plot	wPPO h = harvested line d = low SDS and/or high PPO white, possible discard	ID	Pedigree	Stand		Heading		Plant Height		Spray injury	Agronomic Scores						2019 HR data			
				BZ SFO	Lutz CLO	BZ SFO	Lutz CLO	BZ SFO	Lutz CLO		BZ - SFO		Lutz - CLO		Big Sandy PLB	Sandy JEB	Sum	Prot-	PPO	SDS
											PLB	JEB	PLB	JEB						
										≥5%	13-Jul	15-Jul	22-Jul	3-Aug		ein				
281	h	13X221cD106-4	MTS1211/CIMMYT30798 WA 8186/Loma WA 8186/Loma WA 8186/Loma WA 8186/Loma WA 8186/Loma Yellowstone/2*Spur Yellowstone/2*Spur Yellowstone/2*Spur Yellowstone/2*Spur Warhorse/Yellowstone/Spur	100		167		33.9			5	5		5	6	21	11.7	4	3.3	
282		15X283B1-3		100		174		30.7			6	6		6	6	24	13.2	3	4.2	
283		15X283B55-2		100		174		29.1			6	5		7	6	24	12.0	4	3.6	
284		15X283B57-4		100		174		31.1			7	7		8	7	29	12.8	3	4.2	
285		15X283B60-1		90		175		28.7			6	5		6	5	22	12.3	2	3.1	
286		15X283B65-2		100		173		28.3			5	5		8	6	24	13.4	2	3.2	
287		13X60E86		100		168		30.3			5	5		5	5	20	12.0	4	4.2	
288		13X60E87		100		172		29.9			6	6		5	6	23	11.5	4	4.0	
289		13X60E93		100		171		29.5			6	5		7	6	24	11.8	4	4.5	
290		13X60E99		100		172		32.7			7	6		5	5	23	11.5	4	3.1	
291	h	13X61E1	Warhorse/Yellowstone/Spur Warhorse/Yellowstone/Spur Warhorse/Yellowstone/Spur Warhorse/Yellowstone/Spur Warhorse/Yellowstone/Spur Warhorse/Yellowstone/Spur Warhorse/Yellowstone/Spur Warhorse/Yellowstone/Spur Warhorse/Yellowstone/Spur check	100		168		31.1			6	6		6	5	23	12.1	4	3.8	
292		13X61E6		100		168		30.3			7	6		6	5	24	12.1	4	3.7	
293		13X61E16		100		171		29.5			6	6		6	5	23	12.0	4	3.7	
294		13X61E27		95		171		29.9			6	6		5	4	21	11.8	4	3.9	
295		13X61E35		100		171		31.5			7	7		6	6	26	12.5	4	3.6	
296		13X61E46		100		172		31.5			5	5		5	5	20	11.7	4	4.2	
297		13X61E57		100		172		32.3			6	6		5	5	22	11.7	4	3.3	
298		13X61E70		100		174		35.8			5	5		5	5	20	11.9	4	3.8	
299		13X61E86		100		174		28.7			6	7		5	5	23	11.8	4	3.6	
300		13X61E92		100		173		30.3			5	6		4	4	19	11.6	4	3.6	
301	Rampart	90	check			172		33.5			4	4		5	4	17				
302	Warhorse	100	check			172		31.1			6	6		6	5	23				
303	13X61E95	100	Warhorse/Yellowstone/Spur			174		32.3			5	6		5	4	20	11.9	4	3.6	
304	d 13X61E115	100	Warhorse/Yellowstone/Spur			172		29.9			5	6		6	5	22	12.0	4	2.9	
305	13X61E128	100	Warhorse/Yellowstone/Spur			171		33.5			7	6		5	5	23	11.6	4	3.6	
306	13X61E139	100	Warhorse/Yellowstone/Spur			171		30.7			5	5		4	4	18	12.0	4	3.1	
307	13X63E5	100	Warhorse/Judee/Spur			171		33.5			5	6		6	5	22	12.7	1	3.2	
308	13X63E11	100	Warhorse/Judee/Spur			170		32.7			7	7		4	3	21	11.7	4	3.6	
309	d 13X63E12	100	Warhorse/Judee/Spur			172		33.5			6	6		5	4	21	11.8	1	3.0	
310	13X63E19	100	Warhorse/Judee/Spur			171		31.9			6	7		4	3	20	12.5	3	3.4	
311	d 13X63E24	100	Warhorse/Judee/Spur			168		31.5			5	6		4	3	18	12.4	1	2.8	
312	13X63E25	100	Warhorse/Judee/Spur			171		33.9			6	6		3	4	19	12.9	3	4.1	
313	13X63E27	85	Warhorse/Judee/Spur			171		31.9			6	6		6	5	23	12.7	2	3.3	
314	13X63E32	100	Warhorse/Judee/Spur			170		30.3			7	6		5	4	22	11.8	0	3.3	
315	13X63E39	90	Warhorse/Judee/Spur			172		32.3			7	5		5	4	21	12.7	4	3.1	
316	13X63E43	100	Warhorse/Judee/Spur			168		32.7			7	7		5	4	23	11.6	4	3.6	
317	13X63E49	100	Warhorse/Judee/Spur			171		32.3			5	6		6	5	22	12.1	3	3.3	
318	13X63E62	100	Warhorse/Judee/Spur			171		30.3			6	6		5	4	21	11.9	1	3.7	
319	13X63E65	100	Warhorse/Judee/Spur			168		29.1			5	5		4	4	18	12.0	4	4.1	
320	13X63E82	100	Warhorse/Judee/Spur			171		32.3			5	6		7	6	24	12.7	2	3.3	

Table 146. 2020 Sawfly Observation Nursery (SFO): All location data

Row/ Plot	wPPO	ID	Pedigree	Stand		Heading		Plant Height		Spray injury	Agronomic Scores						2019 HR data			
				BZ SFO	Lutz CLO	BZ SFO	Lutz CLO	BZ SFO	Lutz CLO		BZ - SFO		Lutz - CLO		Big Sandy		Sum	Prot-	PPO	SDS
											PLB	JEB	PLB	JEB	PLB	JEB				
										≥5%	13-Jul	15-Jul	22-Jul	3-Aug		ein				
401		Rampart	check	90		173		36.6			4	4			5	5	18			
402	h	Warhorse	check	100		172		32.7			6	6			7	6	25			
403	h	13X75cE110	(Judee sib, MTS0819)/04X56cE71/MTS	100		174		31.9			7	7			7	5	26	12.5	5	3.5
404		13X75cE124	(Judee sib, MTS0819)/04X56cE71/MTS	100		174		33.5			5	6			6	6	23	12.4	5	3.6
405	d	13X75cE127	(Judee sib, MTS0819)/04X56cE71/MTS	100		172		31.1			6	6			6	7	25	12.1	5	2.7
406	h	13X75cE136	(Judee sib, MTS0819)/04X56cE71/MTS	100		173		32.7			8	6			6	6	26	12.0	5	3.1
407		13X75cE143	(Judee sib, MTS0819)/04X56cE71/MTS	100		172		30.7			5	6			5	6	22	12.2	5	3.1
408		13X78cE1	Yellowstone/04X38cE70/MTS0826-63	100		174		35.0			8	7			6	7	28	11.7	5	3.1
409	d	13X78cE14	Yellowstone/04X38cE70/MTS0826-63	100		173		29.5			6	6			6	6	24	12.6	1	2.6
410	d	13X78cE21	Yellowstone/04X38cE70/MTS0826-63	100		172		32.3			7	7			6	5	25	12.5	5	2.7
411	d	13X78cE23	Yellowstone/04X38cE70/MTS0826-63	100		172		31.5			7	7			6	6	26	12.3	2	3.0
412	d	13X78cE25	Yellowstone/04X38cE70/MTS0826-63	100		168		30.7			6	8			7	7	28	12.2	5	2.9
413		13X78cE40	Yellowstone/04X38cE70/MTS0826-63	100		167		26.8			4	5			6	6	21	11.9	5	3.2
414	d	13X78cE47	Yellowstone/04X38cE70/MTS0826-63	100		172		32.7			6	7			5	5	23	11.8	5	2.9
415	d	13X78cE55	Yellowstone/04X38cE70/MTS0826-63	100		173		29.5			7	6			6	5	24	12.4	1	2.9
416	d	13X78cE59	Yellowstone/04X38cE70/MTS0826-63	100		171		28.3			6	6			6	6	24	12.0	5	3.0
417	d	13X78cE65	Yellowstone/04X38cE70/MTS0826-63	100		167		29.5			6	7			6	6	25	12.1	5	2.8
418	h	13X78cE74	Yellowstone/04X38cE70/MTS0826-63	100		167		29.5			7	6			7	7	27	12.8	5	3.2
419	d	13X78cE78	Yellowstone/04X38cE70/MTS0826-63	90		172		30.3			6	6			5	5	22	11.6	1	3.0
420	d	13X78cE87	Yellowstone/04X38cE70/MTS0826-63	100		167		29.1			6	7			6	6	25	12.6	5	3.0
421	d	13X78cE90	Yellowstone/04X38cE70/MTS0826-63	100		174		32.3			6	6			6	5	23	12.3	1	2.6
422		13X78cE92	Yellowstone/04X38cE70/MTS0826-63	100		171		31.5			5	5			6	6	22	11.9	5	4.2
423	h	13X78cE102	Yellowstone/04X38cE70/MTS0826-63	100		172		28.7			7	6			6	6	25	12.6	5	3.2
424	d	13X78cE106	Yellowstone/04X38cE70/MTS0826-63	100		174		33.1			6	6			6	5	23	12.5	5	2.8
425	d	13X78cE111	Yellowstone/04X38cE70/MTS0826-63	100		172		29.1			7	6			6	6	25	12.5	1	2.8
426		13X78cE124	Yellowstone/04X38cE70/MTS0826-63	100		174		29.1			7	6			6	5	24	12.4	1	3.2
427		13X78cE130	Yellowstone/04X38cE70/MTS0826-63	100		168		31.1			7	6			6	6	25	12.4	5	2.6
428	h	13X78cE135	Yellowstone/04X38cE70/MTS0826-63	85		172		29.5			6	5			8	7	26	12.8	4	3.5
429	d	13X78cE138	Yellowstone/04X38cE70/MTS0826-63	100		174		33.1			6	6			5	5	22	12.8	1	2.9
430		13X194cE1	Warhorse/MT1078	100		174		33.1			6	6			6	6	24	12.7	4	3.9
431		13X194cE7	Warhorse/MT1078	100		174		32.3			6	6			5	5	22	11.8	4	3.1
432		13X194cE10	Warhorse/MT1078	100		172		32.3			6	6			5	6	23	12.8	4	3.8
433		13X194cE18	Warhorse/MT1078	100		172		30.7			6	6			5	5	22	12.3	4	4.0
434		13X194cE19	Warhorse/MT1078	100		174		30.3			6	5			5	5	21	13.3	4	4.1
435		13X194cE23	Warhorse/MT1078	100		171		29.5			7	5			5	5	22	11.8	4	4.0
436		13X194cE39	Warhorse/MT1078	100		168		29.5			6	6			6	5	23	11.6	4	4.2
437		13X194cE44	Warhorse/MT1078	100		171		29.1			6	5			4	4	19	11.5	4	3.8
438		d 13X194cE46	Warhorse/MT1078	90		172		31.5			5	5			4	4	18	11.7	4	3.0
439	w4	13X194cE58	Warhorse/MT1078	100		171		26.4			6	4			3	3	16	12.9	4	3.9
440	w5	13X194cE64	Warhorse/MT1078	100		174		30.7			6	6			3	4	19	13.2	5	3.9

Table 146. 2020 Sawfly Observation Nursery (SFO): All location data

Row/ Plot	wPPO	ID	Pedigree	Agronomic Scores										Spray		Plant Height		Heading		Stand		2019 HR data																					
				h = harvested line d = low SDS and/or high PPO white, possible discard										injury		BZ		Lutz		BZ		Lutz		Sum																			
				d										PLB	JEB	PLB	JEB	PLB	JEB	PLB	JEB	PLB	JEB	Prot-	PPO	SDS																	
																								13-Jul	15-Jul	22-Jul	3-Aug	≥5%	BZ	Lutz	SFO	CLO	BZ	Lutz	SFO	CLO	BZ	Lutz	SFO	CLO	ein		
441		13X194cE72	Warhorse/MT1078	100				168		29.1		7	6			3	3	19				11.9	4	3.2																			
442	w4	13X194cE85	Warhorse/MT1078	100				166		27.6		5	6			4	5	20				12.7	4	4.1																			
443		13X194cE90	Warhorse/MT1078	100				167		30.7		7	7			4	4	22				12.6	5	3.4																			
444		13X194cE96	Warhorse/MT1078	100				168		31.5		6	6			5	5	22				12.1	4	3.4																			
445		13X194cE99	Warhorse/MT1078	100				170		30.7		7	6			6	5	24				11.9	5	3.4																			
446	d	13X194cE108	Warhorse/MT1078	100				171		31.1		6	6			3	4	19				11.5	4	3.0																			
447	w5	13X194cE113	Warhorse/MT1078	100				166		28.3		6	6			6	5	23				12.5	5	4.4																			
448		13X194cE119	Warhorse/MT1078	100				172		29.1		6	6			5	4	21				11.7	5	4.3																			
449		13X194cE143	Warhorse/MT1078	100				171		29.9		7	6			5	5	23				12.7	5	3.8																			
450		13X194cE144	Warhorse/MT1078	100				172		29.9		6	6			5	6	23				12.4	5	4.2																			
451		Rampart	check	100				173		36.6		4	4			3	4	15																									
452		Warhorse	check	100				172		32.7		6	6			6	6	24																									
453		13X206E1	Warhorse/MTS1318	100				168		31.9		6	6			4	5	21				12.8	5	4.0																			
454	w5	13X206E7	Warhorse/MTS1318	100				170		34.6		7	6			5	5	23				12.1	5	3.6																			
455	w5	13X206E8	Warhorse/MTS1318	100				171		32.7		6	6			3	4	19				11.9	5	4.6																			
456		13X206E12	Warhorse/MTS1318	100				171		33.5		7	6			3	3	19				12.2	5	4.6																			
457	w5	13X206E13	Warhorse/MTS1318	100				168		33.5		6	5			5	4	20				12.3	5	4.4																			
458	w5	13X206E17	Warhorse/MTS1318	90				171		30.7		6	6			3	3	18				12.2	5	4.3																			
459		13X206E27	Warhorse/MTS1318	100				172		32.3		7	6			3	3	19				11.9	4	4.0																			
460		13X206E39	Warhorse/MTS1318	100				172		28.3		5	5			3	3	16				12.1	4	4.3																			
461		13X206E41	Warhorse/MTS1318	100				172		32.3		6	6			2	4	18				12.2	4	4.0																			
462	w4	13X206E55	Warhorse/MTS1318	100				172		32.7		6	6			2	3	17				12.6	4	4.4																			
463		13X206E63	Warhorse/MTS1318	100				173		33.5		6	7			2	3	18				12.0	4	3.9																			
464		13X206E73	Warhorse/MTS1318	90				172		34.3		7	6			3	3	19				11.8	4	3.6																			
465	w4	13X206E76	Warhorse/MTS1318	95				171		33.1		5	7			3	3	18				11.8	4	3.9																			
466	w4	13X206E83	Warhorse/MTS1318	100				172		33.5		6	6			5	4	21				12.8	4	4.3																			
467		13X206E96	Warhorse/MTS1318	100				173		32.3		6	6			5	4	21				12.3	4	3.4																			
468	w4	13X206E99	Warhorse/MTS1318	100				172		31.5		7	7			3	3	20				12.6	4	4.8																			
469	w4	13X206E101	Warhorse/MTS1318	100				171		30.3		6	6			5	4	21				12.2	4	4.2																			
470	w4	13X206E108	Warhorse/MTS1318	90				172		30.7		6	6			4	3	19				12.5	4	4.1																			
471		13X206E122	Warhorse/MTS1318	100				173		31.5		6	7			3	3	19				13.3	5	3.4																			
472		13X206E140	Warhorse/MTS1318	100				172		27.2		5	5			3	4	17				12.8	5	3.5																			
473	w5	13X206E151	Warhorse/MTS1318	100				174		31.1		6	6			3	4	19				12.6	5	4.1																			
474	d	13X196E2	MTS1307/08X22cB-85	100				164		25.6		5	5			2	3	15				12.0	4	2.4																			
475		13X196E6	MTS1307/08X22cB-85	100				167		27.6		6	6			5	5	22				12.4	5	3.6																			
476		13X196E14	MTS1307/08X22cB-85	100				168		29.9		6	6			5	5	22				12.3	5	4.1																			
477	d	13X196E40	MTS1307/08X22cB-85	100				166		28.7		7	6			3	4	20				12.3	5	3.0																			
478		13X196E42	MTS1307/08X22cB-85	100				167		28.3		6	5			5	5	21				12.3	5	3.4																			
479		13X196E50	MTS1307/08X22cB-85	100				168		29.5		6	7			4	5	22				11.7	5	3.8																			
480		13X196E58	MTS1307/08X22cB-85	100				166		26.0		5	5			3	3	16				12.0	5	4.1																			

Table 146. 2020 Sawfly Observation Nursery (SFO): All location data

Row/ Plot	wppo	ID	Pedigree	Stand		Heading		Plant Height		Spray injury	Agronomic Scores						2019 HR data		
				Lutz		BZ		Lutz			BZ		Lutz - CLO		BZ - SFO		Sum	Prot- PPO SDS	
				SFO	CLO	SFO	CLO	SFO	CLO		SFO	CLO	PLB	JEB	PLB	JEB			3-Aug
h = harvested line d = low SDS and/or high PPO white, possible discard										≥5%	13-Jul	15-Jul	22-Jul	3-Aug		ein			
481	h	13X196E91	MTS1307/08X22cB-85	100		166		28.0			7	6		6	6	25	12.1	5	3.4
482		13X196E119	MTS1307/08X22cB-85	100		164		27.2			6	6		5	5	22	13.0	4	3.3
483	d	13X196E125	MTS1307/08X22cB-85	100		167		27.6			6	6		5	5	22	12.6	4	3.0
484		13X204E6	MT1138/MTS1318	100		168		29.1			6	6		5	5	22	11.5	4	4.6
485	h	13X204E16	MT1138/MTS1318	100		171		30.7			6	7		6	6	25	11.5	4	3.8
486	w4	13X204E33	MT1138/MTS1318	100		171		28.3			6	7		5	5	23	12.5	4	4.2
487		13X204E41	MT1138/MTS1318	100		172		28.0			6	6		5	5	22	12.5	4	4.6
488		13X204E58	MT1138/MTS1318	100		172		31.9			7	7		5	5	24	12.3	4	3.8
489		13X204E68	MT1138/MTS1318	95		171		29.1			6	6		4	4	20	12.8	5	4.8
490	w4	13X204E70	MT1138/MTS1318	100		172		29.1			6	7		6	5	24	12.4	4	3.2
491	w4	13X204E92	MT1138/MTS1318	90		171		29.5			5	6		3	4	18	12.3	4	4.2
492	w4	13X204E97	MT1138/MTS1318	100		172		30.3			7	7		3	3	20	11.6	4	3.6
493		13X204E101	MT1138/MTS1318	100		171		30.7			7	6		5	4	22	12.1	4	4.2
494		13X208E10	MTS0826-63/MTS1323	100		172		30.3			8	7		3	3	21	12.0	4	3.4
495		13X208E48	MTS0826-63/MTS1323	95		172		27.2			7	6		6	5	24	12.4	4	3.8
496		13X208E56	MTS0826-63/MTS1323	100		172		30.3			8	8		4	4	24	11.6	4	4.4
497		13X208E60	MTS0826-63/MTS1323	90		175		28.0			6	5		6	5	22	12.6	4	4.5
498		13X208E79	MTS0826-63/MTS1323	100		174		28.7			6	6		5	5	22	12.6	5	4.3
499		13X208E88	MTS0826-63/MTS1323	100		173		28.3			6	5		5	6	22	11.5	4	3.4
500		13X208E90	MTS0826-63/MTS1323	100		172		28.7			7	6		5	5	23	12.0	4	4.4
501	Rampart	check	check	90		173		36.6			4	4		4	5	17			
502	Warhorse	check	check	100		172		33.1			6	6		6	6	24			
503	13X208E94	MTS0826-63/MTS1323	95		174		31.5				8	6		5	5	24	12.4	4	4.1
504	13X208E147	MTS0826-63/MTS1323	100		172		28.3				7	7		4	4	22	12.2	5	3.1
505	13X201cE6	MT1102/MTS1308	100		171		30.3				5	5		5	4	19	11.7	5	4.4
506	13X201cE36	MT1102/MTS1308	100		171		30.3				5	5		5	5	20	11.5	4	4.0
507	13X201cE48	MT1102/MTS1308	100		168		29.1				6	6		6	5	23	11.5	5	4.5
508	13X201cE69	MT1102/MTS1308	100		166		30.7				6	6		4	5	21	11.5	5	3.9
509	13X201cE75	MT1102/MTS1308	100		171		28.0				6	6		6	6	24	11.5	4	4.5
510	13X201cE92	MT1102/MTS1308	75		167		28.7				5	6		4	4	19	12.2	5	4.0
511	13X201cE93	MT1102/MTS1308	95		171		27.6				7	6		5	5	23	11.9	5	4.9
512	13X201cE100	MT1102/MTS1308	100		167		29.1				5	5		6	6	22	12.1	5	4.6
513	13X201cE107	MT1102/MTS1308	95		165		28.0				6	6		3	4	19	11.5	4	4.0
514	13X201cE114	MT1102/MTS1308	100		165		29.1				6	6		5	5	22	12.1	5	3.6
515	13X201cE140	MT1102/MTS1308	100		166		30.3				6	6		4	4	20	11.8	5	3.1
516	13X201cE146	MT1102/MTS1308	100		165		28.3				7	5		5	5	22	11.8	5	4.0
517	13X229cE19	MTS1305/TC1012160	100		168		29.5				6	6		5	6	23	11.7	5	3.1
518	d 13X229cE26	MTS1305/TC1012160	100		166		28.3				5	5		4	4	18	12.8	5	2.2
519	13X229cE42	MTS1305/TC1012160	100		172		29.1				6	6		6	5	23	12.6	4	4.5
520	13X229cE61	MTS1305/TC1012160	95		165		29.5				6	5		4	5	20	11.7	5	4.8

Table 146. 2020 Sawfly Observation Nursery (SFO): All location data

Row/ Plot	wPPO h = harvested line d = low SDS and/or high PPO white, possible discard	ID	Pedigree	Stand		Heading		Plant Height		Spray injury	Agronomic Scores						2019 HR data			
				BZ SFO	Lutz CLO	BZ SFO	Lutz CLO	BZ SFO	Lutz CLO		BZ - SFO		Lutz - CLO		Big Sandy PLB	Sandy JEB	Sum	Prot-	PPO	SDS
											PLB	JEB	PLB	JEB						
										≥5%	13-Jul	15-Jul	22-Jul	3-Aug		ein				
521	13X229cE63		MTS1305/T C1012160	100		168		29.1			5	5		5	5	20	12.2	5	3.7	
522	13X229cE77		MTS1305/T C1012160	100		171		30.7			6	6		6	5	23	11.6	4	4.2	
523	13X229cE93		MTS1305/T C1012160	100		166		31.9			5	5		5	6	21	11.6	5	3.2	
524	13X229cE94	h	MTS1305/T C1012160	100		171		31.1			6	7		6	6	25	11.6	4	3.8	
525	13X217E23		IDO1101/Spur	100		173		29.9			6	6		5	4	21	11.5	4	4.4	
526	13X217E56		IDO1101/Spur	100		166		26.8			5	5		6	5	21	11.9	4	4.2	
527	13X217E93		IDO1101/Spur	100		171		30.3			5	5		5	5	21	11.6	4	3.6	
528	13X217E98		IDO1101/Spur	100		167		28.7			5	6		6	5	21	12.3	5	3.7	
529	w5 13X210cE4		WB3768/MTS1307	100		172		32.7			5	5		6	5	21	12.2	5	3.4	
530	w2 13X210cE52		WB3768/MTS1307	100		166		30.3			5	5		4	4	18	12.1	2	3.5	
531	w2 13X210cE108		WB3768/MTS1307	100		167		29.1			6	6		5	5	22	12.7	2	3.2	
532	w2 13X210cE116		WB3768/MTS1307	90		172		31.1			6	6		4	4	20	12.1	2	3.3	
533	w4 13X210cE117		WB3768/MTS1307	95		172		30.7			6	6		5	5	22	11.6	4	3.1	
534	w1 13X210cE124		WB3768/MTS1307	95		171		28.7			6	6		5	5	22	12.0	1	3.8	
535	w4 12X36E65-4		(Judee sib, MTS0819-98)/10K1734w/W	100		172		30.3			6	6		6	5	23	12.5	4	4.2	
536	h 12X36E78-3		(Judee sib, MTS0819-98)/10K1734w/W	100		166		30.7			6	7		6	6	25	11.7	5	3.4	
537	d 12X36E84-2		(Judee sib, MTS0819-98)/10K1734w/W	100		166		31.1			6	6		6	6	24	11.6	4	2.8	
538	12X37E49-2		MTS1227/MT1143/Bearpaw	100		165		29.9			6	6		5	5	22	11.8	1	3.7	
539	12X37E66-2		MTS1227/MT1143/Bearpaw	100		165		29.5			6	7		4	5	22	12.0	4	4.2	
540	d 12X37E71-3		MTS1227/MT1143/Bearpaw	95		174		30.7			5	7		7	6	25	11.7	4	3.0	
541	12X37E101-4		MTS1227/MT1143/Bearpaw	100		166		26.8			5	6		5	5	21	12.0	4	3.8	
542	d 12X37E107-1		MTS1227/MT1143/Bearpaw	100		166		29.9			6	6		5	4	21	12.1	4	2.7	
543	h 12X38cE95-3		Decade*2/(MTS0819, Judee sib)	100		165		32.7			7	7		6	6	26	12.2	5	3.9	
544	12X38cE106-1		Decade*2/(MTS0819, Judee sib)	100		166		29.9			6	6		6	5	23	12.3	4	4.6	
545	12X40cE89-4		(Judee sib, MTS0819)*2/Decade	100		168		32.3			7	5		6	6	24	12.0	5	3.8	
546	12X40cE106-2		(Judee sib, MTS0819)*2/Decade	100		174		31.1			5	6		6	5	22	12.1	5	3.4	
547	d 12X42cE33-4		MTS1227//Accipiter/MTS0832	100		175		30.7			7	7		5	5	24	12.0	5	2.5	
548	12X42cE36-3		MTS1227//Accipiter/MTS0832	100		174		29.9			6	6		5	5	22	12.0	4	3.5	
549	h 12X42cE72-3		MTS1227//Accipiter/MTS0832	100		171		29.5			8	8		6	5	27	11.9	4	3.2	
550	12X42cE104-1		MTS1227//Accipiter/MTS0832	100		172		32.7			5	5		4	4	18	11.7	4	4.0	
551	Rampart		check	100		173		35.8			4	4		4	4	16				
552	Warhorse		check	100		172		31.9			6	6		6	6	24				
553	12X44cE15-1		Judee//MTS0925/MTS1055	100		172		30.7			6	7		5	5	24	12.2	4	4.3	
554	12X44cE47-2		Judee//MTS0925/MTS1055	100		172		29.1			5	5		6	5	20	12.1	4	4.2	
555	12X44cE76-4		Judee//MTS0925/MTS1055	100		171		30.3			5	6		5	5	21	12.1	4	3.6	
556	12X44cE86-3	h	Judee//MTS0925/MTS1055	100		171		31.5			6	7		6	5	24	12.5	4	3.6	
557	12X44cE89-3		Judee//MTS0925/MTS1055	100		171		31.9			6	6		7	6	25	12.5	4	3.7	
558	12X45cE9-3		(Judee sib, MTS0819)*2/MTS1011	100		167		29.1			5	5		5	5	20	12.2	4	3.4	
559	d 12X45cE19-2		(Judee sib, MTS0819)*2/MTS1011	100		171		28.7			6	6		5	4	21	12.0	4	3.0	
560	12X45cE36-3		(Judee sib, MTS0819)*2/MTS1011	100		168		29.1			5	5		4	4	18	12.9	4	4.5	

Table 146. 2020 Sawfly Observation Nursery (SFO): All location data

Row/ Plot	wppo	ID	Pedigree	Stand		Heading		Plant Height		Spray injury	Agronomic Scores						2019 HR data				
				BZ	Lutz	BZ	Lutz	BZ	Lutz		SFO	CLO	BZ - SFO		Lutz - CLO		Big Sandy	Sum	Prot-	PPO	SDS
													PLB	JEB	PLB	JEB					
										≥5%	13-Jul	15-Jul	22-Jul	3-Aug			ein				
561		12X45cE38-2	(Judee sib, MTS0819)*2/MTS1011	100		168		28.3			6	6		5	5	22	12.4	4	4.1		
562		12X45cE42-1	(Judee sib, MTS0819)*2/MTS1011	100		171		30.7			7	7		5	5	24	11.6	4	3.1		
563		12X45cE47-2	(Judee sib, MTS0819)*2/MTS1011	100		172		30.3			6	6		4	3	19	12.0	4	4.7		
564		12X45cE55-1	(Judee sib, MTS0819)*2/MTS1011	100		168		27.6			6	6		4	4	20	12.2	4	3.8		
565		12X45cE60-3	(Judee sib, MTS0819)*2/MTS1011	100		171		32.7			5	5		5	6	21	12.1	1	4.2		
566		12X45cE63-2	(Judee sib, MTS0819)*2/MTS1011	100		171		29.9			6	6		4	4	20	12.3	4	4.5		
567		12X45cE67-3	(Judee sib, MTS0819)*2/MTS1011	100		168		31.5			6	5		6	5	22	12.4	4	3.8		
568		12X45cE82-3	(Judee sib, MTS0819)*2/MTS1011	100		168		32.3			7	6		6	5	24	12.0	4	3.9		
569		12X45cE92-3	(Judee sib, MTS0819)*2/MTS1011	90		171		27.6			5	5		4	4	18	12.4	4	3.5		
570		12X46cE4-4	Judee*2/MTS1014	100		174		29.9			6	7		5	5	23	12.8	4	3.7		
571		12X46cE11-2	Judee*2/MTS1014	95		172		29.1			5	5		5	5	20	12.8	4	3.2		
572	h	12X46cE17-1	Judee*2/MTS1014	100		166		31.5			6	7		6	6	25	12.4	4	3.9		
573	d	12X46cE23-3	Judee*2/MTS1014	95		172		31.9			7	7		5	5	24	12.0	4	3.0		
574		12X46cE62-4	Judee*2/MTS1014	100		174		33.5			7	6		5	5	23	11.9	4	3.8		
575		12X46cE91-3	Judee*2/MTS1014	100		172		32.3			6	5		5	4	20	12.0	4	3.4		
576		12X47cE18-4	(Judee sib, MTS0819-98)//MTS1017/MT	100		167		29.5			7	6		5	5	23	12.8	4	3.9		
577		12X47cE24-3	(Judee sib, MTS0819-98)//MTS1017/MT	100		175		30.3			6	6		6	5	23	12.4	5	3.6		
578		12X47cE36-3	(Judee sib, MTS0819-98)//MTS1017/MT	100		166		29.5			5	5		5	4	19	11.9	4	3.2		
579		12X47cE100-4	(Judee sib, MTS0819-98)//MTS1017/MT	100		174		29.9			6	6		6	6	24	12.9	4	3.3		
580	h	12X47cE107-4	(Judee sib, MTS0819-98)//MTS1017/MT	100		172		31.9			6	7		8	6	27	14.0	4	3.5		
581		12X47cE119-3	(Judee sib, MTS0819-98)//MTS1017/MT	100		165		30.7			5	5		5	4	19	12.6	4	4.7		
582		12X50cE46-3	MTS0832/Spur/Warhorse	100		166		29.5			6	6		6	5	23	12.6	4	4.2		
583		12X50cE69-2	MTS0832/Spur/Warhorse	100		174		32.3			6	5		6	5	22	12.3	4	4.0		
584		12X50cE97-3	MTS0832/Spur/Warhorse	100		168		28.7			5	5		6	5	21	13.1	4	5.2		
585		12X50cE109-3	MTS0832/Spur/Warhorse	90		171		28.7			6	6		5	5	22	12.9	4	4.1		
586	w1	12X57cE4-3	Warhorse//MTS1028/MTS1030	70		172		30.3			5	5		6	5	21	11.6	1	3.1		
587		12X57cE9-2	Warhorse//MTS1028/MTS1030	90		172		29.9			6	6		5	5	22	12.3	4	3.3		
588	h	12X57cE18-3	Warhorse//MTS1028/MTS1030	100		171		31.1			8	7		5	6	26	12.1	1	4.1		
589		12X57cE23-2	Warhorse//MTS1028/MTS1030	100		174		33.1			6	5		6	6	23	11.7	1	3.5		
590		12X57cE63-4	Warhorse//MTS1028/MTS1030	100		171		30.3			7	6		5	5	23	11.7	2	3.4		
591		12X57cE90-3	Warhorse//MTS1028/MTS1030	100		174		33.1			6	5		6	5	22	12.0	2	4.4		
592		12X57cE98-1	Warhorse//MTS1028/MTS1030	100		172		32.3			6	6		4	4	20	12.7	4	3.5		
593		12X58E31-4	MTW1251//MTS1029/MTS1011	100		174		30.7			7	6		5	5	23	12.1	1	4.0		
594	w2	12X58E47-3	MTW1251//MTS1029/MTS1011	90		175		31.1			7	7		5	5	24	12.0	2	4.2		
595	h w1	12X58E56-4	MTW1251//MTS1029/MTS1011	95		173		31.9			8	6		5	6	25	11.9	1	3.3		
596	h	12X67cE4-4	(Judee sib, MTS0819-98)//03X273cE8/N	100		174		32.3			6	6		7	7	26	12.0	4	4.5		
597		12X67cE8-3	(Judee sib, MTS0819-98)//03X273cE8/N	100		175		28.0			7	7		4	5	23	12.6	2	4.2		
598	h	12X67cE12-3	(Judee sib, MTS0819-98)//03X273cE8/N	100		174		31.9			6	5		7	7	25	12.7	4	3.6		
599		12X67cE41-4	(Judee sib, MTS0819-98)//03X273cE8/N	100		174		32.3			6	6		6	6	24	13.2	4	4.2		
600		12X67cE47-1	(Judee sib, MTS0819-98)//03X273cE8/N	100		172		27.2			5	5		5	5	20	12.7	4	3.3		

Table 146. 2020 Sawfly Observation Nursery (SFO): All location data

Row/ Plot	wppo	ID	Pedigree	Stand		Heading		Plant Height		Spray injury	Agronomic Scores						2019 HR data				
				BZ	Lutz	BZ	Lutz	BZ	Lutz		SFO	CLO	SFO	CLO	Sum	Prot-	PPO	SDS			
																			SFO	CLO	PLB
h = harvested line d = low SDS and/or high PPO white, possible discard										≥5%	13-Jul		15-Jul		22-Jul		3-Aug		ein		
601		Rampart	check	100		173		37.0			4	4				5	5	18			
602	h	Warhorse	check	100		172		32.7			6	6				6	6	24			
603		12X68cE5-2	WB-Quake/03X261cE56/Accipiter	100		174		33.9			6	5				6	6	23	12.5	4	3.6
604		12X68cE40-3	WB-Quake/03X261cE56/Accipiter	95		174		33.1			5	5				5	5	20	12.7	4	3.6
605		12X68cE46-4	WB-Quake/03X261cE56/Accipiter	100		174		31.1			6	6				6	6	24	13.2	5	3.3
606		12X68cE71-3	WB-Quake/03X261cE56/Accipiter	100		174		29.1			5	5				6	5	21	12.1	4	3.6
607		12X68cE83-2	WB-Quake/03X261cE56/Accipiter	100		175		28.7			6	6				5	5	22	13.2	5	4.3
608		12X68cE100-2	WB-Quake/03X261cE56/Accipiter	100		172		32.3			6	5				5	6	22	11.8	5	4.0
609		12X69cE42-1	MTS1227/03X261cE56/MTS1014	100		167		32.3			6	6				5	5	22	12.6	4	4.2
610	h	12X71cE7-4	(Judee sib, MTS0819-98)/MTS1166/03	100		171		28.3			7	6				6	6	25	12.5	2	4.4
611		12X71cE9-1	(Judee sib, MTS0819-98)/MTS1166/03	100		172		29.9			6	5				4	4	19	11.6	2	3.8
612		12X71cE13-3	(Judee sib, MTS0819-98)/MTS1166/03	100		174		32.3			5	6				6	7	24	12.1	4	4.2
613		12X71cE56-3	(Judee sib, MTS0819-98)/MTS1166/03	100		173		31.1			5	6				5	6	22	12.9	4	3.4
614		12X71cE67-4	(Judee sib, MTS0819-98)/MTS1166/03	100		165		30.3			6	7				6	5	24	13.8	4	3.1
615		12X71cE71-2	(Judee sib, MTS0819-98)/MTS1166/03	100		168		29.9			7	6				5	6	24	11.9	2	3.5
616		12X71cE83-2	(Judee sib, MTS0819-98)/MTS1166/03	100		165		30.7			8	6				4	5	23	14.1	4	3.7
617		12X73E99-3	MT10113/MTS1177/02X233cE94-3	100		167		29.1			5	6				3	4	18	11.9	4	3.4
618		12X81cE10-4	WB-Quake/MTS1055/MTS1211	100		166		31.5			8	6				3	4	21	11.5	4	3.2
619		12X81cE32-2	WB-Quake/MTS1055/MTS1211	100		166		31.5			6	7				4	5	22	12.3	4	3.8
620		15X180B8-3	Warhorse*2/Loma	100		168		29.5			7	7				4	4	22	12.2	4	3.4
621		15X180B10-4	Warhorse*2/Loma	100		174		26.8			6	6				5	5	22	12.5	4	3.5
622	h	15X180B38-1	Warhorse*2/Loma	100		167		27.2			7	6				6	6	25	12.5	4	3.3
623		15X180B39-4	Warhorse*2/Loma	100		168		29.1			6	5				5	5	21	12.6	4	3.4
624		15X180B50-2	Warhorse*2/Loma	100		172		29.1			7	6				6	5	24	12.0	4	3.2
625		15X180B60-1	Warhorse*2/Loma	95		174		29.1			7	5				6	4	22	12.4	4	3.4
626		d 15X180B71-1	Warhorse*2/Loma	95		171		32.3			7	6				6	5	24	13.1	4	3.0
627		15X180B73-1	Warhorse*2/Loma	90		171		30.3			6	5				7	6	24	12.8	4	3.9
628		d 15X184cB4-3	Warhorse/Loma/MTS1594	90		174		28.0			6	6				5	5	22	12.4	2	2.7
629		15X184cB7-3	Warhorse/Loma/MTS1594	90		166		27.6			6	5				5	5	21	12.5	4	3.7
630		15X184cB20-3	Warhorse/Loma/MTS1594	100		167		29.9			6	6				5	5	22	12.4	4	4.0
631	h	15X184cB26-4	Warhorse/Loma/MTS1594	100		167		29.5			7	7				6	6	26	12.3	1	3.9
632		15X184cB71-1	Warhorse/Loma/MTS1594	100		176		29.1			7	6				6	5	24	11.8	4	3.8
633		15X184cB85-2	Warhorse/Loma/MTS1594	100		174		31.9			6	6				5	4	21	11.8	4	3.4
634		15X184cB94-2	Warhorse/Loma/MTS1594	100		172		29.9			6	7				6	5	24	12.2	4	3.4
635		15X187cB1-2	Loma*2/MTS1404	90		175		29.5			7	6				5	4	22	11.5	4	3.5
636		15X187cB14-3	Loma*2/MTS1404	95		174		29.1			7	6				6	5	24	-	-	-
637		15X187cB23-2	Loma*2/MTS1404	100		174		28.7			8	6				4	5	23	12.4	2	3.1
638		15X187cB24-2	Loma*2/MTS1404	100		172		28.7			6	7				5	5	23	11.7	4	3.8
639		15X187cB27-1	Loma*2/MTS1404	100		175		29.9			7	6				5	5	23	11.8	2	4.2
640		15X187cB34-2	Loma*2/MTS1404	100		174		28.7			7	7				4	4	22	11.8	2	4.1

Table 146. 2020 Sawfly Observation Nursery (SFO): All location data

Row/ Plot	wPPO h = harvested line d = low SDS and/or high PPO white, possible discard	ID	Pedigree	Stand		Heading		Plant Height		Spray injury	Agronomic Scores						2019 HR data			
				BZ SFO	Lutz CLO	BZ SFO	Lutz CLO	BZ SFO	Lutz CLO		BZ - SFO		Lutz - CLO		Big Sandy PLB	Sandy JEB	Sum	Prot-	PPO	SDS
											PLB	JEB	PLB	JEB						
										≥5%	13-Jul	15-Jul	22-Jul	3-Aug		ein				
681	12X188E13-2		Yellowstone/04X38cE70	100		168		30.7			7	7		5	5	24	11.9	1	4.0	
682	12X188E27-1		Yellowstone/04X38cE70	95		167		30.7			6	6		3	3	18	12.6	5	3.7	
683	12X188E46-2		Yellowstone/04X38cE70	100		168		32.3			7	7		5	5	24	12.2	0	4.4	
684	12X188E93-1		Yellowstone/04X38cE70	100		168		32.3			6	6		5	5	22	12.4	1	3.8	
685	d 16X283cB2		MT1407/Joe	100		166		32.7			6	5		5	5	21	11.5	4	2.7	
686	16X283cB4		MT1407/Joe	100		165		27.6			6	6		4	4	20	12.2	4	3.5	
687	16X283cB10		MT1407/Joe	100		168		29.1			5	5		4	4	18	11.2	4	3.5	
688	16X283cB14		MT1407/Joe	100		167		31.9			7	6		4	4	21	10.5	3	3.3	
689	16X283cB20		MT1407/Joe	100		165		29.9			5	5		4	5	19	11.8	3	3.4	
690	16X283cB23		MT1407/Joe	100		168		27.6			6	6		6	5	23	11.6	4	3.2	
691	w4 16X283cB25		MT1407/Joe	90		171		28.7			6	6		6	5	23	11.0	4	3.3	
692	16X283cB26		MT1407/Joe	100		166		30.3			5	5		4	5	19	10.7	4	3.8	
693	16X283cB27		MT1407/Joe	100		168		29.1			6	6		4	4	20	11.4	4	4.2	
694	16X283cB32		MT1407/Joe	100		166		32.3			6	6		4	5	21	11.4	4	3.6	
695	16X283cB37		MT1407/Joe	100		168		30.7			5	5		4	5	19	11.2	4	4.3	
696	w4 16X283cB38		MT1407/Joe	100		168		30.3			7	6		4	4	21	11.7	4	3.9	
697	16X283cB41		MT1407/Joe	100		171		29.5			5	5		5	5	20	11.4	4	4.3	
698	16X283cB43		MT1407/Joe	100		168		30.7			6	5		4	5	20	11.8	4	4.0	
699	16X283cB45		MT1407/Joe	100		171		30.7			5	6		5	4	20	10.3	4	3.9	
700	w4 16X283cB54		MT1407/Joe	100		160		31.9			6	6		4	4	20	11.5	4	3.6	
701	Rampart	check		95		174		35.8			4	4		4	5	17				
702	Warhorse	check		100		174		31.9			6	6		5	5	22				
703	16X283cB68		MT1407/Joe	95		165		30.3			5	4		6	5	20	11.6	4	3.4	
704	w4 16X283cB78		MT1407/Joe	95		171		31.5			7	6		4	4	21	10.8	4	3.7	
705	16X283cB82		MT1407/Joe	95		172		29.1			6	6		5	4	21	10.3	4	3.8	
706	w4 16X283cB90		MT1407/Joe	90		171		30.7			6	6		4	5	21	10.9	4	3.2	
707	d 16X283cB92		MT1407/Joe	95		172		28.0			6	5		5	4	20	10.5	4	2.8	
708	16X283cB93		MT1407/Joe	100		171		31.1			6	5		5	5	21	11.3	4	4.6	
709	w4 16X283cB97		MT1407/Joe	100		172		31.5			7	6		6	5	24	11.5	4	3.2	
710	16X283cB98		MT1407/Joe	100		171		31.1			6	6		4	4	20	11.3	4	3.8	
711	Warhorse			100		174		32.3			6	6		6	5	17				
712	Bobcat			100		173		30.7			6	6		6	6	18				
713	19ALL1129RR_MM			100		167		28.7			6	6		5	5	16				
714	19ALL1129RN_MM			100		164		28.7			5	5		3	4	12				
715	19CP010013			100		166		28.3			6	6		6	5	17				
716	19CP010073			100		165		27.6			5	5		4	4	13				
717	19CP010112			100		165		24.4			5	5		4	4	13				
718	19CP010560			100		165		25.2			6	6		7	5	18				
719	19CP010081			100		165		28.7			7	7		3	3	13				
720	19CP010083			100		165		25.6			6	6		5	4	15				

Table 146. 2020 Sawfly Observation Nursery (SFO): All location data

Row/ Plot	wPPO ID h = harvested line d = low SDS and/or high PPO white, possible discard	Pedigree		Stand		Heading		Plant Height		Spray injury	Agronomic Scores						2019 HR data		
				BZ SFO	Lutz CLO	BZ SFO	Lutz CLO	BZ SFO	Lutz CLO		BZ - SFO		Lutz - CLO		Big Sandy				Sum
											PLB	CLO	PLB	CLO	PLB	JEB			
721	19CP010505					164		31.5		≥5%	13-Jul		15-Jul	22-Jul	3-Aug		ein		
722	19CP010506					163		30.3				6			3	4		13	
723	Warhorse					171		31.5				5			4	5		14	
724	Bobcat					172		28.0				6			6	6		18	
												7			6	6		19	
Average		98.4		170.5		30.7					5.9	5.8	4.4	4.4	5.2	5.0	21.8	12.3 3.9 3.7	

Table 147. 2020 Single Rep Observation 'A' Nursery (SROA): Lines harvested at the Post Farm

Plot #	2021 ID	Cross ID	Pedigree	Yield bu/a	Test weight lb/bu	Heading date from	Plant height in	2019 HR data		
								Prot-ein	PPO	SDS
						1-Jan				
1		Yellowstone	check	84.1	63.0	176	33.9			
7		16X2-DH15	MTV1681/MT1265	87.9		173	32.7	11.9	1	3.7
14		16X2-DH46	MTV1681/MT1265	85.4		174	31.9	12.2	1	4.4
18		16X2-DH56	MTV1681/MT1265	97.1	62.4	173	32.7	12.2	1	4.6
25		17X5-DH-13	MTW1491*2/Joe	90.1		171	30.7	13.5	2	4.4
27		17X5-DH-24	MTW1491*2/Joe	101.7	64.4	170	34.3	12.6	2	4.8
39		17X5-DH-109	MTW1491*2/Joe	94.1		172	33.1	12.1	2	5.6
40		17X5-DH-114	MTW1491*2/Joe	87.6		171	29.9	12.8	2	5.0
55		17X11-DH-15	Ray//MTV1681/Joe	131.8	62.0	176	37.0	12.4	5	5.0
59		17X11-DH-62	Ray//MTV1681/Joe	124.4	60.6	174	36.6	12.1	3	4.8
68		17X11-DH-166	Ray//MTV1681/Joe	122.9	63.9	172	35.0	11.8	4	4.1
72		12X185E2-1	MT1105//MT1156	114.9		175	28.7	12.0	5	3.6
77	MT2124	12X185E55-1	MT1105//MT1156	124.3	63.6	174	29.9	11.6	4	3.4
79	MT2125	12X185E59-3	MT1105//MT1156	134.4	63.1	175	29.9	12.1	4	3.1
80	MT2126	12X185E83-3	MT1105//MT1156	124.2	63.6	175	29.5	12.8	4	3.5
89	w1 MTW2127	12X197E22-1	MT1149/04X115cE30	123.6	64.8	166	28.0	11.9	1	3.2
99	MT2128	12X201E16-1	MT1088/CH-111.14098	127.0	63.8	171	32.7	11.8	4	3.3
127		12X214E41-1	MT1240/Redfield	104.6		165	31.1	13.1	4	3.9
149	MT2129	15X256B90-1	FourOsix/MT1528	132.9	64.8	168	31.9	12.2	5	4.4
174	MT2130	13X136E53	MT1088/CH-111.14098//MT1078	125.2	65.1	168	30.3	10.1	4	3.7
185	MT2131	16X9-DH24	09x257cD9-2/DecadeFhb1-DH7	113.9	63.7	174	31.9	12.6	4	3.8
186	MT2132	16X9-DH31	09x257cD9-2/DecadeFhb1-DH7	114.0	64.3	175	29.1	12.4	4	3.6
187	MT2133	16X9-DH36	09x257cD9-2/DecadeFhb1-DH7	109.6	62.3	174	31.5	12.9	5	4.2
191		17X1-DH-48	MT1444*2/Decade Fhb1-DH9	129.2		174	34.6	12.2	4	4.0
193		17X1-DH-90	MT1444*2/Decade Fhb1-DH9	109.4		168	34.6	12.1	4	3.8
196	MTCL2134	13X1cE23	MT1137/MTCL1067//SY Clearstone 2Cl	125.5	63.8	172	32.7	12.5	4	3.5
201		Yellowstone	check (Clearstone at Lutz)	127.3	63.2	173	35.0			
243		13X8E117	SY Clearstone 2CL/2*MT1078	118.7	61.3	174	30.7	11.6	4	3.8
245		13X8E148	SY Clearstone 2CL/2*MT1078	120.4	61.3	173	34.3	12.0	4	4.2
250	MTCL2135	13X9E54	SY Clearstone 2CL//MTCL1067/WB-Qu	108.2	63.6	173	34.3	12.6	4	3.3
254		13X9E77	SY Clearstone 2CL//MTCL1067/WB-Qu	117.9		172	35.8	12.1	4	3.1
336		13X180E96	MTCL1329/SY Clearstone 2CL	105.8		167	32.7	11.8	4	3.4
338		13X180E120	MTCL1329/SY Clearstone 2CL	94.6		167	33.1	12.3	4	3.4
357	MTCL2136	12X2E44-3	Accipiter/MTS0832//MTCS1205	130.9	64.3	171	29.5	13.5	4	4.9
401		Yellowstone	check (Clearstone at Lutz)	104.3	62.8	173	36.2			
470		13X142cE14	MT1286/KS10HW10//08X22cB-85	106.2		174	31.1	11.0	1	3.2
476		13X142cE59	MT1286/KS10HW10//08X22cB-85	111.1		175	31.1	10.0	0	3.2
482		13X142cE113	MT1286/KS10HW10//08X22cB-85	106.4		174	31.5	11.2	1	3.5
514		13X149E74	Colter//MT1285/OK08539	103.0		174	29.5	10.8	4	3.4
517		13X149E98	Colter//MT1285/OK08539	97.2		172	30.3	12.6	4	3.6
519		13X149E113	Colter//MT1285/OK08539	88.4		174	30.3	12.4	4	3.4
522		13X149E160	Colter//MT1285/OK08539	97.2		174	28.3	10.0	4	3.6
523		13X149E166	Colter//MT1285/OK08539	94.3		173	29.9	10.9	4	3.8
526		13X149E199	Colter//MT1285/OK08539	95.2		176	30.3	11.0	4	4.2
532		13X151cE63	Decade/KS030689NT-2//MT1335	94.9		172	28.7	9.9	4	3.8
543		13X153E46	MT1090*2/NE09498	101.6		173	31.1	10.8	4	3.6
545		13X153E68	MT1090*2/NE09498	95.4		173	30.3	10.8	4	3.8
568	MT2137	13X156E86	MT1286//MT0871/NI10712	110.1	64.6	173	31.5	10.9	4	3.2
588	MT2138	13X160cE82	MT1276/SD07W083-7//05X248cE55	110.1	62.9	174	31.9	11.2	1	3.4
601		Yellowstone	check	111.3	61.1	176	34.3			
608		13X163E81	Yellowstone*2/06X90B-19	113.9	61.3	174	29.5	9.9	1	3.6
610		13X163E110	Yellowstone*2/06X90B-19	111.1	61.7	176	29.9	10.1	1	3.6

Table 147. 2020 Single Rep Observation 'A' Nursery (SROA): Lines harvested at the Post Farm

Plot #	2021 ID	Cross ID	Pedigree	Yield bu/a	Test weight lb/bu	Heading date from	Plant height in	2019 HR data		
								Prot- ein	PPO	SDS
	WPP0					1-Jan				
615		13X165E77	Yellowstone*2/07X5B-57	131.3		175	35.4	11.9	1	4.2
623		13X172E54	MTS1305//MT1240/Redfield	95.4	62.8	170	31.5	13.3	4	4.7
626		13X172E115	MTS1305//MT1240/Redfield	103.9		173	32.3	15.0	4	4.5
633	MT2139	13X173E61	Northern//MT1240/Redfield	109.0	62.6	173	31.5	17.0	5	3.3
641		13X174cE15	MT1143//MT1240/Redfield	100.6		171	31.1	14.5	5	4.4
646		13X174cE74	MT1143//MT1240/Redfield	88.7		174	29.5	14.1	1	4.5
670		13X218E148	IDO1101/Northern	94.1		172	27.6	11.1	3	3.6
696		13X185E123	MT1138/Northern	93.2		176	31.1	10.8	3	3.4
703		13X186cE4	MT1078/05X248cE55	102.4		174	30.7	11.8	4	4.6
715	MT2140	13X187cE19	MT1246/04X494cE33-4	108.4	63.1	175	31.1	11.8	3	3.4
720		13X187cE42	MT1246/04X494cE33-4	104.4		172	28.0	10.5	4	3.7
723		13X187cE115	MT1246/04X494cE33-4	102.7		173	28.7	10.9	1	3.3
725		13X187cE127	MT1246/04X494cE33-4	101.2		175	28.7	12.6	4	4.0
742		13X192E148	MT1383/MT1346	90.3		170	28.7	10.7	0	4.3
801		Yellowstone	check	109.7	60.7	176	35.0			
840		12X102E98-4	MT10113//MT1145/MT10102	99.9		168	29.9	11.9	4	3.1
858	MT2141	12X105E24-4	MT10114/MT10128//MTW1251	110.1	62.4	176	29.5	11.6	4	3.7
859	MT2142	12X105E29-4	MT10114/MT10128//MTW1251	123.2	64.1	174	28.7	11.3	4	4.1
860		12X105E31-1	MT10114/MT10128//MTW1251	99.5		174	28.3	11.2	4	4.1
865		12X105E119-4	MT10114/MT10128//MTW1251	101.5		173	29.1	12.3	4	3.8
866	MT2143	12X105E126-4	MT10114/MT10128//MTW1251	124.7	62.4	173	28.7	11.8	4	4.1
871		12X106E54-2	Northern//MT1143/06X424B6	100.8		175	30.3	12.7	4	4.5
876		12X106E104-4	Northern//MT1143/06X424B6	122.8	61.0	175	29.5	11.6	4	3.3
885	w1 MTW2144	12X109cE59-4	WB3768*2/(10K1726w, Yellowstone wh	120.3	63.6	176	30.3	12.2	1	3.9
889	w1	12X113E6-2	Northern//10K1676w, Yellowstone white	114.5		176	29.9	11.4	1	3.2
891	MT2145	12X113E55-4	Northern//10K1676w, Yellowstone white	119.7	63.4	175	31.1	11.5	1	3.4
892	MT2146	12X113E58-2	Northern//10K1676w, Yellowstone white	108.3	63.8	174	30.7	11.6	1	3.5
894	MT2147	12X113E79-3	Northern//10K1676w, Yellowstone white	107.1	62.4	176	31.5	11.3	1	3.1
895	MT2148	12X113E107-2	Northern//10K1676w, Yellowstone white	109.2	63.7	175	30.7	11.4	1	3.5
905		12X114E95-3	MT1149//10K1676w, Yellowstone white	107.7		173	35.0	11.8	4	3.8
913	MT2149	08X14cE81-3	YLL//Cap19/Vida	114.1	64.8	173	32.3	12.0	4	3.5
914	MT2150	08X14cE110-4	YLL//Cap19/Vida	110.4	65.0	173	32.3	11.8	4	4.0
920	MT2151	12X120E34-1	MT10113//MT0871/MT1151	112.0	63.6	166	32.3	13.8	4	5.0
921	MT2152	12X120E36-4	MT10113//MT0871/MT1151	117.7	63.7	165	33.5	13.0	4	5.5
926	MT2153	12X120E80-3	MT10113//MT0871/MT1151	115.1	63.4	168	32.3	12.4	4	4.5
933		12X121E50-4	MT1156//MT1137/MT1151	124.1	61.5	176	29.9	11.6	4	3.4
935	MT2154	12X121E83-2	MT1156//MT1137/MT1151	112.5	62.1	176	30.3	12.3	4	3.7
938	MT2155	12X121E119-3	MT1156//MT1137/MT1151	115.5	65.0	172	31.9	13.7	5	3.7
940	MT2156	12X123E31-3	MT1240//MT1088/02X172E31-4	123.0	62.6	173	31.5	13.0	4	3.6
945		12X123E105-3	MT1240//MT1088/02X172E31-4	106.7		172	31.5	12.7	4	4.0
954	MT2157	12X126E6-3	MT1285//03X378cE8/MT10102	144.9	63.9	173	32.3	12.0	4	4.4
972	MT2158	12X132E5-4	MT0871//HV9W04-1594R/MT0866	132.8	63.8	175	32.7	11.3	2	3.6
979	w1 MTW2159	12X132E90-4	MT0871//HV9W04-1594R/MT0866	116.2	64.2	174	31.5	12.2	1	4.6
984		12X137cE38-2	MT0871*2/(SD06156-1, Redfield sib)	115.8	61.0	176	43.3	14.1	4	3.6
985		12X137cE59-3	MT0871*2/(SD06156-1, Redfield sib)	119.1	63.0	176	42.9	14.7	4	4.5
986	MT2160	12X139cE2-3	Northern*2/SD08198	115.5	62.9	173	32.7	11.2	5	4.2
989	MT2161	12X139cE93-1	Northern*2/SD08198	113.7	63.5	176	30.7	11.4	1	3.4
993	w2	12X144E7-1	MT1235//KS09HW140/MT10122	105.4	64.2	176	29.9	11.4	2	3.1
1015		12X151E64-4	MT1088*2/SY Wolf	101.4	63.1	176	32.7	12.1	5	3.4
1021	w2	12X169E26-1	WB3768/MTW1251	100.8	62.8	176	28.7	11.9	2	4.0
1022	w2 MTW2162	12X169E27-3	WB3768/MTW1251	120.2	64.1	174	31.5	11.7	2	3.9
1028	MT2163	12X183E1-3	MT1088/MT1156	108.3	62.4	174	31.5	11.5	4	3.6

Table 147. 2020 Single Rep Observation 'A' Nursery (SROA): Lines harvested at the Post Farm

Plot # wPPO	2021 ID	Cross ID	Pedigree	Yield bu/a	Test weight lb/bu	Heading date from	Plant height in	2019 HR data		
								Prot-ein	PPO	SDS
						1-Jan				
1031		12X183E36-3	MT1088/MT1156	118.7		176	33.9	10.7	4	4.5
1033		12X183E70-4	MT1088/MT1156	106.1		174	34.3	10.6	4	4.8
1037		12X183E118-2	MT1088/MT1156	105.6		176	33.1	11.8	4	4.0
1038		12X183E131-1	MT1088/MT1156	105.6		176	33.5	12.4	4	4.7
Average All				110.0	63.1	173.2	31.7	12.0	3.2	3.9
Average MT21xx lines				118.1	63.6	172.9	31.2	12.1	3.3	3.8

Table 148. 2020 Single Rep Observation 'A' Nursery (SROA): All Location data

Row/ Plot	wPPO	ID	Pedigree	Stand		Heading		Plant Height		Spray Injury	Agronomic Score										2019 HR data				
				h = harvested line		BZ	Lutz	SROA	CLO		BZ	Lutz	SROA	CLO	Post	CLO-Lutz	JEB	JEB	PLB	JEB	Moccasin	Avg	Prot-	PPO	SDS
				BZ	Lutz																				
d = low SDS and/or high PPO white, possible discard																									
1	h	Yellowstone	check	75		176		33.9		≥5%	6	5			22-Jul	28-Jul				5.8					
2		Decade	check	100		171		34.3			4	4				5	5		4.5						
3		16X2-DH2	MTV1681/MT1265	85		173		30.7			6	5				5	5		5.3	12.7	1	4.2			
4		16X2-DH4	MTV1681/MT1265	90		174		30.3			6	6				5	5		5.5	12.4	1	4.1			
5		16X2-DH8	MTV1681/MT1265	90		176		31.5			6	5				6	6		5.8	11.8	1	3.7			
6		16X2-DH11	MTV1681/MT1265	90		173		31.9			5	5				6	5		5.3	14.5	5	4.7			
7	h	16X2-DH15	MTV1681/MT1265	95		173		32.7			7	6				5	6		6.0	11.9	1	3.7			
8		16X2-DH16	MTV1681/MT1265	85		177		33.5			6	5				6	6		5.8	12.0	1	3.6			
9		16X2-DH21	MTV1681/MT1265	80		174		32.7			6	5				6	5		5.5	12.4	1	4.0			
10		16X2-DH22	MTV1681/MT1265	90		175		30.7			6	6				5	5		5.5	11.8	1	3.6			
11		16X2-DH28	MTV1681/MT1265	85		174		31.9			6	6				5	6		5.8	12.2	2	4.1			
12		16X2-DH36	MTV1681/MT1265	90		174		32.7			5	5				5	5		5.0	12.1	2	4.2			
13		16X2-DH41	MTV1681/MT1265	100		174		30.7			6	6				6	5		5.8	11.7	1	4.3			
14	h	16X2-DH46	MTV1681/MT1265	90		174		31.9			7	5				6	6		6.0	12.2	1	4.4			
15		16X2-DH49	MTV1681/MT1265	85		176		31.5			6	6				5	4		5.3	12.0	1	3.8			
16		16X2-DH50	MTV1681/MT1265	85		175		34.3			6	5				5	6		5.5	11.6	1	3.8			
17		16X2-DH53	MTV1681/MT1265	90		174		29.5			6	6				5	4		5.3	12.7	4	4.0			
18	h	16X2-DH56	MTV1681/MT1265	90		173		32.7			7	6				6	6		6.3	12.2	1	4.6			
19		17X4-DH-94	MT1265//MTV1681/Joel	80		174		30.7			6	5				5	4		5.0	11.8	2	3.4			
20		17X4-DH-146	MT1265//MTV1681/Joel	85		173		33.9			5	5				5	6		5.3	11.9	4	4.6			
21		17X4-DH-152	MT1265//MTV1681/Joel	95		168		29.9			6	5				5	4		5.0	11.6	2	4.2			
22		17X4-DH-172	MT1265//MTV1681/Joel	95		178		32.7			5	5				5	5		5.0	11.9	1	5.2			
23		17X4-DH-174	MT1265//MTV1681/Joel	100		173		33.5			6	6				4	4		5.0	11.7	1	4.2			
24		17X4-DH-197	MT1265//MTV1681/Joel	90		175		33.1			6	5				4	5		5.0	11.3	1	3.4			
25	h	17X5-DH-13	MTW1491*2/Joel	85		171		30.7			6	6				6	6		6.0	13.5	2	4.4			
26		17X5-DH-18	MTW1491*2/Joel	95		176		36.6			5	5				4	5		4.8	12.6	1	3.8			
27	h	17X5-DH-24	MTW1491*2/Joel	95		170		34.3			7	7				4	4		5.5	12.6	2	4.8			
28		17X5-DH-31	MTW1491*2/Joel	90		174		32.7			5	5				4	4		4.5	12.5	3	4.8			
29		17X5-DH-35	MTW1491*2/Joel	100		173		30.7			5	6				4	4		4.8	12.6	1	4.4			
30		17X5-DH-42	MTW1491*2/Joel	90		175		35.0			5	5				6	6		5.5	12.6	2	4.0			
31		17X5-DH-51	MTW1491*2/Joel	95		173		31.1			5	6				5	5		5.3	13.0	1	4.6			
32		17X5-DH-65	MTW1491*2/Joel	85		175		34.3			5	5				4	5		4.8	12.6	3	3.2			
33		17X5-DH-69	MTW1491*2/Joel	95		174		35.8			6	5				4	6		5.3	12.9	3	4.6			
34		17X5-DH-75	MTW1491*2/Joel	90		170		30.3			5	5				4	5		4.8	12.0	3	4.0			
35		17X5-DH-87	MTW1491*2/Joel	85		168		29.1			6	6				4	5		5.3	11.5	2	4.5			
36		17X5-DH-88	MTW1491*2/Joel	90		171		29.5			5	6				4	4		4.8	12.7	3	4.7			
37		17X5-DH-95	MTW1491*2/Joel	95		168		30.7			6	6				4	4		5.0	11.7	3	3.7			
38		17X5-DH-102	MTW1491*2/Joel	95		171		32.7			6	7				3	5		5.3	13.0	3	3.9			
39	h	17X5-DH-109	MTW1491*2/Joel	100		172		33.1			7	6				5	6		6.0	12.1	2	5.6			
40	h	17X5-DH-114	MTW1491*2/Joel	90		171		29.9			6	6				6	7		6.3	12.8	2	5.0			
41		17X5-DH-120	MTW1491*2/Joel	90		173		33.9			6	6				4	5		5.3	12.6	2	4.5			
42		17X6-DH-21	MT1265*2/Joel	100		171		31.5			6	5				4	5		5.0	13.0	2	3.4			
43		17X6-DH-28	MT1265*2/Joel	100		173		29.5			5	6				5	6		5.5	12.5	4	3.7			
44		17X6-DH-37	MT1265*2/Joel	100		174		31.5			5	6				4	5		5.0	12.3	4	4.2			

Table 148. 2020 Single Rep Observation 'A' Nursery (SROA): All Location data

Row/ Plot	wPPO	ID	Pedigree	Stand		Heading		Plant Height		Spray injury	Agronomic Score								2019 HR data					
				BZ	Lutz	SROA	CLO	BZ	Lutz		SROA	CLO	Post	CLO-Lutz				Big Sandy				Moccasin		Avg
														PLB	JEB	PLB	JEB	PLB	JEB	PLB	JEB	PLB	JEB	
d = low SDS and/or high PPO white, possible discard																			ein					
45	17X6-DH-48		MT1265*2/Jo	95		173		32.7		≥5%	6	6		6	6		6	6	6.0	12.4	4	3.9		
46	17X6-DH-53		MT1265*2/Jo	90		173		28.7			5	5		4	4		4	4	4.5	12.4	2	3.9		
47	17X6-DH-55		MT1265*2/Jo	95		168		32.3			6	6		4	3		4	3	4.8	12.1	4	3.4		
48	17X6-DH-61		MT1265*2/Jo	100		167		33.5			6	5		4	4		4	4	4.8	12.8	4	4.1		
49	17X6-DH-74		MT1265*2/Jo	90		172		36.6			5	6		4	5		5	5	5.0	11.7	5	4.3		
50	d 17X6-DH-84		MT1265*2/Jo	100		172		31.1			5	7		5	5		5	5	5.5	12.6	4	2.8		
51	Yellowstone		check	80		175		32.3			5	5		6	6		5	5	5.5					
52	Decade		check	95		170		33.9			3	5		5	5		4	5	4.5					
53	17X6-DH-89		MT1265*2/Jo	85		174		30.3			5	6		4	4		4	4	4.8	12.8	4	3.3		
54	17X6-DH-107		MT1265*2/Jo	95		175		35.4			5	5		5	7		5	5	5.5	12.0	4	4.2		
55	f 17X11-DH-15		Ray/MTV1681/Jo	85		176		37.0			7	6		7	6		6	6	6.5	12.4	5	5.0		
56	17X11-DH-33		Ray/MTV1681/Jo	90		174		36.6			6	5		2	2		2	3	3.8	11.0	1	3.5		
57	17X11-DH-41		Ray/MTV1681/Jo	95		172		33.5			6	5		2	3		3	4	4.0	12.2	1	4.4		
58	17X11-DH-61		Ray/MTV1681/Jo	100		175		37.4			5	5		5	5		5	5	5.0	11.8	1	3.4		
59	f 17X11-DH-62		Ray/MTV1681/Jo	95		174		36.6			7	6		6	6		6	6	6.3	12.1	3	4.8		
60	17X11-DH-74		Ray/MTV1681/Jo	100		175		37.0			5	5		2	3		3	3	3.8	12.2	2	4.2		
61	17X11-DH-77		Ray/MTV1681/Jo	100		175		34.6			6	6		4	5		5	5	5.3	12.4	4	4.6		
62	17X11-DH-97		Ray/MTV1681/Jo	100		174		36.2			6	6		4	5		5	5	5.3	12.2	4	3.1		
63	17X11-DH-106		Ray/MTV1681/Jo	100		174		31.9			5	5		4	6		6	5	5.0	12.6	2	4.4		
64	17X11-DH-128		Ray/MTV1681/Jo	90		174		35.0			6	6		4	5		5	5	5.3	12.1	2	4.8		
65	17X11-DH-129		Ray/MTV1681/Jo	95		171		30.3			5	5		5	6		6	5	5.3	12.9	2	4.0		
66	17X11-DH-141		Ray/MTV1681/Jo	90		176		32.7			6	5		6	7		7	6	6.0	11.8	2	3.8		
67	17X11-DH-156		Ray/MTV1681/Jo	95		173		33.5			5	5		5	5		5	5	5.0	12.5	1	3.4		
68	f 17X11-DH-166		Ray/MTV1681/Jo	95		172		35.0			7	6		6	6		6	6	6.3	11.8	4	4.1		
69	17X11-DH-177		Ray/MTV1681/Jo	100		172		33.5			6	6		4	5		5	5	5.3	12.3	1	3.6		
70	17X11-DH-180		Ray/MTV1681/Jo	100		175		35.4			6	5		4	6		6	5	5.3	12.4	2	4.0		
71	d 12X184E100-2		MT1090/MT1276	85		172		31.1			5	6		4	4		4	4	4.8	12.2	5	2.7		
72	h 12X185E2-1		MT1105/MT1156	100		175		28.7			8	7		6	6		6	6	6.8	12.0	5	3.6		
73	d 12X185E5-2		MT1105/MT1156	100		175		28.7			6	6		5	5		5	5	5.5	11.6	5	2.9		
74	12X185E7-3		MT1105/MT1156	100		174		29.5			7	6		5	5		5	5	5.8	12.1	5	3.4		
75	d 12X185E23-3		MT1105/MT1156	100		174		29.5			6	6		6	6		6	6	6.0	12.1	4	2.9		
76	d 12X185E37-1		MT1105/MT1156	100		173		29.9			5	4		5	5		5	4	4.8	12.1	4	2.8		
77	h 12X185E55-1		MT1105/MT1156	100		174		29.9			8	7		6	6		6	6	6.8	11.6	4	3.4		
78	12X185E58-1		MT1105/MT1156	90		174		29.1			7	7		5	5		5	6	6.0	12.0	4	3.2		
79	h 12X185E59-3		MT1105/MT1156	100		175		29.9			7	6		7	7		7	6	6.8	12.1	4	3.1		
80	h 12X185E83-3		MT1105/MT1156	100		175		29.5			8	7		6	6		6	6	6.8	12.8	4	3.5		
81	12X185E92-3		MT1105/MT1156	100		174		31.1			5	5		5	5		5	5	5.0	12.2	5	3.2		
82	12X185E100-2		MT1105/MT1156	100		175		28.7			7	6		5	6		6	6	6.0	11.5	4	4.2		
83	d 12X185E146-3		MT1105/MT1156	100		175		29.1			8	6		5	5		5	6	6.0	11.6	4	3.0		
84	12X185E155-2		MT1105/MT1156	100		174		28.0			7	6		5	5		5	5	5.8	11.5	4	3.7		
85	w5 d 12X186E44-3		MT1113/MT1235	95		171		26.8			4	6		5	6		5	6	5.3	12.3	5	3.0		
86	w4 12X186E48-1		MT1113/MT1235	100		174		30.7			4	5		5	5		5	5	4.8	12.0	4	3.2		
87	d 12X186E85-3		MT1113/MT1235	100		173		30.7			4	7		5	6		6	5	5.5	12.6	5	2.6		
88	w5 12X186E90-2		MT1113/MT1235	100		172		28.7			4	6		4	4		4	4	4.5	12.1	5	3.3		

Table 148. 2020 Single Rep Observation 'A' Nursery (SROA): All Location data

Row/ Plot	wPPO	ID	Pedigree	Stand		Heading		Plant Height		Spray injury	Agronomic Score								2019 HR data				
				BZ	Lutz	BZ	Lutz	BZ	Lutz		SROA	CLO	SROA	CLO	Post	CLO-Lutz	Big Sandy	Moccasin	Avg	Prot-	PPO	SDS	
				SROA	CLO	SROA	CLO	SROA	CLO		SROA	CLO	PLB	JEB	PLB	JEB	PLB	JEB					
89	h	w1	12X197E22-1	100		166		28.0		≥5%	7	6				22-Jul	28-Jul	6	6	6.3	11.9	1	3.2
90			12X198E23-2	100		167		28.0			6	6						5	6	5.8	11.6	1	3.1
91	d		12X198E127-3	90		168		29.5			6	5						3	4	4.5	11.9	1	2.8
92	d		12X199E78-3	100		172		31.5			5	7						4	5	5.3	11.5	4	3.0
93	d		12X200E5-3	100		175		30.7			6	6						4	4	5.0	11.8	1	2.5
94			12X200E14-3	100		179		28.3			7	6						3	3	4.8	12.4	1	3.2
95			12X200E51-1	100		178		28.7			7	6						5	5	5.8	11.8	1	3.2
96			12X200E60-2	100		178		29.9			6	6						4	4	5.0	11.9	1	3.1
97			12X200E71-4	90		178		28.0			6	5						3	4	4.5	11.6	1	3.2
98			12X200E109-2	80		178		27.6			5	5						3	4	4.3	12.4	1	3.8
99	h		12X201E16-1	100		171		32.7			6	7						6	6	6.3	11.8	4	3.3
100			12X201E39-3	100		166		32.7			6	6						4	4	5.0	12.7	4	3.5
101			Yellowstone	100		173		34.6			6	5						5	5	5.3			
102			Decade	100		167		34.3			5	4						4	4	4.3			
103	d		12X201E118-2	100		166		27.2			5	5						4	4	4.5	12.0	4	2.7
104			12X204E58-3	100		166		31.5			7	6						3	3	4.8	12.6	3	3.6
105			12X204E66-2	100		168		31.9			6	7						4	5	5.5	13.6	4	3.7
106			12X204E96-3	100		167		31.5			6	6						6	6	6.0	12.5	4	4.2
107			12X206E5-2	100		165		30.3			6	7						5	5	5.8	12.9	4	3.2
108	d		12X206E14-1	100		165		30.3			5	7						5	5	5.5	12.0	4	3.0
109	d		12X206E58-4	100		165		29.5			6	6						4	4	5.0	11.5	4	3.0
110			12X206E61-1	100		166		29.5			5	6						5	6	5.5	11.6	4	4.8
111	d		12X206E65-2	100		165		31.9			6	6						3	4	4.8	11.7	4	2.9
112			12X206E90-3	100		167		32.3			5	5						3	4	4.3	11.8	4	3.3
113	d		12X206E128-2	100		165		28.3			6	7						4	5	5.5	11.5	4	3.0
114			12X208E33-3	95		166		29.5			6	6						3	3	4.5	12.0	4	3.6
115			12X208E60-2	100		166		31.9			6	5						5	5	5.3	11.8	4	3.2
116	d		12X208E105-3	100		166		32.3			6	6						5	5	5.5	11.5	4	2.8
117	d		12X209E29-1	100		173		31.9			7	7						4	5	5.8	11.7	4	2.5
118			12X209E34-3	100		172		30.7			5	6						4	4	4.8	12.0	4	3.9
119	d		12X209E46-1	100		172		29.9			6	7						4	5	5.5	11.9	4	2.8
120			12X209E49-3	100		172		30.3			6	7						5	6	6.0	11.8	4	3.8
121	d		12X209E83-1	100		167		29.5			7	7						4	5	5.8	11.7	4	2.6
122	d		12X210E37-3	100		168		32.7			6	6						3	4	4.8	12.6	4	3.0
123	d		12X210E39-2	100		171		32.3			5	7						3	4	4.8	11.7	4	2.8
124			12X210E61-2	100		168		32.3			6	6						4	4	5.0	12.3	4	3.2
125	d		12X210E91-2	100		166		32.7			6	7						5	5	5.8	12.4	4	2.7
126			12X214E27-3	100		165		32.3			6	5						5	5	5.3	12.7	4	3.2
127	h		12X214E41-1	100		165		31.1			8	6						6	5	6.3	13.1	4	3.9
128			12X214E76-1	100		165		32.7			6	7						4	5	5.5	12.0	4	3.6
129			12X214E86-3	95		166		32.7			7	6						3	5	5.3	13.1	4	4.9
130			12X214E98-3	90		166		31.5			6	6						5	6	5.8	13.1	4	4.3
131			12X214E105-2	100		165		30.3			7	6						5	5	5.8	12.7	4	4.4
132			12X214E110-4	100		165		31.1			6	5						5	4	5.0	13.7	4	3.9

Table 148. 2020 Single Rep Observation 'A' Nursery (SROA): All Location data

Row/ Plot	wPPO h = harvested line d = low SDS and/or high PPO white, possible discard	ID Pedigree	Stand		Heading		Plant Height		Spray injury	Agronomic Score								2019 HR data																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
			BZ	Lutz	BZ	Lutz	BZ	Lutz		SROA	CLO	SROA	CLO	Post	CLO-Lutz	JEB	PLB	JEB	PLB	JEB	Avg	Prot-	PPO	SDS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
			SROA	CLO	SROA	CLO	SROA	CLO		SROA	CLO	PLB	JEB	PLB	JEB	PLB	JEB	PLB	JEB	Avg																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
133	12X214E119-4	MT1240/Redfield	100		166				≥5%																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								

Table 148. 2020 Single Rep Observation 'A' Nursery (SROA): All Location data

Row/ Plot	wPPO ID	Pedigree	Stand			Heading			Plant Height			Spray injury	Agronomic Score						2019 HR data										
			BZ			Lutz			BZ				Lutz			Post	CLO-Lutz			Big Sandy			Moccasin			Avg			
			SROA	CLO		SROA	CLO		SROA	CLO			SROA	CLO			PLB	JEB	PLB	JEB	PLB	JEB	PLB	JEB	Prot-		PPO	SDS	
		d = low SDS and/or high PPO white, possible discard										≥5%												ein					
177	13X137cE38	MTS1327//Overland/KINACI97	100		163		29.5						6	6										5.5	10.1	4	3.2		
178	d 13X137cE52	MTS1327//Overland/KINACI97	100		166		31.1						5	6										5.5	9.8	4	3.0		
179	13X137cE53	MTS1327//Overland/KINACI97	100		166		28.0						6	5										5.3	10.8	4	3.5		
180	d 13X137cE78	MTS1327//Overland/KINACI97	100		166		28.7						6	5										5.3	10.1	4	3.0		
181	13X137cE136	MTS1327//Overland/KINACI97	100		167		31.9						6	5										5.8	9.7	4	3.5		
182	d 13X139cE13	MT1143//Overland/TCI 001744	100		171		29.9						6	6										5.5	9.3	1	2.9		
183	16X8-DH13	DecadeFhb1-DH13//MT1078/Langin	100		165		33.9						6	5										5.3	12.9	4	4.5		
184	16X9-DH1	09x257cD9-2/DecadeFhb1-DH7	100		172		29.1						6	5										5.3	13.2	4	4.5		
185	h 16X9-DH24	09x257cD9-2/DecadeFhb1-DH7	100		174		31.9						8	6										6.5	12.6	4	3.8		
186	h 16X9-DH31	09x257cD9-2/DecadeFhb1-DH7	100		175		29.1						7	6										6.3	12.4	4	3.6		
187	h 16X9-DH36	09x257cD9-2/DecadeFhb1-DH7	100		174		31.5						8	7										6.5	12.9	5	4.2		
188	16X9-DH42	09x257cD9-2/DecadeFhb1-DH7	100		174		29.1						6	6										5.5	12.4	2	3.7		
189	16X9-DH47	09x257cD9-2/DecadeFhb1-DH7	100		166		31.5						6	7										6.0	12.6	4	4.0		
190	16X10-DH25	MT1332/DecadeFhb1-DH17	90		165		32.3						6	6										5.0	11.5	4	3.7		
191	h 17X1-DH-48	MT1444*2/Decade Fhb1-DH9	100		174		34.6						7	7										6.8	12.2	4	4.0		
192	17X1-DH-62	MT1444*2/Decade Fhb1-DH9	100		172		33.5						6	6										5.3	12.3	4	3.6		
193	h 17X1-DH-90	MT1444*2/Decade Fhb1-DH9	100		168		34.6						8	7										6.8	12.1	4	3.8		
194	13X1cE7	MT1137/MTCL1067//SY Clearstone 2CL	85	80	174	172	31.9	26.8					6	6	4	6								5.0	12.1	4	3.4		
195	13X1cE10	MT1137/MTCL1067//SY Clearstone 2CL	100	55	174	174	33.1	26.4					7	5	4	4								5.3	12.1	4	3.6		
196	h 13X1cE23	MT1137/MTCL1067//SY Clearstone 2CL	95	90	172	172	32.7	28.3					6	5	6	6								5.7	12.5	4	3.5		
197	d 13X1cE32	MT1137/MTCL1067//SY Clearstone 2CL	90	70	174	172	33.1	27.6					6	6	3	5								4.7	-	4	2.8		
198	13X1cE45	MT1137/MTCL1067//SY Clearstone 2CL	100	60	174	172	33.5	27.6					6	6	3	5								4.8	12.5	4	3.6		
199	13X1cE55	MT1137/MTCL1067//SY Clearstone 2CL	100	60	174	172	32.7	26.8					6	5	3	4								5.2	12.1	4	3.4		
200	13X1cE65	MT1137/MTCL1067//SY Clearstone 2CL	100	80	168	167	34.3	28.0					5	5	4	4								4.5	13.1	4	3.7		
201	h Yellowstone	check (Clearstone at Lutz)	75	60	173	171	35.0	26.0					7	5	4	4								5.2					
202	Decade	check (Yellowstone at Lutz)	100	50	168		34.3						6	5										5.3					
203	13X1cE81	MT1137/MTCL1067//SY Clearstone 2CL	100	50	171	172	29.5	24.4					6	6	3	4								4.7	12.7	4	3.2		
204	d 13X1cE89	MT1137/MTCL1067//SY Clearstone 2CL	100	85	172	168	32.7	26.8	5				6	6	4	4								5.0	12.7	4	2.8		
205	13X1cE98	MT1137/MTCL1067//SY Clearstone 2CL	100	60	172	171	31.1	25.2					6	6	3	4								4.8	12.3	4	3.2		
206	d 13X3cE1	MTCL1067/MTW1251//MTCL1261, SY	90	60	171	168	31.1	23.6					7	6	3	4								5.0	11.8	4	3.0		
207	w1 d 13X3cE4	MTCL1067/MTW1251//MTCL1261, SY	100	50	172	172	29.1	23.6					6	6	3	4								4.5	-	1	3.0		
208	13X3cE12	MTCL1067/MTW1251//MTCL1261, SY	100	60	172	168	28.7	20.9					6	6	3	4								4.7	13.3	1	3.1		
209	w4 13X3cE26	MTCL1067/MTW1251//MTCL1261, SY	100	30	168	172	28.7	24.0	5				7	6	3	3								4.8	11.6	4	3.1		
210	13X3cE27	MTCL1067/MTW1251//MTCL1261, SY	100	55	167	171	31.9	23.6					7	7	3	3								5.2	12.8	0	3.1		
211	13X3cE31	MTCL1067/MTW1251//MTCL1261, SY	95	20	168	172	30.7	21.3	5				6	6	2	2								4.3	13.1	1	3.5		
212	d 13X3cE48	MTCL1067/MTW1251//MTCL1261, SY	100	40	167	172	31.5	22.4	10				7	6	3	4								5.0	12.6	1	2.8		
213	w4 13X3cE49	MTCL1067/MTW1251//MTCL1261, SY	100	40	166	168	31.9	23.2	5				7	6	4	4								5.0	11.6	4	3.8		
214	w4 13X3cE57	MTCL1067/MTW1251//MTCL1261, SY	90	15	168	172	31.1	22.0					7	5	3	3								4.7	11.8	4	3.6		
215	d 13X3cE66	MTCL1067/MTW1251//MTCL1261, SY	100	45	171	168	30.7	21.7					6	6	3	4								5.0	12.7	0	2.9		
216	13X3cE70	MTCL1067/MTW1251//MTCL1261, SY	100	40	168	172	28.7	22.4					6	5	3	4								4.3	12.8	0	3.7		
217	w4 13X3cE78	MTCL1067/MTW1251//MTCL1261, SY	80	60	167	167	30.7	22.4					6	6	4	4								4.7	11.6	4	3.1		
218	13X3cE84	MTCL1067/MTW1251//MTCL1261, SY	100	50	168	168	29.1	22.8	10				6	6	3	3								4.3	12.8	0	3.9		
219	d 13X3cE91	MTCL1067/MTW1251//MTCL1261, SY	95	50	171	168	28.7	21.3	5				6	6	3	4								4.5	13.0	1	3.0		
220	w4 13X3cE97	MTCL1067/MTW1251//MTCL1261, SY	85	20	172	172	31.1	23.2					6	5	3	3								4.5	11.7	4	3.9		

Table 148. 2020 Single Rep Observation 'A' Nursery (SROA): All Location data

Row/ Plot	wPPO h = harvested line d = low SDS and/or high PPO white, possible discard	ID	Pedigree	Stand			Heading			Plant Height			Spray injury	Agronomic Score										2019 HR data		
				BZ Lutz			BZ Lutz			BZ Lutz				Post		CLO-Lutz		Big Sandy		Moccasin		Avg	2019 HR data			
				SROA	CLO		SROA	CLO		SROA	CLO			PLB	JEB	PLB	JEB	PLB	JEB	PLB	JEB		Prot-	PPO	SDS	
													≥5%	22-Jul			22-Jul			28-Jul			ein			
221	13X3cE121		MTCL1067/MTW1251/(MTCL1261, SY Clearstone 2CL/MT1078/MTCL1329	100	50		174	171		29.1	22.4			6	6	3	4	5	4			4.7	12.7	1	3.2	
222	13X6cE2		SY Clearstone 2CL/MT1078/MTCL1329	100	30		166	167		28.7	23.2			7	7	3	3	6	7			5.5	12.5	4	3.5	
223	13X6cE13		SY Clearstone 2CL/MT1078/MTCL1329	100	40		166	166		28.7	23.2			7	6	3	3	5	5			4.8	11.9	4	3.4	
224	13X6cE31		SY Clearstone 2CL/MT1078/MTCL1329	100	50		166	166		30.3	24.4			6	6	3	4	6	6			5.2	12.1	4	3.2	
225	13X6cE46		SY Clearstone 2CL/MT1078/MTCL1329	90	40		172	171		32.3	25.6			6	7	3	4	6	6			5.3	12.1	4	3.1	
226	13X6cE49		SY Clearstone 2CL/MT1078/MTCL1329	100	35		167	168		31.9	25.2			7	6	2	3	7	7			5.3	11.8	4	3.3	
227	13X6cE53		SY Clearstone 2CL/MT1078/MTCL1329	100	55		173	172		35.4	26.8			5	5	3	4	2	4			3.8	12.7	4	3.1	
228	d 13X6cE61		SY Clearstone 2CL/MT1078/MTCL1329	100	60		168	168		30.7	24.8			7	7	4	4	5	5			5.3	11.6	4	3.0	
229	d 13X6cE86		SY Clearstone 2CL/MT1078/MTCL1329	100	75		168	167		31.5	23.6		5	6	6	6	5	7	7			6.2	-	4	2.9	
230	d 13X6cE92		SY Clearstone 2CL/MT1078/MTCL1329	80	50		171	166		31.5	24.8			6	6	3	4	5	6			5.0	11.6	4	3.0	
231	13X6cE96		SY Clearstone 2CL/MT1078/MTCL1329	100	65		172	167		32.3	25.2		5	6	6	4	5	4	5			5.0	12.7	4	3.2	
232	13X6cE112		SY Clearstone 2CL/MT1078/MTCL1329	95	55		172	168		32.3	25.6			6	5	4	5	5	5			5.0	13.0	4	3.8	
233	d 13X6cE118		SY Clearstone 2CL/MT1078/MTCL1329	100	85		174	166		31.9	25.6		10	6	6	4	4	5	5			5.0	12.1	4	3.0	
234	13X6cE124		SY Clearstone 2CL/MT1078/MTCL1329	85	60		168	167		30.3	23.6			7	6	3	5	5	4			5.0	12.1	4	3.6	
235	13X6cE127		SY Clearstone 2CL/MT1078/MTCL1329	100	70		175	172		30.3	24.4			6	5	4	5	6	6			5.3	13.0	4	4.2	
236	13X8E4		SY Clearstone 2CL/2*MT1078	80	75		171	167		30.7	26.4		5	6	6	5	4	6	6			5.5	12.4	4	3.2	
237	13X8E7		SY Clearstone 2CL/2*MT1078	100	80		174	172		30.7	26.0			6	5	6	5	5	5			5.3	12.7	4	3.4	
238	13X8E44		SY Clearstone 2CL/2*MT1078	80	70		174	174		30.7	26.0			6	6	5	5	5	5			5.3	11.5	4	3.8	
239	13X8E60		SY Clearstone 2CL/2*MT1078	100	80		174	174		31.5	26.4			6	6	5	5	5	5			5.3	12.3	4	3.6	
240	13X8E63		SY Clearstone 2CL/2*MT1078	100	50		172	172		31.9	27.6		5	6	6	4	4	6	6			5.3	12.3	4	3.6	
241	13X8E81		SY Clearstone 2CL/2*MT1078	100	65		174	174		31.9	26.8			7	5	5	5	6	5			5.5	12.0	4	3.6	
242	d 13X8E103		SY Clearstone 2CL/2*MT1078	100	70		174	174		30.3	27.2			5	5	4	4	5	5			4.7	12.2	4	3.0	
243	h 13X8E117		SY Clearstone 2CL/2*MT1078	90	95		174	172		30.7	27.6			6	6	6	6	5	6			5.8	11.6	4	3.8	
244	13X8E140		SY Clearstone 2CL/2*MT1078	100	90		174	172		34.3	29.5			5	5	6	7	5	5			5.5	-	4	3.4	
245	h 13X8E148		SY Clearstone 2CL/2*MT1078	100	90		173	174		34.3	27.6		5	7	7	6	6	6	6			6.3	12.0	4	4.2	
246	13X9E10		SY Clearstone 2CL/MTCL1067/WB-Qua	90	65		174	175		35.0	29.9			5	5	3	5	6	5			4.8	12.4	4	3.4	
247	13X9E16		SY Clearstone 2CL/MTCL1067/WB-Qua	100	80		174	173		35.4	29.5			5	5	5	5	5	5			5.0	12.2	4	3.7	
248	13X9E24		SY Clearstone 2CL/MTCL1067/WB-Qua	80	70		174	172		35.4	28.7			5	5	5	5	6	5			5.2	11.6	4	3.4	
249	d 13X9E51		SY Clearstone 2CL/MTCL1067/WB-Qua	100	75		174	174		35.8	26.8			6	6	5	5	5	4			5.2	12.5	4	3.0	
250	h 13X9E54		SY Clearstone 2CL/MTCL1067/WB-Qua	100	85		173	172		34.3	26.0			6	6	6	6	6	6			6.0	12.6	4	3.3	
251	Yellowstone		check (Clearstone at Lutz)	100	70		173	174		36.2	27.2			7	5	5	5	5	5			5.3				
252	Decade		check (Yellowstone at Lutz)	95	60		167			35.8				5	5			5	5			5.0				
253	d 13X9E63		SY Clearstone 2CL/MTCL1067/WB-Qua	100	85		173	174		37.0	28.0			5	5	4	6	6	5			5.2	12.1	4	2.7	
254	h 13X9E77		SY Clearstone 2CL/MTCL1067/WB-Qua	90	90		172	172		35.8	28.7			6	5	5	7	6	5			5.7	12.1	4	3.1	
255	d 13X9E98		SY Clearstone 2CL/MTCL1067/WB-Qua	85	65		172	174		37.4	28.0			6	6	3	5	6	6			5.3	11.6	4	3.0	
256	13X9E103		SY Clearstone 2CL/MTCL1067/WB-Qua	100	60		171	173		37.4	26.0			6	5	4	4	6	5			5.0	11.7	5	3.4	
257	13X28E10		SY Clearstone 2CL/Judee/Spur	100	50		174	175		31.5	23.6			5	6	3	4	5	5			4.7	11.6	4	3.8	
258	13X29cE24		(SY Clearstone sib, MTCL1131)/(MT109	100	60		174	174		35.4	26.4			6	6	3	4	5	5			4.8	12.0	4	5.2	
259	13X29cE27		(SY Clearstone sib, MTCL1131)/(MT109	80	40		176	175		35.8	27.2			6	5	3	4	4	4			4.3	12.4	3	4.2	
260	13X29cE47		(SY Clearstone sib, MTCL1131)/(MT109	100	60		171	172		33.5	25.6			6	6	5	4	5	5			5.2	12.0	4	3.7	
261	13X32E34		MTC51202/MT1090/05X371D47	100	50		168	168		33.9	26.8			6	5	3	5	6	6			5.2	13.0	4	4.4	
262	13X32E45		MTC51202/MT1090/05X371D47	100	40		174	173		33.5	24.8			6	6	3	4	4	4			4.5	12.5	4	3.7	
263	13X32E85		MTC51202/MT1090/05X371D47	100	50		174	173		34.3	26.4			5	4	3	4	5	4			4.2	11.9	4	3.1	
264	13X32E93		MTC51202/MT1090/05X371D47	100	80		172	168		35.0	25.6		5	5	5	5	4	5	5			4.8	11.9	4	4.1	

Table 148. 2020 Single Rep Observation 'A' Nursery (SROA): All Location data

Row/ Plot	wPPO h = harvested line d = low SDS and/or high PPO white, possible discard	ID	Pedigree	Stand		Heading		Plant Height		Spray injury	Agronomic Score								2019 HR data							
				BZ		Lutz		BZ			Lutz		Post	CLO-Lutz				Big Sandy				Moccasin	Avg			
				SROA	CLO	SROA	CLO	SROA	CLO		SROA	CLO		PLB	JEB	PLB	JEB	PLB	JEB	PLB	JEB			Prot-	PPO	SDS
				100	50	172	172	34.6	26.4	≥5%	6	6	4	5	5	6	5.3	12.2	4	3.9	ein					
265	13X32E122		MTCS1202/MT1090/05X371D47	100	60	171	168	34.6	27.2		5	6	3	5	6	5	5.0	12.4	4	4.6						
266	w4 13X33cE1		(SY Clearstone sib, MTCL1131)/MTCS1	90	30	172	172	31.5	25.2		6	4	3	3	6	6	4.7	12.0	4	4.2						
267	w4 13X33cE12		(SY Clearstone sib, MTCL1131)/MTCS1	95	50	174	174	31.1	25.2		6	6	4	4	6	5	5.2	13.4	4	3.2						
268	13X33cE29		(SY Clearstone sib, MTCL1131)/MTCS1	90	45	172	173	33.9	24.4		5	5	3	4	5	5	4.5	13.3	4	3.4						
269	13X33cE35		(SY Clearstone sib, MTCL1131)/MTCS1	100	50	168	167	35.0	26.0		6	6	3	4	6	6	5.2	12.4	4	3.7						
270	13X33cE38		(SY Clearstone sib, MTCL1131)/MTCS1	85	25	172	175	33.5	24.8		6	6	3	3	5	5	4.7	13.0	4	3.5						
271	13X33cE43		(SY Clearstone sib, MTCL1131)/MTCS1	100	35	173	175	33.1	24.4		6	5	3	3	5	4	4.3	13.0	4	4.0						
272	13X33cE51		(SY Clearstone sib, MTCL1131)/MTCS1	95	30	174	174	32.7	26.4		6	6	3	4	4	4	4.5	13.0	4	3.5						
273	13X33cE58		(SY Clearstone sib, MTCL1131)/MTCS1	100	30	175	174	33.5	24.8		6	6	3	3	4	5	4.5	13.5	4	3.0						
274	d 13X33cE69		(SY Clearstone sib, MTCL1131)/MTCS1	90	15	175	175	35.0	27.2		5	5	3	3	5	5	4.3	12.0	3	4.2						
275	13X33cE80		(SY Clearstone sib, MTCL1131)/MTCS1	100	35	175	175	33.5	24.8		7	6	3	3	6	6	5.2	12.9	4	4.3						
276	13X33cE88		(SY Clearstone sib, MTCL1131)/MTCS1	90	25	172	175	31.5	26.4		5	7	3	3	4	5	4.5	11.9	4	3.4						
277	13X38cE7		WB3768*206X70D4	100	40	174	172	32.3	24.4		6	6	4	5	6	5	5.3	12.2	0	3.0						
278	d 13X38cE16		WB3768*206X70D4	85	20	175	175	33.5	25.6		6	5	3	4	6	5	4.8	12.3	4	2.5						
279	d 13X38cE28		WB3768*206X70D4	100	60	176	174	33.5	24.8		6	6	4	4	6	6	5.3	12.3	4	2.8						
280	d 13X38cE29		WB3768*206X70D4	80	30	175	175	33.5	25.2		6	6	3	4	6	5	5.0	12.2	4	3.0						
281	d 13X38cE43		WB3768*206X70D4	100	40	175	175	32.7	24.4		7	7	4	5	4	5	5.3	12.0	4	3.5						
282	13X38cE45		WB3768*206X70D4	95	35	176	176	32.7	24.4		6	6	3	3	4	5	4.5	11.7	4	3.4						
283	13X38cE53		WB3768*206X70D4	85	40	174	175	31.1	22.8		5	6	3	4	3	3	4.0	11.7	4	3.1						
284	13X38cE67		WB3768*206X70D4	100	55	172	171	31.5	24.8		6	6	5	4	5	5	5.3	13.1	4	3.1						
285	13X38cE73		WB3768*206X70D4	100	40	170	172	31.9	25.2	5	7	6	3	4	6	6	5.3	11.7	1	3.2						
286	13X38cE78		WB3768*206X70D4	100	60	168	167	33.5	25.2		6	5	4	4	4	5	4.7	11.7	0	3.2						
287	13X38cE89		WB3768*206X70D4	100	20	172	175	31.5	22.4		5	5	3	3	3	4	3.8	11.8	4	2.9						
288	d 13X38cE91		WB3768*206X70D4	100	55	171	172	32.7	24.4		6	7	4	5	6	6	5.7	11.6	4	3.5						
289	13X177cE16		Decade/(MTCL1131, SY Clearstone sib)	100	45	171	171	33.9	24.8		6	6	3	4	5	5	4.8	12.0	4	3.9						
290	13X177cE23		Decade/(MTCL1131, SY Clearstone sib)	100	60	171	171	33.5	26.0		6	6	4	4	5	5	5.0	11.9	4	4.0						
291	13X177cE36		Decade/(MTCL1131, SY Clearstone sib)	100	40	171	174	33.1	24.4		7	5	3	4	5	6	5.0	11.5	4	4.5						
292	13X177cE38		Decade/(MTCL1131, SY Clearstone sib)	100	50	167	175	32.3	25.2		7	6	4	5	5	5	5.3	11.5	4	3.8						
293	13X177cE55		Decade/(MTCL1131, SY Clearstone sib)	100	30	171	175	32.7	25.6		6	5	3	3	5	5	4.5	11.7	4	4.2						
294	13X177cE139		Decade/(MTCL1131, SY Clearstone sib)	95	50	168	168	31.9	22.8		6	6	3	4	4	5	4.7	11.8	4	3.6						
295	13X177cE147		Decade/(MTCL1131, SY Clearstone sib)	100	45	167	168	31.1	24.4		6	7	4	3	5	5	5.0	11.8	4	4.1						
296	13X177cE156		Decade/(MTCL1131, SY Clearstone sib)	100	40	167	167	27.2	20.9		6	6	3	4	4	4	4.5	11.7	4	3.8						
297	13X177cE159		Decade/(MTCL1131, SY Clearstone sib)	100	35	168	168	30.7	22.4		6	6	3	4	4	4	4.5	13.5	4	4.0						
298	13X177cE188		Decade/(MTCL1131, SY Clearstone sib)	100	50	167	167	31.9	22.8		6	7	3	3	5	5	4.8	13.6	4	4.6						
299	13X177cE196		Decade/(MTCL1131, SY Clearstone sib)	100	40	168	168	28.0	21.7	10	7	5	4	4	4	4	4.3	12.3	4	4.6						
300	13X177cE201		Decade/(MTCL1131, SY Clearstone sib)	85	50	175	172	35.0	28.3		5	5	4	4	5	5	5.0									
301	Yellowstone		check (Clearstone at Lutz)	100	15	168		33.5			5	5	5	5	4	5	4.8									
302	Decade		check (Yellowstone at Lutz)	100	40	167	167	28.7	22.4		6	7	4	4	4	5	5.0	12.7	4	4.5						
303	13X177cE212		Decade/(MTCL1131, SY Clearstone sib)	90	30	167	167	28.0	22.8	5	6	6	4	5	4	4	4.8	12.7	4	5.2						
304	13X177cE214		Decade/(MTCL1131, SY Clearstone sib)	100	45	170	171	29.5	22.8		6	6	3	4	4	5	4.7	11.5	4	4.3						
305	13X177cE220		Decade/(MTCL1131, SY Clearstone sib)	100	35	168	167	28.3	21.7		6	5	4	4	5	5	4.8	12.4	4	4.8						
306	13X177cE228		Decade/(MTCL1131, SY Clearstone sib)	100	40	171	168	29.1	23.2		6	6	5	5	5	6	5.5	12.1	4	3.9						
307	13X177cE246		Decade/(MTCL1131, SY Clearstone sib)	100	55	172	167	30.7	25.2		5	5	3	4	4	5	4.3	11.8	4	4.3						
308	13X177cE261		Decade/(MTCL1131, SY Clearstone sib)																							

Table 148. 2020 Single Rep Observation 'A' Nursery (SROA): All Location data

Row/ Plot	wPPO h = harvested line d = low SDS and/or high PPO white, possible discard	ID Pedigree	Stand		Heading		Plant Height		Spray injury	Agronomic Score										2019 HR data				
			BZ		Lutz		BZ			Lutz		Post	CLO-Lutz				Big Sandy				Moccasin		Avg	
			SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	PLB		JEB	PLB	JEB	PLB	JEB	PLB	JEB	Prot-	PPD	SDS		
			≥5%											22-Jul		22-Jul		28-Jul		ein				
309	13X177cE278	Decade/(MTCL1131, SY Clearstone sib)	100	60	172	168	32.3	26.0	30	6	7	4	4	6	6	5.5	12.5	4	3.6					
310	13X179E3	MT1090/(MTCL1261, SY Clearstone sib)	90	25	172	174	32.7	25.2		5	6	3	3	5	5	4.5	12.3	4	4.1					
311	13X179E11	MT1090/(MTCL1261, SY Clearstone sib)	100	25	171	174	34.6	26.4		6	5	3	3	5	5	4.5	13.0	4	4.2					
312	13X179E29	MT1090/(MTCL1261, SY Clearstone sib)	80	30	172	172	33.1	26.0		6	5	3	3	4	5	4.3	12.3	4	4.6					
313	13X179E31	MT1090/(MTCL1261, SY Clearstone sib)	100	40	173	172	32.3	25.6	5	6	6	3	4	5	6	5.0	12.9	4	3.2					
314	13X179E40	MT1090/(MTCL1261, SY Clearstone sib)	80	35	172	171	31.1	24.8		6	5	3	3	4	4	4.2	12.0	4	3.6					
315	13X179E51	MT1090/(MTCL1261, SY Clearstone sib)	100	60	172	168	33.5	26.8	5	6	6	4	4	5	5	5.0	11.9	4	3.4					
316	13X179E59	MT1090/(MTCL1261, SY Clearstone sib)	90	70	172	168	31.5	26.0	5	6	5	5	4	6	6	5.3	11.8	4	3.2					
317	13X179E65	MT1090/(MTCL1261, SY Clearstone sib)	100	70	172	167	31.5	24.4	5	7	6	6	4	5	5	5.5	11.7	4	3.2					
318	13X179E70	MT1090/(MTCL1261, SY Clearstone sib)	75	40	173	171	30.7	25.6		6	5	3	5	5	5	4.8	11.8	4	3.4					
319	13X179E100	MT1090/(MTCL1261, SY Clearstone sib)	80	75	172	168	32.3	24.8	5	6	5	5	4	5	5	5.0	12.1	4	3.4					
320	13X179E107	MT1090/(MTCL1261, SY Clearstone sib)	75	70	168	168	32.7	25.2	5	6	6	5	5	5	6	5.5	11.5	4	3.2					
321	13X179E109	MT1090/(MTCL1261, SY Clearstone sib)	85	60	171	172	33.5	27.2		7	5	5	5	5	5	5.3	11.6	4	3.8					
322	13X179E113	MT1090/(MTCL1261, SY Clearstone sib)	100	50	171	171	33.9	24.4		6	5	4	4	5	5	4.8	12.1	4	3.8					
323	13X179E126	MT1090/(MTCL1261, SY Clearstone sib)	100	30	171	174	32.7	26.0		6	6	3	4	5	5	4.8	12.6	4	3.6					
324	13X179E155	MT1090/(MTCL1261, SY Clearstone sib)	100	50	172	168	34.3	25.2	5	6	5	4	4	5	4	4.7	12.0	4	3.6					
325	13X179E157	MT1090/(MTCL1261, SY Clearstone sib)	95	55	172	172	33.5	25.6	5	6	5	3	4	6	5	4.8	11.9	4	4.2					
326	13X179E171	MT1090/(MTCL1261, SY Clearstone sib)	70	40	172	171	34.6	26.0		6	6	3	4	6	6	5.2	12.2	4	3.3					
327	13X179E175	MT1090/(MTCL1261, SY Clearstone sib)	100	15	171	175	34.6	26.0		7	5	3	3	3	4	4.2	12.1	4	3.4					
328	13X179E178	MT1090/(MTCL1261, SY Clearstone sib)	100	50	171	172	34.3	24.4		6	6	4	4	5	5	5.0	12.7	4	3.2					
329	13X179E192	MT1090/(MTCL1261, SY Clearstone sib)	100	55	171	171	34.6	24.8		7	7	4	5	5	5	5.5	13.6	4	3.9					
330	13X179E225	MT1090/(MTCL1261, SY Clearstone sib)	100	40	168	172	35.4	25.6		7	6	3	4	6	5	5.2	12.1	4	3.4					
331	13X179E233	MT1090/(MTCL1261, SY Clearstone sib)	100	30	171	172	33.9	25.6		6	6	3	3	4	5	4.5	12.1	4	3.1					
332	d 13X180E5	MTCL1329/SY Clearstone 2CL	95	75	168	168	33.1	25.6		7	7	6	5	6	5	6.0	12.9	4	2.6					
333	d 13X180E7	MTCL1329/SY Clearstone 2CL	100	70	167	167	32.3	25.2		6	6	4	5	5	5	5.2	12.5	4	2.9					
334	13X180E27	MTCL1329/SY Clearstone 2CL	100	45	171	172	34.6	26.8		7	8	4	5	4	5	5.5	12.0	4	3.4					
335	d 13X180E38	MTCL1329/SY Clearstone 2CL	100	50	171	172	35.0	26.0		7	7	4	6	5	5	5.7	11.8	4	2.8					
336	h 13X180E96	MTCL1329/SY Clearstone 2CL	100	80	167	166	32.7	25.2		7	7	6	5	6	5	6.0	11.8	4	3.4					
337	d 13X180E105	MTCL1329/SY Clearstone 2CL	90	75	167	166	33.1	25.6		6	7	5	6	6	6	6.0	12.5	4	3.0					
338	h 13X180E120	MTCL1329/SY Clearstone 2CL	100	70	167	167	33.1	24.8	5	7	6	6	5	7	6	6.2	12.3	4	3.4					
339	d 13X180E123	MTCL1329/SY Clearstone 2CL	100	35	168	167	31.5	25.2	5	6	6	3	4	7	7	5.5	12.0	4	2.8					
340	13X180E129	MTCL1329/SY Clearstone 2CL	100	75	168	167	33.9	25.6	10	6	6	5	5	6	6	5.5	12.2	4	3.2					
341	d 13X180E132	MTCL1329/SY Clearstone 2CL	100	55	168	167	34.3	24.4	5	6	6	3	5	6	6	5.3	12.2	4	3.0					
342	d 13X180E156	MTCL1329/SY Clearstone 2CL	100	45	170	168	33.1	26.0	5	6	7	3	4	5	5	5.0	11.9	4	3.0					
343	d 13X180E158	MTCL1329/SY Clearstone 2CL	100	30	167	170	33.5	25.2		6	6	3	3	6	5	4.8	11.8	4	3.0					
344	13X180E161	MTCL1329/SY Clearstone 2CL	100	35	168	171	33.1	23.6		6	6	3	4	5	5	4.8	12.3	4	3.4					
345	13X180E165	MTCL1329/SY Clearstone 2CL	100	30	168	171	32.7	24.8		7	5	3	3	7	7	5.3	12.6	4	3.2					
346	d 13X180E171	MTCL1329/SY Clearstone 2CL	100	25	172	172	31.9	24.4		6	6	3	4	6	6	5.2	12.3	4	2.4					
347	13X180E178	MTCL1329/SY Clearstone 2CL	90	20	172	173	33.9	27.2		6	6	3	3	6	6	5.0	13.2	4	3.2					
348	13X181cE6	SY Clearstone 2CL/MTS1311	100	35	172	171	30.3	22.0		5	5	4	4	5	5	4.7	12.9	4	3.6					
349	13X181cE25	SY Clearstone 2CL/MTS1311	90	20	171	171	30.7	22.4		5	5	3	3	5	5	4.3	13.7	4	4.4					
350	13X181cE33	SY Clearstone 2CL/MTS1311	100	40	171	168	32.7	22.8		7	6	4	4	6	6	5.5	12.9	4	3.8					
351	Yellowstone	check (Clearstone at Lutz)	80	35	174	172	34.6	26.8	2	7	5	3	4	6	6	5.2								
352	Decade	check (Yellowstone at Lutz)	100	30	168		33.9			6	5			6	6	5.8								

Table 148. 2020 Single Rep Observation 'A' Nursery (SROA): All Location data

Row/ Plot	wPPO h = harvested line d = low SDS and/or high PPO white, possible discard	ID	Pedigree	Stand			Heading			Plant Height			Spray injury	Agronomic Score								2019 HR data				
				BZ Lutz			BZ Lutz			BZ Lutz				Post		CLO-Lutz		Big Sandy		Moccasin		Avg	2019 HR data			
				SROA	CLO		SROA	CLO		SROA	CLO			PLB	JEB	PLB	JEB	PLB	JEB	PLB	JEB		Prot-	PPO	SDS	
353		13X181cE51	SY Clearstone 2CL/MTS1311	90	20		173	172		35.4	26.8		≥5%	5	5	3	3	6	6			4.7		12.8	4	4.4
354		13X181cE71	SY Clearstone 2CL/MTS1311	100	40		172	174		33.9	24.0			6	6	3	3	5	5			4.7		13.4	4	3.6
355		13X181cE82	SY Clearstone 2CL/MTS1311	100	30		171	172		29.5	22.8			5	6	3	3	5	5			4.5		13.2	4	4.4
356		13X181cE96	SY Clearstone 2CL/MTS1311	100	30		172	168		30.7	23.6			6	6	4	3	5	5			4.8		13.1	4	3.8
357	h	12X2E44-3	Accipiter/MTS0832/MTCS1205	95	55		171	167		29.5	23.2		15	6	7	6	4	6	6			5.8		13.5	4	4.9
358		12X2E49-1	Accipiter/MTS0832/MTCS1205	100	40		172	171		33.5	25.2		5	5	6	4	4	5	5			4.8		14.1	4	4.7
359		12X2E65-4	Accipiter/MTS0832/MTCS1205	100	45		174	172		29.9	22.4			5	6	4	4	5	5			4.8		14.3	4	5.4
360		12X2E69-3	Accipiter/MTS0832/MTCS1205	100	35		175	175		31.9	24.4			6	6	4	3	5	5			4.8		13.8	4	5.1
361		12X2E77-3	Accipiter/MTS0832/MTCS1205	100	45		174	174		33.9	26.4			5	5	4	4	5	6			4.8		13.9	4	4.7
362		12X2E90-2	Accipiter/MTS0832/MTCS1205	100	25		173	174		31.5	22.8			6	6	3	3	6	5			4.8		13.7	4	4.9
363		12X2sE17-3	Accipiter/MTS0832/MTCS1205	90	30		174	175		30.7	23.6			6	6	4	4	5	5			5.0		13.5	3	3.3
364		12X2sE24-4	Accipiter/MTS0832/MTCS1205	100	25		174	175		32.7	23.2			6	7	3	4	5	5			5.0		13.4	3	3.3
365		12X2sE41-3	Accipiter/MTS0832/MTCS1205	100	30		175	176		32.3	23.6			5	6	4	4	6	6			5.2		12.5	3	3.9
366	d	12X7E25-1	MTCL1260/(SY Clearstone sib, MTCL1068, SY Ck)	100	15		167	173		31.9	24.4			6	6	2	2	3	4			3.8		12.2	3	2.8
367		12X8cE39-1	MTCL1067/MT0954/MTCL1068, SY Ck	100	25		172	174		31.1	24.0			6	5	3	3	3	4			4.0		12.9	3	3.5
368		12X10E16-3	MT1276/MT1145/MTCL1127	100	15		171	175		31.1	23.6			5	6	3	3	4	5			4.3		13.5	4	3.6
369		12X10E24-4	MT1276/MT1145/MTCL1127	90	25		165	167		29.9	22.4		10	7	6	3	3	6	5			5.0		13.3	4	3.1
370		12X10E99-3	MT1276/MT1145/MTCL1127	95	20		166	168		28.0	21.3		10	6	6	3	3	7	5			5.0		13.2	4	3.4
371		12X11E2-2	Northern/MTCL1127/Overland	100	35		173	172		33.1	23.2		5	5	7	4	4	6	6			5.3		12.7	4	3.5
372		12X11E15-3	Northern/MTCL1127/Overland	100	25		171	172		30.7	22.0			7	6	3	4	7	6			5.5		12.2	4	3.8
373	d	12X11E30-4	Northern/MTCL1127/Overland	100	35		166	171		30.7	21.3		15	7	5	3	3	6	6			5.0		12.1	4	2.8
374		12X11E37-2	Northern/MTCL1127/Overland	90	30		174	174		29.9	21.7			6	6	3	4	4	5			4.7		11.8	4	3.3
375	d	12X11E60-2	Northern/MTCL1127/Overland	90	40		172	168		31.1	22.0		5	6	6	3	3	7	6			5.2		12.0	4	3.0
376		12X11E84-2	Northern/MTCL1127/Overland	80	50		173	168		29.9	22.0		10	6	6	4	3	3	3			4.2		11.9	4	3.2
377	d	12X13E26-2	MTCL1067/MTCL1125/Northern	100	55		175	175		28.3	22.0			6	6	5	4	3	4			4.7		12.1	3	2.9
378	d	12X13E31-1	MTCL1067/MTCL1125/Northern	85	40		175	174		31.5	25.6			6	6	4	5	3	4			4.7		12.6	4	2.4
379		12X13E52-2	MTCL1067/MTCL1125/Northern	100	45		174	168		33.5	25.2			7	7	4	4	4	5			5.2		12.5	4	3.4
380	d	12X13E62-3	MTCL1067/MTCL1125/Northern	80	55		174	172		31.9	24.8			5	5	5	5	6	5			5.2		13.0	4	2.8
381		12X13E65-2	MTCL1067/MTCL1125/Northern	100	65		175	175		33.5	24.8			6	6	6	5	5	5			5.5		11.7	4	3.6
382		12X13E79-1	MTCL1067/MTCL1125/Northern	85	50		176	176		32.3	24.0			6	6	4	4	6	6			5.3		12.4	4	4.0
383		12X13E83-2	MTCL1067/MTCL1125/Northern	100	50		174	174		33.9	26.8			6	6	4	5	4	5			5.0		12.3	4	3.6
384		12X13E96-4	MTCL1067/MTCL1125/Northern	90	55		174	171		31.9	24.4		5	7	7	5	4	5	5			5.5		12.6	4	3.6
385		12X14E2-2	MTCL1260/MTCL1125/MT1091	100	60		174	172		32.3	25.2			7	6	5	4	5	5			5.3		12.6	4	3.2
386		12X14E16-2	MTCL1260/MTCL1125/MT1091	90	25		173	172		32.7	26.0			6	5	3	4	5	5			4.7		12.6	4	3.2
387		12X14E25-1	MTCL1260/MTCL1125/MT1091	100	40		175	174		31.1	25.6			6	6	4	5	4	5			5.0		12.3	3	3.3
388		12X14E40-1	MTCL1260/MTCL1125/MT1091	90	45		167	168		32.3	26.4			7	7	5	4	5	5			5.5		13.5	5	3.9
389		12X14E51-2	MTCL1260/MTCL1125/MT1091	100	65		173	172		32.3	24.8			6	6	6	5	5	5			5.5		12.2	4	3.5
390		12X14E55-1	MTCL1260/MTCL1125/MT1091	85	35		171	171		31.1	24.8			6	6	3	4	5	5			4.8		12.8	4	4.0
391		12X14E59-4	MTCL1260/MTCL1125/MT1091	100	50		172	172		32.7	23.6			7	8	4	4	6	6			5.8		11.7	4	3.4
392		12X14E67-2	MTCL1260/MTCL1125/MT1091	90	30		174	175		29.5	24.0			6	6	3	4	5	5			4.8		11.8	4	3.4
393		12X14E74-1	MTCL1260/MTCL1125/MT1091	100	50		174	172		30.3	26.8			6	7	4	4	5	5			5.2		13.2	4	3.6
394		12X14E80-3	MTCL1260/MTCL1125/MT1091	95	45		174	172		33.1	26.8			6	6	5	5	5	5			5.3		12.7	4	3.8
395		12X14E99-1	MTCL1260/MTCL1125/MT1091	100	25		172	173		34.6	28.0			6	5	3	4	6	6			5.0		13.3	4	3.1
396		12X14E108-3	MTCL1260/MTCL1125/MT1091	90	50		167	167		33.5	26.8			7	6	4	4	3	4			4.7		13.5	4	3.8

Table 148. 2020 Single Rep Observation 'A' Nursery (SROA): All Location data

Row/ Plot	wPPO	ID	Pedigree	Stand			Heading			Plant Height			Spray injury	Agronomic Score										2019 HR data																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
				BZ	Lutz	CLO	BZ	Lutz	CLO	SROA	Lutz	CLO		SROA	Lutz	CLO	BZ	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA	Lutz	CLO	SROA

Table 148. 2020 Single Rep Observation 'A' Nursery (SROA): All Location data

Row/ Plot	wPPO	ID	Pedigree	Stand		Heading		Plant Height		Spray injury	Agronomic Score								2019 HR data																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
				BZ	Lutz	BZ	Lutz	BZ	Lutz		Post	CLO-Lutz	Big Sandy	Moccasin	Avg	2019 HR data																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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Table 148. 2020 Single Rep Observation 'A' Nursery (SROA): All Location data

Row/ Plot	wPPO	ID	Pedigree	Stand		Heading		Plant Height			Spray injury	Agronomic Score								2019 HR data																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
				BZ	Lutz	BZ	Lutz	SROA	CLO	SROA		CLO	SROA	CLO	Post	CLO-Lutz				Big Sandy				Moccasin		Avg																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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Table 148. 2020 Single Rep Observation 'A' Nursery (SROA): All Location data

Row/ Plot	wPPO h = harvested line d = low SDS and/or high PPO white, possible discard	ID Pedigree	Stand		Heading		Plant Height		Spray injury	Agronomic Score								2019 HR data	
			BZ	Lutz	BZ	Lutz	BZ	Lutz		SROA	CLO	Post	CLO-Lutz	Big Sandy	Moccasin	Avg	Prot-	PPO	SDS
			SROA	CLO	SROA	CLO	SROA	CLO		PLB	JEB	PLB	JEB	PLB	JEB				
573	13X156E122	MT1286//MT0871N10712	90		173		29.1		≥5%	6	5		5	5	5.3	11.2	4	3.4	
574	13X156E123	MT1286//MT0871N10712	100		173		31.1			6	5		5	6	5.5	11.8	1	3.6	
575	13X156E136	MT1286//MT0871N10712	90		173		28.3			6	6		6	6	6.0	11.1	4	3.4	
576	13X156E145	MT1286//MT0871N10712	100		174		31.1			6	7		6	5	6.0	11.2	4	3.4	
577	13X156E157	MT1286//MT0871N10712	85		174		29.1			6	6		5	5	5.5	10.9	4	3.4	
578	13X156E160	MT1286//MT0871N10712	90		174		30.3			6	6		5	5	5.5	9.9	4	3.8	
579	13X156E161	MT1286//MT0871N10712	85		173		28.7			7	6		6	6	6.3	11.0	4	3.6	
580	w2 d 13X160cE3	MT1276//SD07W083-7//05X248cE55	95		174		29.9			5	6		6	5	5.5	10.0	2	2.2	
581	w1 d 13X160cE12	MT1276//SD07W083-7//05X248cE55	90		176		32.7			6	6		5	5	5.5	9.8	1	2.3	
582	w2 d 13X160cE17	MT1276//SD07W083-7//05X248cE55	95		176		29.9			7	5		5	5	5.5	11.6	2	2.3	
583	13X160cE21	MT1276//SD07W083-7//05X248cE55	100		174		31.5			6	6		6	6	6.0	10.5	4	3.5	
584	w1 d 13X160cE52	MT1276//SD07W083-7//05X248cE55	95		174		30.7			6	7		5	5	5.8	10.6	1	2.0	
585	d 13X160cE62	MT1276//SD07W083-7//05X248cE55	100		174		29.1			7	6		6	4	5.8	10.1	4	3.0	
586	w1 d 13X160cE73	MT1276//SD07W083-7//05X248cE55	100		174		31.5			6	7		6	5	6.0	9.8	1	2.2	
587	w1 d 13X160cE77	MT1276//SD07W083-7//05X248cE55	90		174		30.3			5	6		6	5	5.5	9.9	1	2.4	
588	h 13X160cE82	MT1276//SD07W083-7//05X248cE55	100		174		31.9			7	8		6	4	6.3	11.2	1	3.4	
589	w2 d 13X160cE86	MT1276//SD07W083-7//05X248cE55	90		174		30.3			6	6		5	5	5.5	10.4	2	2.4	
590	w1 d 13X160cE90	MT1276//SD07W083-7//05X248cE55	100		173		32.3			6	7		6	6	6.3	10.5	1	3.0	
591	w1 d 13X160cE95	MT1276//SD07W083-7//05X248cE55	95		172		29.9			6	7		5	4	5.5	10.0	1	2.3	
592	13X160cE107	MT1276//SD07W083-7//05X248cE55	100		172		29.5			6	6		4	5	5.3	10.3	4	3.5	
593	d 13X160cE119	MT1276//SD07W083-7//05X248cE55	100		172		31.5			7	6		4	5	5.5	10.8	2	2.9	
594	d 13X160cE121	MT1276//SD07W083-7//05X248cE55	90		175		33.9			5	6		5	5	5.3	-	4	1.8	
595	d 13X160cE131	MT1276//SD07W083-7//05X248cE55	100		175		29.5			6	6		5	5	5.5	10.1	4	1.8	
596	13X160cE139	MT1276//SD07W083-7//05X248cE55	85		175		29.5			6	6		6	6	6.0	11.4	1	3.4	
597	w1 13X160cE142	MT1276//SD07W083-7//05X248cE55	95		175		31.9			5	6		5	5	5.3	10.2	1	3.2	
598	w0 d 13X160cE154	MT1276//SD07W083-7//05X248cE55	95		175		30.7			5	6		6	6	5.8	10.4	0	2.1	
599	d 13X160cE156	MT1276//SD07W083-7//05X248cE55	100		174		29.1			6	5		5	5	5.3	10.4	4	2.2	
600	w1 d 13X160cE161	MT1276//SD07W083-7//05X248cE55	100		176		31.9			6	6		5	4	5.3	10.3	1	2.5	
601	h Yellowstone	check	90		176		34.3			6	5		6	5	5.5				
602	Decade	check	95		173		33.1			6	5		5	5	5.3				
603	d 13X160cE163	MT1276//SD07W083-7//05X248cE55	100		166		30.3			5	4		4	4	4.3	10.1	4	3.0	
604	d 13X163E16	Yellowstone*2/06X90B-19	90		175		31.5			6	5		4	5	5.0	10.4	4	3.0	
605	13X163E38	Yellowstone*2/06X90B-19	90		175		34.6			5	3		5	6	4.8	10.8	4	3.2	
606	13X163E45	Yellowstone*2/06X90B-19	100		176		31.5			6	6		5	5	5.5	10.3	3	3.4	
607	13X163E56	Yellowstone*2/06X90B-19	90		175		30.7			6	6		5	5	5.5	11.0	3	3.8	
608	h 13X163E81	Yellowstone*2/06X90B-19	100		174		29.5			7	7		6	6	6.5	9.9	1	3.6	
609	13X163E109	Yellowstone*2/06X90B-19	95		173		33.1			6	6		5	5	5.5	10.3	4	3.5	
610	h 13X163E110	Yellowstone*2/06X90B-19	100		176		29.9			6	6		6	7	6.3	10.1	1	3.6	
611	13X163E115	Yellowstone*2/06X90B-19	100		174		29.5			6	6		6	6	6.0	11.2	3	3.7	
612	13X165E24	Yellowstone*2/07X5B-57	100		177		35.4			7	5		5	5	5.5	9.7	3	4.2	
613	13X165E43	Yellowstone*2/07X5B-57	100		177		35.8			6	5		5	6	5.5	10.2	3	3.8	
614	13X165E46	Yellowstone*2/07X5B-57	100		177		35.0			6	5		5	5	5.3	10.7	3	4.0	
615	h 13X165E77	Yellowstone*2/07X5B-57	100		175		35.4			6	6		7	7	6.5	11.9	1	4.2	
616	13X165E83	Yellowstone*2/07X5B-57	100		175		37.4			6	5		6	5	5.5	11.4	4	4.5	

Table 148. 2020 Single Rep Observation 'A' Nursery (SROA): All Location data

Row/ Plot	wPPO h = harvested line d = low SDS and/or high PPO white, possible discard	ID	Pedigree	Stand		Heading		Plant Height		Spray injury	Agronomic Score										2019 HR data	
				BZ	Lutz	BZ	Lutz	BZ	Lutz		Post	CLO-Lutz	Big Sandy	Moccasin	Avg							
				SROA	CLO	SROA	CLO	SROA	CLO		PLB	JEB	PLB	JEB	PLB	JEB					Prot-	PPO SDS
																	ein					
617	13X165E92		Yellowstone*2/07X5B-57	100		175		35.0		≥5%	6	5		5	5	5.3	10.2	3	4.0			
618	13X165E93		Yellowstone*2/07X5B-57	85		175		35.0			6	5		6	5	5.5	10.3	4	3.4			
619	13X172E4		MTS1305/MT1240/Redfield	100		168		30.7			6	6		5	5	5.5	10.5	3	4.2			
620	13X172E17		MTS1305/MT1240/Redfield	100		173		33.5			6	7		6	6	6.3	11.4	4	4.5			
621	13X172E31		MTS1305/MT1240/Redfield	100		172		31.9			6	7		5	5	5.8	11.7	4	3.9			
622	13X172E42		MTS1305/MT1240/Redfield	95		173		31.1			5	6		4	5	5.0	12.4	4	3.5			
623	13X172E54	h	MTS1305/MT1240/Redfield	100		170		31.5			7	7		5	6	6.3	13.3	4	4.7			
624	13X172E77		MTS1305/MT1240/Redfield	100		173		32.3			5	5		5	5	5.0	14.6	4	4.8			
625	13X172E108		MTS1305/MT1240/Redfield	100		173		33.1			6	6		5	5	5.5	13.5	4	3.5			
626	13X172E115	h	MTS1305/MT1240/Redfield	100		173		32.3			6	7		7	6	6.5	15.0	4	4.5			
627	13X172E128		MTS1305/MT1240/Redfield	100		170		31.5			5	6		5	5	5.3	13.1	4	3.8			
628	13X172E130		MTS1305/MT1240/Redfield	100		175		31.1			6	6		5	5	5.5	13.0	4	4.3			
629	13X172E152		MTS1305/MT1240/Redfield	100		174		30.7			5	5		6	5	5.3	13.2	4	3.8			
630	13X173E5		Northern/MT1240/Redfield	100		172		29.9			6	6		6	6	6.0	16.1	4	4.2			
631	13X173E10		Northern/MT1240/Redfield	90		176		29.9			6	6		4	4	5.0	16.0	3	3.8			
632	13X173E11		Northern/MT1240/Redfield	90		172		28.0			7	6		5	5	5.8	13.5	2	3.3			
633	13X173E61	h	Northern/MT1240/Redfield	95		173		31.5			7	7		7	6	6.8	17.0	5	3.3			
634	13X173E64		Northern/MT1240/Redfield	100		173		29.5			5	5		5	5	5.0	15.6	4	4.7			
635	13X173E79		Northern/MT1240/Redfield	80		174		29.9			6	6		5	6	5.8	15.7	5	4.8			
636	13X173E82		Northern/MT1240/Redfield	90		175		31.9			6	6		6	5	5.8	14.7	3	3.2			
637	13X173E92		Northern/MT1240/Redfield	80		176		27.6			6	6		5	5	5.5	15.3	3	3.2			
638	13X173E130		Northern/MT1240/Redfield	90		176		30.3			6	7		6	5	6.0	14.8	3	3.2			
639	13X173E139		Northern/MT1240/Redfield	90		176		28.3			6	6		5	4	5.3	16.6	5	4.2			
640	13X174cE2		MT1143/MT1240/Redfield	100		170		28.0			6	6		6	6	6.0	16.5	5	4.0			
641	13X174cE15	h	MT1143/MT1240/Redfield	100		171		31.1			6	7		6	6	6.3	14.5	5	4.4			
642	13X174cE20		MT1143/MT1240/Redfield	75		174		28.3			6	5		4	5	5.0	15.8	3	4.8			
643	13X174cE33		MT1143/MT1240/Redfield	90		173		28.3			6	6		5	5	5.5	12.7	4	4.4			
644	13X174cE56		MT1143/MT1240/Redfield	95		172		31.1			5	6		6	4	5.3	-	4	3.8			
645	13X174cE58		MT1143/MT1240/Redfield	90		174		31.5			6	5		4	6	5.3	13.5	2	3.2			
646	13X174cE74	h	MT1143/MT1240/Redfield	75		174		29.5			7	7		6	6	6.5	14.1	1	4.5			
647	13X174cE92		MT1143/MT1240/Redfield	100		168		29.5			7	6		5	5	5.8	15.4	5	3.9			
648	13X174cE95		MT1143/MT1240/Redfield	100		172		28.3			6	6		6	6	6.0	14.7	4	4.8			
649	13X174cE100		MT1143/MT1240/Redfield	90		171		29.1			6	6		5	5	5.5	12.5	2	3.6			
650	13X174cE114		MT1143/MT1240/Redfield	100		170		29.1			6	7		6	6	6.3	12.5	3	4.6			
651	Yellowstone		check	95		176		34.3			6	5		5	5	5.3						
652	Decade		check	100		173		33.9			6	5		5	5	5.3						
653	13X174cE134		MT1143/MT1240/Redfield	95		171		32.7			6	6		6	5	5.8	12.4	4	4.4			
654	13X174cE140		MT1143/MT1240/Redfield	70		173		33.9			6	6		5	5	5.5	11.1	1	4.4			
655	13X213E28		MT08184/09X146-B77-1	80		176		32.3			5	5		5	5	5.0	12.4	1	3.9			
656	d 13X213E148		MT08184/09X146-B77-1	90		174		33.1			5	6		6	6	5.8	-	3	2.9			
657	d 13X215E95		MT08184/09X146-B155-1	90		175		31.1			5	5		5	6	5.3	9.9	0	2.4			
658	13X215E97		MT08184/09X146-B155-1	90		175		31.5			5	4		5	5	4.8	10.4	1	3.2			
659	w3 13X218E34		IDO1101/Northern	100		171		25.6			6	5		6	5	5.5	10.9	3	3.2			
660	d 13X218E40		IDO1101/Northern	85		175		29.1			5	6		5	6	5.5	9.9	3	2.4			

Table 148. 2020 Single Rep Observation 'A' Nursery (SROA): All Location data

Row/ Plot	wPPO	ID	Pedigree	Stand		Heading		Plant Height		Spray injury	Agronomic Score						2019 HR data				
				BZ	Lutz	SROA	CLO	BZ	Lutz		SROA	CLO	Post	CLO-Lutz				Moccasin	Avg		
														PLB	JEB	PLB	JEB			PLB	JEB
h = harvested line d = low SDS and/or high PPO white, possible discard										≥5%	22-Jul		22-Jul		28-Jul			ein	Prot-	PPO	SDS
661		13X218E57	IDO1101/Northern	100		172		29.5			6	6	4	4	5.0	10.1	3	3.1			
662	d	13X218E84	IDO1101/Northern	100		168		26.8			6	5	5	5	5.3	10.0	1	2.7			
663	d	13X218E93	IDO1101/Northern	100		173		28.3			6	6	4	4	5.0	10.3	3	2.8			
664	w3	13X218E102	IDO1101/Northern	90		176		29.5			6	6	5	6	5.8	10.0	3	3.4			
665		13X218E106	IDO1101/Northern	100		171		26.4			5	5	5	5	5.0	10.8	3	3.3			
666		13X218E113	IDO1101/Northern	100		173		30.3			6	6	6	5	5.8	10.8	3	3.2			
667	d	13X218E130	IDO1101/Northern	100		176		30.3			6	6	6	6	6.0	9.7	0	3.0			
668	w3	13X218E133	IDO1101/Northern	80		176		31.9			5	6	5	5	5.3	10.5	3	4.1			
669	d	13X218E142	IDO1101/Northern	100		172		29.1			6	5	5	6	5.5	10.3	3	2.8			
670	h	13X218E148	IDO1101/Northern	100		172		27.6			6	6	7	6	6.3	11.1	3	3.6			
671		13X218E154	IDO1101/Northern	100		172		28.3			6	5	6	6	5.8	11.5	3	3.6			
672	w2	13X218E183	IDO1101/Northern	85		176		30.7			6	5	4	5	5.0	11.3	2	3.2			
673		13X218E185	IDO1101/Northern	100		174		29.9			6	6	5	5	5.5	-	2	3.7			
674	d	13X218E187	IDO1101/Northern	100		172		29.1			5	5	5	5	5.0	10.9	0	2.4			
675		13X219cE21	IDO1101/MT1108	100		176		29.1			5	6	6	5	5.5	11.8	4	4.6			
676		13X219cE23	IDO1101/MT1108	90		176		28.3			6	6	7	6	6.3	11.6	4	3.7			
677		13X219cE50	IDO1101/MT1108	100		175		29.1			5	5	5	4	4.8	12.0	4	4.5			
678		13X225cE84	MT1335/CMSS99Y05529T	85		166		27.6			5	5	5	5	5.0	13.6	0	3.4			
679		13X225cE99	MT1335/CMSS99Y05529T	85		176		29.5			5	6	6	5	5.5	10.0	3	3.1			
680	d	13X225cE114	MT1335/CMSS99Y05529T	90		166		26.0			5	5	5	5	5.0	13.3	4	2.2			
681		13X225cE120	MT1335/CMSS99Y05529T	90		165		25.6			4	4	6	4	4.5	13.9	3	3.4			
682	d	13X225cE126	MT1335/CMSS99Y05529T	100		175		30.7			6	5	5	5	5.3	13.2	4	2.6			
683		13X225cE137	MT1335/CMSS99Y05529T	100		171		28.3			6	7	5	6	6.0	12.5	1	4.3			
684	d	13X225cE144	MT1335/CMSS99Y05529T	95		171		32.3			5	5	4	5	4.8	12.5	4	2.6			
685		13X185E29	MT1138/Northern	80		176		29.1			6	5	5	5	5.3	12.2	3	4.3			
686		13X185E35	MT1138/Northern	100		177		29.9			6	6	5	6	5.8	11.1	3	3.5			
687	d	13X185E62	MT1138/Northern	100		177		31.1			7	7	6	6	6.5	9.8	3	2.2			
688	d	13X185E68	MT1138/Northern	100		176		29.5			5	6	5	5	5.3	9.7	3	3.0			
689		13X185E71	MT1138/Northern	85		176		31.1			6	6	5	5	5.5	10.4	3	3.1			
690	d	13X185E75	MT1138/Northern	100		174		31.1			6	6	6	6	6.0	11.9	3	2.6			
691		13X185E87	MT1138/Northern	90		176		31.5			6	6	6	5	5.8	10.3	3	3.2			
692	d	13X185E101	MT1138/Northern	90		174		33.9			5	5	6	5	5.3	12.1	1	2.8			
693		13X185E106	MT1138/Northern	100		176		31.1			5	6	5	5	5.3	10.7	0	4.0			
694		13X185E113	MT1138/Northern	100		176		30.3			5	6	5	5	5.3	11.2	1	3.4			
695	d	13X185E116	MT1138/Northern	100		176		31.9			7	6	7	7	6.8	11.7	3	2.8			
696	h	13X185E123	MT1138/Northern	100		176		31.1			7	7	7	6	6.8	10.8	3	3.4			
697		13X185E149	MT1138/Northern	100		175		29.1			5	6	5	5	5.3	10.4	3	3.5			
698	d	13X185E151	MT1138/Northern	100		176		31.1			6	7	6	6	6.3	11.0	3	2.8			
699		13X185E155	MT1138/Northern	90		176		28.7			6	6	5	5	5.5	10.8	3	3.7			
700		13X186cE1	MT1078/05X248cE55	100		173		31.5			6	6	6	6	6.0	11.0	3	3.2			
701	Yellowstone	check	check	85		175		33.9			6	5	6	6	5.8						
702	Decade	check	check	100		170		33.1			6	5	5	5	5.5						
703	h	13X186cE4	MT1078/05X248cE55	100		174		30.7			7	7	6	6	6.5	11.8	4	4.6			
704		13X186cE18	MT1078/05X248cE55	100		168		30.3			5	6	6	7	6.0	13.2	4	4.3			

Table 148. 2020 Single Rep Observation 'A' Nursery (SROA): All Location data

Row/ Plot	wPPO	ID	Pedigree	Stand		Heading		Plant Height		Spray injury	Agronomic Score										2019 HR data																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
				BZ	Lutz	SROA	CLO	BZ	Lutz		SROA	CLO	Post	CLO-Lutz				Big Sandy				Moccasin		Avg	Prot-	PPO	SDS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
														JEB	PLB	JEB	PLB	JEB	PLB	JEB	PLB	JEB	PLB					JEB	PLB	JEB	PLB	JEB	PLB	JEB	PLB	JEB	PLB	JEB	PLB	JEB																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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Table 148. 2020 Single Rep Observation 'A' Nursery (SROA): All Location data

Row/ Plot	wPPO ID	Pedigree	Stand			Heading			Plant Height			Spray injury	Agronomic Score								2019 HR data									
			BZ Lutz CLO			BZ Lutz CLO			BZ Lutz CLO				SROA		Lutz		CLO		Post		CLO-Lutz		Big Sandy		Moccasin		Avg	2019 HR data		
			SROA	CLO		SROA	CLO		SROA	CLO			PLB	JEB	PLB	JEB	PLB	JEB	PLB	JEB	PLB	JEB	PLB	JEB	Prot-	PPO		SDS		
749	d	13X230cE35	100			172			27.6			≥5%	5	6			22-Jul			5	6	5	5	5	5.3	9.9	4	3.0		
750		13X230cE37	100			165			28.3				5	6						6	5	7	6	6	5.8	9.9	4	4.7		
751	Yellowstone	check	80			177			32.3				6	5						5	3	4	4	4.6						
752	Decade	check	100			172			32.7				5	5						6	6	6	6	5.6						
753	13X230cE41	MT1335/TC1012160	100			173			26.8				6	5						5	5	6	5	5.3	9.8	4	3.7			
754	13X230cE80	MT1335/TC1012160	100			170			25.6				5	6						6	6	5	5	5.5	10.2	4	4.2			
755	13X230cE89	MT1335/TC1012160	100			168			26.4				6	5						3	5	7	6	5.3	9.8	4	4.0			
756	13X230cE93	MT1335/TC1012160	100			166			26.8				6	6						5	6	5	5	5.5	11.6	4	4.2			
757	13X230cE99	MT1335/TC1012160	100			165			27.6				6	5						7	5	5	5	5.5	10.4	4	3.6			
758	13X230cE103	MT1335/TC1012160	100			165			28.3				5	5						5	5	6	5	5.2	11.2	4	4.3			
759	13X230cE149	MT1335/TC1012160	95			174			26.4				6	6						6	6	6	6	6.0	10.1	4	3.2			
760	13X230cE150	MT1335/TC1012160	100			173			26.8				6	6						4	5	7	5	5.5	9.9	4	3.6			
761	16X040B13	MT16105/MT1078/Langin	100			168			28.7				5	5						2	4	5	5	4.3	9.8	1	3.4			
762	16X040B26	MT16105/MT1078/Langin	100			173			29.5				5	5						3	4	4	4	4.2	10.1	1	3.6			
763	16X040B49	MT16105/MT1078/Langin	100			167			26.4				5	5						4	5	5	5	4.8	9.7	3	3.7			
764	16X040B71	MT16105/MT1078/Langin	100			166			29.5				5	5						4	5	5	4	4.7	9.7	4	3.9			
765	16X040B99	MT16105/MT1078/Langin	90			173			31.1				4	5						3	4	5	5	4.3	11.0	3	4.1			
766	16X040B103	MT16105/MT1078/Langin	100			168			29.1				6	6						4	5	6	5	5.3	10.3	4	3.8			
767	d 16X158B6	MT1665/MT1541/Langin	100			171			26.8				6	6						4	5	5	5	5.2	9.8	0	3.0			
768	16X158B9	MT1665/MT1541/Langin	100			175			28.0				5	6						5	6	5	5	5.3	9.8	4	3.8			
769	16X158B11	MT1665/MT1541/Langin	95			171			27.2				5	5						4	5	5	4	4.7	10.7	3	3.9			
770	16X158B19	MT1665/MT1541/Langin	100			173			29.1				5	6						5	6	6	6	5.7	10.9	1	3.9			
771	16X158B25	MT1665/MT1541/Langin	90			166			27.2				4	5						4	5	3	4	4.2	10.1	4	3.5			
772	16X158B32	MT1665/MT1541/Langin	100			175			29.1				5	6						5	6	5	5	5.3	9.8	4	4.0			
773	16X158B39	MT1665/MT1541/Langin	90			173			26.4				5	4						4	5	4	4	4.3	10.5	1	4.3			
774	16X158B47	MT1665/MT1541/Langin	100			174			26.8				6	5						4	5	5	5	5.0	10.4	3	4.0			
775	16X158B50	MT1665/MT1541/Langin	95			172			27.6				5	5						3	5	5	5	4.7	9.9	4	3.7			
776	16X158B53	MT1665/MT1541/Langin	100			167			26.0				6	5						4	4	6	6	5.2	9.8	4	3.7			
777	16X158B56	MT1665/MT1541/Langin	95			171			27.2				5	6						3	4	5	5	4.7	10.9	1	4.4			
778	16X158B74	MT1665/MT1541/Langin	100			168			28.7				5	5						5	5	5	5	5.0	10.2	4	3.3			
779	16X158B77	MT1665/MT1541/Langin	100			172			30.7				6	6						3	4	5	5	4.8	10.5	3	4.0			
780	16X158B80	MT1665/MT1541/Langin	100			166			29.1				5	4						3	4	6	6	4.7	10.4	4	3.4			
781	16X158B87	MT1665/MT1541/Langin	100			171			29.9				5	5						2	4	5	5	4.3	11.2	4	4.3			
782	16X158B99	MT1665/MT1541/Langin	95			171			29.5				5	5						2	4	5	5	4.3	10.9	4	4.6			
783	16X158B103	MT1665/MT1541/Langin	100			176			31.1				6	6						2	3	4	5	4.3	10.7	2	3.7			
784	16X158B109	MT1665/MT1541/Langin	100			176			30.7				6	5						3	4	5	5	4.7	10.4	3	3.7			
785	16X158B114	MT1665/MT1541/Langin	100			174			31.5				6	6						2	4	5	5	4.7	10.7	4	4.0			
786	16X158B120	MT1665/MT1541/Langin	100			175			31.5				6	6						3	5	7	6	5.5	10.8	3	4.1			
787	16X158B122	MT1665/MT1541/Langin	100			172			30.7				6	5						3	5	5	5	4.8	10.9	4	3.3			
788	16X205cB49	MT1599/09X257cD9-2	100			174			31.9				6	6						4	4	6	5	5.2	10.2	0	3.4			
789	MT1265	check	100			176			35.0				6	5						2	4	6	5	4.7						
790	16X285B15	MT1265/Joe	90			170			31.9				5	5						3	4	6	6	4.8	11.3	3	3.7			
791	w4 16X285B16	MT1265/Joe	100			170			32.3				6	5						3	5	6	6	5.2	10.5	4	3.6			
792	16X285B24	MT1265/Joe	100			166			32.7				6	6						4	5	5	4	5.0	11.4	4	4.2			

Table 148. 2020 Single Rep Observation 'A' Nursery (SROA): All Location data

Row/ Plot	wPPO h = harvested line d = low SDS and/or high PPO white, possible discard	ID	Pedigree	Stand		Heading		Plant Height		Spray injury	Agronomic Score										2019 HR data	
				BZ	Lutz	BZ	Lutz	BZ	Lutz		Post	CLO-Lutz	Big Sandy	Moccasin	Avg							
				SROA	CLO	SROA	CLO	SROA	CLO		PLB	JEB	PLB	JEB	PLB	JEB					Prot-	PPO SDS
793	16X285B33		MT1265/Joe	100		176		34.3		≥5%	7	6	4	6	6	6	5.8	11.2	0	5.0		
794	16X285B56		MT1265/Joe	100		168		34.3			6	5	3	4	5	5	4.7	11.1	4	4.2		
795	12X86cE4-3		MT1105/MT1091/Accipiter	100		175		33.9			5	5	3	4	5	5	4.5	11.4	4	3.9		
796	12X86cE64-3		MT1105/MT1091/Accipiter	100		174		33.1			6	5	3	4	6	6	5.0	12.0	4	4.2		
797	12X86cE77-4		MT1105/MT1091/Accipiter	100		174		33.1			6	5	4	5	5	5	5.0	12.7	4	4.2		
798	12X86cE106-4		MT1105/MT1091/Accipiter	90		174		31.1			6	6	3	4	5	6	5.0	12.9	4	5.2		
799	12X88cE1-3		MT0871/MT1088/Decade	100		174		29.5			7	7	3	5	6	5	5.5	12.5	2	4.2		
800	12X88cE3-2		MT0871/MT1088/Decade	85		166		28.3			6	6	6	5	6	6	5.8	13.2	4	4.7		
801	Yellowstone		check	80		176		35.0			6	5	4	6	6	6	5.4					
802	Decade		check	100		173		35.0			5	5	5	5	5	5	5.0					
803	12X88cE29-2		MT0871/MT1088/Decade	100		170		32.7			6	6	3	4	5	5	4.8	12.4	4	4.4		
804	12X88cE52-3		MT0871/MT1088/Decade	100		175		29.1			7	6	4	6	5	5	5.5	11.6	2	3.3		
805	12X88cE63-2		MT0871/MT1088/Decade	100		173		29.5			7	6	3	5	7	7	5.8	11.6	3	4.0		
806	12X88cE70-3		MT0871/MT1088/Decade	100		176		30.3			6	6	3	4	6	6	5.2	11.6	4	3.2		
807	12X88cE77-2		MT0871/MT1088/Decade	100		173		30.3			6	7	3	4	4	5	4.8	11.7	2	4.5		
808	12X88cE85-3		MT0871/MT1088/Decade	100		168		29.1			7	6	4	5	6	6	5.7	12.4	5	4.0		
809	12X88cE120-4		MT0871/MT1088/Decade	100		165		28.7			5	5	5	5	5	5	5.0	12.3	5	4.2		
810	12X89E43-1		MT1088*2/Decade	100		173		33.1			6	7	4	5	5	6	5.5	12.1	5	4.2		
811	12X89E79-4		MT1088*2/Decade	95		176		33.1			5	6	2	4	5	5	4.5	12.1	4	3.8		
812	12X89E96-3		MT1088*2/Decade	100		176		31.5			5	6	5	5	4	5	5.0	11.9	4	4.0		
813	12X89E101-1		MT1088*2/Decade	100		176		31.9			5	6	2	4	5	5	4.5	11.9	4	4.4		
814	12X98E3-1		Northern/MT10114/MT0954	100		175		32.3			6	7	4	4	6	7	5.7	11.1	2	3.4		
815	12X98E9-4		Northern/MT10114/MT0954	100		176		32.3			5	6	2	4	6	6	4.8	12.5	1	3.7		
816	d 12X98E19-2		Northern/MT10114/MT0954	100		176		33.1			6	6	4	5	7	6	5.7	12.0	1	3.0		
817	12X98E21-3		Northern/MT10114/MT0954	100		176		31.1			6	6	5	5	5	5	5.3	13.1	2	3.2		
818	12X98E28-4		Northern/MT10114/MT0954	100		176		32.7			6	5	2	4	6	6	4.8	10.9	1	4.0		
819	12X98E30-3		Northern/MT10114/MT0954	100		176		30.7			6	6	4	4	6	5	5.2	12.1	1	3.6		
820	12X98E31-2		Northern/MT10114/MT0954	100		175		31.5			7	6	4	5	6	5	5.5	11.4	1	4.4		
821	12X98E64-3		Northern/MT10114/MT0954	100		176		31.1			7	6	5	5	4	4	5.2	12.1	1	4.4		
822	12X98E69-4		Northern/MT10114/MT0954	100		176		31.1			6	7	6	5	5	5	5.7	11.4	1	3.6		
823	12X98E121-2		Northern/MT10114/MT0954	100		176		31.5			6	6	4	5	6	5	5.3	11.3	1	3.7		
824	12X98E126-3		Northern/MT10114/MT0954	100		176		30.7			7	7	6	5	5	5	5.8	11.8	1	4.3		
825	12X99cE1-3		MT1137/MT1078/MT1149	95		176		31.9			6	6	3	5	5	5	5.0	12.3	4	3.8		
826	12X99cE5-2		MT1137/MT1078/MT1149	100		176		32.7			6	6	5	6	7	6	6.0	12.3	4	3.8		
827	12X99cE27-4		MT1137/MT1078/MT1149	100		175		32.7			6	6	4	5	6	5	5.3	12.3	4	3.4		
828	12X99cE28-3		MT1137/MT1078/MT1149	100		174		32.3			6	5	5	6	6	5	5.5	12.1	4	3.3		
829	12X99cE34-4		MT1137/MT1078/MT1149	100		176		31.5			6	5	5	5	6	5	5.3	11.5	4	3.1		
830	12X99cE68-3		MT1137/MT1078/MT1149	100		175		32.3			7	6	5	5	6	6	5.8	11.4	4	3.6		
831	12X99cE75-2		MT1137/MT1078/MT1149	100		176		31.9			6	6	6	5	4	4	5.2	11.6	4	3.1		
832	12X99cE93-1		MT1137/MT1078/MT1149	100		175		31.5			6	5	5	5	6	5	5.3	11.7	4	4.5		
833	12X99cE105-4		MT1137/MT1078/MT1149	100		176		30.7			6	7	6	6	5	5	5.8	11.6	4	3.4		
834	12X99cE112-4		MT1137/MT1078/MT1149	100		175		31.1			6	6	5	6	5	5	5.5	11.6	4	3.6		
835	12X99cE120-3		MT1137/MT1078/MT1149	100		173		30.7			7	7	4	5	6	6	5.8	11.7	4	3.3		
836	12X99cE126-3		MT1137/MT1078/MT1149	100		177		31.1			5	5	5	5	5	5	5.0	11.4	4	3.7		

Table 148. 2020 Single Rep Observation 'A' Nursery (SROA): All Location data

Row/ Plot	wPPO	ID	Pedigree	Stand		Heading		Plant Height		Spray injury	Agronomic Score										2019 HR data																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
				BZ	Lutz	SROA	CLO	BZ	Lutz		SROA	CLO	BZ	Lutz	SROA	CLO	Post				Moccasin				Avg																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
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Table 148. 2020 Single Rep Observation 'A' Nursery (SROA): All Location data

Row/ Plot	wPPO h = harvested line d = low SDS and/or high PPO white, possible discard	ID	Pedigree	Stand		Heading		Plant Height		Spray injury	Agronomic Score										2019 HR data	
				BZ	Lutz	BZ	Lutz	BZ	Lutz		Post	CLO-Lutz	Big Sandy	Moccasin	Avg							
				SROA	CLO	SROA	CLO	SROA	CLO		PLB	JEB	PLB	JEB	PLB	JEB					Prot-	PPD SDS
																	ein					
881	w1	12X109cE13-4	WB3768*2/(10K1726w, Yellowstone white)	100		177		31.1			6	5	6	6	5.8	12.0	1	3.8				
882	w2	12X109cE22-3	WB3768*2/(10K1726w, Yellowstone white)	100		176		29.1			7	6	5	5	5.8	12.4	2	3.4				
883	w2	12X109cE24-3	WB3768*2/(10K1726w, Yellowstone white)	90		176		29.9			6	5	6	5	5.5	12.1	2	3.7				
884	w1	12X109cE34-4	WB3768*2/(10K1726w, Yellowstone white)	100		176		28.7			6	6	5	5	5.5	11.8	1	4.0				
885	h	12X109cE59-4	WB3768*2/(10K1726w, Yellowstone white)	100		176		30.3			8	5	7	7	6.8	12.2	1	3.9				
886	w1	12X109cE62-3	WB3768*2/(10K1726w, Yellowstone white)	100		176		33.5			7	5	4	5	5.3	11.7	1	4.2				
887		12X110cE59-2	MT1088/(10K1676w, Yellowstone white)	100		174		32.7			6	5	4	4	4.8	12.4	4	4.7				
888	w1	12X113E1-3	Northern/(10K1676w, Yellowstone white)	100		176		32.7			6	6	5	5	5.5	10.8	1	3.4				
889	h	12X113E6-2	Northern/(10K1676w, Yellowstone white)	100		176		29.9			6	7	6	6	6.3	11.4	1	3.2				
890		12X113E40-4	Northern/(10K1676w, Yellowstone white)	100		176		30.3			6	6	6	5	5.8	12.2	1	4.0				
891	h	12X113E55-4	Northern/(10K1676w, Yellowstone white)	100		175		31.1			7	6	6	6	6.3	11.5	1	3.4				
892	h	12X113E58-2	Northern/(10K1676w, Yellowstone white)	100		174		30.7			6	7	6	6	6.3	11.6	1	3.5				
893	w2	12X113E70-1	Northern/(10K1676w, Yellowstone white)	100		177		32.3			6	6	5	5	5.5	11.6	2	3.3				
894	h	12X113E79-3	Northern/(10K1676w, Yellowstone white)	100		176		31.5			7	8	6	6	6.8	11.3	1	3.1				
895	h	12X113E107-2	Northern/(10K1676w, Yellowstone white)	100		175		30.7			6	6	7	7	6.5	11.4	1	3.5				
896	w1	12X113E117-3	Northern/(10K1676w, Yellowstone white)	100		177		32.3			6	7	5	5	5.8	11.9	1	3.3				
897		12X113E124-3	Northern/(10K1676w, Yellowstone white)	100		176		33.1			6	7	5	4	5.5	12.5	1	4.3				
898	w1	12X113E132-2	Northern/(10K1676w, Yellowstone white)	100		173		31.5			7	6	6	5	6.0	11.0	1	4.1				
899	w1	12X113E137-2	Northern/(10K1676w, Yellowstone white)	100		176		30.7			6	6	6	5	5.8	11.3	1	3.4				
900		12X114E7-2	MT1149/(10K1676w, Yellowstone white)	100		173		33.5			6	5	7	6	6.0	12.0	4	4.2				
901	Yellowstone	check		90		175		33.9			6	5	5	5	5.3							
902	Decade	check		100		168		35.4			5	5	6	5	5.3							
903	12X114E35-4	MT1149/(10K1676w, Yellowstone white)		100		172		34.3			6	6	6	6	6.0	12.3	3	4.4				
904	12X114E68-2	MT1149/(10K1676w, Yellowstone white)		100		173		33.1			6	6	6	5	5.8	12.2	3	3.8				
905	h	12X114E95-3	MT1149/(10K1676w, Yellowstone white)	100		173		35.0			7	7	7	7	7.0	11.8	4	3.8				
906	08X14cE19-2	YLL/Cap19Vida		100		172		31.1			6	6	5	4	5.3	12.8	4	3.9				
907	08X14cE22-4	YLL/Cap19Vida		100		171		31.1			6	6	5	5	5.5	13.1	4	3.8				
908	08X14cE36-3	YLL/Cap19Vida		100		173		31.5			6	6	6	4	5.5	12.2	4	4.0				
909	08X14cE50-1	YLL/Cap19Vida		100		172		31.5			7	5	7	5	6.0	12.6	4	3.4				
910	08X14cE59-2	YLL/Cap19Vida		100		173		31.1			7	6	6	5	6.0	13.0	4	3.8				
911	08X14cE62-2	YLL/Cap19Vida		100		172		31.9			6	7	6	5	6.0	12.2	4	3.5				
912	08X14cE74-3	YLL/Cap19Vida		100		173		32.7			6	5	6	5	5.5	12.1	4	4.1				
913	h	08X14cE81-3	YLL/Cap19Vida	100		173		32.3			8	6	6	5	6.3	12.0	4	3.5				
914	h	08X14cE110-4	YLL/Cap19Vida	100		173		32.3			7	6	6	6	6.3	11.8	4	4.0				
915	12X119E4-2	Colter*2/MT1147		100		173		35.0			6	5	6	6	5.8	13.0	4	4.3				
916	12X119E45-1	Colter*2/MT1147		100		171		34.3			6	6	6	5	5.8	12.7	4	4.0				
917	12X119E60-2	Colter*2/MT1147		100		173		34.6			6	7	5	5	5.8	12.9	4	3.7				
918	12X120E16-3	MT10113/MT0871/MT1151		100		174		31.9			6	6	6	5	5.8	13.7	2	4.1				
919	12X120E28-2	MT10113/MT0871/MT1151		100		171		30.7			6	6	5	4	5.3	13.9	4	4.3				
920	h	12X120E34-1	MT10113/MT0871/MT1151	100		166		32.3			7	7	6	5	6.3	13.8	4	5.0				
921	h	12X120E36-4	MT10113/MT0871/MT1151	100		165		33.5			8	7	6	6	6.8	13.0	4	5.5				
922	12X120E41-4	MT10113/MT0871/MT1151		100		172		30.7			6	6	6	5	5.8	14.0	2	4.5				
923	12X120E53-1	MT10113/MT0871/MT1151		100		173		31.5			6	7	5	5	5.8	13.6	2	4.6				
924	12X120E58-2	MT10113/MT0871/MT1151		100		173		30.7			6	6	6	5	5.8	12.5	2	3.9				

Table 148. 2020 Single Rep Observation 'A' Nursery (SROA): All Location data

Row/ Plot	wPPO	ID	Pedigree	Stand		Heading		Plant Height		Spray injury	Agronomic Score								2019 HR data																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
				BZ	Lutz	SROA	CLO	BZ	Lutz		SROA	CLO	Post	CLO-Lutz				Big Sandy				Moccasin	Avg	Prot-	PPO	SDS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
														JEB	PLB	JEB	PLB	JEB	PLB	JEB	PLB						JEB	PLB	JEB	PLB	JEB	PLB	JEB	PLB	JEB	PLB	JEB	PLB	JEB																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
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Table 148. 2020 Single Rep Observation 'A' Nursery (SROA): All Location data

Row/ Plot	wPPO h = harvested line d = low SDS and/or high PPO white, possible discard	ID	Pedigree	Stand		Heading		Plant Height		Spray injury	Agronomic Score								2019 HR data			
				BZ SROA	Lutz CLO	BZ SROA	Lutz CLO	BZ SROA	Lutz CLO		Post PLB	JEB	CLO-Lutz PLB	Big Sandy JEB	Moccasin PLB	JEB	Avg	2019 HR data				
																		Prot-	PP0 SDS			
969	12X131E115-1		MT1240//HV9W04-1594R/Accipiter	100		172		34.3		≥5%	5	5						5.0	ein	12.5	4	4.1
970	12X131E124-4		MT1240//HV9W04-1594R/Accipiter	100		172		35.4			6	5						5.5		12.4	4	4.2
971	12X132E3-3	w3	MT0871//HV9W04-1594R/MT0866	100		174		29.9			6	6						5.3		12.8	3	3.8
972	12X132E5-4	h	MT0871//HV9W04-1594R/MT0866	100		175		32.7			6	7						6.5		11.3	2	3.6
973	12X132E13-3		MT0871//HV9W04-1594R/MT0866	100		171		26.4			5	5						5.3		12.5	1	4.7
974	12X132E14-2	w1	MT0871//HV9W04-1594R/MT0866	95		174		27.2			5	6						5.3		12.5	1	4.6
975	12X132E22-4	w1	MT0871//HV9W04-1594R/MT0866	100		174		26.8			5	5						5.3		12.6	1	4.4
976	12X132E50-1	w1	MT0871//HV9W04-1594R/MT0866	100		173		29.1			6	6						5.5		12.3	1	4.3
977	12X132E70-1		MT0871//HV9W04-1594R/MT0866	100		171		27.2			5	6						5.3		11.7	1	4.7
978	12X132E75-4	w1	MT0871//HV9W04-1594R/MT0866	100		174		29.1			6	6						5.5		11.9	1	4.2
979	12X132E90-4	h	MT0871//HV9W04-1594R/MT0866	100		174		31.5			7	7						6.5		12.2	1	4.6
980	12X132E96-4		MT0871//HV9W04-1594R/MT0866	100		174		29.5			6	6						5.5		11.7	3	4.1
981	12X132E110-1	w1	MT0871//HV9W04-1594R/MT0866	100		173		26.4			5	7						5.8		11.5	1	5.2
982	12X132E119-2	w1	MT0871//HV9W04-1594R/MT0866	100		173		26.8			5	6						5.3		11.3	1	4.4
983	12X137cE28-3	w4 d	MT0871*2/(SD06156-1, Redfield sib)	100		170		26.4			6	6						5.8		14.8	4	2.8
984	12X137cE38-2	f	MT0871*2/(SD06156-1, Redfield sib)	100		176		43.3			7	6						6.0		14.1	4	3.6
985	12X137cE59-3	f	MT0871*2/(SD06156-1, Redfield sib)	100		176		42.9			7	7						6.8		14.7	4	4.5
986	12X139cE2-3	h	Northern*2/SD08198	100		173		32.7			8	6						6.3		11.2	5	4.2
987	12X139cE33-3	d	Northern*2/SD08198	100		176		29.9			6	7						5.8		11.4	1	2.6
988	12X139cE58-3		Northern*2/SD08198	100		176		31.5			6	6						5.8		12.2	1	4.4
989	12X139cE93-1	h	Northern*2/SD08198	100		176		30.7			7	6						6.5		11.4	1	3.4
990	12X139cE116-3		Northern*2/SD08198	100		176		31.1			6	6						5.5		11.9	4	4.6
991	12X140E43-2		MT10113/SD08198/MT1078	100		173		29.5			6	5						5.3		11.4	4	3.8
992	12X140E118-3		MT10113/SD08198/MT1078	95		173		28.7			6	6						6.0		11.8	4	3.8
993	12X144E7-1	h	MT1235//KS09HW140/MT10122	100		176		29.9			7	7						6.5		11.4	2	3.1
994	12X144E16-3		MT1235//KS09HW140/MT10122	95		173		29.1			6	6						5.8		13.0	5	3.4
995	12X144E20-3	w2 d	MT1235//KS09HW140/MT10122	90		176		30.3			6	7						6.3		11.5	2	2.3
996	12X144E24-1	d	MT1235//KS09HW140/MT10122	100		173		30.7			6	6						5.8		12.9	4	2.8
997	12X144E47-2	w2 d	MT1235//KS09HW140/MT10122	100		176		31.1			6	6						6.3		11.4	2	3.0
998	12X144E50-2	w2 d	MT1235//KS09HW140/MT10122	100		175		30.7			6	6						5.8		11.5	2	2.8
999	12X144E113-4	w2 d	MT1235//KS09HW140/MT10122	100		176		33.9			6	7						6.3		12.0	2	3.0
1000	12X150E22-2		Northern//MT1088/SY Wolf	100		175		34.6			6	6						5.5		11.5	0	3.4
1001	Yellowstone		check	95		174		34.6			6	5						5.5				
1002	Decade		check	100		168		34.6			5	5						5.0				
1003	12X150E60-3		Northern//MT1088/SY Wolf	100		174		35.4			6	5						5.5		11.9	1	3.5
1004	12X150E81-1		Northern//MT1088/SY Wolf	100		174		35.8			7	5						6.0		12.2	4	3.6
1005	12X150E101-2		Northern//MT1088/SY Wolf	100		173		29.5			6	6						6.0		12.8	4	3.2
1006	12X150E127-4		Northern//MT1088/SY Wolf	100		174		34.3			6	5						5.5		12.0	2	3.2
1007	12X151E5-4		MT1088*2/SY Wolf	100		174		32.3			6	6						6.0		12.2	5	3.6
1008	12X151E11-3		MT1088*2/SY Wolf	100		176		33.9			6	5						5.5		12.1	4	3.6
1009	12X151E14-3		MT1088*2/SY Wolf	100		174		31.5			5	6						5.5		12.1	5	3.4
1010	12X151E36-4		MT1088*2/SY Wolf	100		175		32.7			5	5						5.0		12.7	4	3.8
1011	12X151E47-3		MT1088*2/SY Wolf	100		175		31.9			6	6						6.0		12.6	5	4.0
1012	12X151E50-4		MT1088*2/SY Wolf	100		176		33.5			6	5						5.5		13.3	4	4.3

Table 148. 2020 Single Rep Observation 'A' Nursery (SROA): All Location data

Row/ Plot	wPPO h = harvested line d = low SDS and/or high PPO white, possible discard	ID	Pedigree	Stand		Heading		Plant Height		Spray injury	Agronomic Score										2019 HR data	
				BZ	Lutz	BZ	Lutz	BZ	Lutz		Post	CLO-Lutz	Big Sandy	Moccasin	Avg					Prot-	PPO	SDS
				SROA	CLO	SROA	CLO	SROA	CLO		PLB	JEB	PLB	JEB	PLB	JEB	PLB	JEB	PLB			
1013	12X151E57-4	MT1088*2/SY Wolf	100	176	32.7					≥5%	5	6								ein		
1014	12X151E58-2	MT1088*2/SY Wolf	100	173	32.3						5	6								11.6	4	4.4
1015	12X151E64-4	MT1088*2/SY Wolf	100	176	32.7						6	7								13.6	4	4.2
1016	12X151E75-3	MT1088*2/SY Wolf	100	175	32.7						6	6								12.1	5	3.4
1017	12X151E124-3	MT1088*2/SY Wolf	100	176	31.9						5	5								12.5	4	4.6
1018	12X151E130-1	MT1088*2/SY Wolf	100	175	32.7						6	6								11.6	4	4.7
1019	12X169E6-4	WB3768/MTW1251	100	176	32.3						6	6								11.3	2	4.0
1020	12X169E9-2	WB3768/MTW1251	100	174	30.7						6	7								11.8	2	3.8
1021	12X169E26-1	WB3768/MTW1251	100	176	28.7						7	7								11.9	2	4.0
1022	12X169E27-3	WB3768/MTW1251	100	174	31.5						7	6								11.7	2	3.9
1023	12X169E49-2	WB3768/MTW1251	100	174	28.7						6	6								11.8	2	3.2
1024	12X169E80-2	WB3768/MTW1251	100	174	32.7						5	6								11.8	4	4.0
1025	12X169E100-3	WB3768/MTW1251	100	175	28.3						6	5								11.7	2	3.4
1026	12X176cE8-2	Colter/MT1105	100	174	31.1						6	6								11.3	0	4.4
1027	12X176cE45-1	Colter/MT1105	100	173	33.9						6	6								12.2	4	4.4
1028	12X183E1-3	MT1088/MT1156	100	174	31.5						7	7								11.5	4	3.6
1029	12X183E11-2	MT1088/MT1156	100	173	34.3						6	7								12.8	4	3.2
1030	12X183E23-1	MT1088/MT1156	100	174	32.7						6	6								12.3	4	4.8
1031	12X183E36-3	MT1088/MT1156	100	176	33.9						7	6								10.7	4	4.5
1032	12X183E47-3	MT1088/MT1156	100	174	33.5						6	6								11.7	4	3.3
1033	12X183E70-4	MT1088/MT1156	100	174	34.3						7	6								10.6	4	4.8
1034	12X183E80-2	MT1088/MT1156	100	174	32.7						6	6								12.2	4	3.8
1035	12X183E92-4	MT1088/MT1156	100	176	33.9						7	7								11.1	4	3.9
1036	12X183E95-4	MT1088/MT1156	100	176	33.1						6	6								12.0	4	3.7
1037	12X183E118-2	MT1088/MT1156	100	176	33.1						7	6								11.8	4	4.0
1038	12X183E131-1	MT1088/MT1156	95	176	33.5						7	7								12.4	4	4.7
1039	17X4-DH-44	MT1265/MTV1681/Joel	95	174	39.4						5	5								12.2	2	4.2
1040	17X4-DH-145	MT1265/MTV1681/Joel	100	176	36.6						6	5								12.3	2	3.2
1041	17X6-DH-52	MT1265*2/Joel	100	174	37.0						5	5								11.6	1	4.7
1042	17X6-DH-82	MT1265*2/Joel	100	174	35.4						5	6								12.2	4	3.5
1043	17X224	MT1695/KS081067-M-15	100	165	35.0																	
1044	17X225	CO11D1236/MT1776	100	165	31.1																	
1045	17X226	MT1638/CO11D1397	100	165	33.9																	
1046	17X227	MTS1703/CO12D1929	100	166	34.3																	
1047	17X228	MT1471/CO12M0649	100	170	33.1																	
1048	17X229	Loma/CO12M0649	90	168	35.4																	
1049	17X230	MT1542/TX14M7520	100	170	33.5																	
1050	17X231	FourOxix/SD10109-2-4	95	170	33.9																	
1051	Yellowstone	check	90	175	35.4																	
1052	Decade	check	100	172	35.0																	
1053	17X232	MT1695/SD12008-2	100	166	35.4																	
1054	17X233	MT1760/SD13117-1	100	170	33.1																	
1055	17X234	TX10V7258/MT16102	100	167	33.5																	
1056	17X235	MT1265//Yellowstone/1074-76-17	90	175	35.4																	

Table 148. 2020 Single Rep Observation 'A' Nursery (SROA): All Location data

Row/ Plot	wPPO h = harvested line d = low SDS and/or high PPO white, possible discard	ID	Pedigree	Stand		Heading		Plant Height		Spray injury	Agronomic Score						2019 HR data					
				BZ	Lutz	BZ	Lutz	BZ	Lutz		SROA	CLO	SROA	CLO	Post PLB	JEB	PLB	JEB	Moccasin JEB	Avg	2019 HR data	
																					Prot-	PPO
1057	17X236c		MT1138/MT1757	90		174		33.5		≥5%		22-Jul		28-Jul					ein			
1058	17X239		MTV1681/MT1348	95		171		28.7														
1059	17X240		MT1444/MT1521	90		175		31.5														
1060	17X241c		MT1670/MTW1491	90		176		33.5														
1061	17X238c		MT1642/MT1138	85		176		35.0														
1062	17X245		MT1542/MT1781	100		173		32.7														
1063	17X246		MT1641/MT1748	85		176		41.7														
1064	17X247		MT1641/MTF1631	95		173		32.3														
1065	17X242c		MTW1491/MT17104	100		171		36.2														
1066	18JC1		MTCL1502/MTCL1329/Patwin515	100		167		31.1														
1067	18JC2		YLL/LOMA/Decade/Patwin515	95		172		32.7														
1068	18JC3		Loma/YLL*3/CONAN	90		176		31.1														
1069	18JC4		WH/YLL*3/CONAN	100		173		34.6														
1070	16X226A1		Rawhide/MT1665	100		168		33.5														
1071	16X226A2		Rawhide/MT1665	80		171		31.5														
1072	16X226A3		Rawhide/MT1665	95		167		32.7														
1073	16X227A2		Rawhide/Bobcat	100		165		31.9														
1074	16X227A3		Rawhide/Bobcat	100		165		33.5														
1075	19XJC221		Northern*3/3/Warhorse//Yellowstone*4/C	90		175		33.1														
1076	19XJC222		Loma*4//Yellowstone*4/Conan	70		176		30.3														
1077	19XJC223		FourOsix*2/3/Loma*2//Yellowstone*4/C	60		173		33.1														
1078	19XJC224		Yellowstone*3/3/Loma//Decade/Patwin5	100		174		34.3														
1079	19XJC225		Loma*4//Decade/Patwin515	75		175		29.5														
1080	19XJC226		Decade*5/Patwin515	40		168		31.5														
1081	19XJC227		MT1443*3/3/MT1502/MTCL1329/Patwin	90		170		32.7														
1082	19XJC228		MT1794*2//Decade*3/Patwin515	85		166		32.7														
1083	19XJC230		Yellowstone*5//UC1110/ABG282-290	65		175		34.6														
1084	19XJC231		Decade*4/3/Judee//UC1110/ABG282-29	60		170		33.9														
1085	19XJC232		Judee*5//UC1110/ABG282-290	20		172		30.7														
1086	19XJC233		Warhorse*4/3/Judee//UC1110/ABG282-2	100		174		32.7														
1087	19XJC234		Northern*4/3/Judee//UC1110/ABG282-2	25		175		30.7														
1088	19XJC235		FourOsix*2/4/Northern*2/3/Judee//UC11	5		175		27.6														
1089	19XJC236		Loma *4/MN-11394-6	85		176		30.3														
1090	19XJC238		Warhorse*4/3/Patwin515 //Conan/Warh	95		173		32.7														
1091	19XJC274		Decade*4/Patwin515	100		171		32.7														
1092	19XJC275		Judee*4//UC1110/ABG282-290	90		166		32.3														
1093	19XJC276		FourOsix/3/Loma*2//Yellowstone*4/Cona	80		174		32.7														
1094	19XJC277		FourOsix/3/Warhorse*2//Yellowstone*4/C	85		171		33.1														
1095	19XJC278		FourOsix/4/Northern*2/3/Judee//UC1110	100		165		31.1														
1096	19XJC279		MT1794//Decade*3/Patwin515	70		171		31.1														
1097	19XJC280		Loma*3//Decade/Patwin515	80		176		30.3														
1098	19XJC281		Loma*3//Yellowstone*4/Conan	90		175		31.5														
1099	19XJC282		Loma *4/MN-11394-6	90		175		30.3														
1100	19XJC283		Northern*3/3/Warhorse//Yellowstone*4/C	95		173		32.7														

Table 148. 2020 Single Rep Observation 'A' Nursery (SROA): All Location data

Row/ Plot	wPPO	ID	Pedigree	Stand			Heading			Plant Height			Spray injury	Agronomic Score										2019 HR data																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
				BZ	Lutz	CLO	BZ	Lutz	CLO	SROA	CLO	SROA		CLO	BZ	Lutz	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA	CLO	SROA

Table 149. 2020 Northern Regional Performance Nursery: Summary of locations

Entry #	Cultivar/ Line	Class	Pedigree	Yield bu/ac	Test weight lb/bu	Winter survival %	Heading date Julian	Plant height in	Protein %
+ = new for 2020									
locations				3	3	1	3	3	3
29	+ MT1745	HRW	Decade*2//NI06732	73.9	61.2	88	168.5	27.2	12.1
12	+ 19CP010078	HRW	SY MONUMENT/JAGALENE//OVERLAND	68.7	60.8	82	165.4	26.0	12.0
18	+ LCH18-7115	HRW		68.6	62.0	63	161.8	28.6	12.3
16	+ LCH17-5660	HRW		67.6	61.4	82	162.8	25.8	12.6
31	+ MTCL1737	HRW	YLL-2CL/3/YLL*2//Pelsart//PROM/3*YLL	66.9	59.9	78	169.3	24.4	12.3
39	+ SD15004-2	HRW	Striker/SD03164-2//SD06069	66.7	60.6	75	165.9	29.7	12.8
22	NW15443	HWW	OR 2060108/NW03681//NW03666	64.3	60.5	73	162.0	27.8	12.2
15	+ 19CP010076	HRW	(BC98337-10-53/CDC FALCON/NE03458//SY WOLF	64.2	62.7	82	162.9	26.4	12.3
13	+ 19CP010081	HRW	JUDEE/SY WOLF	63.4	62.7	62	163.8	25.6	12.7
35	SD12DHA03282	HRW	Striker/SD03184-4	63.4	62.3	75	165.0	27.1	12.2
33	SD12DHA01373	HRW	Radiant/SD06069	63.1	61.8	75	165.7	28.0	12.1
7	+ 18NORD-103	HRW	Jerry/SD09113	62.5	61.0	85	163.9	28.3	13.3
32	+ SD12DHA00031	HRW	Lyman/SD03164-2	62.4	61.7	53	161.7	28.6	12.9
19	+ LCH17-1296	HRW		62.4	59.2	88	162.1	23.7	12.3
40	+ SD15035-2	HRW	NE05425/SD07184//SD07056	62.3	61.7	72	162.7	29.1	12.5
37	+ SD13DHA02346	HRW	Smoky Hill/Redifield	61.7	61.7	75	165.4	27.8	12.8
41	SD15205-1	HRW	Bearpaw/SD06156-1	61.5	61.2	77	163.0	29.1	12.0
30	+ MT1746	HRW	MT06103//MTW0881/SD06W166	61.4	62.4	88	167.4	24.8	12.6
2	Overland	HRW	Overland	61.3	61.0	70	162.8	26.8	13.4
6	17NORD-94	HRW	Boomer/ Ideal	61.0	59.9	82	164.7	28.7	12.7
9	+ 18NORD-111	HRW	Boomer/Ideal	60.9	60.8	77	163.7	28.5	12.8
27	+ NE17544	HRW	Pan3349/HV9W04-1594R//NE06607	60.7	61.8	77	161.4	27.7	13.1
23	NE16562	HRW	HV9W02-942R/CAMELOT	59.7	61.0	67	161.1	26.3	12.9
21	NE15624	HRW	NE05537/KS05HW15-2	59.4	61.4	77	160.6	23.7	13.8
34	+ SD12DHA01688	HRW	SD07173/Redfield	59.3	60.2	72	161.6	26.8	13.1
11	+ 19CP010075	HRW	MORGAN/06BC796#96	59.2	61.6	83	162.8	26.3	12.0
8	+ 18NORD-104	HWW	Boomer/SD06158	59.1	60.2	80	167.7	28.3	13.3
4	Jagalene	HRW	Jagalene	58.8	62.4	75	163.1	26.9	13.3
26	+ NE17443	HRW	NW07534/NE06545	58.4	61.3	68	161.0	24.3	13.2
25	+ NE17441	HRW	Hitch/NE07409	58.1	61.6	72	160.7	27.7	13.5
28	+ NE17590	HRW	R41/NE06545//NE06545	57.6	61.9	62	161.4	28.9	13.4
5	Jerry	HRW	Jerry	57.6	60.7	77	165.0	29.3	12.9
24	+ NHH17612	HRW	Brawl_CL/NHH09655	57.5	61.5	72	161.8	25.6	13.0
14	+ 19CP010083	HRW	JUDEE/SY SUNRISE	57.0	61.9	67	161.9	22.8	13.4
3	Wesley	HRW	Wesley	55.5	61.1	87	160.4	25.3	14.0
38	+ SD14355-2	HRW	Lyman/SD339-71//Lyman	54.7	62.4	88	160.3	28.2	14.1
20	+ LCH17-3468	HRW		54.7	61.3	67	161.1	24.2	14.1
10	+ 18NORD-108	HWW	Broadview/SD07W083-4	54.6	60.5	78	167.8	27.3	13.5
36	+ SD12DHA03429	HRW	Overland/Lyman	53.1	60.1	60	160.3	27.2	14.1
1	Kharkof	HRW	Kharkof	52.3	61.6	88	167.3	35.9	14.8
17	+ DH15HRW-63-81	HRW		50.9	60.8	63	160.9	26.8	14.5
Average				60.6	61.3	75.1	163.4	27.1	13.0
LSD (0.05)				7.3	1.2	20.6	2.3	2.4	0.8
C.V. (%)				7.4	1.2	16.9	0.8	5.3	3.6
P-value (Varieties)				<.0001	<.0001		<.0001	<.0001	<.0001

Table 150. 2020 Northern Regional Performance Nursery: Bozeman, MT

Entry #	Cultivar/ Line	Class	Pedigree	Yield bu/ac	Test weight lb/bu	Stand % 5-May	Heading date Julian	Plant height in	Protein %
+ = new for 2020				RCB	RCB	RCB	RCB	RCB	bulk
29	+ MT1745	HRW	Decade*2/NI06732	96.4	63.5	95	174.0	31.0	12.4
39	+ SD15004-2	HRW	Striker/SD03164-2//SD06069	94.4	63.6	100	171.0	35.8	13.9
42	Northern	HRW	local check	93.9	62.3	95	174.5	32.0	13.0
18	+ LCH18-7115	HRW		92.1	64.3	100	165.0	34.8	13.0
12	+ 19CP010078	HRW	SY MONUMENT/JAGALENE//OVERLAND	91.9	62.9	100	168.0	31.1	13.0
40	+ SD15035-2	HRW	NE05425/SD07184//SD07056	89.4	63.4	92	167.0	34.7	13.4
13	+ 19CP010081	HRW	JUDEE/SY WOLF	88.4	64.9	100	166.0	28.2	13.5
16	+ LCH17-5660	HRW		88.4	62.3	95	167.0	30.1	13.3
35	SD12DHA03282	HRW	Striker/SD03184-4	88.1	64.2	97	171.0	31.4	13.1
37	+ SD13DHA02346	HRW	Smoky Hill/Redfield	87.9	64.0	95	169.5	32.6	13.9
32	+ SD12DHA00031	HRW	Lyman/SD03164-2	87.8	63.5	97	165.5	33.9	13.6
22	NW15443	HWW	OR 2060108/NW03681//NW03666	86.1	62.6	92	166.0	32.3	13.0
31	+ MTCL1737	HRW	YLL-2CL/3/YLL*2/Pelsart//PROM/3*YLL	86.0	60.6	95	174.5	28.7	13.3
41	SD15205-1	HRW	Bearpaw/SD06156-1	84.9	63.0	75	169.0	33.6	12.5
9	+ 18NORD-111	HRW	Boomer/Ideal	84.6	62.7	100	169.5	34.3	13.2
19	+ LCH17-1296	HRW		83.0	60.1	95	165.5	26.5	13.6
27	+ NE17544	HRW	Pan3349/HV9W04-1594R//NE06607	82.9	63.7	97	165.5	32.7	14.0
33	SD12DHA01373	HRW	Radiant/SD06069	82.7	63.7	100	171.0	31.5	13.0
6	17NORD-94	HRW	Boomer/ Ideal	81.7	61.8	90	171.5	34.4	13.3
34	+ SD12DHA01688	HRW	SD07173/Redfield	81.5	61.8	95	165.5	31.8	14.7
4	Jagalene	HRW	Jagalene	81.3	64.5	93	167.0	31.8	14.4
15	+ 19CP010076	HRW	(BC98337-10-53/CDC FALCON/NE03458//SY W	80.9	63.8	87	166.0	29.3	13.3
2	Overland	HRW	Overland	80.8	62.8	97	165.5	32.7	14.7
30	+ MT1746	HRW	MT06103//MTW0881/SD06W166	80.0	64.1	100	172.0	29.0	13.5
7	+ 18NORD-103	HRW	Jerry/SD09113	79.3	62.7	92	168.0	34.1	14.6
26	+ NE17443	HRW	NW07534/NE06545	79.0	62.5	95	165.0	28.6	14.3
14	+ 19CP010083	HRW	JUDEE/SY SUNRISE	78.1	63.7	97	165.0	26.4	14.5
28	+ NE17590	HRW	R41/NE06545//NE06545	77.8	63.6	100	165.5	35.6	14.5
25	+ NE17441	HRW	Hitch/NE07409	75.7	63.1	97	164.0	31.2	14.6
8	+ 18NORD-104	HWW	Boomer/SD06158	75.5	61.9	93	173.0	34.5	14.2
21	NE15624	HRW	NE05537/KS05HW15-2	75.4	62.8	100	164.0	26.6	15.0
3	Wesley	HRW	Wesley	75.4	62.7	100	164.5	28.1	15.2
5	Jerry	HRW	Jerry	75.2	62.7	85	170.5	34.7	13.2
24	+ NHH17612	HRW	Brawl_CL/NHH09655	74.8	63.5	92	166.0	29.7	14.3
23	NE16562	HRW	HV9W02-942R/CAMELOT	74.1	62.7	88	165.0	30.1	14.0
10	+ 18NORD-108	HWW	Broadview/SD07W083-4	72.8	61.7	100	172.0	32.6	14.5
36	+ SD12DHA03429	HRW	Overland/Lyman	72.3	61.5	82	165.0	32.4	15.5
11	+ 19CP010075	HRW	MORGAN/06BC796#96	71.8	63.4	97	167.5	29.8	13.3
38	+ SD14355-2	HRW	Lyman/SD339-71//Lyman	71.6	63.6	93	164.5	34.1	15.0
20	+ LCH17-3468	HRW		71.0	63.1	95	164.5	28.4	15.3
17	+ DH15HRW-63-81	HRW		68.5	61.9	90	164.5	32.0	16.4
1	Kharkof	HRW	Kharkof	67.1	62.9	100	172.0	47.0	16.1
Average				81.2	63.0	94.6	167.8	31.9	14.0
LSD (0.05)				7.6	0.6	11.2	1.4	1.4	
C.V. (%)				5.8	0.6	7.3	0.5	2.8	
P-value (Varieties)				<.0001	<.0001	0.0095	<.0001	<.0001	

Table 151. 2020 Northern Regional Performance Nursery: Moccasin, MT

Entry #	Cultivar/ Line	Class	Pedigree	Yield bu/ac	Test weight lb/bu	Winter survival %	Heading date Julian	Plant height in	Protein %
+ = new for 2020				RCB	RCB	RCB	RCB	RCB	bulk
16	+ LCH17-5660	HRW		72.7	65.8	35	165.0	26.3	11.3
29	+ MT1745	HRW	Decade*2/NIO6732	71.9	63.5	32	173.3	27.7	11.4
18	+ LCH18-7115	HRW		67.7	64.2	44	165.0	27.3	11.0
31	+ MTCL1737	HRW	YLL-2CL/3/YLL*2/Pelsart//PROM/3*YLL	67.5	62.4	27	174.0	24.3	10.5
23	NE16562	HRW	HV9W02-942R/CAMELOT	66.5	64.2	49	163.7	27.0	12.0
12	+ 19CP010078	HRW	SY MONUMENT/JAGALENE//OVERLAND	64.4	63.1	30	171.0	26.7	10.4
32	+ SD12DHA00031	HRW	Lyman/SD03164-2	62.8	64.0	39	165.0	29.3	11.1
33	SD12DHA01373	HRW	Radiant/SD06069	61.6	64.4	37	169.0	29.3	10.9
7	+ 18NORD-103	HRW	Jerry/SD09113	61.5	63.7	42	168.0	28.0	12.5
15	+ 19CP010076	HRW	(BC98337-10-53/CDC FALCON/NE03458//SY WOLF)	61.3	66.5	27	166.3	28.0	11.3
21	NE15624	HRW	NE05537/KS05HW15-2	60.7	64.4	36	164.0	25.0	12.6
19	+ LCH17-1296	HRW		59.8	63.0	31	165.0	25.3	11.1
30	+ MT1746	HRW	MT06103//MTW0881/SD06W166	59.5	66.0	38	173.3	25.0	11.0
22	NW15443	HWW	OR 2060108/NW03681//NW03666	58.8	62.0	28	165.0	28.0	11.1
8	+ 18NORD-104	HWW	Boomer/SD06158	57.1	62.9	36	171.3	28.3	12.3
27	+ NE17544	HRW	Pan3349/HV9W04-1594R//NE06607	56.7	64.3	30	164.7	28.0	12.3
2	Overland	HRW	Overland	56.7	62.4	32	167.7	26.7	11.6
11	+ 19CP010075	HRW	MORGAN/06BC796#96	56.4	64.0	33	166.3	26.7	10.4
35	SD12DHA03282	HRW	Striker/SD03184-4	56.2	64.5	29	167.0	27.7	10.8
13	+ 19CP010081	HRW	JUDEE/SY WOLF	55.7	63.5	37	169.0	26.7	11.2
25	+ NE17441	HRW	Hitch/NE07409	55.3	64.4	39	164.3	29.7	12.4
24	+ NHH17612	HRW	Brawl_CL/NHH09655	55.0	63.1	37	165.0	25.7	11.7
39	+ SD15004-2	HRW	Striker/SD03164-2//SD06069	55.0	61.2	25	170.7	28.7	12.1
6	17NORD-94	HRW	Boomer/ Ideal	54.4	62.6	41	166.0	29.0	12.3
41	SD15205-1	HRW	Bearpaw/SD06156-1	54.2	63.0	30	165.7	30.7	11.2
9	+ 18NORD-111	HRW	Boomer/Ideal	53.9	63.0	38	164.7	29.0	12.4
34	+ SD12DHA01688	HRW	SD07173/Redfield	53.4	63.1	40	165.0	26.3	11.2
20	+ LCH17-3468	HRW		52.5	63.3	28	163.7	25.0	12.7
14	+ 19CP010083	HRW	JUDEE/SY SUNRISE	52.3	63.7	33	165.0	22.7	12.5
26	+ NE17443	HRW	NW07534/NE06545	52.3	64.6	35	164.0	25.0	11.9
5	Jerry	HRW	Jerry	51.9	62.3	33	167.7	28.7	11.7
40	+ SD15035-2	HRW	NE05425/SD07184//SD07056	51.7	64.0	35	165.0	27.7	11.1
37	+ SD13DHA02346	HRW	Smoky Hill/Redifield	50.9	63.3	35	169.0	26.7	11.5
4	Jagalene	HRW	Jagalene	50.6	64.5	42	165.7	27.3	12.6
28	+ NE17590	HRW	R41/NE06545//NE06545	50.6	64.3	35	164.0	26.3	12.4
10	+ 18NORD-108	HWW	Broadview/SD07W083-4	50.1	63.7	37	173.0	27.3	11.9
38	+ SD14355-2	HRW	Lyman/SD339-71//Lyman	49.3	64.8	35	165.0	28.7	13.8
3	Wesley	HRW	Wesley	48.4	63.5	37	164.3	26.0	13.1
36	+ SD12DHA03429	HRW	Overland/Lyman	48.0	62.1	29	163.7	28.0	12.9
1	Kharkof	HRW	Kharkof	46.7	63.8	38	173.0	33.7	13.8
17	+ DH15HRW-63-81	HRW		45.8	63.5	40	164.0	26.0	13.1
Average				56.5	63.7	34.9	166.9	27.3	11.8
LSD (0.05)				12.7	2.0	ns	3.3	4.0	1.0
C.V. (%)				13.9	2.0	24.2	1.2	9.0	5.4
P-value (Varieties)				0.0022	0.0016	0.3353	<.0001	0.0123	<.0001

Table 152. 2020 Northern Regional Performance Nursery: Williston, ND

Entry #	Cultivar/ Line	Class	Pedigree	Yield bu/ac	Test weight lb/bu	Winter survival %	Heading date Julian	Plant height in	Protein %
+ = new for 2020				RCB	RCB	RCB	RCB	RCB	RCB
29	+ MT1745	HRW	Decade*2/N106732	53.2	56.5	88	157.3	22.8	12.6
39	+ SD15004-2	HRW	Striker/SD03164-2//SD06069	50.6	57.1	75	155.0	24.7	12.5
15	+ 19CP010076	HRW	(BC98337-10-53/CDC FALCON/NE03458//SY WOLF	50.4	57.7	82	155.3	21.8	12.4
12	+ 19CP010078	HRW	SY MONUMENT/JAGALENE//OVERLAND	49.7	56.4	82	156.3	20.2	12.6
11	+ 19CP010075	HRW	MORGAN/06BC796#96	49.4	57.4	83	153.7	22.4	12.4
22	NW15443	HWW	OR 2060108/NW03681//NW03666	48.0	57.0	73	154.0	23.1	12.4
31	+ MTCL1737	HRW	YLL-2CL/3/YLL*2/Pelsart//PROM/3*YLL	47.0	56.6	78	158.3	20.1	13.1
6	17NORD-94	HRW	Boomer/ Ideal	46.8	55.4	82	155.7	22.7	12.4
7	+ 18NORD-103	HRW	Jerry/SD09113	46.5	56.7	85	154.7	22.8	12.9
37	+ SD13DHA02346	HRW	Smoky Hill/Redifield	46.3	57.9	75	156.7	24.2	13.0
2	Overland	HRW	Overland	46.3	57.9	70	154.3	20.9	13.9
13	+ 19CP010081	HRW	JUDEE/SY WOLF	46.0	59.8	62	155.3	21.9	13.3
18	+ LCH18-7115	HRW		46.0	57.4	63	154.3	23.8	12.9
35	SD12DHA03282	HRW	Striker/SD03184-4	45.8	58.1	75	156.0	22.2	12.7
40	+ SD15035-2	HRW	NE05425/SD07184//SD07056	45.7	57.8	72	155.0	24.8	12.9
5	Jerry	HRW	Jerry	45.7	57.0	77	155.7	24.5	13.9
41	SD15205-1	HRW	Bearpaw/SD06156-1	45.4	57.5	77	153.3	23.1	12.3
33	SD12DHA01373	HRW	Radiant/SD06069	44.9	57.2	75	156.0	23.1	12.4
30	+ MT1746	HRW	MT06103//MTW0881/SD06W166	44.7	57.0	88	156.0	20.3	13.2
8	+ 18NORD-104	HWW	Boomer/SD06158	44.7	55.7	80	157.7	22.2	13.4
19	+ LCH17-1296	HRW		44.4	54.5	88	154.7	19.4	12.2
4	Jagalene	HRW	Jagalene	44.3	58.1	75	155.7	21.5	12.8
28	+ NE17590	HRW	R41/NE06545//NE06545	44.2	57.9	62	153.7	24.8	13.4
9	+ 18NORD-111	HRW	Boomer/Ideal	44.0	56.6	77	156.0	22.3	12.7
26	+ NE17443	HRW	NW07534/NE06545	43.7	56.8	68	153.0	19.4	13.4
25	+ NE17441	HRW	Hitch/NE07409	43.2	57.2	72	152.7	22.2	13.5
38	+ SD14355-2	HRW	Lyman/SD339-71//Lyman	43.0	58.8	88	150.3	21.9	13.5
1	Kharkof	HRW	Kharkof	43.0	58.0	88	156.0	26.9	14.6
34	+ SD12DHA01688	HRW	SD07173/Redfield	43.0	55.7	72	153.3	22.2	13.3
24	+ NHH17612	HRW	Brawl_CL/NHH09655	42.6	58.0	72	153.3	21.4	13.0
3	Wesley	HRW	Wesley	42.5	57.0	87	151.3	21.7	13.6
27	+ NE17544	HRW	Pan3349/HV9W04-1594R//NE06607	42.4	57.4	77	153.0	22.3	13.0
21	NE15624	HRW	NE05537/KS05HW15-2	42.1	57.0	77	152.7	19.6	13.8
16	+ LCH17-5660	HRW		41.6	56.1	82	155.3	20.9	13.1
10	+ 18NORD-108	HWW	Broadview/SD07W083-4	40.9	56.2	78	157.3	22.1	14.0
14	+ 19CP010083	HRW	JUDEE/SY SUNRISE	40.6	58.2	67	154.7	19.4	13.1
20	+ LCH17-3468	HRW		40.5	57.4	67	154.0	19.3	14.2
36	+ SD12DHA03429	HRW	Overland/Lyman	39.0	56.7	60	151.3	21.1	13.9
23	NE16562	HRW	HV9W02-942R/CAMELOT	38.5	56.1	67	153.7	21.7	12.6
17	+ DH15HRW-63-81	HRW		38.2	56.9	63	153.3	22.4	14.1
32	+ SD12DHA00031	HRW	Lyman/SD03164-2	36.7	57.7	53	153.7	22.7	14.1
Average				44.4	57.1	75.1	154.6	22.1	13.2
LSD (0.05)				6.3	0.7	20.6	1.8	2.2	1.2
C.V. (%)				8.7	0.7	16.9	0.7	6.1	5.7
P-value (Varieties)									

Table 153. 2020 Southern Regional Performance Nursery (SRPN): Bozeman, MT

Entry #	Line + = new for 2020	Market Class	Pedigree	Yield bu/ac	Test weight lb/bu	Heading date Julian	Plant height cm	Protein %
1	Kharkof	HRW	Kharkof	62.9	62.8	173	121	16.0
2	Scout66	HRW	Scout66	67.0	63.2	165	100	15.6
3	TAM-107	HRW	TAM-107	63.6	62.3	164	79	14.7
4	Jagalene	HRW	Jagalene	83.9	64.2	167	82	14.1
5	+ K19U7124R10	HRW	Duster*2/5/Duster*3//Sr35/2*2174/3/X100994-1/4/	71.7	61.0	165	76	14.2
6	+ K19U7126R37	HRW	Duster*2/5/Duster*3//Sr35/2*2174/3/X100994-1/4/	72.4	60.6	166	77	13.9
7	+ KS15H137-2	HRW	KS08HW176-4//Bill Brown/KS08HW61-2	82.7	62.7	167	75	13.5
8	+ KS17H17	HRW	Oakley CL//KS07HW5-1-1-3-3/T158	79.2	63.6	166	85	15.3
9	+ KS17H91-1	HRW	KS07HW5-1-1-3-3/T158/KS09HW97-5	71.8	63.5	168	82	13.9
10	TX15M8024	HRW	TAM 203/Duster	68.6	62.6	165	77	14.8
11	+ TX16A001183	HRW	Hitch/TX07A001305	66.8	62.9	164	70	14.5
12	+ TX16A001193	HRW	TX07A001421/Duster	64.7	63.4	164	72	15.0
13	+ TX16A001205	HRW	Winterhawk/TX05V7269	77.2	64.5	164	70	13.4
14	+ TX16A001289	HRW	TX05A001188/Fuller	68.5	63.8	165	74	14.5
15	+ TX16A001405	HRW	TX05A001188/Duster	90.0	62.7	165	71	13.2
16	+ TX16M9216	HRW	X09A440S [=TX07A001482/TAM 401]/Duster	68.1	63.3	166	77	14.4
17	+ TX16M9315	HRW	TAM 203/Hitch	75.5	61.0	165	69	13.7
18	+ ON1366277	HRW	Duster/Billings//OK06822W	67.1	63.3	165	76	14.6
19	+ ON13P016	HRW	OK93P656H3299-99/OK03522	77.1	64.3	164	78	14.8
20	+ 19CP010066	HRW	KS020633-M-13/SY WOLF//SY WOLF	79.9	65.0	165	73	13.5
21	+ 19CP010063	HRW	SY GOLD/TAM 111//POSTROCK	80.9	63.2	166	72	14.2
22	+ 19CP010068	HRW	Everest/APH09T9506	85.4	63.6	165	73	13.4
23	+ 19CP010057	HRW	DUSTER/05BC083-29-2//SY WOLF	78.5	62.2	164	78	14.4
24	+ BASF 1	HRW	unknown	73.9	64.2	164	80	14.7
25	+ BASF 2	HRW	unknown	76.8	63.1	165	80	14.7
26	+ LCH17-3481	HRW		81.6	62.4	166	79	15.2
27	+ LCH17-5221	HRW		69.4	63.0	164	70	14.7
28	+ LCH17-5660	HRW		87.1	62.6	167	71	13.1
29	+ LCH17-4196	HRW		83.0	64.3	166	79	12.9
30	+ LCH18-7071	HRW		99.3	63.4	171	80	11.9
31	CO15D098R	HRW	TAM 114/Antero//Byrd = <u>Steamboat</u>	88.1	64.5	165	78	13.3
32	+ CO14A136-135	HRW	AF10/2*Byrd//AF26/Byrd	93.4	62.6	166	79	12.5
33	+ CO14A055-258	HRW	AF28/Byrd//AF10/2*Byrd = <u>Kivari AX</u>	99.9	63.5	165	79	11.8
34	+ CO16SF065	HRW	Antero/Judee//Antero	92.9	63.8	165	74	13.3
35	+ CO16SF070	HRW	Antero/Judee//Antero	88.9	63.8	165	73	13.8
36	+ KS12DH0090-17	HRW	KanMark/KS050444-M-6	71.6	64.7	166	72	14.4
37	KS12DH0156-88	HRW	KS040477K-12/Gallagher	89.9	63.3	167	65	13.1
38	+ KS13DH0041-35	HRW	T158/KS040640K-1	86.2	62.4	167	74	13.3
39	+ KS13DH0030-28	HRW	KS060634K-8/KS040640K-1	86.9	61.3	166	71	13.0
40	OK16729W	HW	LA98149BUB-3-4-B/OK03522//OK07231	83.1	64.6	164	89	14.1
41	OK16D101089	HRW	OK12621/OK09125 = <u>Uncharted</u>	66.4	63.5	163	74	14.7
42	+ OK168512	HRW	Wsm1-Overley/Fuller//CO050270/3/CO050337-8 = <u>Breakthrough</u>	78.9	64.7	164	72	14.1
43	+ OK188608	HRW	KS020635-M-2/OK08214//OK07214	66.8	63.1	163	70	14.8
44	+ OK15MASBx7 A	HRW	Gallagher*3/ Snowmass	83.2	64.0	164	65	13.5
45	+ OK16D101105	HRW	OK12621/OK09125	70.1	63.1	164	68	14.6
46	NE16562	HRW	HV9W02-942R/CAMELOT	75.0	63.4	164	74	14.6
47	NI17410	HRW	TX06A001281/NI04420	79.3	63.0	164	82	14.9
48	+ NE17433	HRW	NI10720W/NW03666	82.6	63.5	164	79	14.1
49	+ NHH17450	HRW	Brawl_CL/NHH09655	70.6	63.2	165	78	14.2
50	+ NHH17612	HRW	Brawl_CL/NHH09655	71.4	63.7	165	78	14.2
Average				78.0	63.2	165.3	76.8	14.1

planted: 10/17/2019

harvested: 8/19/2020

Crop Year Rainfall (Sept 2019 - Aug 2020): 14.79

Table 154. 2020 Western Regional Hard Winter Wheat Test (Exp. 0101): Bozeman, MT

Entry #	Cultivar/Line	Class	Pedigree	Yield bu/ac	Test weight lb/bu	Heading date Julian	Plant height in	Protein %
	+ = new for 2020			RCB	RCB	RCB	RCB	bulk
12	+ MT1642	HRW	Yellowstone/Madsen//Yellowstone	112.8	63.2	174.0	34.5	12.9
13	+ HRW11044-B-0-0-2	HRW	Norwest 553/Compile	105.7	61.4	170.7	29.7	12.7
3	LCS JET	HRW	check	104.0	60.4	172.0	27.7	12.7
14	+ OR2160011R	HRW	OR2080633/Aramis	103.2	61.0	175.0	29.9	12.3
2	Whetstone	HRW	check	101.6	63.9	166.0	30.3	13.7
4	HRW11012-2-DH-16-1	HRW	Bermude/Norwest 553	98.3	61.8	174.7	26.4	12.1
15	+ OR2160089R	HRW	OR2080236H/Norwest 553	98.3	62.5	174.3	27.3	12.8
5	HRW11012-2-DH-27-1	HRW	Bermude/Norwest 553	97.3	62.2	175.0	26.4	11.9
8	OR2150169R	HRW	WH1200553/OR952577//Norwest 553	96.6	61.3	173.7	27.7	11.8
9	OR2150168H	HWW	WH1200553/OR952577//Norwest 553	95.6	61.8	175.0	26.9	12.5
16	+ OR2160065H	HWW	Norwest 553/OR2090028H	90.6	62.7	172.0	30.6	13.5
6	OR2140119H	HWW	OR2070014H/Norwest553	89.9	63.1	175.0	31.8	12.3
7	OR2150100R	HRW	Norwest 553/AP05TW2821	89.3	62.7	168.0	27.6	14.7
10	+ IDO1806	HWW	IDO1621/IDO660	86.6	64.0	172.7	27.2	13.3
11	+ IDO1906	HWW	Soissons/IDO685//Shaan897-8	73.0	62.2	164.3	26.8	14.4
1	Kharkof	HRW	check	71.8	62.1	172.0	48.0	16.4
Average				94.7	61.7	172.1	29.9	13.1
LSD (0.05)				13.9	1.8	1.4	1.6	
C.V. (%)				8.8	1.8	0.5	3.1	
P-value (Varieties)				<.0001	<.0001	<.0001	<.0001	<.0001

bold = indicates highest value within a column**bold** = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

planted: 10/16/2019

harvested: 8/22/2020

Crop Year Rainfall (Sept 2019 - Aug 2020): 14.79 in

Table 155. 2020 Winter Cereals Forage Test (Exp. WCF1): Bozeman, MT

Entry #	Cultivar/ Line + = new for 2020	Forage type	Grain yield bu/ac	Test weight lb/bu	Heading date Julian	Plant height in	Lodging (0-9)	Forage Yield tons/a	g/3' sample	Grain protein %
1	Ray	check	80.0	61.6	176.5	37.9	0.0	6.46	404	13.0
2	Willow Creek	check	70.0	62.5	180.3	49.9	2.5	5.92	370	15.2
3	a + MTF 20186	MTF1232WB3768	88.8	63.0	175.8	45.4	1.5	6.28	393	14.2
4	+ MTF 20187	Overland/TCI 001744	62.7	63.9	167.3	40.8	0.0	6.20	388	14.1
5	+ MTF 20188	MT10121*2/MV11-04	70.8	62.4	171.8	46.9	0.3	7.21	451	14.8
6	a + MTF 20189	MT10121*2/MV11-04	66.9	62.2	172.8	47.9	0.0	7.35	460	14.9
7	FX1001		75.7	54.9	171.8	58.3	2.8	7.24	453	13.4
8	Ray Zn+	Ray Zinc Biofortification	88.6	61.0	175.8	37.9	0.0	5.74	359	13.0
Average			75.4	61.4	174.0	45.6	0.9	6.55	410	14.1
LSD (0.05)			12.0	0.7	1.4	1.3	1.1	ns		0.3
C.V. (%)			10.8	0.7	0.6	2.0	81.8	18.8		1.3
P-value (Varieties)			0.0009	<.0001	<.0001	<.0001	<.0001	0.4236		<.0001

bold = indicates highest value within a column

a = lines in 2021 Advanced Test

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

planted: 10/16/2019

harvested: 8/22/2020

2020 WINTER CEREAL FORAGE TRIAL- Multi-location Summary

Crop	Cultivar	Heading				Height in	Lodging (0-9)	Forage						Grain			
		Julian 4	Moisture	Protein %	ADF			NDF	RFV	Yield		Nitrate ppm	Yield bu/ac	Protein %	Test wt lb/bu		
										DM tons/ac	Nitrogen lbs/ac						
Triticale	Locations FX 1001	168.7	3	3	37	3	3	3	3	3	3	3	3	3	3	3	3
	Wheat a	173.2	64	9.9	38	59	94	5.52	134	536	80.5	12.8	63.5				
	Wheat	166.6	66	8.5	38	61	91	5.15	111	379	74.6	12.3	65.0				
	Wheat	168.5	63	7.8	39	58	95	5.93	108	296	75.1	13.3	63.7				
	Wheat a	169.8	64	8.6	39	59	93	5.86	127	271	71.0	13.5	63.7				
Wheat	Ray	173.8	64	8.9	38	58	96	4.82	110	215	87.2	11.9	62.6				
Wheat	Willow Creek	177.6	60	8.0	39	59	93	5.67	117	202	61.4	13.7	63.0				
Mean		171.2	65.6	8.5	38	59	94	5.60	118	317	76	12.8	62.6				
CV%		0.7	6.3	7	3.7	4.6	6.4	13.1	16.5	58.9	12.8	3.1	1.2				
LSD 0.05		1.9	ns	1.1	ns	ns	ns	ns	ns	ns	14.4	0.6	1.4				
P-value (Cultivar)		<.0001	0.7726	0.0122	0.6933	0.7888	0.8880	0.1614	0.6323	0.4069	0.0381	<.0001	<.0001				

Bold Indicates highest yielding cultivar within a column.

a = lines in 2021 Advanced Test

Bold Indicates cultivars yielding equal to the highest yielding entry based on Fisher's Protected LSD at the 0.05 probability level.

Forage nitrogen yield is computed by multiplying the DM yield with the forage nitrogen percentage (protein %/6.25, expressed in decimal form).

WINTER CEREAL FORAGE TRIAL- MSU Post Farm - Bozeman, 2020

Crop	Cultivar	Heading Julian	Height in	Lodging (0-9)	Moisture	Forage					Grain							
						ADF %	NDF	RFV	Yield		Nitrate ppm	Yield		Protein %	Test wt lb/bu			
									DM tons/ac	Nitrogen lbs/ac		lbs/ac	bu/ac					
Triticale	FX 1001	171.8	58.3	2.8						7.24					81.1	13.4	54.9	
Wheat	MTF 20186	175.8	45.4	1.5						6.28					88.8	14.2	63.0	
Wheat	MTF 20187	167.3	40.8	0.0						6.20					62.7	14.1	63.9	
Wheat	MTF 20188	171.8	46.9	0.3						7.21					70.8	14.8	62.4	
Wheat	MTF 20189	172.8	47.9	0.0						7.35					66.9	14.9	62.2	
Wheat	Ray	176.5	37.9	0.0						6.46					80.0	13.0	61.6	
Wheat	Willow Creek	180.3	49.9	2.5						5.92					70.0	15.2	62.5	
Wheat	Ray Zn+ seed	175.8	37.9	0.0						5.74					88.6	13.0	61.0	
Mean		174.0	45.6	0.9						6.55					76.1	14.1	61.4	
CV%		0.6	2.0	81.8						18.8					10.8	1.3	0.7	
LSD 0.05		1.4	1.3	1.1						ns					12.0	0.3	0.7	
P-value (Cultivar)		<.0001	<.0001	<.0001						0.4236					0.0009	<.0001	<.0001	

Bold indicates highest yielding cultivar within a column.

Bold indicates cultivars yielding equal to the highest yielding entry based on Fisher's Protected LSD at the 0.05 probability level.

Forage nitrogen yield is computed by multiplying the DM yield with the forage nitrogen percentage (protein %/6.25, expressed in decimal form).

WINTER CEREAL FORAGE TRIAL- MSU Central Agricultural Research Center, Moccasin, 2020

Crop	Cultivar	Heading Julian	Height in	Lodging	Forage					Grain						
					Moisture	Protein %	ADF	NDF	RFV	Yield						
										DM tons/ac	Nitrogen lbs/ac	Nitrate ppm	Yield lbs/ac	Protein %	Test weight lbs/bu	
Triticale	FX 1001	170.5	50.2	2	59	7.9	36	57	100	3.26	88	82	2413	48.0	9.4	56.0
Triticale	Trical 20T04	171.8	42.6	0	62	7.0	39	58	94	3.26	76	112	2565	51.0	9.1	51.1
Triticale	Trical Flex 719	166.8	43.6	0	57	8.8	40	61	89	3.10	88	90	2479	50.0	8.2	53.7
Wheat	MTF 20186	175.0	38.3	0.3	59	10.7	37	59	95	2.83	93	150	3094	51.6	10.5	63.5
Wheat	MTF 20187	170.8	36.2	0	60	7.9	35	55	104	2.76	71	95	2885	48.1	10.2	64.9
Wheat	MTF 20188	171.3	39.1	0	56	7.6	39	59	93	3.08	75	121	2840	47.3	11.0	64.0
Wheat	MTF 20189	173.0	39.4	0	58	9.0	39	61	89	3.12	93	149	2991	49.8	11.3	64.2
Wheat	Ray	174.0	32.4	0	60	8.7	36	57	100	2.54	69	115	2922	48.7	9.8	62.8
Wheat	WB4394	167.8	27.5	0	56	9.3	38	58	96	2.41	69	131	2872	47.9	10.8	64.6
Wheat	WB4462	164.0	25.9	0	54	8.9	34	54	109	2.32	70	102	2716	45.3	10.9	65.8
Wheat	WB4595	167.5	25.8	0	58	9.6	37	56	100	2.43	73	107	2987	49.8	10.0	65.5
Wheat	WB4721	164.0	24.1	0	56	10.2	33	51	115	2.44	83	129	2123	35.4	12.5	66.4
Wheat	Willow Creek	181.3	44.4	0	62	7.6	40	61	89	2.72	70	121	2328	38.8	11.2	62.3
Mean		170.6	36.1	0.2	58.3	8.7	37	57	98	2.79	78	116	2709	47.0	10.4	61.9
CV%		0.6	2.6	80.1	3.8	7.4	2.7	2.3	3.1	10.9	13.6	29	8	8	5	1.4
LSD 0.05		1.5	1.3	0.2	3	1.4	2.2	2.9	6.6	0.4	NS	NS	310	6	0.7	1.2
P-value (Cultivar)		<0.0001	<0.0001	<0.0001	<0.0001	0.003	0.0002	0.0003	<0.0001	<0.0001	0.25	0.66	<0.0001	<0.0001	<0.0001	<0.0001

Bold indicates highest yielding cultivar within a column.

Bold indicates cultivars yielding equal to the highest yielding entry based on Fisher's Protected LSD at the 0.05 probability level.

Forage nitrogen yield is computed by multiplying the DM yield with the forage nitrogen percentage (protein %/6.25, expressed in decimal form).

WINTER CEREAL FORAGE TRIAL- MSU Northern Agricultural Research Center, Havre, 2020

Crop	Cultivar	Heading	Height	Lodging	Moisture	Forage					Grain				
						ADF	NDF	RFV	Yield			Nitrate	lbs/ac	Yield	Protein
									DM	Nitrogen	%				
		Julian	in			%			tons/ac	lbs/ac		ppm		bu/ac	lbs/bu
Triticale	FX 1001	163.8	45.5	--	69	10.9	61	91	3.02	100	3455	820	69.1	13.2	59.8
Triticale	Trical 20T04	164.8	38.5	--	72	11.3	60	94	2.70	106	4112	460	82.2	12.7	57.3
Triticale	Trical Flex 719	163.0	43.9	--	67	12.1	58	99	3.42	132	4092	529	81.8	13.1	55.1
Wheat	MTF 20186	167.8	37.8	--	65	12.2	36	96	3.70	139	3550	1287	59.2	14.3	64.1
Wheat	MTF 20187	161.5	33.5	--	72	11.8	37	89	2.76	109	4149	854	69.1	12.5	66.1
Wheat	MTF 20188	163.3	41.3	--	67	11.2	36	99	3.16	108	3315	684	55.3	14.6	64.6
Wheat	MTF 20189	164.3	40.1	--	67	10.6	37	96	2.98	101	452	3184	53.1	14.8	64.8
Wheat	Ray	167.8	32.5	--	66	11.6	37	96	3.25	127	370	3919	65.3	13.3	63.3
Wheat	WB4394	161.3	27.4	--	69	12.0	37	92	2.67	114	852	3446	57.4	13.1	66.1
Wheat	WB4462	159.8	27.5	--	69	12.0	37	92	2.23	88	728	3569	59.5	12.6	65.5
Wheat	WB4595	161.5	26.7	--	72	12.4	35	91	2.56	107	613	4263	71.1	11.7	68.1
Wheat	WB4721	157.5	25.6	--	69	12.8	36	98	2.34	93	1073	3686	61.4	14.2	67.6
Wheat	Willow Creek	171.3	40.1	--	53	11.6	37	58	4.19	154	450	2915	48.6	14.7	11.25
Mean		163.6	35.4		67.6	11.7	37	94	3.00	114	705	3666	64.1	13.4	63.6
CV%		0.4	4.8		2.5	5.4	3.2	5.4	9	9.1	24.1	6.2	6.3	2.1	0.6
LSD 0.05		1	2.4		2.4	NS	NS	NS	0.4	22	371	329	5.8	0.4	0.6
P-value (Cultivar)		<0.0001	<0.0001		<0.0001	0.14	0.99	0.63	<0.0001	0.001	0.005	<0.0001	<0.0001	<0.0001	0.0012

Bold indicates highest yielding cultivar within a column.

Bold indicates cultivars yielding equal to the highest yielding entry based on Fisher's Protected LSD at the 0.05 probability level.

Forage nitrogen yield is computed by multiplying the DM yield with the forage nitrogen percentage (protein %/6.25, expressed in decimal form).

WINTER CEREAL FORAGE TRIAL- MSU Northwestern Agricultural Research Center, Creston, 2020

Crop	Cultivar	Heading Julian	Height in	Lodging (0-9)	Moisture	Protein %	ADF	NDF	RFV	Yield					Grain	
										DM tons/ac	Nitrogen		Nitrate ppm	Yield lbs/ac	Yield bu/ac	Protein %
											lbs/ac	bu/ac				
Triticale	FX 1001	168.5	73.0	9.4	65	4.7	39	54	102	11.54	165	48	170	6149	123.0	12.7
Wheat	MTF 20186	174.0	57.0	8.6	67	6.7	41	59	90	9.27	171	170	170	7349	122.5	12.3
Wheat	MTF 20187	167.0	50.7	5.8	65	5.7	43	64	81	8.86	154	187	187	7102	118.4	12.3
Wheat	MTF 20188	167.5	53.8	0.5	65	4.5	41	57	93	10.27	141	83	83	7608	126.8	12.7
Wheat	MTF 20189	169.0	59.3	3.0	67	6.2	41	57	94	10.00	187	212	212	6850	114.2	13.1
Wheat	Ray	176.8	47.4	1.3	67	6.3	42	58	91	7.04	135	160	160	9278	154.6	11.3
Wheat	Willow Creek	177.5	63.5	9.5	66	4.8	41	57	93	9.87	125	36	36	5298	88.3	13.7
Mean		171.5	57.8	5.4	66.0	5.5	41	58	92	9.56	154	128	128	7090	121.1	12.6
CV%		0.7	3.9	45.9	3.5	21.9	6.2	6.1	9.5	10.2	23.8	71.5	71.5	7.6	7.5	4.5
LSD 0.05		1.9	3.4	3.7	NS	NS	NS	NS	NS	1.7	NS	NS	NS	802	13.5	0.8
P-value (Cultivar)		<0.0001	<.0001	<.0001	0.7	0.47	0.7	0.37	0.51	0.004	0.65	0.42	0.42	<0.0001	<0.0001	0.0007

Bold Indicates highest yielding cultivar within a column.

Bold Indicates cultivars yielding equal to the highest yielding entry based on Fisher's Protected LSD at the 0.05 probability level.

Forage nitrogen yield is computed by multiplying the DM yield with the forage nitrogen percentage (protein %/6.25, expressed in decimal form).

Crop	Cultivar	Forage										Grain			
		Heading Julian	Height in	Moisture	Protein %	ADF	NDF	RFV	Yield			Yield			
									DM tons/ac	Nitrogen lbs/ac	Nitrate ppm	lbs/ac	bu/ac		
Triticale	FX 1001	184.0	47.3	58					3.10			419	7.5		
Wheat	MTF 20186	175.5	31.8	59	6.9	37	57	98	2.24	48	59	376	6.3		
Wheat	MTF 20187	175.5	29.6	59	7.7	34	54	110	1.94	47	37	521	8.7		
Wheat	MTF 20188	175.3	31.0	58	7.1	36	54	106	2.18	50	39	618	10.3		
Wheat	MTF 20189	175.3	33.1	59	7.1	37	58	96	2.20	47	63	637	10.6		
Wheat	Ray	179.5	27.8	62	8.1	36	56	101	2.30	55	33	390	6.5		
Wheat	Willow Creek	184.0	35.1	60	6.5	36	55	104	2.68	51	61	372	6.2		
Mean		178.4	33.7	59.4	7.2	36	56	102	2.38	50	49	476	8.0		
CV%		1.1	4.5	2.6	9.7	6.1	5.1	8.3	13.3	10.6	53	39	39		
LSD 0.05		2.9	2.3	2.3	NS	NS	NS	NS	0.5	NS	NS	NS	NS		
P-value (Cultivar)		<0.0001	<0.0001	0.017	0.39	0.63	0.58	0.63	0.0012	0.72	0.73	0.22	0.24		

Bold Indicates highest yielding cultivar within a column.**Bold** Indicates cultivars yielding equal to the highest yielding entry based on Fisher's Protected LSD at the 0.05 probability level.

Forage nitrogen yield is computed by multiplying the DM yield with the forage nitrogen percentage (protein %/6.25, expressed in decimal form).

Table 156. 2020 Forage Observation Nursery (FO): Post and Lutz data

Plot	2021 ID	Cross ID	Pedigree	Seed		Stand		Heading		Plant height		Forage (Post)		Agronomic Score (0-9)				2019 HR data	
				Yield	Test	Post	Lutz	Post	Lutz	Post	Lutz	ton/a	adj	PLB	JEB	PLB	JEB	Prot-	PPO SDS
				bu/a	weight	27-May		Post	Lutz	Post	Lutz	ton/a	g/3	###	24-Jul	31-Jul	27-Jul		
1		Willow Creek			lb/bu	80	20	180	182	52.8	43.3	6.83	6.83	427	6	4	3	17	
2	h	Ray		92.1	62.3	100	70	175	176	39.0	31.1	7.37	7.37	461	6	7	5	24	
3		12X175E97	MTF1232/WB3768			85	50	175	177	44.1	38.2	7.72	7.72	483	7	6	6	25	-
4		12X175E97-1	MTF1232/WB3768			100	60	176	176	46.1	37.0	8.72	7.67	545	8	5	6	24	13.4
5		12X175E100	MTF1232/WB3768			85	70	177	177	46.1	39.0	4.38	4.38	274	7	6	6	25	-
6		12X175E100-3	MTF1232/WB3768			100	75	176	176	44.5	38.6	6.36	6.36	398	6	6	7	25	12.8
7		12X175E1-3	MTF1232/WB3768			80	70	177	177	45.7	37.0	7.66	7.66	479	7	5	6	23	12.3
8		12X175E23-3	MTF1232/WB3768			75	60	176	176	46.9	37.0	8.51	8.51	532	6	6	4	22	13.5
9		12X175E65-4	MTF1232/WB3768			100	40	175	176	45.7	36.6	6.81	6.81	426	8	7	5	24	13.3
10		12X175E115-4	MTF1232/WB3768			85	35	175	176	47.6	37.8	4.94	4.94	309	8	6	5	25	12.6
11	h	2021FO3	MTF1232/WB3768	89.0	63.2	100	60	175	176	48.4	38.2	9.39	8.26	587	8	6	5	25	12.6
12		12X203E20-3	Overland//ITCI 001744			100	25	167	168	42.5	32.7	7.02	7.02	439	6	5	3	17	12.3
13	d	12X203E23-1	Overland//ITCI 001744			100	40	166	170	42.9	32.7	6.38	6.38	399	6	6	4	5	13.7
14		12X203E23-4	Overland//ITCI 001744			100	50	166	167	41.3	33.5	7.39	7.39	462	6	6	3	4	19
15		12X203E62-3	Overland//ITCI 001744			100	30	166	168	44.5	34.3	6.00	6.00	375	6	6	3	3	18
16	d	12X203E80-2	Overland//ITCI 001744			90	25	177	180	44.5	35.8	6.32	6.32	395	7	5	5	22	11.8
17	d	12X203E82-1	Overland//ITCI 001744			100	35	165	167	45.3	34.6	6.48	6.48	405	6	6	3	4	19
18	h	2021FO4	MT10121*2/MV11-04	74.8	62.1	100	40	172	172	49.2	38.2	11.42	10.05	714	7	5	4	5	21
19	d	17X9-DH-31	HE181-3/MTF1559			90	40	175	175	43.7	36.6	9.34	9.34	584	7	7	5	24	12.2
20		17X9-DH-40	HE181-3/MTF1559			100	30	174	176	42.5	33.5	8.00	8.00	500	7	7	4	5	23
21		17X9-DH-51	HE181-3/MTF1559			75	20	180	177	46.9	35.4	6.97	6.97	436	6	6	3	3	18
22	d	17X9-DH-55	HE181-3/MTF1559			60	30	175	176	44.9	35.0	8.28	7.29	518	6	6	4	5	21
23	d	17X9-DH-59	HE181-3/MTF1559			100	15	175	177	42.9	35.0	6.38	6.38	399	7	7	3	4	21
24	d	17X9-DH-63	HE181-3/MTF1559			70	20	175	176	40.9	32.3	5.45	5.45	341	7	6	3	4	20
25	d	17X9-DH-64	HE181-3/MTF1559			100	25	175	176	44.5	36.2	8.04	7.08	503	7	6	3	4	20
26	h	17X9-DH-68	HE181-3/MTF1559			70	60	176	175	44.9	37.0	7.77	7.77	486	6	6	7	25	13.1
27	d	17X9-DH-70	HE181-3/MTF1559			100	40	172	172	39.8	31.1	6.76	6.76	423	6	6	5	22	12.0
28	h	MTF21204	HE181-3/MTF1559	84.4	57.9	100	35	176	178	47.2	41.7	7.85	7.85	491	8	7	6	5	26
29		17X9-DH-83	HE181-3/MTF1559			85	40	177	175	39.4	32.3	5.92	5.92	370	6	6	4	4	20
30		17X9-DH-88	HE181-3/MTF1559			85	50	179	178	47.6	39.0	6.70	6.70	419	7	6	5	23	12.6
31		17X9-DH-90	HE181-3/MTF1559			70	40	177	176	43.7	35.8	6.80	6.80	425	7	7	6	6	26
32	d	17X9-DH-94	HE181-3/MTF1559			100	30	174	176	42.5	35.4	7.98	7.02	499	7	6	5	23	12.8
33	d	17X9-DH-97	HE181-3/MTF1559			80	60	177	177	40.9	32.3	6.59	6.59	412	7	6	7	6	26
34	d	17X9-DH-106	HE181-3/MTF1559			100	50	175	175	44.1	37.4	7.07	7.07	442	7	7	6	6	26
35	h	2021FO5	HE181-3/MTF1559	55.3	58.5	70	65	177	176	50.4	40.9	9.58	8.43	599	6	5	6	5	22
36		17X9-DH-114	HE181-3/MTF1559			60	20	176	176	43.3	35.0	8.86	7.80	554	5	5	3	4	17
37	h	17X9-DH-122	HE181-3/MTF1559	71.2	59.5	60	45	176	175	44.1	36.6	8.01	8.01	501	6	7	5	6	24
38		17X9-DH-125	HE181-3/MTF1559			65	25	175	176	43.3	39.0	6.67	6.67	417	6	5	4	4	19
39	d	17X9-DH-129	HE181-3/MTF1559			90	40	174	175	46.1	39.4	7.37	6.49	461	7	5	4	4	20
40		17X9-DH-136	HE181-3/MTF1559			85	50	180	179	40.2	33.1	4.99	4.99	312	7	7	5	6	25
41		17X10-DH-40	OK12206-127206-2/MTF1631			90	40	175	177	38.2	31.5	6.65	6.65	416	6	6	4	4	20
42		17X10-DH-53	OK12206-127206-2/MTF1631			80	50	168	168	39.0	35.0	6.54	6.54	409	6	6	5	5	22
43		17X10-DH-68	OK12206-127206-2/MTF1631			100	50	172	175	46.9	38.6	7.40	7.40	463	7	6	4	5	22

Table 156. 2020 Forage Observation Nursery (FO): Post and Lutz data

Plot	2021 ID h = harvested line d = low SDS and/or high PPO white, possible discard	Cross ID	Pedigree	Seed		Stand		Heading		Plant height		Forage (Post)		Agronomic Score (0-9)				2019 HR data				
				Yield bu/a	Test weight lb/bu	Post	Lutz	Post	Lutz	ton/a	adj g/3'	PLB	JEB	PLB	JEB	Sum	ein	Prot- PPO SDS				
44	d	17X10-DH-69	OK12206-127206-2/MTF1631			90	35	172	174	43.7	34.6	7.44	7.44	465	6	6	4	5	21	12.4	1	2.8
45		17X10-DH-88	OK12206-127206-2/MTF1631			70	55	171	168	40.2	33.9	6.78	6.78	424	5	5	4	4	18	11.8	1	4.4
46		17X10-DH-91	OK12206-127206-2/MTF1631			100	40	171	174	33.5	29.5	6.33	5.57	396	6	5	3	4	18	12.3	1	4.3
47	d	17X10-DH-97	OK12206-127206-2/MTF1631			60	35	179	179	42.9	35.0	8.27	7.28	517	6	7	5	5	23	12.9	1	2.8
48		17X10-DH-98	OK12206-127206-2/MTF1631			90	25	175	177	38.2	34.6	5.41	5.41	338	6	7	2	3	18	12.2	1	3.5
49		17X10-DH-100	OK12206-127206-2/MTF1631			65	40	176	178	44.1	36.2	8.11	7.14	507	6	6	5	6	23	13.4	3	3.1
50		17X10-DH-106	OK12206-127206-2/MTF1631			90	30	170	172	41.3	33.5	6.46	5.68	404	6	6	4	4	20	13.8	1	4.1
51		Willow Creek				60	25	181	182	55.9	42.9	6.14	6.14	384	6	5	3	3	17			
52		Ray				65	60	177	177	38.2	32.7	6.27	5.52	392	7	7	6	6	26			
53		17X10-DH-108	OK12206-127206-2/MTF1631			80	30	171	172	39.8	33.1	6.20	5.46	388	5	6	2	3	16	13.2	0	3.6
54		17X10-DH-114	OK12206-127206-2/MTF1631			80	35	173	173	40.2	32.7	4.94	4.94	309	6	6	3	4	19	12.2	1	4.2
55		17X10-DH-115	OK12206-127206-2/MTF1631			75	30	175	173	41.7	33.5	5.76	5.76	360	7	7	4	5	23	12.2	0	3.9
56		17X10-DH-123	OK12206-127206-2/MTF1631			95	60	171	168	40.6	31.1	7.31	7.31	457	7	6	5	5	23	12.3	1	4.2
57		17X10-DH-131	OK12206-127206-2/MTF1631			100	40	168	167	39.0	30.3	6.62		414	5	5	4	4	18	12.8	1	3.8
58		17X10-DH-133	OK12206-127206-2/MTF1631			90	65	177	174	38.2	29.5	6.27		392	7	6	6	6	25	-	0	4.0
59	h	2021FO14	OK12206-127206-2/MTF1631	71.4	61.8	90	70	173	172	39.0	34.3	7.00	7.00	438	7	5	5	5	22	13.7	1	4.4
60		17X10-DH-138	OK12206-127206-2/MTF1631			85	60	175	171	39.8	31.9	5.53		346	6	6	4	5	21	13.5	1	4.4
61		17X10-DH-141	OK12206-127206-2/MTF1631			100	65	176	172	36.6	30.7	6.54		409	6	7	5	6	24	11.8	1	3.6
62		17X10-DH-167	OK12206-127206-2/MTF1631			90	85	168	165	35.4	30.7	5.17		323	5	5	5	5	20	11.8	1	4.8
63	d	17X11-DH-18	Ray//MTV1681/Jo			100	90	177	175	44.1	37.4	6.72		420	6	6	8	7	27	11.9	5	3.0
64		17X11-DH-27	Ray//MTV1681/Jo			90	70	177	172	40.9	34.6	5.15		322	6	7	7	6	26	11.9	1	4.4
65		17X11-DH-32	Ray//MTV1681/Jo			100	55	175	174	35.4	29.5	5.72		358	5	6	5	6	22	12.7	1	4.0
66		17X11-DH-45	Ray//MTV1681/Jo			100	80	176	168	39.0	32.7	6.04		378	5	6	7	6	24	11.7	1	3.6
67		17X11-DH-55	Ray//MTV1681/Jo			100	70	176	175	38.6	31.5	6.11		382	6	7	7	7	27	12.9	1	4.4
68		17X11-DH-58	Ray//MTV1681/Jo			100	80	171	167	36.6	29.9	6.65		416	6	5	5	6	22	12.9	4	4.6
69		17X11-DH-63	Ray//MTV1681/Jo			95	45	175	172	36.6	31.5	5.60		350	6	6	4	5	21	12.4	1	3.8
70		17X11-DH-68	Ray//MTV1681/Jo			95	75	176	175	39.4	33.1	5.74		359	7	6	6	6	25	11.9	2	3.6
71		17X11-DH-75	Ray//MTV1681/Jo			90	65	173	168	38.2	33.1	6.17		386	7	6	6	5	24	12.9	4	4.2
72		17X11-DH-78	Ray//MTV1681/Jo			100	90	176	176	38.6	32.7	5.71		357	6	6	7	6	25	12.1	4	4.0
73		17X11-DH-82	Ray//MTV1681/Jo			95	80	173	171	35.0	29.1	4.54		284	6	6	5	5	22	12.6	1	3.4
74		17X11-DH-83	Ray//MTV1681/Jo			100	70	173	168	38.2	32.3	5.90		369	6	7	6	6	25	12.3	1	4.5
75		17X11-DH-93	Ray//MTV1681/Jo			95	65	176	173	39.4	35.0	5.92		370	6	6	5	5	22	12.5	2	3.3
76		17X11-DH-99	Ray//MTV1681/Jo			100	50	179	175	38.6	33.5	5.17		323	5	5	4	5	19	12.9	4	3.8
77		17X11-DH-107	Ray//MTV1681/Jo			95	90	173	167	37.0	31.1	5.69		356	6	6	6	6	24	13.0	5	4.0
78		17X11-DH-123	Ray//MTV1681/Jo			100	95	173	168	36.6	34.3	5.52		345	6	5	6	6	23	12.1	4	3.6
79	h	2021FO15	Ray//MTV1681/Jo	80.7	62.2	100	80	176	174	40.6	34.6	6.62	6.62	414	6	6	7	6	25	12.0	4	3.6
80	h	2021FO16	Ray//MTV1681/Jo	75.7	60.7	100	90	176	173	39.8	34.6	6.64	6.64	415	7	7	8	7	29	12.7	1	3.8
81		17X11-DH-158	Ray//MTV1681/Jo			100	65	173	168	37.4	32.3	6.44		403	5	6	5	5	21	12.3	1	3.6
82	h	2021FO17	Ray//MTV1681/Jo	68.5	59.1	95	70	176	174	42.9	33.5	7.37	7.37	461	6	6	6	6	24	11.1	1	3.8
83		17X11-DH-163	Ray//MTV1681/Jo			95	45	176	174	38.2	31.5	5.52		345	6	6	4	5	21	12.0	1	4.4
84		17X11-DH-169	Ray//MTV1681/Jo			100	65	176	175	38.6	32.7	5.64		353	7	7	6	6	26	12.2	4	3.9
85		17X11-DH-179	Ray//MTV1681/Jo			95	50	179	176	40.6	33.1	6.11		382	6	6	5	5	22	12.6	4	4.2
86		13X136E8	MT1088/CH-111.14098//MT1078			85	60	176	171	35.0	27.6	4.24		265	5	5	5	4	19	9.6	4	4.2

Table 156. 2020 Forage Observation Nursery (FO): Post and Lutz data

Plot	2021 ID	Cross ID	Pedigree	Seed		Stand		Heading		Plant height		Forage (Post)		Agronomic Score (0-9)					2019 HR data	
				Yield	Test	Post	Lutz	Post	Lutz	Post	Lutz	ton/a	adj	g/3	PLB	JEB	PLB	JEB	Sum	
				bu/a	weight							ton/a			PLB	JEB	PLB	JEB		Prot- PPO SDS
					lb/bu										####	24-Jul	31-Jul	27-Jul	ein	
87		13X136E9	MT1088/CH-111.14098//MT1078			90	50	172	171	33.9	27.2	5.15		322	5	5	5	4	19	9.7 4 3.8
88		13X136E54	MT1088/CH-111.14098//MT1078			90	80	176	172	34.6	30.3	5.26		329	6	6	5	5	22	10.8 4 4.1
89		Willow Creek				30	20	182	182	50.4	42.9	5.01		313	4	4	4	3	15	
90	h	Ray		75.4	59.9	100	75	178	177	37.8	30.7	6.16	6.16	385	6	6	6	5	23	
91		Ray Zn+				100		178		38.2		6.24		390	6	6				
Average						88.7	51.4	174.6	173.9	41.7	34.4	6.62			6.26	5.96	4.91	4.98	22.1	12.6 2.3 3.6

Table 157. 2020 WSMV Main Study - (Paul Lorenzo thesis): 2 location average

			*** Bozeman data is from untreated rows ***							
Entry	Cultivar/Line	Pedigree	Wsm2/ Cmc4	Wsm1	Yield bu/ac	Test weight lb/bu	Heading date Julian	Plant height cm	Sawfly cutting %	Protein %
locations					2	2	2	2	1	2
43	p 17X4-DH-232	MT1265//MTV1681/Joe	++	-	89.9	61.1	171.7	30.9	36.0	
6	17X4-DH-68	MT1265//MTV1681/Joe	--	-	88.0	61.1	172.1	32.2	26.9	
23	p 17X6-DH-13	MT1265*2/Joe	+-		86.4	62.0	168.5	29.9	36.1	
33	17X4-DH-258	MT1265//MTV1681/Joe	+-	-	86.3	61.7	169.3	33.1	47.6	
49	17X6-DH-104	MT1265*2/Joe	++		85.9	61.3	169.8	33.8	40.4	
48	p 17X6-DH-103	MT1265*2/Joe	++		85.7	62.0	170.8	31.7	31.1	
7	17X4-DH-85	MT1265//MTV1681/Joe	--	-	85.4	61.7	172.1	35.4	34.2	
32	17X4-DH-253	MT1265//MTV1681/Joe	+-	-	85.4	61.0	170.0	32.6	23.1	
29	17X4-DH-45	MT1265//MTV1681/Joe	+-	-	84.9	61.5	172.5	33.7	24.0	
26	p 17X6-DH-91	MT1265*2/Joe	+-		84.7	61.3	170.8	31.4	23.6	
12	17X6-DH-10	MT1265*2/Joe	--		83.6	62.6	172.4	30.3	46.8	
13	17X6-DH-33	MT1265*2/Joe	--		83.2	62.5	171.1	28.4	31.8	
9	17X4-DH-221	MT1265//MTV1681/Joe	--	-	82.6	60.6	172.1	31.8	40.7	
16	17X6-DH-92	MT1265*2/Joe	--		82.6	62.6	166.4	30.5	38.2	
38	17X6-DH-97	MT1265*2/Joe	+-		82.6	61.7	171.9	30.4	16.5	
10	17X4-DH-222	MT1265//MTV1681/Joe	--	-	82.5	60.5	172.8	32.3	48.1	
30	17X4-DH-69	MT1265//MTV1681/Joe	+-	-	82.5	61.6	170.9	30.2	45.9	
3	MTV1681	check			82.2	61.2	170.7	29.1	33.3	
5	Yellowstone	check			81.8	61.5	172.5	30.5	40.3	
24	p 17X6-DH-16	MT1265*2/Joe	+-		81.8	61.4	172.3	31.5	42.8	
31	17X4-DH-97	MT1265//MTV1681/Joe	+-	-	81.1	60.9	169.7	32.5	63.9	
35	17X6-DH-46	MT1265*2/Joe	+-		80.7	61.9	169.4	31.0	28.8	
14	17X6-DH-50	MT1265*2/Joe	--		80.6	61.9	169.9	30.6	45.1	
15	17X6-DH-57	MT1265*2/Joe	--		80.0	62.5	171.6	30.1	48.2	
11	17X4-DH-255	MT1265//MTV1681/Joe	--	-	79.8	61.0	170.3	28.4	18.6	
18	17X4-DH-67	MT1265//MTV1681/Joe	+-	-	79.8	61.6	171.3	28.5	54.6	
21	17X4-DH-231	MT1265//MTV1681/Joe	+-	-	79.6	61.8	169.0	27.8	27.2	
4	Guardian	check			79.5	64.1	164.6	28.4	30.5	
45	p 17X6-DH-71	MT1265*2/Joe	++		79.4	61.4	168.4	30.5	38.9	
19	17X4-DH-177	MT1265//MTV1681/Joe	+-	-	79.1	62.4	170.3	30.1	33.5	
36	17X6-DH-47	MT1265*2/Joe	+-		78.9	63.5	170.6	32.5	10.7	
47	17X6-DH-100	MT1265*2/Joe	++		78.9	60.7	169.3	30.2	35.7	
40	17X4-DH-121	MT1265//MTV1681/Joe	++	-	78.7	62.3	169.3	29.3	34.9	
1	MT1265	check			78.5	60.2	173.3	30.9	32.3	
34	17X6-DH-45	MT1265*2/Joe	+-		78.5	61.8	168.3	32.0	22.9	
44	17X4-DH-240	MT1265//MTV1681/Joe	++	-	78.3	60.6	172.1	28.9	36.3	
46	17X6-DH-87	MT1265*2/Joe	++		78.3	62.1	171.9	32.5	39.6	
25	17X6-DH-56	MT1265*2/Joe	+-		78.2	61.8	168.5	30.2	40.0	
39	17X4-DH-100	MT1265//MTV1681/Joe	++	-	77.7	60.8	172.2	29.1	48.7	
28	17X4-DH-33	MT1265//MTV1681/Joe	+-	-	77.6	62.4	172.5	29.0	60.5	
17	17X4-DH-49	MT1265//MTV1681/Joe	+-	-	77.5	61.7	171.3	28.7	37.7	
2	KS Dallas	check			77.1	62.6	167.2	27.1	33.2	
42	17X4-DH-224	MT1265//MTV1681/Joe	++	-	76.2	61.5	171.5	30.7	72.5	
27	17X6-DH-98	MT1265*2/Joe	+-		76.0	62.1	170.2	30.6	36.4	
22	17X4-DH-254	MT1265//MTV1681/Joe	+-	-	75.8	61.3	170.8	28.6	49.9	
41	17X4-DH-151	MT1265//MTV1681/Joe	++	-	75.3	61.9	172.8	29.4	51.3	
8	17X4-DH-207	MT1265//MTV1681/Joe	--	-	74.1	61.0	168.1	29.5	53.8	
20	17X4-DH-205	MT1265//MTV1681/Joe	+-	-	72.8	62.2	165.7	29.5	43.4	
37	17X6-DH-79	MT1265*2/Joe	+-		72.1	62.7	168.0	31.2	20.8	
Average					80.5	61.7	170.4	30.6	37.9	
LSD (0.05)					8.7	0.7	1.5	1.3	17.0	
C. V. (%)					5.4	0.6	0.4	2.2	30.2	

bold = indicates highest value within a column

p = lines in 2021 Preliminary A Test

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 158. 2020 WSMV Main Study - (Paul Lorenzo thesis) 4 reps x 49 entries: Bozeman

Entry	Cultivar/Line	Pedigree	Wsm2/ Cmc4	Yield			Test weight (lb/bu)			Stand % 12-May	Heading date Julian		WSMV % neg. leaves	Plant height (cm)			Protein %	
				PBS	WSMV	RCB	PBS	WSMV	RCB		LAT	RCB		PBS control	WSMV treated	RCB	PBS	WSMV
				100%	102%		101%	96%	100%	98%	106%		95%	106%	105%		100%	
1	MT1265	check		99.4	91.6		60.7	60.8	-0.1	78	175.1		96	85.8	85.3			
2	KS Dallas	check		105.1	102.3		63.4	62.8	0.6	99	169.5		99	79.2	78.9			
3	MTV1681	check		105.3	106.4		61.6	61.5	0.2	98	173.9		96	81.6	82.0			
4	Guardian	check		106.4	106.0		64.7	64.9	-0.2	99	166.1		100	79.0	79.0			
5	Yellowstone	check		107.3	100.6		61.8	61.6	0.2	93	175.5		93	85.1	85.4			
6	17X4-DH-68	MT1265/MTV1681/Joe	--	115.7	107.8		62.0	61.6	0.4	98	174.3		92	91.7	93.0			
7	17X4-DH-85	MT1265/MTV1681/Joe	--	117.6	103.7		62.8	62.3	0.5	99	174.2		71	98.5	98.9			
8	17X4-DH-207	MT1265/MTV1681/Joe	--	95.0	98.7		61.4	61.2	0.2	98	170.6		87	83.7	84.3			
9	17X4-DH-221	MT1265/MTV1681/Joe	--	106.5	103.5		61.0	60.8	0.2	93	174.2		70	90.2	90.5			
10	17X4-DH-222	MT1265/MTV1681/Joe	--	107.8	97.9		61.5	61.1	0.4	95	175.0		92	89.0	88.3			
11	17X4-DH-255	MT1265/MTV1681/Joe	--	101.8	92.3		61.6	61.8	-0.2	98	172.3		89	79.7	80.0			
12	17X6-DH-10	MT1265*2/Joe	--	109.0	105.0		63.5	63.1	0.4	98	174.0		71	84.8	84.6			
13	17X6-DH-33	MT1265*2/Joe	--	107.2	101.7		63.5	63.2	0.4	98	172.9		89	83.0	81.9			
14	17X6-DH-50	MT1265*2/Joe	--	107.7	97.9		62.8	62.4	0.4	96	172.6		66	85.2	84.5			
15	17X6-DH-57	MT1265*2/Joe	--	101.9	108.3		63.5	63.4	0.2	99	173.7		75	83.7	83.8			
16	17X6-DH-92	MT1265*2/Joe	--	106.3	103.2		63.4	63.1	0.3	100	168.2		70	86.9	86.9			
17	17X4-DH-49	MT1265/MTV1681/Joe	+-	101.5	105.0		62.5	62.5	0.1	100	173.4		86	81.5	81.3			
18	17X4-DH-67	MT1265/MTV1681/Joe	+-	103.8	97.7		62.4	62.6	-0.3	98	173.4		93	78.9	79.8			
19	17X4-DH-177	MT1265/MTV1681/Joe	+-	102.3	106.3		63.1	62.7	0.4	96	172.3		98	85.7	87.6			
20	17X4-DH-205	MT1265/MTV1681/Joe	+-	92.0	92.1		62.6	62.5	0.1	100	167.6		98	84.0	84.0			
21	17X4-DH-231	MT1265/MTV1681/Joe	+-	103.0	99.8		62.3	62.8	-0.6	99	172.1		95	78.4	77.3			
22	17X4-DH-254	MT1265/MTV1681/Joe	+-	102.5	103.2		62.0	62.3	-0.4	95	173.3		94	80.2	80.6			
23	p 17X6-DH-13	MT1265*2/Joe	+-	117.3	103.6		62.5	62.7	-0.2	99	170.6		97	85.3	85.0			
24	p 17X6-DH-16	MT1265*2/Joe	+-	107.0	111.7		62.0	62.4	-0.5	100	175.1		95	90.1	90.1			
25	17X6-DH-56	MT1265*2/Joe	+-	99.6	106.1		62.4	62.7	-0.3	99	170.1		97	86.8	85.6			
26	p 17X6-DH-91	MT1265*2/Joe	+-	110.1	108.6		61.6	61.9	-0.3	99	173.9		85	89.6	89.3			
27	17X6-DH-98	MT1265*2/Joe	+-	96.4	106.1		62.7	62.8	-0.1	100	173.2		99	86.2	86.3			
28	17X4-DH-33	MT1265/MTV1681/Joe	+-	99.9	106.2		62.6	62.5	0.1	99	175.5		93	81.2	81.8			
29	17X4-DH-45	MT1265/MTV1681/Joe	+-	110.0	101.6		62.0	61.6	0.5	98	174.6		82	96.3	95.9			
30	17X4-DH-69	MT1265/MTV1681/Joe	+-	109.2	108.7		62.2	62.2	0.0	99	173.5		94	86.4	85.8			
31	17X4-DH-97	MT1265/MTV1681/Joe	+-	109.0	98.3		61.5	61.0	0.5	100	173.4		73	90.1	91.5			
32	17X4-DH-253	MT1265/MTV1681/Joe	+-	108.8	100.4		61.5	61.7	-0.3	100	172.8		93	90.9	89.8			
33	17X4-DH-258	MT1265/MTV1681/Joe	+-	112.6	103.1		62.3	61.9	0.4	100	170.9		85	93.6	93.3			
34	17X6-DH-45	MT1265*2/Joe	+-	104.6	94.6		62.2	62.0	0.1	100	171.5		77	90.3	89.9			
35	17X6-DH-46	MT1265*2/Joe	+-	100.3	90.9		62.4	61.7	0.7	96	171.9		93	86.2	85.6			
36	17X6-DH-47	MT1265*2/Joe	+-	99.7	96.1		64.0	63.3	0.7	98	173.4		84	89.3	89.8			
37	17X6-DH-79	MT1265*2/Joe	+-	89.3	88.6		63.0	62.6	0.5	99	170.8		84	87.2	86.0			

Table 158. 2020 WSMV Main Study - (Paul Lorenzo thesis) 4 reps x 49 entries: Bozeman

Entry	Cultivar/Line	Pedigree	Wsm2/ Cmc4	Wsm1	Yield			Test weight (lb/bu)			Stand % 12-May	Heading date Julian	WSMV % neg. leaves	Plant height (cm)			Protein %		
					PBS	WSMV	RCB	PBS	WSMV	PBS- WSMV				PBS control	WSMV treated	PBS- WSMV	PBS	WSMV	RCB
					100%	102%		101%	96%	100%	98%	106%	95%	106%	105%	100%			
38	17X6-DH-97	lattice efficiency relative to RCB			106.1	102.6		62.2	62.1	0.0	100	174.9	97	87.0	85.3	1.5			
39	17X4-DH-100	MT1265*2/Joe	-+																
40	17X4-DH-101	MT1265/MTV1681/Joe	++		104.1	102.9		61.0	61.6	-0.6	99	174.5	98	81.7	81.8	-0.3			
41	17X4-DH-121	MT1265/MTV1681/Joe	++		100.6	103.9		62.9	62.6	0.3	99	172.0	99	81.9	81.3	0.6			
42	17X4-DH-151	MT1265/MTV1681/Joe	++		95.9	99.3		61.9	62.3	-0.4	98	175.9	100	81.3	81.3	0.0			
43	17X4-DH-224	MT1265/MTV1681/Joe	++		102.8	104.1		62.2	62.5	-0.3	99	173.5	100	85.4	85.8	-0.1			
44	17X4-DH-232	MT1265/MTV1681/Joe	++		117.3	112.9		62.1	62.0	0.1	98	174.3	97	88.0	88.3	-0.3			
45	17X4-DH-240	MT1265/MTV1681/Joe	++		101.1	105.9		60.9	61.4	-0.4	98	174.7	100	81.2	80.9	0.4			
46	17X6-DH-71	MT1265*2/Joe	++		101.6	104.7		61.7	61.9	-0.2	99	171.3	100	85.7	85.5	-0.1			
47	17X6-DH-87	MT1265*2/Joe	++		102.3	97.4		62.4	62.4	0.0	98	174.4	95	92.7	91.8	1.1			
48	17X6-DH-100	MT1265*2/Joe	++		103.6	114.2		61.4	61.7	-0.3	98	171.3	98	87.0	87.9	-0.5			
49	17X6-DH-103	MT1265*2/Joe	++		109.0	112.8		62.5	62.2	0.3	100	173.5	99	89.6	89.6	0.1			
50	17X6-DH-104	MT1265*2/Joe	++		116.3	108.7		61.8	61.9	-0.1	100	173.4	96	94.8	94.1	0.6			
Average					104.9	102.5		62.3	62.2	0.1	97.7	172.8	90.4	86.2	86.0	0.1			
LSD (0.05)					12.1	10.7		0.5	0.8	ns	5.2	1.1	16.3	2.1	2.0	ns			
C. V. (%)					8.2	7.5		0.6	0.9	931	3.8	0.5	12.9	1.7	1.7	1191			
P-value (Varieties)					0.0008	0.0003		<0.0001	<0.0001	0.174	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	0.2323			

bold = indicates highest value within a column
bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 159. 2020 WSMV Main Study - (Paul Lorenzo thesis) 4 reps x 49 entries: Havre

Entry	Cultivar/Line	Pedigree	Wsm2/ Cmc4	Wsm1	Yield bu/ac	Test weight lb/bu	Stand %	Heading date Julian	Plant height cm	Sawfly cutting %	Protein %
					LAT	LAT	RCB	LAT	RCB	LAT	LAT
lattice efficiency relative to RCB					113%	107%	98%	114%	103%	129%	105%
1	MT1265	check			57.5	59.7	78	171.4	71.4	32.3	14.0
2	KS Dallas	check			49.0	61.8	99	164.9	58.3	33.2	14.1
3	MTV1681	check			59.1	60.7	98	167.5	66.2	33.3	14.0
4	Guardian	check			52.6	63.5	99	163.0	65.3	30.5	14.7
5	Yellowstone	check			56.2	61.2	93	169.5	70.0	40.3	13.9
6	17X4-DH-68	MT1265//MTV1681/Joe	--	-	60.3	60.2	98	169.9	72.0	26.9	13.9
7	17X4-DH-85	MT1265//MTV1681/Joe	--	-	53.1	60.6	99	169.9	81.4	34.2	14.8
8	17X4-DH-207	MT1265//MTV1681/Joe	--	-	53.2	60.5	98	165.5	66.3	53.8	14.5
9	17X4-DH-221	MT1265//MTV1681/Joe	--	-	58.7	60.1	93	170.0	71.3	40.7	13.5
10	17X4-DH-222	MT1265//MTV1681/Joe	--	-	57.2	59.5	95	170.5	75.1	48.1	14.5
11	17X4-DH-255	MT1265//MTV1681/Joe	--	-	57.7	60.4	98	168.2	64.5	18.6	14.9
12	17X6-DH-10	MT1265*2/Joe	--		58.1	61.6	98	170.7	69.2	46.8	13.7
13	17X6-DH-33	MT1265*2/Joe	--		59.1	61.4	98	169.3	61.4	31.8	13.6
14	17X6-DH-50	MT1265*2/Joe	--		53.5	60.9	96	167.1	70.3	45.1	14.2
15	17X6-DH-57	MT1265*2/Joe	--		58.1	61.4	99	169.4	69.2	48.2	14.0
16	17X6-DH-92	MT1265*2/Joe	--		58.9	61.7	100	164.6	68.2	38.2	13.6
17	17X4-DH-49	MT1265//MTV1681/Joe	+-	-	53.4	60.8	100	169.2	64.4	37.7	14.1
18	17X4-DH-67	MT1265//MTV1681/Joe	+-	-	55.8	60.8	98	169.2	65.8	54.6	14.0
19	17X4-DH-177	MT1265//MTV1681/Joe	+-	-	55.8	61.7	96	168.2	67.2	33.5	13.7
20	17X4-DH-205	MT1265//MTV1681/Joe	+-	-	53.6	61.7	100	163.7	66.0	43.4	14.1
21	17X4-DH-231	MT1265//MTV1681/Joe	+-	-	56.1	61.3	99	165.9	62.8	27.2	14.3
22	17X4-DH-254	MT1265//MTV1681/Joe	+-	-	49.0	60.5	95	168.2	65.2	49.9	14.5
23	p 17X6-DH-13	MT1265*2/Joe	+-		55.4	61.5	99	166.3	66.8	36.1	13.9
24	p 17X6-DH-16	MT1265*2/Joe	+-		56.6	60.7	100	169.4	70.0	42.8	14.1
25	17X6-DH-56	MT1265*2/Joe	+-		56.8	61.1	99	166.9	66.4	40.0	13.8
26	p 17X6-DH-91	MT1265*2/Joe	+-		59.2	61.0	99	167.7	70.1	23.6	13.9
27	17X6-DH-98	MT1265*2/Joe	+-		55.6	61.4	100	167.1	69.2	36.4	14.5
28	17X4-DH-33	MT1265//MTV1681/Joe	-+	-	55.3	62.2	99	169.4	66.3	60.5	14.3
29	17X4-DH-45	MT1265//MTV1681/Joe	-+	-	59.7	60.9	98	170.3	75.0	24.0	14.5
30	17X4-DH-69	MT1265//MTV1681/Joe	-+	-	55.8	60.9	99	168.3	66.8	45.9	14.5
31	17X4-DH-97	MT1265//MTV1681/Joe	-+	-	53.1	60.2	100	166.0	75.0	63.9	13.9
32	17X4-DH-253	MT1265//MTV1681/Joe	-+	-	61.9	60.4	100	167.1	74.6	23.1	14.1
33	17X4-DH-258	MT1265//MTV1681/Joe	-+	-	59.9	61.0	100	167.7	74.7	47.6	13.8
34	17X6-DH-45	MT1265*2/Joe	-+		52.3	61.4	100	165.0	72.1	22.9	14.8
35	17X6-DH-46	MT1265*2/Joe	-+		61.0	61.3	96	166.9	71.1	28.8	13.8
36	17X6-DH-47	MT1265*2/Joe	-+		58.1	63.0	98	167.7	75.6	10.7	14.5
37	17X6-DH-79	MT1265*2/Joe	-+		54.8	62.3	99	165.2	71.3	20.8	13.9
38	17X6-DH-97	MT1265*2/Joe	-+		59.1	61.2	100	168.9	67.3	16.5	14.0
39	17X4-DH-100	MT1265//MTV1681/Joe	++	-	51.2	60.6	99	169.8	66.1	48.7	14.4
40	17X4-DH-121	MT1265//MTV1681/Joe	++	-	56.7	61.6	99	166.6	66.8	34.9	14.0
41	17X4-DH-151	MT1265//MTV1681/Joe	++	-	54.6	61.8	98	169.7	68.2	51.3	14.6
42	17X4-DH-224	MT1265//MTV1681/Joe	++	-	49.6	60.7	99	169.4	70.6	72.5	14.8
43	p 17X4-DH-232	MT1265//MTV1681/Joe	++	-	62.5	60.1	98	169.0	69.1	36.0	13.7
44	17X4-DH-240	MT1265//MTV1681/Joe	++	-	55.5	60.3	98	169.4	65.5	36.3	14.3
45	p 17X6-DH-71	MT1265*2/Joe	++		57.1	61.0	99	165.4	69.3	38.9	13.9
46	17X6-DH-87	MT1265*2/Joe	++		54.3	61.8	98	169.3	72.5	39.6	14.6
47	17X6-DH-100	MT1265*2/Joe	++		54.2	59.9	98	167.3	66.6	35.7	13.9
48	p 17X6-DH-103	MT1265*2/Joe	++		62.4	61.5	100	168.0	71.4	31.1	13.1
49	17X6-DH-104	MT1265*2/Joe	++		55.4	60.7	100	166.2	76.9	40.4	14.1
Average					56.2	61.1	97.7	167.9	69.1	37.9	14.1
LSD (0.05)					5.8	0.8	5.2	2.5	5.2	17.0	0.4
C. V. (%)					7.0	0.9	3.8	1.0	5.3	30.2	1.8
P-value (Varieties)					<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001

bold = indicates highest value within a column

p = lines in 2021 Preliminary A Test

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p=0.05)

Table 160. 2020 WSMV 2nd Study - (Paul Lorenzo thesis) 4 reps x 25 entries: Bozeman

Entry	Cultivar/Line	Pedigree	Wsm1	Wsm2	Awms	Yield bu/a			Test weight (lb/bu)			Stand %	Heading date	Forage weight (g/2ft sample)		Plant height (cm)		Protein %	
						PBS control	WSMV control	RCB	PBS control	WSMV control	RCB			PBS control	WSMV control	PBS control	WSMV control	PBS control	WSMV control
		lattice efficiency relative to RCB				105%	102%		141%	112%	101%	100%							
1	Ray	check	-	-		102.7	103.8		61.1	61.0	0.03	98	176.3	128.9	116.1	96.0	95.4	0.6	
2	MTV1681	check	+	-	+	101.9	101.1		61.9	61.6	0.25	90	175.0	103.5	104.7	81.1	79.9	1.3	
3	Mace	check	+	-	+	74.3	79.3		62.4	62.4	-0.03	85	168.0	85.4	100.9	70.1	71.0	-0.9	
4	Guardian	check	-	+	+	94.2	95.1		64.1	64.5	-0.25	96	167.5	94.4	113.0	78.9	77.6	1.3	
5	17X11-DH-36	Ray/MTV1681/Joel	-	-	+	106.4	97.4		62.5	62.8	-0.28	95	174.0	117.1	106.1	82.6	83.5	-0.9	
6	17X11-DH-71	Ray/MTV1681/Joel	-	-	+	89.0	97.1		62.0	61.8	0.05	95	175.8	116.0	122.4	96.6	96.5	0.1	
7	17X11-DH-121	Ray/MTV1681/Joel	-	-	+	89.6	82.3		63.5	63.0	0.30	98	172.5	96.6	97.5	80.4	79.3	1.1	
8	17X11-DH-37	Ray/MTV1681/Joel	-	-		107.9	102.7		60.0	59.7	0.20	99	175.8	121.9	127.4	91.5	91.3	0.3	
9	17X11-DH-120	Ray/MTV1681/Joel	-	-		106.6	106.5		60.7	60.0	0.55	100	177.0	117.0	136.0	107.9	106.6	1.3	
10	17X11-DH-153	Ray/MTV1681/Joel	-	-		105.3	104.7		60.6	59.9	0.78	95	176.0	123.4	126.3	108.3	107.3	1.0	
11	17X11-DH-127	Ray/MTV1681/Joel	-	+	+	114.1	120.3		61.4	61.8	-0.25	99	175.0	114.8	125.0	91.1	90.5	0.6	
12	17X11-DH-145	Ray/MTV1681/Joel	-	+	+	102.5	96.4		62.7	63.0	-0.25	96	173.3	106.2	107.6	85.6	87.1	-1.5	
13	17X11-DH-167	Ray/MTV1681/Joel	-	+	+	81.8	101.5		61.6	61.4	0.08	98	175.0	106.8	120.7	95.3	94.9	0.4	
14	17X11-DH-28	Ray/MTV1681/Joel	-	+		107.4	112.7		61.5	61.3	0.18	96	175.0	116.7	136.1	91.9	92.8	-0.9	
15	17X11-DH-136	Ray/MTV1681/Joel	-	+		104.0	110.0		62.8	63.1	-0.20	100	175.3	107.3	117.8	99.6	98.6	1.0	
16	17X11-DH-183	Ray/MTV1681/Joel	-	+		92.9	98.3		63.1	62.6	0.58	94	175.3	109.5	99.8	92.3	91.1	1.1	
17	17X11-DH-47	Ray/MTV1681/Joel	+	-	+	91.1	95.4		62.3	62.2	0.20	95	173.0	95.0	113.3	87.3	86.9	0.4	
18	17X11-DH-165	Ray/MTV1681/Joel	+	-	+	97.8	105.6		62.1	61.9	0.28	100	173.5	107.4	120.2	85.5	86.0	-0.5	
19	17X11-DH-172	Ray/MTV1681/Joel	+	-	+	103.4	115.5		62.4	62.1	0.30	95	175.8	105.1	117.9	90.4	90.8	-0.4	
20	17X11-DH-64	Ray/MTV1681/Joel	+	-		100.0	98.7		61.9	61.3	0.60	99	174.5	104.3	112.9	83.9	84.6	-0.8	
21	17X11-DH-137	Ray/MTV1681/Joel	+	-		111.6	108.3		62.7	62.6	0.03	99	175.8	111.9	126.6	98.4	98.5	-0.1	
22	17X11-DH-174	Ray/MTV1681/Joel	+	-		105.8	105.7		61.8	62.0	-0.15	95	176.0	110.6	132.8	95.6	95.4	0.3	
23	17X11-DH-87	Ray/MTV1681/Joel	+	+		93.7	101.5		62.0	62.0	0.08	96	171.0	111.0	113.6	87.0	86.6	0.4	
24	17X11-DH-122	Ray/MTV1681/Joel	+	+		107.5	111.2		62.2	62.3	-0.10	98	173.5	114.0	118.0	92.8	91.6	1.1	
25	17X11-DH-173	Ray/MTV1681/Joel	+	+		103.3	107.6		61.5	61.5	0.00	96	176.0	124.6	109.2	103.1	102.5	0.6	
Average						99.8	102.3		62.0	61.9	0.1	96.2	174.2	110.0	116.9	90.9	90.6	0.3	
LSD (0.05)						12.6	13.1		0.6	0.5	ns	5.1	1.0	16.3	15.4	2.1	1.7	2.0	
C. V. (%)						8.6	9.1		0.6	0.6	393.5	3.8	0.4	9.9	9.4	1.6	1.3	507.2	
P-value (Varieties)						0.0001	<.0001		<.0001	<.0001	0.0925	0.0002	<.0001	0.0002	<.0001	<.0001	<.0001	0.0349	0.0245

bold = indicates highest value within a column
bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p = 0.05)

Table 157. 2017-2019 Montana Intrastate Winter Wheat (Exp. 35): Cereal Quality Evaluations

ID	Whole Kernel					Flour				
	PPO		Hardness		Protein %		Yield %		Protein %	
	2019	2yr	3yr	2019	2yr	3yr	2019	2yr	3yr	L*
AAC Wildfire	0.232	0.249		73.1			71.4	71.8	12.5	89.3
Bobcat	0.239	0.248	0.236	65.8	68.8		71.5	72.3	12.2	89.5
Brawl CLP	0.224	0.245	0.258	68.0	71.7		71.3	71.0	12.0	89.8
Byrd CL Plus	0.267	0.263	0.274	64.6	66.9		69.6	70.4	10.6	90.1
Flathead	0.204	0.220	0.233	69.1	71.6		72.3	72.9	12.0	90.2
FourOsix	0.215	0.220	0.236	69.2	73.5		69.6	71.3	12.1	89.7
Incline AX	0.176	0.202		67.0			68.9	69.4	10.3	90.0
Judee	0.227	0.231	0.235	75.6	77.1		70.4	71.1	12.3	89.6
Keldin	0.250	0.274	0.291	63.6	65.8		69.9	70.4	11.4	89.8
LCS Jet	0.203	0.226	0.253	65.3	67.6		71.8	72.4	11.4	89.5
Loma	0.117	0.129	0.142	71.0	75.3		72.1	72.5	11.5	89.1
MT1642	0.125	0.128		75.6			70.7	70.9	11.7	89.6
MT1683	0.196	0.212		72.2			70.5	70.8	11.6	89.3
MT1745	0.241			69.6			71.0		10.9	89.5
MT1746	0.109			66.6			70.0		11.4	90.0
MT1787	0.199			70.2			71.8		11.8	89.1
MT1793	0.230			67.6			70.8		12.0	89.7
MTCL1732	0.261			72.6			69.5		11.3	89.5
MTCL1737	0.178			77.3			71.2		11.5	89.2
MTW1491	0.101	0.115	0.109	71.6	75.4		71.6	72.0	11.5	89.7
Northern	0.087	0.097	0.095	79.9	82.8		71.4	70.7	11.6	88.8
StandClear CLP	0.288	0.283		66.7			72.8	72.8	12.4	89.0
SY Clearstone 2CL	0.218	0.240	0.255	73.6	74.6		69.4	69.7	11.8	89.6
SY Legend CL2	0.292			71.3			68.4		11.4	89.2
SY Monument	0.140	0.170	0.185	75.5	77.8		72.0	72.4	10.9	89.7
SY Wolverine	0.245			67.1			71.4		11.5	89.7
Warhorse	0.208	0.234	0.245	79.8	84.4		69.9	70.2	12.4	89.4
WB4269	0.178			66.4			69.8		10.6	89.7
WB4311	0.232			68.5			71.1		11.6	89.6
WB4418	0.198			82.3			68.6		11.1	89.0
Yellowstone ^{1/}	0.194	0.221		72.0			70.1	70.6	11.9	89.5
Average	0.202	0.210	0.218	70.9	73.8		70.7	71.3	11.6	89.5
LSD (0.05)	0.046	0.031	0.030	6.9	4.3		1.5	0.9	0.8	0.4
C.V.	16.3	14.8	17.1	7.0	5.9		1.5	1.3	4.8	0.3

^{1/} = Yellowstone misplanted in 2017

bold, bold-underlined, ns denotes statistical significance at P <= 0.05, highest value, and non-significance within column, respectively

Table 157. 2017-2019 Montana Intrastate Winter Wheat (Exp. 35): Cereal Quality Evaluations

ID	Flour color			b*			Whole Wheat Ash (%)			Flour Ash (%)			Tolerance			Mixograph		
	a*												2019			2019		
	2019	2yr	3yr	2019	2yr	3yr	2019	2yr	3yr	2019	2yr	3yr	2019	2yr	3yr	2019	2yr	3yr
AAC Wildfire	-1.88	-1.83		12.3	12.0		1.52	1.49		0.42	0.42		4.5	4.1		4.3	4.7	
Bobcat	-2.16	-2.08	-1.96	12.8	12.4	12.1	1.54	1.48	1.46	0.39	0.39	0.40	3.3	3.4	3.2	4.2	4.7	5.5
Brawl CLP	-1.87	-1.81	-1.81	10.8	10.3	10.6	1.50	1.43	1.42	0.38	0.38	0.39	2.8	2.6	2.8	3.9	3.8	4.0
Byrd CL Plus	-1.91	-1.83	-1.82	11.0	10.6	10.9	1.50	1.42	1.42	0.39	0.38	0.38	3.5	3.1	2.8	3.6	4.0	4.3
Flathead	-1.34	-1.20	-1.20	9.6	9.1	9.2	1.43	1.42	1.39	0.41	0.41	0.41	4.3	4.1	4.0	7.9	7.8	8.7
FourOsix	-1.65	-1.52	-1.52	10.9	10.4	10.5	1.48	1.43	1.41	0.40	0.41	0.41	3.5	3.1	2.9	4.6	4.7	5.0
Incline AX	-1.95	-1.88		11.2	11.0		1.51	1.50		0.40	0.39		3.8	3.5		3.3	3.9	
Judee	-1.70	-1.56	-1.59	11.1	10.5	10.7	1.50	1.46	1.44	0.40	0.40	0.40	3.5	3.3	3.3	5.5	5.4	5.1
Keldin	-1.46	-1.34	-1.37	10.0	9.6	9.8	1.44	1.37	1.36	0.42	0.42	0.43	3.5	3.0	3.0	3.8	4.3	4.6
LCS Jet	-1.68	-1.59	-1.57	11.3	10.9	11.1	1.43	1.39	1.36	0.36	0.37	0.38	4.0	3.6	3.4	4.3	4.9	5.0
Loma	-2.22	-2.09	-2.06	13.4	12.7	12.9	1.48	1.50	1.45	0.39	0.39	0.40	3.5	3.5	3.3	4.7	5.3	5.8
MT1642	-1.53	-1.41		10.6	10.0		1.47	1.45		0.39	0.40		4.5	4.1		6.8	7.0	
MT1683	-1.69	-1.59		11.4	10.9		1.48	1.48		0.40	0.41		4.3	3.9		6.1	6.7	
MT1745	-1.70			11.1			1.48			0.38			4.3			5.0		
MT1746	-1.79			10.5			1.49			0.42			3.8			4.2		
MT1787	-1.64			11.5			1.48			0.43			3.5			4.1		
MT1793	-1.39			9.2			1.46			0.40			2.8			4.3		
MTCL1732	-1.28			9.5			1.45			0.40			3.8			4.4		
MTCL1737	-1.79			11.5			1.48			0.43			2.8			4.0		
MTW1491	-1.50	-1.37	-1.35	10.4	10.0	10.1	1.44	1.45	1.41	0.39	0.40	0.40	3.8	3.9	3.8	6.6	6.8	7.5
Northern	-1.57	-1.45	-1.47	11.4	10.9	11.1	1.44	1.42	1.42	0.45	0.45	0.45	3.0	3.0	2.8	3.3	3.2	3.4
StandClear CLP	-1.80	-1.64		12.0	11.6		1.47	1.42		0.42	0.40		3.0	3.1		3.1	3.6	
SY Clearstone 2CL	-1.72	-1.61	-1.60	11.1	10.5	10.7	1.46	1.45	1.44	0.41	0.41	0.41	4.0	3.6	3.7	4.4	4.9	5.3
SY Legend CL2	-1.84			12.1			1.42			0.42			3.5			3.6		
SY Monument	-1.61	-1.50	-1.49	10.7	10.1	10.3	1.40	1.37	1.37	0.37	0.38	0.39	4.5	4.1	3.8	6.3	6.9	7.4
SY Wolverine	-1.98			11.5			1.41			0.38			1.3			3.6		
Warhorse	-1.68	-1.57	-1.57	11.1	10.5	10.8	1.44	1.42	1.40	0.42	0.42	0.41	2.3	2.3	2.1	3.8	4.1	4.1
WB4269	-2.09			11.8			1.35			0.42			3.0			3.2		
WB4311	-1.75			10.9			1.32			0.39			4.0			3.2		
WB4418	-1.51			10.7			1.45			0.45			3.3			3.1		
Yellowstone ^{1/}	-1.55	-1.45		10.9	10.4		1.48	1.45		0.41	0.41		4.0	3.9		6.2	6.7	
Average	-1.72	-1.61	-1.60	11.1	10.7	10.8	1.46	1.44	1.41	0.40	0.40	0.40	3.5	3.5	3.2	4.5	5.2	5.4
LSD (0.05)	0.13	0.12	0.09	0.3	0.4	0.4	0.07	0.60	0.05	0.03	0.02	0.01	1.2	0.7	0.6	1.2	0.9	1.0
C.V.	5.40	7.6	7.5	2.2	3.5	4.6	3.6	4.2	4.5	4.7	4.2	3.7	24.0	20.7	23.9	18.4	17.2	22.1

^{1/} = Yellowstone misplanted in 2017

bold, bold-underlined, ns denotes statistical significance at P <= 0.05, highest value, and non-significance within column, respectively

Table 157. 2017-2019 Montana Intrastate Winter Wheat (Exp. 35): Cereal Quality Evaluations

ID	Test Bake											
	Absorption %			Mix time (min.)			Absorption %			Bake		
	2019	2yr	3yr	2019	2yr	3yr	2019	2yr	3yr	2019	2yr	3yr
AAC Wildfire	64.3	66.0		10.0	11.1		74.0	76.1		1070	1071	
Bobcat	64.2	65.7	66.9	10.7	10.7	12.3	74.5	76.0	77.2	1108	1088	1083
Brawl CLP	64.8	65.9	65.3	7.7	7.0	6.8	75.0	76.0	75.3	1071	1059	1057
Byrd CL Plus	60.4	62.4	63.3	8.0	7.6	8.1	70.3	72.1	73.1	981	996	1009
Flathead	64.7	66.6	67.0	16.3	16.0	16.8	75.2	76.9	77.5	1088	1074	1075
FourOsix	63.7	65.6	66.4	9.9	9.8	10.1	73.5	75.3	76.3	1135	1119	1119
Incline AX	58.8	61.3		6.9	7.9		68.5	71.0		979	983	
Judee	65.7	66.9	65.8	9.4	8.8	8.2	75.3	76.6	75.6	1194	1163	1150
Keldin	62.4	64.4	64.3	7.0	7.3	7.5	72.6	74.5	74.3	1038	1028	1022
LCS Jet	60.7	63.4	64.2	7.6	8.1	8.2	72.0	74.5	75.0	1019	988	988
Loma	62.5	64.9	65.3	10.2	11.3	11.6	72.9	75.5	75.8	1153	1155	1142
MT1642	64.1	67.2		11.4	12.2		74.6	77.6		1143	1141	
MT1683	64.6	66.7		12.7	12.5		75.0	76.9		1134	1109	
MT1745	62.2			10.0			73.3			990		
MT1746	62.2			7.9			72.6			1054		
MT1787	62.6			8.4			73.3			1013		
MT1793	64.2			12.2			74.7			1084		
MTCL1732	63.1			9.4			74.3			1031		
MTCL1737	62.3			7.1			71.6			1050		
MTW1491	63.5	65.4	66.0	13.6	14.2	14.9	74.3	76.3	76.9	1083	1088	1070
Northern	62.2	63.8	64.0	4.8	4.9	4.7	71.4	73.3	73.3	1085	1084	1078
StandClear CLP	63.6	65.2		7.5	7.5		73.4	75.3		1079	1087	
SY Clearstone 2CL	63.4	65.1	65.0	7.8	8.2	8.0	73.3	74.9	74.8	1109	1085	1077
SY Legend CL2	62.8			6.0			72.8			1074		
SY Monument	62.4	64.5	64.8	14.7	14.8	14.5	74.2	75.1	75.5	1011	1013	1015
SY Wolverine	60.6			5.7			70.4			1019		
Warhorse	65.1	66.2	65.7	6.3	6.2	6.1	75.2	76.2	75.8	1136	1116	1109
WB4269	57.5			5.8			69.2			863		
WB4311	60.9			5.0			70.7			1060		
WB4418	59.8			5.3			69.6			969		
Yellowstone ^{1/}	64.9	66.5		12.1	12.1		75.3	76.9		1098	1095	
Average	62.7	65.2	65.3	8.9	9.9	9.9	73.0	75.3	75.4	1062	1077	1071
LSD (0.05)	2.2	1.5	1.5	2.6	2.0	2.1	2.4	1.6	1.6	62	41	31
C.V.	2.4	2.3	2.9	20.9	20.8	25.9	2.3	2.2	2.6	4.2	3.8	3.5

^{1/} = Yellowstone misplanted in 2017

bold, bold-underlined, ns denotes statistical significance at $P < 0.05$, highest value, and non-significance within column, respectively

2019 Winter Wheat Cereal Quality Data

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Laboratory Procedures & Interpretation

Sample Preparation: Incoming wheat samples are cleaned on a Carter dockage tester to remove foreign material and then scoured in a Forster scourer to remove light dust and chaff. Samples are then placed in pre-labeled cans for quality analysis.

Whole Grain Analysis: Wheat samples are analyzed using an Infratec 1225 Grain Analyzer. This is a near infrared transmittance (NIT) instrument for simultaneous and accurate determination of protein and moisture in whole grain samples. The measurement is based on the fact that these constituents in grain absorb electromagnetic radiation in the near-infrared region of the spectrum. NIT-analysis, like all other spectrophotometric measurements, is an indirect method. Having a good calibration for reliable analysis is essential. Our instrument utilizes a calibration provided by the manufacturer. The LECO FP-528 combustion method nitrogen analyzer is used as a reference method. Wheat protein is corrected to a 12% moisture basis.

Milling: Once the moisture is determined (Infratec 1225), a calculated amount of water is added to the sample. The sample is rotated for 30 minutes to provide proper mixing and uniform distribution of moisture. Twenty-four hours before milling the wheat is tempered; spring wheat is tempered to 15.5% moisture and winter wheat is tempered to 15% moisture.

Samples submitted for milling and test bake and Asian noodle evaluation are milled on the Brabender Automat Mill. Approximately 600 g to 1000g of wheat sample is milled, to obtain flour, bran, and shorts/middlings. This mill recovers at least 98% of the wheat as flour, bran, shorts and middlings. Protein and moisture content and physical dough tests are determined using the flour fraction. The flour is then baked to determine bake absorption, mixing time, bread volume and crumb grain score. These are all indicators of baking quality. Selected flours are also evaluated for Asian noodle quality.

Micromilling: Early generation samples submitted for mixograph data can be milled using a Brabender Junior. Samples are tempered 24 hours prior to milling. Spring wheats are tempered to 15.5% moisture and winter wheats are tempered to 15% moisture. Approximately 100 g of wheat sample is milled to obtain two fractions, flour and bran (exosperm). The flour is shifted through a #100 screen to remove shorts then protein and moisture content and mixograph properties are determined using the flour fraction.

Whole Wheat Milling: Samples submitted for whole wheat bake tests are ground using a UDY Cyclone mill with a 0.5 mm screen. SDS sedimentation, whole wheat ash, evaluation and moisture by oven samples are ground on the Perten 3303, which does not dry the samples.

Flour Yield: Percent flour yield is calculated by dividing the flour by the total product (flour, bran, and shorts/middlings).

Flour Color: Flour color is measured using a Minolta Color Meter, and L* (brightness), a* (green – red) and b* (blue – yellow) attached with Minolta Granular-Materials Attachment (CR-A50).

Flour Ash: The mineral content of the flour or an evaluation of much outer layers (i.e. aleurone, pericarp, bran, etc.) are in the flour. The approximate ash content of the endosperm is 0.30 - 0.50% and whole wheat is 1.2 - 1.8%. The percent ash from a 3-5 g sample of flour ignited and heated for 18 hours at 580°C in a muffle furnace. Percent ash = (weight of residue)/(weight of sample) x 100. Flour ash is corrected to a 14% moisture basis (AACC Method 08-01). Whole wheat ash is reported AS IS basis according to oven moisture data.

Flour Moisture: The INF 1241 Grain Analyzer (near infrared reflectance) system is used for routine flour moisture determination. The reference method uses 2-3 g of flour heated in an aluminum dish in a mechanical-convection oven for 1 hr at 130°C, allowed to cool in a desiccator and weighed (AACC Method 44-15A).

Flour Protein: The INF 1241 Grain Analyzer system is used for routine flour protein determination. The combustion method is used as the reference method. The LECO FP-528 nitrogen analyzer, combusts 0.25 g flour in an oxygen atmosphere followed by a series of catalytic reactions that result in nitrogen gas. The gas is utilized for determining the total protein. Percent crude protein = % nitrogen x 5.70. Flour protein is corrected to a 14% moisture basis. AACC Method 46-30.

SDS Sedimentation: This test is a measure of protein quality; giving a good correlation with loaf volume. A 0.45 g (14% m.b.) whole meal sample is placed in a 10 ml graduated cylinder and 5 ml water containing Methylene Blue is added. Cylinders are vortexed at 0, 2 and 4 minutes. Immediately after the last vortex, 5 ml SDS-lactic reagent is added and cylinders are mixed by gentle inversion (4 times) using an aliquot mixer. Inversion is repeated at 2, 4 and 6 minutes. Contents of the cylinders were allowed to settle for 20 minutes before the sedimentation volumes were read. SDS Sedimentation is a very important test in breeders' early generation samples. Because it is more efficient than running mixographs and requires less than a gram of flour, it has become the method of choice for early generation material.

Mixogram:

This is a test of the mixing properties of a dough. The quality of a loaf of bread is strongly dependent on the mixing, and for each combination of flour and mixer it is possible to find an optimum stage of dough development. Ten grams of flour on a 14% moisture basis are weighed and mixed at optimum water absorption. As long as there is only flour mixing in the mixograph there is no resistance. When water is added, the dough development starts, and this is seen as an ascending part of the mixing curve. The mixograph curve suggests mixing time requirement, tolerance and optimum water absorption. Depending on the dough strength of the flour, the curve will reach a maximum; either as a well-defined peak or as a plateau. After further mixing, a decrease in the mixing curve is recorded and the breakdown starts. Dough breakdown behavior is

reflected in the tail of the curve when mixing continues beyond the mixing peak and is commonly referred to as mixing tolerance. A dough with good mixing tolerance will have a broader “window of opportunity” for a baker to stop the dough at optimum development. Good dough mixing tolerance would also indicate that bread dough should be elastic after mixing. The point of optimum dough development is at the maximum in the mixing curve or slightly after the peak. The rate of breakdown shows the stability of the dough and its sensitivity to mechanical treatment. Attached is an example of a graded mixogram. The mixogram is still an important test in breeders’ early generation samples. It tells us if the sample will have good mixing properties and can therefore be screened at a very early stage without actually baking. (AACC Method 54-40)

For desirable bread-type flour with adequate flour protein, a mixogram should indicate high water absorption, moderate mixing times (3-6 minutes), strong gluten strength, and good dough mixing tolerance. The mixograms are visually evaluated for correct water absorption, gluten strength and mixing time. Mixogram curves of bread-type flours with undesirable traits (low flour protein, extreme mixing times, poor mixing tolerance, weak gluten strength and low water absorption) are often eliminated from the breeding program.

- **Mixogram Absorption:** Optimum flour water absorption is visually evaluated by the swings of the mixogram curve. Absorption is reported as percent by weight, corrected to a 14% flour moisture basis. Mixogram absorption is a function of protein content, variety, flour moisture and environment. Mixogram absorption is used to estimate the bread baking absorption.
- **Mixogram Mixing Time:** The time in minutes required for optimum dough development. It is the maximum point on the mixing curve or slightly after the peak. Mixogram mixing time is largely a function of protein content and environment. Extremely long mixing time is considered undesirable because the power and time requirements would not be economical for a commercial bakery. Also, extremely long mixing time is often associated with tough, bucky doughs, which do not perform properly in a mechanized bakery. Mixogram mixing time is used to approximate the optimum bread dough mixing time.
- **Mixogram Type:** The desirable qualities of good bread wheat are largely associated with the quantity and quality of its protein. The quantity is influenced mainly by environmental factors, but the quality of protein is mainly a heritable characteristic. A high-quality variety produces good bread over a fairly wide range of protein percentages, whereas a low-quality variety may produce relatively poor-quality bread even when its protein content is high. Mixograms are typed according to protein content/quality and tolerance. Protein content/quality is divided into three categories: Low (less than 10%), Medium (10% - 12.9%) and High (13% or greater). The mixogram of an 11% protein flour may be classified as high if the height of the curve reflects that of a flour with a 13% or better protein; meaning the protein in the flour is of a higher quality. Tolerance is scored 0-9(weak to strong). Tolerance is measured between

the 3rd and 4th minute after the mixogram has come to a peak, which was determined by intersecting lines crossing in the middle of the mixogram envelope Front to Back.

Bread Baking:

Baking 100 g flour loaves is applicable to determine effect of environment, variety, and wheat flour components. This procedure provides an optimized bread-making method for evaluating bread wheat flour quality. All ingredients are incorporated in the initial mixing step. The method is a 90 min, sugar-based, fermented dough system. The bread formula contains 100 g (flour corrected to 14% moisture basis), 6 g sugar, 3.5 g shortening, 1.8 g yeast, 1.5 g salt, 180 ppm Doh-Tone (fungal alpha-amylase), and 150 ppm ascorbic acid as an oxidant. In the test, mixing time, oxidation level, fermentation time, and water absorption are optimized and balanced. (AACC Method 10-10B)

- **Bake Absorption:** The amount of water required to make a dough of proper consistency for bread baking when mixed to optimum conditions based on the feel and appearance of the dough as judged by an experienced baker.
- **Bake Mixing Time:** The time required in minutes for dough to reach point of minimum mobility. The test baker determines optimum mixing time. The appearance of the dough changes during mixing. The lumpy mass obtained after initial wetting is transformed into a coherent mass that exhibits elasticity. When optimum development is reached, the dough has elastic properties and appears smooth across the pins. If mixing is continued beyond the peak of development (over mixed), the dough becomes very sticky, extensible, and appears shiny.
- **Bake Volume:** The volume of a loaf of bread is determined by canola seed displacement. Loaf volume is a good measurement of protein quality.
- **Crumb Grain Score:** Subjective judgement of crumb grain quality is determined by an experienced baker. The bread is allowed to cool on racks 2 hours before the appearance of the loaf is noted and the crumb grain graded. The general appearance and inside cellular structure is what determines a quality crumb grain. Scoring values are rated from unsatisfactory to excellent numerically evaluated 1-5, 5 being the best.
- **Bread Color:** Bread color is measured using a Minolta Color Meter, and L* (brightness), a* (green – red) and b* (blue – yellow). First the bread is cut into approx. 1 inch slices and the crust is cut away. The internal pieces of the bread is then pressed through the smooth roller of an Atlas Pasta Maker. Two bread “sheets” are stacked for bread color measurement.
- **Visual** – This is a subjective evaluation of the color of the internal crumb of the bread. 1 = gray; 2 = dull; 3 = yellow; 4 = creamy; 5 = bright white.

Chinese Raw Noodle Making:

This method was selected because it emphasizes differences in noodle color between flours. Formula contains 100 g flour (14% moisture basis) and 29.2 g salt water solution (4.29% w/v). Water absorption is held constant. Dough sheets and noodles are prepared using an Otake Laboratory Noodle Machine. (Oriental Noodle Technology – 1998 AACC Short Course, Wheat Marketing Center, Portland, OR)

- **Noodle Score:** The score is a subjective evaluation of noodle processing in addition to color stability. The score is additive, incorporating Machining (Mixing, Sheeting and Slitting) = Sample Score X 20 points, Dough sheet appearance = Sample Score X 5 points, and Color stability = Sample Score X 20 points. The higher the number the better the performance. The standard control flour, comparable to Australian Premium Hard White Wheat (APH), is assigned a score of 7 for each measurement evaluated. (140+35+140=315 total points). Experimental samples are scored (1-10) against the standard control flour.
- **Noodle Color:** A bright and creamy color is desirable for Chinese raw noodles. Noodle color is evaluated by instrumental measurement at 0 and 24 hours after noodles are made. The noodle sheets color is measured using the Minolta Color Meter, and L* (brightness), a* (green – red) and b* (blue – yellow) values are taken. It has been found that the L* value of noodle sheet is positively correlated with the noodle sensory brightness score, namely, the higher the L* value, the better the noodle color. The value for a* is negatively correlated with noodle brightness and should be minimized for better noodle color. For bamee or hokkien style noodles, it is important to maximize b* for a more yellow noodle.
- **Noodle Texture Profile Analysis:** The TA.XT2 Texture Analyzer is used to measures the textural properties of cooked noodles. This involves two passes of a ¼ inch flat probe into five strands of noodles. A curve is generated by which many factors can be determined to provide an accurate assessment of the noodle characteristics. Noodles were cooked in boiling water for 5 minutes, drained and cooled in ice water prior to analysis. A subset of noodles was returned to hot water for an additional 5 minutes then cooled and analyzed to determine cooking tolerance. Results for each set of noodles are labeled as 0M and 5M, respectively.
 - ◆ **Noodle firmness** (hardness) – the peak force during the first compression on noodles by the probe. This parameter is related to sensory noodle bite.
 - ◆ **Noodle springiness** – indicates the degree of recovery after compression by the probe. This parameter is related to sensory noodle springiness.
 - ◆ **Noodle cohesiveness** – is a measure of the extent to which noodle structure is disrupted during the first compression by the probe. This parameter may be associated with sensory noodle bite and springiness.
 - ◆ **Noodle adhesiveness** – is the negative force between the first and the second peak (work necessary to overcome the attractive forces between

the surface of the noodle and the surface of the probe), and it is theoretically related to noodle stickiness to teeth at biting. However, this parameter usually has large experimental variations, and can be misleading.

- ◆ **Resilience** – is how much the noodle fights to regain its shape.
- ◆ Note: **Chewiness** (applies to solid products) and **Gumminess** (applies to semi-solid products) are mutually exclusive and are artificial artifacts. Considered to be poor tests.

References:

American Association of Cereal Chemists. Approved Methods of the AACCC, 9th ed. The Association: St. Paul, MN. (1995).

Table 1. 2019 Winter Wheat Cereal Quality Lab Entries: Mill & Bake (and Noodle) lines

CQL Sample #	Class	2019 WW Entry #	Cultivar/Line	Pedigree	Mill & Noodle Bake	
Intrastate Winter Wheat (Exp. 35): Bozeman, Havre, Huntley, and Conrad						
INT-1	HRW	1	Yellowstone	Montana, 2005	x	x
INT-2	HRW	2	Judee	Montana, 2011	x	
INT-3	HRW	3	Warhorse	Montana, 2013	x	
INT-4	HRW	4	Brawl CLP	Colorado Wheat Res. Fdn., 2011	x	
INT-5	HRW	6	SY Clearstone 2CL	Montana/Syngenta, 2012	x	
INT-6	HRW	7	Northern	Montana, 2015	x	x
INT-7	HRW	8	Loma	Montana, 2016	x	
INT-8	HRW	9	Keldin	WestBred, 2011	x	x
INT-9	HRW	10	FourOsix	Montana, 2018 (MT1465)	x	x
INT-10	HWW	13	NuMont (MTW1491)	Montana/Thresher Mills, 2020	x	x
INT-11	HRW	14	SY Monument	Syngenta (AgriPro), 2015	x	
INT-12	HRW	16	SY Legend CL2	Syngenta, 2018	x	
INT-13	HRW	17	SY Wolverine	Syngenta 2019	x	
INT-14	HRW	18	WB4269	WestBred, 2017	x	
INT-15	HRW	19	WB4311	WestBred, 2017	x	
INT-16	HRW	20	WB4418	WestBred, 2017	x	
INT-17	HRW	23	LCS Jet	Limagrain Cereal Seeds, 2015	x	
INT-18	HRW	26	Incline AX	Colorado Wheat Res. Fdn., 2017	x	
INT-19	HRW	28	Byrd CL Plus	Colorado, 2018	x	
INT-20	HRW	29	AAC Wildfire	Alberta; (SECAN), 2015	x	x
INT-21	HRW	33	Flathead	Montana, 2019	x	x
INT-22	HRW	34	Bobcat	Montana, 2019	x	x
INT-23	HRW	35	StandClear CLP	Montana/Nutrien, 2019	x	
INT-24	HRW	36	MT1642	Yellowstone/Madsen//Yellowstone	x	x
INT-25	HRW	37	MT1683	Yellowstone(L)*2/CDC Buteo	x	x
INT-26	HRW	38	MTCL1732	AP035-8-1/5/MT08134/4/YLL*4/3/MTCL01158/CDC T	x	x
INT-27	HRW	39	MTCL1737	YLL-2CL/3/YLL*2/Pelsart//PROM/3*YLL	x	x
INT-28	HRW	40	MT1745	Decade*2/NI06732	x	x
INT-29	HRW	41	MT1746	MT06103//MTW0881/SD06W166	x	x
INT-30	HRW	46	MT1787	MT08185//YLL*2/PI640431/3/PROM/3*YLL//YLL*2/Pe	x	x
INT-31	HRW	47	MT1793	Decade-Fhb1	x	x
Advanced Winter Wheat (Exp. 14): Bozeman, Havre, Huntley, and Conrad						
ADV-1	HRW	1	Yellowstone	check	x	x
ADV-2	HRW	2	Judee	check	x	
ADV-3	HRW	4	Warhorse	check	x	
ADV-4	HRW	5	SY Monument	check	x	
ADV-5	HRW	10	MTS1810	08X350-A6/Warhorse	x	x
ADV-6	HRW	12	MTS1831	MTS0907/MTS0827	x	x
ADV-7	HRW	13	MTS18116	Loma*2/Warhorse	x	x
ADV-8	HRW	16	MTS18149	Loma*2/AAC Gateway	x	x
ADV-9	HRW	22	MT1845	Yellowstone/493-22(Reeder/6*Paul)	x	x
ADV-10	HRW	23	MT1848	Northern//MT08184/MT0887	x	x
ADV-11	HRW	25	MT1855	05X438-aC71(MT0097*2//Jagalene/Choteau)/Roughri	x	x
ADV-12	HRW	26	MT1866	MT0859//00X83cE45/MT0698	x	x
ADV-13	HRW	27	MT1867	MT0859//00X83cE45/MT0698	x	x
ADV-14	HRW	28	MT1872	MT0859//MT0840/MT0873	x	x

Table 1. 2019 Winter Wheat Cereal Quality Lab Entries: Mill & Bake (and Noodle) lines

CQL Sample #	Class	2019 WW Entry #	Cultivar/Line	Pedigree	Mill & Noodle Bake

Sawfly Winter Wheat (Exp. 58): Bozeman, Havre, and Big Sandy

SF-1	HRW	1	Yellowstone	check	all tests from here on, are mill and bake only
SF-2	HRW	2	Judee	check	
SF-3	HRW	4	Warhorse	check	
SF-4	HRW	5	Loma	check	
SF-5	HRW	6	Bobcat	check	
SF-6	HRW	7	StandClear CLP	check (formerly MTCS1601)	
SF-7	HRW	13	MTS1810	08X350-A6/Warhorse	
SF-8	HRW	15	MTS1831	MTS0907/MTS0827	
SF-9	HRW	16	MTS18116	Loma*2/Warhorse	
SF-10	HRW	19	MTS18149	Loma*2/AAC Gateway	
SF-11	HRW	27	MTS1903	(Judee sib, MTS0819)//08X350-A6/Warhorse	
SF-12	HRW	32	MTS1908	(Judee sib, MTS0819)//08X350-A6/Warhorse	
SF-13	HRW	38	MTS1914	MTS1585//Loma/AAC Gateway	
SF-14	HRW	39	MTS1915	MTS1596//Emerson/Spur	
SF-15	HRW	40	MTS1916	MTS1596//Emerson/Spur	
SF-16	HRW	42	MTS1918	Judee//MTS0907/MTS0827	
SF-17	HRW	43	MTS1919	Warhorse*2/Accipiter	
SF-18	HRW	44	MTS1920	Warhorse*2/Accipiter	
SF-19	HRW	46	MTS1922	08X350-A6/Warhorse	

Preliminary A Winter Wheat (Exp. 36): Bozeman, Huntley, Conrad and Moccasin

PreA-1	HRW	1	Yellowstone	check	
PreA-2	HRW	3	Judee	check	
PreA-3	HRW	4	SY Monument	check	
PreA-4	HRW	8	MTCL19149	MTCL1125/MT1091	
PreA-5	HRW	10	MTCL19151	MT0871/(06X445B1-2, SY Clearstone sib)	
PreA-6	HRW	11	MTCL19152	MT0871/(06X445B1-2, SY Clearstone sib)	
PreA-7	HRW	12	MTCL19153	MT0871/(06X445B1-2, SY Clearstone sib)	
PreA-8	HRW	18	MT19159	Northern//02X22cE38/MT10121	
PreA-9	HRW	32	MT19173	HV9W04-1594R/Accipiter	
PreA-10	HRW	34	MT19175	SD08198/Northern	
PreA-11	HRW	35	MT19176	MTW1098//Yellowstone-Lr41/Decade	
PreA-12	HRW	42	MT19183	MT1078//AAC Gateway/MT1265	
PreA-13	HRW	45	MT19186	MT1090//MT08185/MT0742	
PreA-14	HRW	48	MT19189	MT1084//MT08184/CO04575(cl)	
PreA-15	HRW	52	MT19193	Yellowstone/SD08W015	
PreA-16	HRW	55	MT19196	Northern//Yellowstone/MTW0880	

Preliminary B Winter Wheat (Exp. 37): Bozeman

PreB-1	HRW	4	MT19106	09x257cD9-2/DecadeFhb1-DH7	
PreB-2	HRW	13	MT19115	DecadeFhb1-DH11/Overland FHB-1	
PreB-3	HRW	14	MT19116	DecadeFhb1-DH11/Overland FHB-1	
PreB-4	HRW	15	MT19117	DecadeFhb1-DH11/Overland FHB-1	
PreB-5	HRW	20	MT19122	DecadeFhb1-DH11/Overland FHB-1	
PreB-6	HRW	21	MT19123	DecadeFhb1-DH13//MT1078/Langin	
PreB-7	HRW	26	MT19128	DecadeFhb1-DH13//MT1078/Langin	
PreB-8	HRW	30	MT19132	MT1078//Colter/Emerson	
PreB-9	HRW	31	MT19133	MT1078//Judee/Emerson	

Table 1. 2019 Winter Wheat Cereal Quality Lab Entries: Mill & Bake (and Noodle) lines

CQL Sample #	Class	2019 WW Entry #	Cultivar/Line	Pedigree	Mill & Noodle Bake
PreB-10	HRW	32	MT19134	MT1078//Judee/Emerson	
PreB-11	HRW	33	MT19135	MT1078//Judee/Emerson	
PreB-12	HRW	40	MT19142	MT1332/DecadeFhb1-DH17	
PreB-13	HRW	41	MT19143	MTS1596//Emerson/Spur	
PreB-14	HRW	42	MT19144	MTS1596//Emerson/Spur	
PreB-15	HRW	43	MT19145	MTS1596//Emerson/Spur	
PreB-16	HRW	44	Decade	check	
PreB-17	HRW	45	Yellowstone	check	
PreB-18	HRW	47	MT1793	check	

Preliminary C Winter Wheat (Exp. 39): Bozeman and Big Sandy

PreC-1	HRW	1	Yellowstone	check
PreC-2	HRW	2	Warhorse	check
PreC-3	HRW	3	Loma	check
PreC-4	HRW	4	Bobcat	check
PreC-5	HRW	22	MTS1943	MTS1584*2/Loma
PreC-6	HRW	24	MTS1945	MTS1584*2/Loma
PreC-7	HRW	33	MTS1954	MTS1584*2/Loma

Preliminary D Winter Wheat (Exp. 40): Bozeman

PreD-1	HRW	1	Yellowstone	check
PreD-2	HRW	2	Warhorse	check
PreD-3	HRW	3	Loma	check
PreD-4	HRW	4	Bobcat	check
PreD-5	HRW	5	MTS1971	Loma*2/MTS1574
PreD-6	HRW	10	MTS1976	Loma*2/MTS1574
PreD-7	HRW	36	MTS19102	MTS1412*2/Warhorse

Sawfly Observation (SFO): Bozeman

SFO-1	HRW	SFO - 2	Warhorse	check
SFO-2	HRW	34	MTCS2061	Warhorse/MTCS1203
SFO-3	HRW	41	MTCS2062	Warhorse/MTCS1203
SFO-4	HRW	60	MTCS2063	MTCS1203//MTS1021/MTCL1003
SFO-5	HRW	202	Warhorse	check
SFO-6	HRW	229	MTS2064	(Judee sib, MTS0819-98)//MTS1017/MTS1177
SFO-7	HRW	259	MTS2065	Warhorse//MTS1028/MTS1030
SFO-8	HRW	402	Warhorse	check
SFO-9	HRW	503	MTS2066	Warhorse*2/Loma
SFO-10	HRW	507	MTS2067	Warhorse/Loma//MTS1594
SFO-11	HRW	541	MTS2068	(Judee sib, MTS0819)//08X350-A6/Warhorse
SFO-12	HRW	584	MTS2069	(Judee sib, MTS0819)/MV17-04//Judee
SFO-13	HRW	588	MTS2070	Decade/(MTS0819, Judee sib)
SFO-14	HRW	591	MTS2071	Decade/(MTS0819, Judee sib)
SFO-15	HRW	598	MTS2072	MTS0832/Spur
SFO-16	HRW	602	Warhorse	check
SFO-17	HRW	611	MTS2073	MTS1054//Warhorse/MTS1008
SFO-18	HRW	613	MTS2074	(Colter sib, MT08177)/MTS0916//MTS0826
SFO-19	HRW	619	MTS2075	MT10105/Warhorse//MTS1011
SFO-20	HRW	627	MTS2076	MT10105/Warhorse//MTS1011

Table 1. 2019 Winter Wheat Cereal Quality Lab Entries: Mill & Bake (and Noodle) lines

CQL Sample #	Class	2019 WW Entry #	Cultivar/Line	Pedigree	Mill & Noodle Bake
SFO-21	HRW	645	MTS2077	Judee//16FAWWON-Irr-87/(MT0977, Northern sib)	
SFO-22	HRW	647	MTS2078	Judee//MTS1023/16FAWWON-Irr-87	
SFO-23	HRW	649	MTS2079	(Judee sib, MTS0819)/MV17-04//Judee	
SFO-24	HRW	659	MTS2080	Decade/(MTS0819, Judee sib)	
SFO-25	HRW	663	MTS2081	Judee/MTS1014	
SFO-26	HRW	703	MTS2082	Warhorse*2/Accipiter	
SFO-27	HRW	704	MTS2083	Warhorse*2/Accipiter	
SFO-28	HRW	712	MTS2084	Warhorse*2/Accipiter	

Single Rep. Observation 'A' (SROA): Bozeman

SROA-1	HRW	SROA-1	Yellowstone	check
SROA-2	HRW	59	MT2001	Yellowstone*4//Cap19/Vida/3/MT08185
SROA-3	HRW	92	MT2002	MT0871//MT1088/Decade
SROA-4	HRW	106	MT2003	MT1088*2/Decade
SROA-5	HRW	107	MT2004	MT1088*2/Decade
SROA-6	HRW	182	MTCL2005	MTCL1260//MTCL1125/MT1091
SROA-7	HRW	214	MTCL2006	MT1137/MTCL1067
SROA-8	HRW	251	Yellowstone	check
SROA-9	HRW	266	MTCL2007	MTCL1125/MT1091
SROA-10	HRW	267	MTCL2008	MTCL1125/MT1091
SROA-11	HRW	269	MTCL2009	MTCL1125/MT1091
SROA-12	HRW	275	MTCL2010	MT0871/(06X445B1-2, SY Clearstone sib)
SROA-13	HRW	278	MTCL2011	MT0871/(06X445B1-2, SY Clearstone sib)
SROA-14	HRW	280	MTCL2012	MT0871/(06X445B1-2, SY Clearstone sib)
SROA-15	HRW	282	MTCL2013	MT0871/(06X445B1-2, SY Clearstone sib)
SROA-16	HRW	292	MTCL2014	MT0871/(06X445B1-2, SY Clearstone sib)
SROA-17	HRW	293	MTCL2015	MT0871/(06X445B1-2, SY Clearstone sib)
SROA-18	HRW	325	MT2016	MT1137/MT1078//MT1149
SROA-19	HRW	331	MT2017	MT10113//MT1145/MT10102
SROA-20	HRW	345	MT2018	MT1149//MT10102/MT10116
SROA-21	HRW	386	MT2019	MT10114/MT10128//MTW1251
SROA-22	HRW	392	MT2020	Northern//MT1143/06X424B6
SROA-23	HRW	411	MT2021	MT10113//((474-23, winter McNeal)/MT10121
SROA-24	HRW	419	MT2022	Overland//((457-12, winter McNeal)/MT10128
SROA-25	HWW	423	MTW2023	WB3768*2/(10K1726w, Yellowstone white)
SROA-26	HRW	445	MT2024	Northern//((10K1676w, Yellowstone white)/WB3768
SROA-27	HRW	459	MT2025	YLL//Cap19/Vida
SROA-28	HRW	461	MT2026	YLL//Cap19/Vida
SROA-29	HRW	464	MT2027	YLL//Cap19/Vida
SROA-30	HRW	499	MT2028	MT10113//MT0871/MT1151
SROA-31	HRW	501	Yellowstone	check
SROA-32	HRW	522	MT2029	MT1240//MT1088/02X172E31-4
SROA-33	HWW	544	MTW2030	Northern//03X378cE8/MT0990
SROA-34	HWW	546	MTW2031	Northern//03X378cE8/MT0990
SROA-35	HRW	557	MT2032	MT1285//03X378cE8/MT10102
SROA-36	HRW	560	MT2033	MT1285//03X378cE8/MT10102
SROA-37	HRW	567	MT2034	MT1285//03X378cE8/MT10102
SROA-38	HRW	683	MT2035	MT1235//KS09HW140/MT10122
SROA-39	HWW	686	MTW2036	MT1235//KS09HW140/MT10122
SROA-40	HRW	699	MT2037	Northern//MT1088/SY Wolf
SROA-41	HRW	718	MT2038	MT1088*2/SY Wolf

Table 1. 2019 Winter Wheat Cereal Quality Lab Entries: Mill & Bake (and Noodle) lines

CQL Sample #	Class	2019 WW Entry #	Cultivar/Line	Pedigree	Mill & Noodle Bake
SROA-42	HRW	734	MT2039	Colter/MT1105	
SROA-43	HRW	749	MT2040	MT1088/MT1156	
SROA-44	HRW	751	Yellowstone	check	
SROA-45	HRW	766	MT2041	MT1088/MT1156	
SROA-46	HRW	771	MT2042	MT1090/MT1276	
SROA-47	HRW	804	MT2043	MT1105//MT1156	
SROA-48	HRW	838	MT2044	MT1285/OK08539	
SROA-49	HRW	850	MT2045	MT0871/NI10712	
SROA-50	HRW	881	MT2046	MT1240/Redfield	
SROA-51	HRW	916	MT2047	Yellowstone//((493-22, Reeder/6*Paul)/3/MT0871	
SROA-52	HRW	927	MT2048	Northern//02X22cE38/MT10121	
SROA-53	HRW	941	MT2049	Colter//03X273cEx/MT10105	
SROA-54	HRW	945	MT2050	MT10121//Yellowstone/SD08W015	
SROA-55	HRW	965	MT2051	Overland//MTW1098/KS08HW88	
SROA-56	HRW	978	MT2052	Judith/OK06332//MT0990	
SROA-57	HRW	1001	Yellowstone	check	
SROA-58	HRW	1016	MT2053	HV9W04-1594R/Accipiter	
SROA-59	HRW	1025	MT2054	MT10104//MTW0785/Yellowstone-Lr41	
SROA-60	HRW	1030	MT2055	MT10104//MTW0785/Yellowstone-Lr41	
SROA-61	HRW	1039	MT2056	(Northern sib, MT0977)//MT0859/MT0938	
SROA-62	HRW	1044	MT2057	Robidoux//MT08185/MT0861	
SROA-63	HRW	1063	MT2058	MT10116//MT0861/MTW0785	
SROA-64	HRW	1066	MT2059	MT08185//YLL*2/PI640431/3/PROM/3*YLL/YLL*2/Pelsart	
SROA-65	HRW	1068	MT2060	MT08185//YLL*2/PI640431/3/PROM/3*YLL/YLL*2/Pelsart	

Table 2. 2019 Bozeman, MT (Exp. 3501) Intrastate Winter Wheat Nursery - Mill & Bake and Noodle Data

VARIETY	x = in 2021 test	CLASS	PO	Single Kernel Hardness	Wheat protein, % (12 m.b.)	Flour Yield %	Flour Protein%(14% m.b.)	Flour Color			Type	Mixograph			Test Bake		
								L*brightness	A*green-red	B*blue-yellow		Tolerance	Mixing Time Min	Water Absorption%	Mixing Time Min	Water Absorption%	Crumb Grain
AAC Wildfire	x	HRW	0.232	79.3	12.4	72.6	11.1	89.6	-2.07	12.2	MH	5	3.2	61.8	8.2	71.5	1050
Bobcat	x	HRW	0.244	60.8	11.6	73.8	10.6	89.5	-2.09	12.1	M	5	3.9	61.5	11.2	72.2	1020
Brawl CLP	x	HRW	0.233	67.8	12.3	71.8	10.6	90.1	-2.03	10.7	M	2	3.3	63.9	6.9	73.6	1080
Byrd CL Plus	x	HRW	0.311	64.1	11.0	71.6	9.5	90.5	-2.01	11.1	M	5	3.0	58.3	5.8	68.0	950
Flathead	x	HRW	0.259	68.0	11.3	73.9	10.4	90.1	-1.42	9.2	M	5	6.2	61.8	12.5	71.5	1025
FourOsix	x	HRW	0.218	68.1	11.7	73.3	10.7	90.3	-1.77	10.5	M	5	3.2	59.8	6.4	69.5	1065
Incline AX		HRW	0.220	57.8	10.6	70.7	8.9	90.6	-2.04	11.1	M	3	3.4	57.4	5.1	67.1	950
Judee	x	HRW	0.260	84.9	12.3	71.8	11.1	89.8	-1.82	11.1	M	4	4.9	63.4	9.6	73.1	1145
Keldin	x	HRW	0.281	64.7	11.6	72.5	9.6	90.3	-1.53	9.7	M	4	2.8	57.8	4.8	69.5	985
LCS Jet		HRW	0.197	71.2	11.6	73.4	10.2	89.7	-1.77	11.2	M	4	3.9	59.2	6.9	72.4	975
Loma	x	HRW	0.125	59.7	11.5	73.7	10.6	89.9	-2.39	13.1	M	4	4.5	60.5	10.1	71.2	1125
MT1642		HRW	0.142	71.1	11.8	72.4	10.7	90.1	-1.65	10.3	M	5	5.7	61.5	10.0	71.2	1085
MT1683		HRW	0.190	71.3	12.1	72.4	9.7	89.8	-1.84	11.2	M	4	4.6	62.3	9.6	72.5	1105
MT1745	x	HRW	0.226	66.2	11.2	72.3	9.9	89.6	-1.78	10.8	M	4	3.7	58.3	8.6	69.5	980
MT1746		HRW	0.128	62.9	11.8	71.5	10.5	90.2	-1.86	10.3	MH	4	3.3	58.4	5.8	68.6	1040
MT1787		HRW	0.202	66.4	12.0	73.3	10.8	89.4	-1.76	11.3	MH	4	3.1	58.8	6.1	68.5	975
MT1793		HRW	0.222	62.1	12.5	72.2	11.0	90.0	-1.47	9.0	M	4	3.6	62.9	10.4	73.6	1090
MTCL1732		HRW	0.305	67.1	11.6	71.6	9.9	90.0	-1.35	9.1	M	4	3.9	59.5	7.4	70.7	1040
MTCL1737	x	HWW	0.200	72.6	12.2	71.9	11.2	89.5	-1.85	11.0	M	4	2.8	58.2	5.8	68.4	1045
StandClear CLP	x	HRW	0.274	66.0	12.2	74.0	11.0	89.7	-2.13	12.2	M	4	3.3	62.3	7.3	72.5	1075
MTW1491		HWW	0.090	68.9	11.2	72.8	9.4	90.2	-1.62	10.1	M	4	4.8	59.6	9.1	70.8	1025
Northern	x	HRW	0.086	72.4	11.6	72.2	10.3	88.8	-1.63	10.8	M	4	2.5	58.0	3.7	67.7	1060
SY Clearstone 2CL	x	HRW	0.215	77.4	12.2	70.9	11.0	90.0	-1.85	10.9	M	4	4.0	63.4	7.2	73.1	1125
SY Legend CL2		HRW	0.284	59.6	11.1	70.2	9.2	89.7	-2.04	11.9	MH	4	2.9	56.7	5.0	67.4	915
SY Monument		HRW	0.101	68.3	11.1	73.4	9.8	90.2	-1.77	10.6	M	4	5.6	58.3	10.3	70.5	950
SY Wolverine	x	HRW	0.264	66.0	12.4	72.2	11.1	90.1	-2.04	11.3	M	2	3.1	59.4	4.3	69.1	955
Warhorse	x	HRW	0.238	63.5	12.6	71.6	11.4	89.8	-1.82	11.0	M	3	3.7	64.5	7.2	74.2	1080
WB4269		HRW	0.173	55.1	11.5	70.6	10.0	89.9	-2.12	11.5	MH	3	2.2	53.9	4.1	66.1	850
WB4311		HRW	0.234	75.9	11.8	72.4	10.6	90.2	-1.89	10.7	MH	4	2.4	59.5	3.8	69.2	1010
WB4418	x	HRW	0.241	64.4	11.6	70.4	9.6	89.3	-1.62	10.6	M	3	2.8	57.3	3.5	67.0	915
Yellowstone	x	HRW	0.190	72.0	11.6	71.9	10.5	89.8	-1.70	10.6	M	4	5.1	61.5	10.2	72.2	1055
MIN			0.086	55.1	10.6	70.2	8.9	88.8	-2.39	9.0		2	2.2	53.9	3.5	66.1	850
MAX			0.311	84.9	12.6	74.0	11.4	90.6	-1.35	13.1		5	6.2	64.5	12.5	74.2	1145
AVG			0.212	67.6	11.7	72.2	10.4	89.9	-1.83	10.9		3.9	3.7	60.0	7.3	70.4	1024
																	5.8

Table 3. 2019 Havre, MT (Exp. 3502) Intrastate Winter Wheat Nursery - Mill & Bake and Noodle Data

VARIETY	x = in 2021 test	CLASS	PO	Single Kernel Hardness	Wheat protein, % (12 m.b.)	Flour Yield %	Flour Protein%(14% m.b.)	Flour Color			Type	Mixograph			Test Bake		
								L*brightness	A*green-red	B*blue-yellow		Tolerance	Mixing Time Min	Water Absorption%	Mixing Time Min	Water Absorption%	Crumb Grain
AAC Wildfire	x	HRW	0.219	67.7	14.2	71.7	13.3	89.2	-1.74	12.1	MH	4	4.6	68.3	11.2	78.0	1105
Bobcat	x	HRW	0.252	59.8	14.5	72.0	13.7	89.5	-2.04	12.3	M	1	4.4	68.7	10.0	79.4	1210
Brawl CLP	x	HRW	0.269	57.2	15.1	72.7	13.8	88.8	-1.50	10.1	M	2	4.9	67.3	6.9	78.0	1155
Byrd CL Plus	x	HRW	0.297	59.1	13.6	70.9	12.2	89.9	-1.61	10.2	MH	3	3.5	63.5	8.4	73.2	1125
Flathead	x	HRW	0.215	64.0	14.8	72.7	14.0	89.3	-1.07	9.2	M	5	8.3	70.5	18.6	82.2	1205
FourOsix	x	HRW	0.231	60.8	14.5	65.2	13.8	88.9	-1.33	10.7	MH	1	4.4	68.5	10.5	78.2	1245
Incline AX		HRW	0.180	61.8	13.3	69.6	12.0	90.0	-1.70	10.5	M	4	3.9	63.3	8.5	73.0	1080
Judee	x	HRW	0.248	64.9	15.4	71.8	14.3	89.4	-1.33	10.1	M	4	4.6	69.2	8.2	78.9	1310
Keldin	x	HRW	0.232	53.9	14.9	70.6	13.8	89.5	-1.22	9.6	MH	3	3.7	68.3	7.4	78.0	1130
LCS Jet		HRW	0.235	55.5	14.2	72.0	12.9	89.3	-1.46	11.0	MH	6	4.4	63.0	8.4	75.2	1025
Loma	x	HRW	0.128	61.6	14.8	72.5	13.8	89.0	-1.90	12.5	MH	2	4.9	67.8	10.9	79.0	1265
MT1642		HRW	0.122	73.2	15.3	70.5	14.2	89.2	-1.16	10.0	MH	5	6.7	67.9	10.3	78.1	1220
MT1683		HRW	0.249	67.8	14.8	70.9	13.4	88.9	-1.32	10.7	MH	4	5.8	67.2	10.9	78.4	1180
MT1745	x	HRW	0.232	61.0	13.8	70.8	12.8	89.6	-1.46	10.3	M	4	5.8	66.3	10.1	77.5	1045
MT1746		HRW	0.121	59.6	14.7	70.3	13.3	89.8	-1.53	10.0	MH	4	4.2	67.3	7.7	77.5	1145
MT1787		HRW	0.211	64.1	14.9	71.9	13.8	88.8	-1.33	10.9	MH	3	4.3	68.3	9.5	78.5	1130
MT1793		HRW	0.290	57.8	15.9	72.0	14.6	89.5	-1.12	8.7	MH	0	4.3	69.5	11.3	80.2	1205
MTCL1732		HRW	0.355	63.3	14.3	70.9	12.8	89.2	-1.05	8.9	MH	3	4.3	66.2	8.6	77.4	1075
MTCL1737	x	HWW	0.210	75.4	14.7	71.5	13.1	88.6	-1.48	11.2	M	2	4.8	65.9	8.4	76.1	1100
StandClear CLP	x	HRW	0.252	59.7	14.7	71.5	13.7	89.2	-1.64	11.2	M	3	3.9	68.5	8.2	78.2	1150
MTW1491		HWW	0.121	66.2	14.4	71.6	13.6	89.4	-1.24	10.0	MH	4	6.4	68.0	15.4	79.2	1190
Northern	x	HRW	0.094	72.0	14.5	71.2	13.0	89.0	-1.29	10.6	M	3	3.8	66.5	4.7	76.2	1155
SY Clearstone 2CL	x	HRW	0.248	64.6	14.9	69.4	13.8	89.4	-1.44	10.2	M	4	4.5	67.1	7.2	76.8	1160
SY Legend CL2		HRW	0.309	67.9	14.4	69.6	13.0	89.1	-1.58	11.3	MH	2	3.4	67.4	5.3	77.1	1200
SY Monument		HRW	0.167	68.2	13.7	71.9	12.2	89.4	-1.34	9.9	MH	4	6.9	66.0	16.3	78.2	1105
SY Wolverine	x	HRW	0.235	56.4	15.4	71.0	14.2	89.2	-1.71	10.8	M	0	3.8	64.4	5.7	74.1	1175
Warhorse	x	HRW	0.224	76.1	16.1	70.0	14.3	89.2	-1.37	10.2	MH	1	4.3	69.7	6.2	80.4	1310
WB4269		HRW	0.201	57.4	13.4	70.7	12.0	89.2	-1.93	11.7	MH	2	3.0	58.5	5.1	69.2	920
WB4311		HRW	0.263	55.6	14.6	70.9	13.3	89.1	-1.43	10.2	MH	4	3.5	63.5	4.8	73.2	1145
WB4418	x	HRW	0.228	74.7	13.9	68.5	12.4	89.1	-1.30	10.0	MH	2	2.8	61.4	4.3	71.1	1000
Yellowstone	x	HRW	0.203	65.4	14.8	71.0	14.0	89.3	-1.25	10.2	MH	4	5.5	68.4	12.5	78.1	1195
MIN			0.094	53.9	13.3	65.2	12.0	88.6	-2.04	8.7		0	2.8	58.5	4.3	69.2	920
MAX			0.355	76.1	16.1	72.7	14.6	90.0	-1.05	12.5		6	8.3	70.5	18.6	82.2	1310
AVG			0.221	63.6	14.6	70.9	13.4	89.3	-1.45	10.5		3.0	4.6	66.7	9.1	77.1	1150

Table 4. 2019 Huntley, MT (Exp. 3508) Intrastate Winter Wheat Nursery - Mill & Bake and Noodle Data

VARIETY	CLASS	PPO	Single Kernel Hardness	Wheat protein, % (12 m.b.)	Flour Yield %	Flour Color			Flour Ash, %	Type	Mixograph			Test Bake				
						L*brightness	A*green-red	B*blue-yellow			Tolerance	Mixing Time Min	Water Absorption%	Mixing Time Min	Water Absorption%	Crumb Grain		
AAC Wildfire	HRW	0.261	70.6	12.9	72.6	11.4	89.3	-1.91	12.3	0.42	MH	4	2.9	57.5	5.0	67.2	995	6
	HRW	0.214	70.0	13.2	71.8	11.7	89.2	-2.19	13.4	0.43	M	4	2.3	58.1	4.5	67.8	1055	5
Brawl CLP	HRW	0.242	69.3	12.6	71.6	11.5	90.0	-1.85	10.7	0.40	M	4	2.6	61.9	5.8	72.1	980	5
Byrd CL Plus	HRW	0.212	65.0	10.4	68.4	9.0	90.4	-2.11	11.3	0.40	M	3	2.7	54.2	5.3	63.9	825	5
Flathead	HRW	0.179	67.0	11.8	73.7	10.8	89.6	-1.33	9.4	0.40	MH	4	5.3	58.8	10.4	69.5	975	5
FourOsix	HRW	0.248	71.8	12.4	71.6	10.7	89.7	-1.73	11.0	0.40	M	4	3.4	58.8	5.7	68.5	1105	5
Incline AX	HRW	0.185	69.8	10.8	68.1	9.1	89.9	-2.02	11.3	0.41	M	4	1.7	51.4	3.8	61.1	860	5
Judee	HRW	0.202	74.2	11.9	70.3	10.5	89.8	-1.88	11.5	0.40	M	3	3.9	59.8	6.3	70.0	1065	5
Keldin	HRW	0.260	68.8	10.6	70.5	9.4	89.8	-1.56	10.1	0.43	MH	3	3.0	56.7	4.1	66.4	885	6
LCS Jet	HRW	0.231	67.0	11.9	72.5	10.3	89.4	-1.73	11.5	0.37	MH	3	3.8	56.9	5.8	67.1	945	6
Loma	HRW	0.106	81.6	11.4	71.0	9.5	89.2	-2.43	13.7	0.40	MH	3	3.3	55.7	4.8	65.4	985	6
MT1642	HRW	0.120	78.1	11.3	71.1	9.3	89.6	-1.65	10.9	0.38	M	4	3.9	59.3	8.5	71.5	975	6
MT1683	HRW	0.187	71.9	12.4	70.2	11.1	89.3	-1.79	11.7	0.42	M	4	4.2	61.8	8.9	71.5	1045	5
MT1745	HRW	0.274	72.1	11.6	70.8	9.4	89.7	-1.81	11.6	0.36	M	4	3.4	59.3	7.1	71.5	910	6
MT1746	HRW	0.111	68.5	11.5	70.1	9.9	90.0	-1.90	10.9	0.45	M	3	2.7	57.3	3.8	67.5	935	6
MT1787	HRW	0.205	71.1	12.2	70.3	10.2	89.1	-1.74	11.6	0.43	M	3	3.1	58.0	6.1	70.7	915	6
MT1793	HRW	0.177	71.7	11.4	69.8	10.1	89.7	-1.50	9.5	0.41	M	3	2.8	57.7	5.5	67.9	925	6
MTCL1732	HRW	0.236	74.8	11.9	69.7	10.5	89.6	-1.33	9.8	0.44	M	4	3.2	59.4	6.2	69.6	970	5
MTCL1737	x	HWW	79.0	11.5	70.8	9.5	89.4	-1.96	11.8	0.42	M	2	2.7	58.7	3.6	66.4	955	7
StandClear CLP	x	HRW	70.8	12.3	72.7	10.8	89.5	-2.06	12.3	0.42	M	3	2.4	57.5	4.2	67.2	1050	6
MTW1491		HWW	0.127	73.2	11.7	71.7	10.4	89.6	-1.55	10.6	MH	3	4.2	57.9	6.8	68.6	985	5
Northern	x	HRW	87.9	11.9	71.2	10.7	88.6	-1.70	12.1	0.49	M	2	2.5	59.3	3.5	67.0	950	5
SY Clearstone 2CL	x	HRW	73.0	12.1	69.9	10.3	89.6	-1.84	11.5	0.42	MH	4	2.9	57.4	5.3	67.1	1025	5
SY Legend CL2		HRW	76.4	12.6	67.5	10.7	89.0	-1.83	12.2	0.44	MH	4	3.2	59.2	5.2	68.9	1025	6
SY Monument		HRW	80.9	11.8	71.9	10.6	89.5	-1.60	10.7	0.39	MH	5	4.9	59.8	10.8	72.0	965	5
SY Wolverine	x	HRW	74.2	11.5	71.7	9.7	89.7	-2.05	11.8	0.38	M	2	2.8	56.2	4.6	66.4	905	6
Warhorse	x	HRW	87.9	12.3	71.0	11.1	89.2	-1.88	11.6	0.43	MH	3	3.1	59.3	4.7	69.0	1005	5
WB4269		HRW	73.1	11.0	68.8	9.6	89.9	-2.13	11.6	0.42	M	3	3.0	56.4	5.3	67.1	780	5
WB4311		HRW	69.3	12.2	70.8	10.8	89.8	-1.84	10.8	0.40	M	4	1.9	57.8	3.1	68.0	965	5
WB4418	x	HRW	97.1	11.5	69.0	10.0	88.9	-1.55	10.8	0.46	MH	4	1.9	56.5	4.2	66.2	850	5
Yellowstone	x	HRW	73.6	12.4	69.6	11.2	89.4	-1.62	11.2	0.43	M	4	4.4	61.7	9.1	73.4	1010	5
MIN		0.104	65.0	10.4	67.5	9.0	88.6	-2.43	9.4	0.36		2	1.7	51.4	3.1	61.1	780	5
MAX		0.402	97.1	13.2	73.7	11.7	90.4	-1.33	13.7	0.49		5	5.3	61.9	10.8	73.4	1105	7
AVG		0.209	74.2	11.8	70.7	10.3	89.5	-1.81	11.3	0.41		3.5	3.2	58.1	5.7	68.3	962	5.5

Table 5. 2019 Conrad, MT (Exp. 3518) Intrastate Winter Wheat Nursery - Mill & Bake and Noodle Data

VARIETY	CLASS	PPO	Single Kernel Hardness	Wheat protein, % (12 m.b.)	Flour Yield %	Flour Color			Wheat Ash, %	Flour Ash, %	Mixograph			Test Bake					
						L*brightness	A*green-red	B*blue-yellow			Type	Tolerance	Mixing Time Min	Water Absorption%	Mixing Time Min	Water Absorption%	Loaf Volume	Crumb Grain	
AAC Wildfire	HRW	0.216	75.0	15.1	68.8	14.1	89.0	-1.80	12.5	1.51	0.44	MH	5	6.4	69.4	15.5	79.1	1130	6
Bobcat	HRW	0.247	72.6	14.1	68.5	12.9	89.9	-2.31	13.4	1.48	0.37	M	3	6.3	68.5	17.1	78.7	1145	5
Brawl CLP	HRW	0.152	77.6	13.1	69.1	12.1	90.1	-2.08	11.7	1.36	0.38	M	3	4.8	66.0	11.1	76.2	1070	5
Byrd CL Plus	HRW	0.249	70.0	13.1	67.3	11.6	89.9	-1.92	11.6	1.45	0.38	M	3	5.0	65.4	12.4	76.1	1025	5
Flathead	HRW	0.164	77.3	13.7	68.9	12.6	89.7	-1.53	10.7	1.38	0.40	M	3	11.8	67.8	23.6	77.5	1145	6
FourOsix	HRW	0.162	76.2	14.1	68.3	13.2	89.7	-1.77	11.5	1.39	0.40	M	4	7.5	67.5	16.9	77.7	1125	6
Incline AX	HRW	0.118	78.5	12.5	67.1	11.1	89.6	-2.02	12.1	1.34	0.39	M	4	4.3	63.1	10.1	72.8	1025	6
Judee	HRW	0.196	78.4	14.3	67.8	13.4	89.6	-1.76	11.8	1.34	0.41	M	3	8.4	70.3	13.4	79.0	1255	4
Keldin	HRW	0.228	66.8	14.1	66.0	12.7	89.7	-1.53	10.7	1.46	0.43	M	4	5.7	66.8	11.8	76.5	1150	6
LCS Jet	HRW	0.149	67.5	13.7	69.4	12.1	89.5	-1.75	11.7	1.42	0.34	M	3	5.2	63.7	9.2	73.4	1130	7
Loma	HRW	0.111	81.1	13.7	71.3	12.2	88.4	-2.16	14.1	1.36	0.39	M	5	6.0	65.8	15.0	76.0	1235	6
MT1642	HRW	0.116	80.2	13.4	68.8	12.5	89.4	-1.65	11.2	1.34	0.39	M	4	11.0	67.7	16.8	77.4	1290	5
MT1683	HRW	0.161	77.9	13.5	68.3	12.2	89.3	-1.82	12.1	1.34	0.40	M	5	9.8	67.2	21.3	77.4	1205	6
MT1745	HRW	0.231	79.1	12.5	70.2	11.3	89.2	-1.74	11.7	1.40	0.39	M	5	7.2	64.8	14.1	74.5	1025	5
MT1746	HRW	0.075	75.5	13.0	68.1	11.9	89.9	-1.85	10.9	1.31	0.38	M	4	6.5	65.9	14.1	76.6	1095	6
MT1787	HRW	0.179	79.2	13.1	71.8	12.2	88.9	-1.73	12.1	1.36	0.42	M	4	5.7	65.2	12.0	75.4	1030	5
MT1793	HRW	0.230	78.9	13.5	69.2	12.3	89.5	-1.47	9.6	1.40	0.39	MH	4	6.6	66.5	21.5	77.2	1115	6
MTCL1732	HRW	0.147	85.3	13.4	65.9	12.1	89.4	-1.38	10.2	1.39	0.40	M	4	6.3	67.3	15.2	79.5	1040	5
MTCL1737	HWW	0.155	82.4	13.5	70.4	12.1	89.1	-1.86	12.1	1.37	0.41	M	3	5.8	66.3	10.6	75.5	1100	6
StandClear CLP	HRW	0.226	70.4	14.6	73.1	14.1	87.5	-1.37	12.2	1.37	0.51	M	2	2.9	66.0	10.2	75.7	1040	5
MTW1491	HWW	0.066	78.1	13.7	70.2	12.6	89.7	-1.60	11.1	1.33	0.40	M	4	11.0	68.3	23.2	78.5	1130	5
Northern	HRW	0.064	87.5	13.5	70.8	12.2	89.0	-1.65	12.1	1.36	0.44	M	3	4.2	64.9	7.3	74.6	1175	6
SY Clearstone 2CL	HRW	0.167	79.5	13.8	67.5	12.0	89.3	-1.76	11.8	1.35	0.41	M	4	6.2	65.8	11.6	76.0	1125	6
SY Legend CL2	HRW	0.200	81.2	13.6	66.4	12.6	88.9	-1.92	13.1	1.41	0.42	MH	4	4.8	68.0	8.4	77.7	1155	5
SY Monument	HRW	0.094	84.6	12.2	70.9	10.8	89.5	-1.74	11.5	1.27	0.36	M	5	7.8	65.5	21.5	76.2	1025	6
SY Wolverine	HRW	0.201	71.8	13.1	70.6	10.9	90.0	-2.11	12.0	1.24	0.34	M	1	4.7	62.4	8.0	72.1	1040	5
Warhorse	HRW	0.187	91.6	13.6	66.9	12.6	89.3	-1.66	11.6	1.38	0.43	M	2	4.1	67.0	6.9	77.2	1150	7
WB4269	HRW	0.147	80.0	12.2	69.0	10.7	89.7	-2.19	12.4	1.27	0.43	M	4	4.4	61.3	8.6	74.5	900	6
WB4311	HRW	0.244	73.3	13.3	70.2	11.6	89.3	-1.84	11.8	1.20	0.36	M	4	5.0	62.7	8.3	72.4	1120	6
WB4418	HRW	0.144	93.1	13.5	66.4	12.3	88.8	-1.58	11.6	1.41	0.45	MH	4	4.9	64.0	9.0	74.2	1110	6
Yellowstone	HRW	0.162	77.0	13.9	68.0	12.0	89.3	-1.62	11.6	1.39	0.39	M	4	9.9	67.9	16.7	77.6	1130	6
MIN		0.064	66.8	12.2	65.9	10.7	87.5	-2.31	9.6	1.20	0.34		1	2.9	61.3	6.9	72.1	900	4
MAX		0.249	93.1	15.1	73.1	14.1	90.1	-1.37	14.1	1.51	0.51		5	11.8	70.3	23.6	79.5	1290	7
AVG		0.167	78.3	13.5	68.9	12.2	89.4	-1.78	11.8	1.37	0.40		3.7	6.5	66.1	13.6	76.2	1111	5.6

Table 6. 2019 Means across 4 locations (Exp. 35) Intrastate Winter Wheat Nursery - Mill & Bake and Noodle Data

VARIETY	CLASS	x = in 2021 test	PPO	Single Kernel Hardness	Wheat protein, % (12 m.b.)	Flour Yield %	Flour Protein%(14% m.b)	Flour Color			Wheat Ash, %	Flour Ash, %	Mixograph			Test Bake		
								L*brightness	A*green-red	B*blue-yellow			Tolerance	Mixing Time Min	Water Absorption%	Mixing Time Min	Water Absorption%	Crumb Grain
AAC Wildfire	HRW	x	0.232	73.1	13.7	71.4	12.5	89.3	-1.88	12.3	1.52	0.42	4.5	4.3	64.3	10.0	74.0	1070
Bobcat	HRW	x	0.239	65.8	13.4	71.5	12.2	89.5	-2.16	12.8	1.54	0.39	3.3	4.2	64.2	10.7	74.5	1108
Brawl CLP	HRW	x	0.224	68.0	13.3	71.3	12.0	89.8	-1.87	10.8	1.50	0.38	2.8	3.9	64.8	7.7	75.0	1071
Byrd CL Plus	HRW	x	0.267	64.6	12.0	69.6	10.6	90.2	-1.91	11.0	1.50	0.39	3.5	3.6	60.4	8.0	70.3	981
Flathead	HRW	x	0.204	69.1	12.9	72.3	12.0	89.7	-1.34	9.6	1.43	0.41	4.3	7.9	64.7	16.3	75.2	1088
FourOsis	HRW	x	0.215	69.2	13.2	69.6	12.1	89.7	-1.65	10.9	1.48	0.40	3.5	4.6	63.7	9.9	73.5	1135
Incline AX	HRW		0.176	67.0	11.8	68.9	10.3	90.0	-1.95	11.2	1.51	0.40	3.8	3.3	58.8	6.9	68.5	979
Judee	HRW	x	0.227	75.6	13.5	70.4	12.3	89.6	-1.70	11.1	1.50	0.40	3.5	5.5	65.7	9.4	75.3	1194
Keldin	HRW	x	0.250	63.6	12.8	69.9	11.4	89.8	-1.46	10.0	1.44	0.42	3.5	3.8	62.4	7.0	72.6	1038
LCS Jet	HRW		0.203	65.3	12.9	71.8	11.4	89.5	-1.68	11.3	1.43	0.36	4.0	4.3	60.7	7.6	72.0	1019
Loma	HRW	x	0.117	71.0	12.9	72.1	11.5	89.1	-2.22	13.4	1.48	0.39	3.5	4.7	62.5	10.2	72.9	1153
MT1642	HRW		0.125	75.6	13.0	70.7	11.7	89.6	-1.53	10.6	1.47	0.39	4.5	6.8	64.1	11.4	74.6	1143
MT1683	HRW		0.196	72.2	13.2	70.5	11.6	89.3	-1.69	11.4	1.48	0.40	4.3	6.1	64.6	12.7	75.0	1134
MT1745	HRW	x	0.241	69.6	12.3	71.0	10.9	89.5	-1.70	11.1	1.48	0.38	4.3	5.0	62.2	10.0	73.3	990
MT1746	HRW		0.109	66.6	12.8	70.0	11.4	90.0	-1.79	10.5	1.49	0.42	3.8	4.2	62.2	7.9	72.6	1054
MT1787	HRW		0.199	70.2	13.1	71.8	11.8	89.1	-1.64	11.5	1.48	0.43	3.5	4.1	62.6	8.4	73.3	1013
MT1793	HRW		0.230	67.6	13.3	70.8	12.0	89.7	-1.39	9.2	1.46	0.40	2.8	4.3	64.2	12.2	74.7	1084
MTCL1732	HRW		0.261	72.6	12.8	69.5	11.3	89.5	-1.28	9.5	1.45	0.40	3.8	4.4	63.1	9.4	74.3	1031
MTCL1737	HRW	x	0.178	77.3	13.0	71.2	11.5	89.2	-1.79	11.5	1.48	0.43	2.8	4.0	62.3	7.1	71.6	1050
MTW1491	HRW	x	0.101	71.6	12.8	71.6	11.5	89.7	-1.50	10.4	1.44	0.39	3.8	6.6	63.5	13.6	74.3	1083
Northern	HRW		0.087	79.9	12.9	71.4	11.6	88.8	-1.57	11.4	1.44	0.45	3.0	3.3	62.2	4.8	71.4	1085
StandClear CLP	HRW	x	0.288	66.7	13.5	72.8	12.4	89.0	-1.80	12.0	1.47	0.42	3.0	3.1	63.6	7.5	73.4	1079
SY Clearstone 2CL	HRW	x	0.218	73.6	13.3	69.4	11.8	89.6	-1.72	11.1	1.46	0.41	4.0	4.4	63.4	7.8	73.3	1109
SY Legend CL2	HRW		0.292	71.3	12.9	68.4	11.4	89.2	-1.84	12.1	1.42	0.42	3.5	3.6	62.8	6.0	72.8	1074
SY Monument	HRW		0.140	75.5	12.2	72.0	10.9	89.7	-1.61	10.7	1.40	0.37	4.5	6.3	62.4	14.7	74.2	1011
SY Wolverine	HRW	x	0.245	67.1	13.1	71.4	11.5	89.7	-1.98	11.5	1.41	0.38	1.3	3.6	60.6	5.7	70.4	1019
Warhorse	HRW	x	0.208	79.8	13.7	69.9	12.4	89.4	-1.68	11.1	1.44	0.42	2.3	3.8	65.1	6.3	75.2	1136
WB4269	HRW		0.178	66.4	12.0	69.8	10.6	89.7	-2.09	11.8	1.35	0.42	3.0	3.2	57.5	5.8	69.2	863
WB4311	HRW		0.232	68.5	13.0	71.1	11.6	89.6	-1.75	10.9	1.32	0.39	4.0	3.2	60.9	5.0	70.7	1060
WB4418	HRW	x	0.198	82.3	12.6	68.6	11.1	89.0	-1.51	10.7	1.45	0.45	3.3	3.1	59.8	5.3	69.6	969
Yellowstone	HRW	x	0.194	72.0	13.2	70.1	11.9	89.5	-1.55	10.9	1.48	0.41	4.0	6.2	64.9	12.1	75.3	1098
Average			0.202	70.9	12.9	70.7	11.6	89.5	-1.72	11.1	1.46	0.40	3.5	4.5	62.7	8.9	73.0	1062
LSD			0.046	6.9	0.6	1.5	0.8	0.4	0.13	0.3	0.07	0.03	1.2	1.2	2.2	2.6	2.4	62
CV%			16.3	7.0	3.6	1.5	4.8	0.3	5.40	2.2	3.60	4.70	24.0	18.4	2.4	20.9	2.3	4.2

Table 7. 2019 (Exp. 3501) Intrastate Winter Wheat Nursery Noodles
Location: Bozeman, MT

		Noodle Color						Noodle Score	Texture Profile Analysis												
		L* at 0 hour (Brightness)	a* at 0 hour (Green - Red)	b* at 0 hour (Blue - Yellow)	L* at 24 hour (Brightness)	a* at 24 hour (Green - Red)	b* at 24 hour (Blue - Yellow)		Springiness at 0 min	Cohesiveness at 0 min	Adhesiveness at 0 min	Hardness, g at 0 min	Chewiness at 0 min	Springiness at 5 min	Cohesiveness at 5 min	Adhesiveness at 5 min	Hardness, g at 5 min	Chewiness at 5 min			
	x = in 2021 test	AAC Wildfire	86.3	-0.34	18.7	76.0	0.46	29.3	10.3	292	0.87	0.64	-32.7	1016	563	0.87	0.59	-35.8	888	455	
		Bobcat	87.8	-0.52	17.1	77.5	0.24	26.3	10.2	297	0.92	0.61	-46.3	1243	699	0.95	0.60	-37.7	980	558	
		Byrd CL Plus	x	x																	
		Flathead	x	88.2	0.15	13.1	78.5	0.75	19.7	9.8	311	0.91	0.62	-47.6	1302	734	0.89	0.59	-40.7	981	511
		FourOsix	x	86.3	-0.07	16.7	76.7	0.93	23.5	9.6	316	0.90	0.63	-40.8	1210	686	0.90	0.57	-37.3	961	493
		Incline AX																			
		Judee	x																		
		Keldin	x	87.3	0.07	15.0	79.1	0.72	22.7	8.2	336	0.91	0.63	-38.8	1195	685	0.91	0.59	-35.5	902	489
		LCS Jet																			
		Loma	x																		
		MT1642		87.6	-0.11	15.7	78.0	0.51	23.7	9.6	317	0.93	0.65	-51.8	1037	622	0.90	0.60	-33.1	904	484
		MT1683		87.4	-0.19	15.8	77.9	0.89	23.7	9.5	312	0.85	0.62	-41.7	1285	678	0.87	0.59	-40.3	971	496
		MT1745	x	88.1	-0.26	15.7	79.8	0.34	23.6	8.3	329	0.93	0.62	-37.0	1206	688	0.90	0.56	-32.4	931	473
		MT1746		87.9	-0.38	15.9	79.8	0.33	25.6	8.1	335	0.89	0.60	-42.6	1365	729	0.87	0.57	-50.7	1106	554
		MT1787		86.9	-0.11	16.4	77.4	0.93	24.0	9.4	313	0.86	0.61	-42.8	1295	679	0.87	0.59	-43.7	984	502
		MT1793		87.6	0.14	13.4	77.5	0.83	21.0	10.2	294	0.92	0.63	-50.9	1300	753	0.87	0.58	-45.1	1069	545
		MTCL1732		87.4	0.37	13.8	78.0	1.46	21.1	9.5	314	0.89	0.62	-47.3	1365	754	0.90	0.59	-44.0	1019	543
		MTCL1737	x	86.6	-0.17	16.4	76.2	0.92	24.9	10.4	291	0.94	0.63	-38.4	1160	680	0.83	0.59	-28.6	902	444
		StandClear CLP	x																		
		MTW1491		88.7	-0.04	13.5	80.9	0.73	22.5	7.8	349	0.89	0.63	-35.8	1126	629	0.88	0.59	-37.4	912	469
Northern	x	87.8	0.07	14.4	79.5	0.89	23.6	8.3	334	0.92	0.61	-37.0	1237	694	0.93	0.57	-28.6	879	469		
SY Clearstone 2CL	x																				
SY Legend CL2																					
SY Monument																					
SY Wolverine	x																				
Warhorse	x																				
WB4269																					
WB4311																					
WB4418	x																				
Yellowstone	x	87.9	0.02	13.9	79.7	0.83	22.2	8.3	333	0.94	0.66	-42.9	1172	718	0.92	0.58	-29.6	963	512		
		MIN	86.3	-0.52	13.1	76.0	0.24	19.7	7.8	291	0.85	0.60	-51.8	1016	563	0.83	0.56	-50.7	879	444	
		MAX	88.7	0.37	18.7	80.9	1.46	29.3	10.4	349	0.94	0.66	-32.7	1365	754	0.95	0.60	-28.6	1106	558	
		AVG	87.5	-0.09	15.3	78.3	0.74	23.6	9.2	317	0.90	0.62	-42.2	1220	687	0.89	0.58	-37.5	959	500	

Table 8. 2019 (Exp. 3502) Intrastate Winter Wheat Nursery Noodles
Location: Havre, MT

		Noodle Color						Noodle Score	Texture Profile Analysis										
		L* at 0 hour (Brightness)	a* at 0 hour (Green - Red)	b* at 0 hour (Blue - Yellow)	L* at 24 hour (Brightness)	a* at 24 hour (Green - Red)	b* at 24 hour (Blue - Yellow)		Springiness at 0 min	Cohesiveness at 0 min	Adhesiveness at 0 min	Hardness, g at 0 min	Chewiness at 0 min	Springiness at 5 min	Cohesiveness at 5 min	Adhesiveness at 5 min	Hardness, g at 5 min	Chewiness at 5 min	
		X = in 2021 test																	
AAC Wildfire	X	84.3	0.40	19.8	73.9	1.57	28.9	10.4	295	0.92	0.63	-58.2	1353	776	0.93	0.60	-45.5	1126	625
Bobcat	X	84.2	0.02	20.4	71.7	0.51	29.2	12.5	253	0.97	0.64	-58.2	1372	850	0.92	0.61	-48.7	1113	623
Brawl CLP	X																		
Byrd CL Plus	X																		
Flathead	X	85.4	1.01	14.3	73.9	2.14	21.6	11.6	273	0.95	0.63	-46.4	1372	816	0.92	0.61	-44.4	1129	633
FourOsix	X	83.6	0.93	16.6	71.3	2.11	24.2	12.3	254	0.95	0.66	-46.4	1169	732	0.95	0.62	-40.0	957	556
Incline AX																			
Judee	X																		
Keldin	X	84.3	0.87	16.2	73.0	2.32	24.5	11.3	273	0.96	0.65	-39.7	1261	787	0.95	0.63	-49.2	1053	630
LCS Jet																			
Loma	X																		
MT1642		84.2	1.05	16.7	72.7	2.10	24.4	11.5	269	0.94	0.64	-99.7	1748	1058	0.96	0.61	-82.5	1208	709
MT1683		84.4	0.78	16.7	73.1	2.27	24.6	11.3	272	0.93	0.64	-56.0	1571	934	0.92	0.61	-51.4	1202	672
MT1745	X	85.8	0.31	17.0	76.4	1.20	24.5	9.4	314	0.94	0.59	-53.4	1186	654	0.92	0.59	-47.4	1192	643
MT1746		85.4	0.36	16.9	76.3	1.62	26.5	9.1	312	0.93	0.62	-66.9	1529	874	0.92	0.59	-46.0	1223	661
MT1787		84.0	0.77	17.8	73.1	2.36	25.2	10.9	292	0.91	0.61	-55.8	1401	780	0.90	0.57	-41.4	1148	585
MT1793		84.3	0.77	15.4	71.9	1.91	21.1	12.4	245	0.91	0.63	-44.1	1336	760	0.92	0.59	-38.2	1099	596
MTCL1732		85.4	0.86	14.6	75.6	2.13	21.0	9.8	309	0.94	0.63	-49.8	1402	826	0.95	0.62	-44.2	1083	636
MTCL1737	X	83.5	0.68	18.2	72.6	2.10	25.8	10.9	291	0.92	0.61	-58.9	1486	831	0.94	0.59	-53.4	1186	654
StandClear CLP																			
MTW1491	X	85.8	0.74	15.2	76.3	2.24	24.9	9.6	315	0.94	0.60	-50.3	1512	855	0.93	0.59	-45.8	1259	692
Northern	X	85.0	0.69	16.6	75.2	2.15	25.0	9.7	315	0.93	0.62	-44.8	1280	739	0.94	0.59	-38.3	1027	563
SY Clearstone 2CL	X																		
SY Legend CL2																			
SY Monument																			
SY Wolverine	X																		
Warhorse	X																		
WB4269																			
WB4311																			
WB4418	X																		
Yellowstone	X	85.0	0.89	15.1	74.4	2.28	23.7	10.5	294	0.94	0.65	-51.9	1366	831	0.93	0.62	-34.7	1059	606
MIN		83.5	0.02	14.3	71.3	0.51	21.0	9.1	245	0.91	0.59	-99.7	1169	654	0.90	0.57	-82.5	957	556
MAX		85.8	1.05	20.4	76.4	2.36	29.2	12.5	315	0.97	0.66	-39.7	1748	1058	0.96	0.63	-34.7	1259	709
AVG		84.7	0.70	16.7	73.8	1.94	24.7	10.8	286	0.94	0.63	-55.0	1396	819	0.93	0.60	-46.9	1129	630

Table 9. 2019 (Exp. 3501) Intrastate Winter Wheat Nursery Noodles
Location: Huntley, MT

		Noodle Color						Noodle Score	Texture Profile Analysis										
		L* at 0 hour (Brightness)	a* at 0 hour (Green - Red)	b* at 0 hour (Blue - Yellow)	L* at 24 hour (Brightness)	a* at 24 hour (Green - Red)	b* at 24 hour (Blue - Yellow)		Springiness at 0 min	Cohesiveness at 0 min	Adhesiveness at 0 min	Hardness, g at 0 min	Chewiness at 0 min	Springiness at 5 min	Cohesiveness at 5 min	Adhesiveness at 5 min	Hardness, g at 5 min	Chewiness at 5 min	
		X = in 2021 test																	
AAC Wildfire	X	84.8	0.07	19.7	74.8	1.13	28.8	9.9	314	0.86	0.59	-57.6	1399	711	0.89	0.57	-49.9	1081	544
Bobcat	X	84.6	-0.08	20.3	71.1	0.84	30.1	13.5	236	0.92	0.63	-52.4	1430	827	0.93	0.59	-47.7	1166	633
Brawl CLP	X																		
Byrd CL Plus	X																		
Flathead	X	87.1	0.47	13.4	75.9	1.38	21.0	11.2	274	0.92	0.62	-51.4	1288	738	0.92	0.59	-50.4	1069	576
FourOsix	X	85.7	0.32	16.3	74.4	1.31	25.0	11.3	276	0.88	0.61	-44.1	1273	683	0.91	0.58	-41.9	1010	527
Incline AX																			
Judee	X																		
Keldin	X	87.2	0.25	14.6	77.9	0.64	22.3	9.3	314	0.90	0.59	-45.7	1397	747	0.88	0.55	-44.4	1085	522
LCS Jet																			
Loma	X																		
MT1642		87.2	0.05	15.9	78.5	0.38	23.2	8.7	327	0.90	0.61	-59.0	1396	771	0.88	0.57	-53.1	1168	582
MT1683		85.5	0.21	17.2	74.8	1.41	25.6	10.7	292	0.91	0.62	-64.6	1452	808	0.89	0.58	-55.3	1140	588
MT1745	X	87.2	0.04	15.9	78.0	0.61	25.1	9.2	312	0.90	0.60	-46.5	1328	710	0.88	0.56	-40.0	1046	512
MT1746		87.2	-0.19	16.3	79.3	0.39	26.1	7.9	352	0.86	0.59	-43.3	1303	668	0.92	0.57	-40.0	996	516
MT1787		85.6	-0.29	16.7	74.9	1.51	25.6	10.7	291	0.89	0.60	-51.8	1374	735	0.90	0.57	-47.3	1093	559
MT1793		86.3	0.24	15.3	76.2	1.11	21.3	10.1	281	0.91	0.63	-45.5	1232	706	0.90	0.57	-38.0	979	504
MTCL1732		86.1	0.73	14.8	75.0	2.06	23.4	11.1	274	0.90	0.62	-41.3	1298	718	0.91	0.59	-45.0	1049	561
MTCL1737	X	85.4	-0.01	17.6	75.1	0.73	26.5	10.3	288	0.86	0.58	-53.6	1356	671	0.85	0.55	-50.3	1089	504
StandClear CLP	X																		
MTW1491		87.6	0.08	15.0	79.1	1.04	24.0	8.4	333	0.90	0.62	-49.9	1281	708	0.92	0.57	-48.5	1024	537
Northern	X	86.1	0.23	16.1	77.0	1.27	24.9	9.1	314	0.87	0.59	-39.3	1300	670	0.93	0.56	-42.7	998	523
SY Clearstone 2CL	X																		
SY Legend CL2																			
SY Monument																			
SY Wolverine	X																		
Warhorse	X																		
WB4269																			
WB4311																			
WB4418	X																		
Yellowstone	X	86.0	0.39	15.2	75.6	1.59	24.3	10.5	295	0.88	0.61	-48.8	1406	756	0.88	0.58	-44.5	1112	569
MIN		84.6	-0.29	13.4	71.1	0.38	21.0	7.9	236	0.86	0.58	-64.6	1232	668	0.85	0.55	-55.3	979	504
MAX		87.6	0.73	20.3	79.3	2.06	30.1	13.5	352	0.92	0.63	-39.3	1452	827	0.93	0.59	-38.0	1168	633
AVG		86.2	0.16	16.3	76.1	1.09	24.8	10.1	298	0.89	0.61	-49.7	1344	727	0.90	0.57	-46.2	1069	547

Table 10. 2019 (Exp. 3501) Intrastate Winter Wheat Nursery Noodles
Location: Conrad, MT

		Noodle Color						Noodle Score	Texture Profile Analysis										
		L* at 0 hour (Brightness)	a* at 0 hour (Green - Red)	b* at 0 hour (Blue - Yellow)	L* at 24 hour (Brightness)	a* at 24 hour (Green - Red)	b* at 24 hour (Blue - Yellow)		Springiness at 0 min	Cohesiveness at 0 min	Adhesiveness at 0 min	Hardness, g at 0 min	Chewiness at 0 min	Springiness at 5 min	Cohesiveness at 5 min	Adhesiveness at 5 min	Hardness, g at 5 min	Chewiness at 5 min	
		X = in 2021 test																	
AAC Wildfire	X	83.4	0.58	20.1	71.2	2.23	30.9	12.2	248	0.85	0.62	-52.0	1382	731	0.91	0.59	-59.1	1234	670
Bobcat	X	83.7	-0.21	23.8	71.1	0.54	33.1	12.7	252	0.91	0.62	-53.5	1400	790	0.88	0.59	-43.1	1138	595
Brawl CLP	X																		
Byrd CL Plus	X																		
Flathead	X	84.6	0.63	17.3	71.8	1.86	25.5	12.8	250	0.92	0.64	-47.0	1298	761	0.92	0.61	-38.2	1039	584
FourOsix	X	83.7	0.60	19.4	72.1	2.14	28.4	11.6	272	0.88	0.62	-56.6	1396	756	0.87	0.59	-45.6	1139	585
Incline AX																			
Judee	X																		
Keldin	X	84.4	0.65	18.2	72.1	2.21	28.2	12.3	252	0.87	0.61	-76.2	1578	835	0.91	0.57	-56.2	1324	682
LCS Jet																			
Loma	X																		
MT1642		85.2	0.44	17.7	74.0	1.35	27.8	11.2	274	0.89	0.61	-57.0	1539	832	0.89	0.58	-57.5	1241	637
MT1683		85.2	0.25	18.1	74.2	1.66	27.2	11.0	274	0.94	0.61	-58.1	1529	878	0.91	0.60	-40.1	1126	609
MT1745	X	87.1	0.13	15.8	77.3	0.82	25.8	9.8	313	0.86	0.61	-51.5	1421	748	0.91	0.58	-42.2	1106	589
MT1746		87.0	-0.18	17.2	77.8	0.75	27.9	9.2	312	0.88	0.61	-66.1	1544	823	0.88	0.58	-41.1	1174	596
MT1787		84.9	0.43	17.7	73.2	2.05	26.9	11.7	271	0.88	0.59	-54.8	1465	769	0.88	0.59	-47.8	1031	539
MT1793		85.4	0.52	15.1	73.2	1.55	23.5	12.3	252	0.89	0.63	-66.0	1465	811	0.89	0.61	-46.1	1103	591
MTCL1732		85.1	0.78	15.7	73.9	2.24	24.4	11.3	269	0.91	0.62	-53.7	1441	814	0.89	0.60	-49.8	1204	639
MTCL1737	X	83.9	0.24	19.5	72.9	1.70	27.8	11.0	273	0.90	0.60	-50.4	1442	786	0.90	0.57	-44.0	1174	605
StandClear CLP	X																		
MTW1491		86.5	0.41	16.2	76.4	1.84	28.0	10.0	293	0.90	0.62	-61.2	1490	827	0.88	0.59	-43.9	1139	589
Northern	X	84.8	0.46	17.9	74.8	2.03	26.7	10.0	295	0.93	0.58	-50.0	1389	743	0.91	0.54	-43.3	1161	575
SY Clearstone 2CL	X																		
SY Legend CL2																			
SY Monument																			
SY Wolverine	X																		
Warhorse	X																		
WB4269																			
WB4311																			
WB4418	X																		
Yellowstone	X	84.2	0.66	17.2	72.8	2.26	26.8	11.5	273	0.90	0.62	-69.5	1587	881	0.88	0.59	-44.2	1215	630
MIN		83.4	-0.21	15.1	71.1	0.54	23.5	9.2	248	0.85	0.58	-76.2	1298	731	0.87	0.54	-59.1	1031	539
MAX		87.1	0.78	23.8	77.8	2.26	33.1	12.8	313	0.94	0.64	-47.0	1587	881	0.92	0.61	-38.2	1324	682
AVG		85.0	0.40	17.9	73.7	1.70	27.4	11.3	273	0.89	0.61	-57.7	1460	799	0.90	0.59	-46.4	1159	607

Table 11. 2019 (Exp. 35) Intrastate Winter Wheat Nursery Noodles
Means of 4 locations

	Noodle Color						Noodle Score	Texture Profile Analysis												
	L* at 0 hour (Brightness)	a* at 0 hour (Green - Red)	b* at 0 hour (Blue - Yellow)	L* at 24 hour (Brightness)	a* at 24 hour (Green - Red)	b* at 24 hour (Blue - Yellow)		Springiness at 0 min	Cohesiveness at 0 min	Adhesiveness at 0 min	Hardness, g at 0 min	Chewiness at 0 min	Springiness at 5 min	Cohesiveness at 5 min	Adhesiveness at 5 min	Hardness, g at 5 min	Chewiness at 5 min			
	x = in 2021 test																			
AAC Wildfire	84.7	0.18	19.6	74.0	1.35	29.5	10.7	287	0.87	0.62	-50.1	1287	695	0.90	0.59	-47.6	1082	573		
Bobcat	85.1	-0.20	20.4	72.9	0.53	29.7	12.2	260	0.93	0.63	-52.6	1361	792	0.92	0.60	-44.3	1099	603		
Brawl CLP	x	x																		
Byrd CL Plus	x	x																		
Flathead	86.3	0.57	14.5	75.0	1.53	22.0	11.4	277	0.92	0.63	-48.1	1315	762	0.91	0.60	-43.4	1054	576		
FourOsix	84.8	0.45	17.2	73.6	1.62	25.3	11.2	280	0.90	0.63	-47.0	1262	714	0.91	0.59	-41.2	1017	540		
Incline AX																				
Judee	x	x																		
Keldin	x	x						294	0.91	0.62	-50.1	1358	764	0.91	0.58	-46.3	1091	581		
LCS Jet																				
Loma	x	x																		
MT1642	86.0	0.36	16.5	75.8	1.09	24.8	10.3	297	0.91	0.63	-66.9	1430	821	0.91	0.59	-56.6	1130	603		
MT1683	85.6	0.26	16.9	75.0	1.56	25.3	10.6	288	0.91	0.62	-55.1	1459	825	0.90	0.59	-46.8	1110	591		
MT1745	87.0	0.06	16.1	77.9	0.74	24.8	9.2	317	0.91	0.60	-47.1	1285	700	0.90	0.57	-40.5	1069	554		
MT1746	86.9	-0.10	16.6	78.3	0.77	26.5	8.6	328	0.89	0.60	-54.7	1435	774	0.90	0.58	-44.5	1125	582		
MT1787	85.3	0.20	17.1	74.7	1.71	25.4	10.7	292	0.89	0.60	-51.3	1384	741	0.89	0.58	-45.0	1064	546		
MT1793	85.9	0.42	14.8	74.7	1.35	21.7	11.3	268	0.91	0.63	-51.6	1333	758	0.90	0.59	-41.8	1062	559		
MTCL1732	86.0	0.69	14.7	75.6	1.97	22.5	10.4	292	0.91	0.62	-48.0	1377	778	0.91	0.60	-45.7	1089	595		
MTCL1737	84.8	0.19	17.9	74.2	1.36	26.2	10.7	286	0.90	0.61	-50.3	1361	742	0.88	0.57	-44.1	1088	552		
StandClear CLP	x	x																		
MTW1491	87.1	0.30	15.0	78.2	1.46	24.9	9.0	323	0.91	0.62	-49.3	1352	755	0.90	0.59	-43.9	1083	572		
Northern	85.9	0.36	16.3	76.7	1.59	25.0	9.3	315	0.91	0.60	-42.8	1301	711	0.93	0.57	-38.2	1016	533		
SY Clearstone 2CL	x	x																		
SY Legend CL2																				
SY Monument																				
SY Wolverine	x	x																		
Warhorse	x	x																		
WB4269																				
WB4311																				
WB4418	x	x																		
Yellowstone	x	x	85.8	0.49	15.4	75.6	1.74	24.2	10.2	299	0.91	0.63	-53.3	1383	797	0.90	0.59	-38.2	1087	579
Average																				
LSD																				
CV%																				

Table 12. 2019 Advanced Winter Wheat Nursery Mill & Bake (Exp. 1401)
Location: Bozeman, MT

Sample No.	Variety	Class	PPO	Single kernel hardness	Wheat Protein, % (12% m.b.)	Flour Yield, %	Flour Protein, % (14% m.b.)	L* Brightness	a* Green - Red	b* Blue - Yellow	Wheat Ash, %	Flour Ash, %	Mixograph Type	Mixing Tolerance	Mixing Time, min	Mixing Water Absorption, %	Bake Mixing Time, min	Bake Water Absorption, %	Loaf Volume	Crumb Grain Score
1	x Yellowstone	HRW	0.214	70.5	11.8	72.5	9.9	89.3	-1.61	10.5	1.48	0.40	M	4	4.5	61.4	9.9	72.6	990	5
2	x Judee	HRW	0.318	79.9	12.8	71	11.6	89.7	-1.78	11.0	1.58	0.42	M	4	5	63.8	9.8	74	1165	5
3	x Warhorse	HRW	0.347	82.5	12.5	72.2	10.6	89.6	-1.74	10.9	1.38	0.40	M	2	3.4	61.5	5.9	71.2	1035	5
4	a SY Monumen	HRW	0.155	76.8	11.7	72.7	10.5	89.7	-1.65	10.5	1.37	0.39	M	4	5.5	63.2	12.1	73.4	970	5
5	MTS1810	HRW	0.224	71.9	12.4	71.2	11.1	90.1	-1.90	10.9	1.43	0.40	M	1	2.9	63.3	4.9	72.5	1085	6
6	x MTS1831	HRW	0.195	70.8	11.1	72.3	9.5	90.2	-1.81	10.0	1.43	0.40	M	3	6.1	61.7	13.8	71.4	965	6
7	x MTS18116	HRW	0.257	79.0	11.7	71.6	10.1	89.7	-1.76	10.0	1.51	0.41	M	4	6.0	62.8	17.0	72.5	960	6
8	x MTS18149	HRW	0.137	73.4	11.8	74.1	10.8	89.5	-1.98	12.0	1.33	0.40	M	4	4.9	64.0	15.6	75.2	1050	5
9	MT1845	HRW	0.135	67.6	12.6	70.7	11.3	89.6	-1.75	11.0	1.53	0.43	M	4	5.9	62.8	11.1	73.5	1085	6
10	MT1848	HRW	0.100	77.4	12.7	72.1	11.1	89.1	-1.75	11.4	1.55	0.51	M	4	3.8	64.4	8.8	74.6	1100	6
11	x MTS1855	HRW	0.298	78.6	12.0	73.1	10.7	89.1	-2.05	12.0	1.56	0.41	LM	1	2.9	62.5	5.2	72.2	945	5
12	MT1866	HRW	0.223	66.5	12.0	73.2	10.3	89.1	-1.82	11.2	1.48	0.42	M	3	3.3	61.0	6.2	70.7	980	6
13	MT1867	HRW	0.316	64.9	11.3	72.1	10.0	89.7	-1.95	11.0	1.48	0.38	M	4	3.4	58.5	7.8	70.2	860	5
14	x MT1872	HRW	0.301	62.4	12.1	71.1	10.9	86.6	-2.05	11.5	1.44	0.40	M	3	2.8	57.9	4.8	67.6	1005	5
MIN			0.100	62.4	11.1	70.7	9.5	86.6	-2.05	10.0	1.33	0.38		1	2.8	57.9	4.8	67.6	860	5
MAX			0.347	82.5	12.8	74.1	11.6	90.2	-1.61	12.0	1.58	0.51		4	6.1	64.4	17.0	75.2	1165	6
AVE			0.230	73.0	12.0	72.1	10.6	89.4	-1.83	11.0	1.47	0.41		3.2	4.3	62.1	9.5	72.3	1014	5.4

Table 13. 2019 Advanced Winter Wheat Nursery Mill & Bake (Exp. 1402)
Location: Havre, MT

Sample No.	Variety	Class	PPD	Single kernel hardness	Wheat Protein, % (12% m.b.)	Flour Yield, %	Flour Protein, % (14% m.b.)	L* Brightness	a* Green - Red	b* Blue - Yellow	Wheat Ash, %	Flour Ash, %	Mixograph Type	Mixing Tolerance	Mixing Time, min	Mixing Water Absorption, %	Bake Mixing Time, min	Bake Water Absorption, %	Loaf Volume	Crumb Grain Score
1	x Yellowstone	HRW	0.223	66.2	14.4	71.5	13.1	88.9	-1.26	10.3	1.44	0.42	MH	4	6.1	67.2	12.2	77.4	1115	5
2	x Judee	HRW	0.291	70.8	15.2	71.9	14.2	88.9	-1.35	10.1	1.49	0.41	MH	3	4.1	66.8	7.1	77	1110	6
3	x Warhorse	HRW	0.266	75.7	15.2	70.6	14.5	88.6	-1.44	10.2	1.57	0.43	MH	2	3.6	67.6	5.7	77.8	1190	6
4	a SY Monumen	HRW	0.166	70.5	13.4	71.1	11.8	89.1	-1.35	9.9	1.52	0.37	MH	5	7.6	67.1	16.4	78.8	1040	5
5	MTS1810	HRW	0.248	65.8	15.1	69.9	13.9	89.0	-1.65	11.2	1.48	0.45	M	0	2.7	65.7	3.6	75.4	1120	5
6	x MTS1831	HRW	0.243	76.8	13.9	71.5	12.7	89.2	-1.57	10.1	1.56	0.42	MH	5	6.9	66.7	17.4	77.4	1155	6
7	x MTS18116	HRW	0.179	74.0	13.8	71.9	12.5	89.4	-1.59	10.0	1.46	0.40	MH	3	5.4	67.2	16.8	78.4	1125	6
8	x MTS18149	HRW	0.158	72.4	14.9	72.7	13.6	88.6	-1.70	12.1	1.59	0.41	MH	3	4.9	68.3	13.9	79.5	1205	6
9	MT1845	HRW	0.125	61.9	14.7	69.9	13.7	88.9	-1.45	10.5	1.53	0.44	MH	4	6.2	69.3	13.2	80.5	1175	6
10	MT1848	HRW	0.096	73.1	15.2	70.8	13.7	88.3	-1.39	11.3	1.62	0.47	MH	3	3.9	69.0	8.4	78.7	1250	5
11	x MTS1855	HRW	0.202	72.5	15.0	71.5	13.7	88.8	-1.75	11.6	1.61	0.40	LM	0	3.0	67.7	4.8	77.4	1085	6
12	MT1866	HRW	0.214	64.4	14.9	70.5	13.4	89.2	-1.59	10.8	1.58	0.39	M	2	5.3	67.8	10.2	77.5	1095	6
13	MT1867	HRW	0.250	74.2	14.0	69.8	13.0	89.3	-1.70	10.7	1.55	0.37	M	4	5.5	66.2	9.8	78.4	1045	6
14	x MT1872	HRW	0.287	67.4	14.2	68.9	12.9	89.6	-1.92	11.4	1.55	0.41	LM	0	3.0	64.4	4.3	74.1	975	5
MIN			0.096	61.9	13.4	68.9	11.8	88.3	-1.92	9.9	1.44	0.37		0	2.7	64.4	3.6	74.1	975	5
MAX			0.291	76.8	15.2	72.7	14.5	89.6	-1.26	12.1	1.62	0.47		5	7.6	69.3	17.4	80.5	1250	6
AVE			0.210	70.4	14.6	70.9	13.3	89.0	-1.55	10.7	1.54	0.41		2.7	4.9	67.2	10.3	77.7	1120	5.6

Table 14. 2019 Advanced Winter Wheat Nursery Mill & Bake (Exp. 1408)
Location: Huntley, MT

Sample No.	Variety		Class	PPO	Single kernel hardness	Wheat Protein, % (12% m.b.)	Flour Yield, %	Flour Protein, % (14% m.b.)	L* Brightness			a* Green - Red			b* Blue - Yellow			Wheat Ash, %	Flour Ash, %	Mixograph Type	Mixing Tolerance	Mixo Mixing Time, min	Mixo Water Absorption, %	Bake Mixing Time, min	Bake Water Absorption, %	Loaf Volume	Crumb Grain Score
	1	2							1	2	1	2	1	2	1	2	1										
1	x	Yellowstone	HRW	0.316	75.8	12.1	69	10.8	89.2	-1.62	10.9	1.55	0.42	M	4	4.9	61	9.9	73.2	1015	7						
2	x	Judee	HRW	0.249	86.5	13.1	69.4	11.3	89.2	-1.81	11.3	1.73	0.42	MH	4	4.0	60.5	7.6	70.2	1115	6						
3	x	Warhorse	HRW	0.249	91.2	12.2	70.5	11.0	89.0	-1.86	11.4	1.53	0.45	M	2	4.1	60.0	5.4	70.2	1035	6						
4	a	SY Monumen	HRW	0.192	79.9	11.6	71.4	9.8	89.1	-1.62	10.6	1.49	0.38	M	4	5.9	59.4	12.6	72.6	895	6						
5		MTS1810	HRW	0.185	76.0	12.5	68.9	11.2	89.4	-1.94	11.6	1.45	0.41	LM	1	2.1	57.5	3.2	66.2	970	4						
6	x	MTS1831	HRW	0.257	78.3	11.4	68.7	10.1	89.6	-1.77	10.4	1.58	0.41	MH	4	4.4	58.5	12.2	70.2	935	6						
7	x	MTS18116	HRW	0.254	84.7	11.0	70.6	9.9	89.2	-1.77	10.4	1.64	0.44	M	4	5.0	58.2	10.6	70.4	935	6						
8	x	MTS18149	HRW	0.162	83.3	12.6	71.6	10.9	88.6	-1.93	12.5	1.66	0.41	M	4	4.3	61.0	9.1	71.7	1060	5						
9		MT1845	HRW	0.115	74.5	13.0	69.3	11.6	89.1	-1.66	11.1	1.57	0.47	M	4	6.0	63.3	13.1	76.5	1020	6						
10		MT1848	HRW	0.090	81.3	13.0	70.7	11.7	88.5	-1.79	12.2	1.61	0.48	MH	4	3.5	63.5	7.3	73.7	1040	6						
11	x	MTS1855	HRW	0.211	88.6	13.4	70.1	11.3	88.6	-1.97	12.7	1.72	0.44	LM	1	1.8	57.0	2.8	66.7	975	5						
12		MT1866	HRW	0.257	75.1	11.0	70.0	9.3	89.4	-2.01	11.5	1.59	0.43	M	3	1.9	51.8	3.2	61.5	900	6						
13		MT1867	HRW	0.336	82.0	12.3	68.9	11.2	89.4	-1.86	11.3	1.61	0.42	LM	3	3.2	60.7	5.2	70.4	980	6						
14	x	MT1872	HRW	0.217	67.7	11.6	70.7	10.2	89.6	-2.24	12.3	1.52	0.45	LM	1	2.2	53.8	2.7	61.5	865	5						
MIN																											
MAX																											
AVE																											

Table 15. 2019 Advanced Winter Wheat Nursery Mill & Bake (Exp. 1418)
Location: Conrad, MT

Sample No.	Variety	Class	PPD	Single kernel hardness	Wheat Protein, % (12% m.b.)	Flour Yield, %	Flour Protein, % (14% m.b.)	L* Brightness	a* Green - Red	b* Blue - Yellow	Wheat Ash, %	Flour Ash, %	Mixograph Type	Mixing Tolerance	Mixing Time, min	Mixing Water Absorption, %	Bake Mixing Time, min	Bake Water Absorption, %	Loaf Volume	Crumb Grain Score
1	x Yellowstone	HRW	0.214	90.8	13.3	70.6	11.3	89.3	-1.54	11.4	1.36	0.38	M	4	8.8	66.6	18.1	76.8	1100	6
2	x Judee	HRW	0.224	92.4	13.3	70.4	12.6	89.2	-1.65	11.5	1.30	0.40	M	4	6.1	65.7	11.3	75.4	1145	6
3	x Warhorse	HRW	0.209	97.1	13.1	68.3	12.1	89.1	-1.63	11.7	1.33	0.42	M	2	4.1	64.2	5.5	74.4	1105	6
4	a SY Monumen	HRW	0.148	88.3	12.3	71.3	11.4	89.6	-1.63	11.5	1.40	0.35	M	4	8.4	64.2	20.9	75.4	1005	6
5	MTS1810	HRW	0.213	86.3	13.7	69.7	13.5	89.9	-1.76	11.3	1.20	0.42	M	2	3.1	66.3	6.7	76.5	1110	5
6	x MTS1831	HRW	0.209	98.0	12.2	70	11.0	89.1	-1.73	11.1	1.43	0.43	M	4	6.8	63.5	17.2	73.2	1065	6
7	x MTS18116	HRW	0.213	93.9	12.7	69.9	11.6	89.6	-1.68	11.1	1.46	0.42	M	3	7.4	64.7	19.2	74.4	1100	6
8	x MTS18149	HRW	0.135	83.7	13.1	72.9	12	89.1	-1.90	12.7	1.50	0.39	M	4	6.4	67.4	22.2	79.1	1075	6
9	MT1845	HRW	0.106	79.9	13.3	70.4	11.5	89.1	-1.72	12.3	1.29	0.41	M	5	8.4	67.0	21.2	79.7	1065	5
10	MT1848	HRW	0.078	94.8	14.0	72.2	13.2	88.5	-1.63	12.3	1.38	0.47	MH	2	5.5	69.5	14.8	79.2	1150	5
11	x MTS1855	HRW	0.168	99.2	13.6	71.3	12.1	88.9	-1.99	12.8	1.46	0.39	M	1	3.6	66.7	8.1	76.4	1055	7
12	MT1866	HRW	0.195	80.7	13.2	68.3	11.5	89.4	-1.72	11.6	1.43	0.43	M	4	5.4	65.4	14.4	76.1	1050	5
13	MT1867	HRW	0.292	86.6	12.9	68.6	11.6	89.3	-1.82	11.8	1.43	0.38	M	4	5.2	66.4	18.7	81.6	1010	7
14	x MT1872	HRW	0.210	75.5	13.1	70.2	12.0	89.7	-2.03	12.0	1.44	0.40	M	1	3.7	64.2	7.2	74.4	990	5
MIN			0.078	75.5	12.2	68.3	11.0	88.5	-2.03	11.1	1.20	0.35		1	3.1	63.5	5.5	73.2	990	5
MAX			0.292	99.2	14.0	72.9	13.5	89.9	-1.54	12.8	1.50	0.47		5	8.8	69.5	22.2	81.6	1150	7
AVE			0.187	89.1	13.1	70.3	12.0	89.3	-1.75	11.8	1.39	0.41		3.1	5.9	65.8	14.7	76.6	1073	5.8

Table 16. 2019 Advanced Winter Wheat Nursery Mill & Bake (Exp. 14)
Location: Means Across Locations

Sample No.	Variety	Class	PO	Single kernel hardness	Wheat Protein, % (12% m.b.)	Flour Yield, %	Flour Protein, % (14% m.b.)	L* Brightness	a* Green - Red	b* Blue - Yellow	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	x Yellowstone	HRW	0.242	75.8	12.9	70.9	11.3	89.2	-1.51	10.8	1.46	0.41	4.0	6.1	64.1	12.5	75.0	1055	5.8
2	x Judee	HRW	0.270	82.4	13.6	70.7	12.4	89.2	-1.65	11.0	1.53	0.41	3.8	4.8	64.2	9.0	74.2	1134	5.8
3	x Warhorse	HRW	0.268	86.6	13.3	70.4	12.1	89.1	-1.67	11.1	1.45	0.43	2.0	3.8	63.3	5.6	73.4	1091	5.8
4	a SY Monumer	HRW	0.165	78.9	12.3	71.6	10.9	89.4	-1.56	10.6	1.45	0.37	4.3	6.9	63.5	15.5	75.1	978	5.5
5	MTS1810	HRW	0.217	75.0	13.4	69.9	12.4	89.6	-1.81	11.2	1.39	0.42	1.0	2.7	63.2	4.6	72.7	1071	5.0
6	x MTS1831	HRW	0.226	81.0	12.2	70.6	10.8	89.5	-1.72	10.4	1.50	0.42	4.0	6.1	62.6	15.2	73.1	1030	6.0
7	x MTS18116	HRW	0.226	82.9	12.3	71.0	11.0	89.5	-1.70	10.4	1.52	0.42	3.5	6.0	63.2	15.9	73.9	1030	6.0
8	x MTS18149	HRW	0.148	78.2	13.1	72.8	11.8	89.0	-1.88	12.3	1.52	0.40	3.8	5.1	65.2	15.2	76.4	1098	5.5
9	MT1845	HRW	0.120	71.0	13.4	70.1	12.0	89.2	-1.65	11.2	1.48	0.44	4.3	6.6	65.6	14.7	77.6	1086	5.8
10	MT1848	HRW	0.091	81.7	13.7	71.5	12.4	88.6	-1.64	11.8	1.54	0.48	3.3	4.2	66.6	9.8	76.6	1135	5.5
11	x MTS1855	HRW	0.219	84.7	13.5	71.5	12.0	88.9	-1.94	12.3	1.59	0.41	0.8	2.8	63.5	5.2	73.2	1015	5.8
12	MT1866	HRW	0.222	71.7	12.8	70.5	11.1	89.3	-1.79	11.3	1.52	0.42	3.0	4.0	61.5	8.5	71.5	1006	5.8
13	MT1867	HRW	0.299	76.9	12.6	69.9	11.5	89.4	-1.83	11.2	1.52	0.39	3.8	4.3	63.0	10.4	75.2	974	6.0
14	x MT1872	HRW	0.254	68.2	12.8	70.2	11.5	88.9	-2.06	11.8	1.49	0.42	1.3	2.9	60.1	4.8	69.4	959	5.0
Average																			
LSD (0.05)																			
C.V.																			
ns																			
10.8																			

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 17. 2019 Advanced Winter Wheat Nursery (Exp. 1401): Noodles

Location: Bozeman, MT			Noodle Color								Texture Profile Analysis																	
Sample No.	Variety	Class	L* at 0 hour (Brightness)		a* at 0 hour (Green - Red)		b* at 0 hour (Blue - Yellow)		24 hour L * Stability (0hr-24hr)	Noodle Score	Springiness at 0 min		Adhesiveness at 0 min		Hardness, g at 0 min		Chewiness at 0 min		Springiness at 5 min		Cohesiveness at 5 min		Adhesiveness at 5 min		Hardness, g at 5 min		Chewiness at 5 min	
1	x	Yellowstone	HRW	87.1	-0.04	15.3	78.4	0.96	22.0	8.6	333	0.90	0.63	-42.3	1309	739	0.90	0.58	-36.2	1014	527							
2	x	Judee	HRW																									
3	x	Warhorse	HRW																									
4	a	SY Monumen	HRW																									
5		MTS1810	HRW	86.1	-0.38	18.9	76.5	0.61	27.3	9.7	314	0.95	0.62	-37.5	1165	681	0.89	0.56	-36.9	915	461							
6	x	MTS1831	HRW	87.9	-0.31	15.0	79.2	0.09	23.4	8.6	335	0.88	0.61	-40.1	1239	665	0.88	0.55	-37.6	996	484							
7	x	MTS18116	HRW	86.2	-0.17	16.8	76.3	0.47	24.7	9.9	314	0.87	0.61	-42.9	1282	681	0.91	0.56	-39.0	1068	545							
8	x	MTS18149	HRW	85.6	-0.22	18.1	74.5	0.43	25.5	11.1	271	0.88	0.62	-43.1	1328	730	0.90	0.60	-33.1	987	532							
9		MT1845	HRW	86.0	0.03	17.6	76.6	1.33	27.0	9.3	313	0.89	0.62	-44.1	1379	761	0.87	0.58	-51.5	1187	595							
10		MT1848	HRW	84.7	0.03	19.0	75.5	1.27	27.0	9.2	313	0.93	0.62	-42.0	1291	752	0.91	0.59	-46.3	1002	539							
11	x	MTS1855	HRW	86.4	-0.25	17.2	75.7	0.53	26.6	10.8	295	0.89	0.61	-50.2	1242	673	0.88	0.56	-45.1	1014	501							
12		MT1866	HRW	85.8	-0.02	17.6	75.4	1.07	25.8	10.4	294	0.90	0.60	-44.1	1374	737	0.91	0.57	-47.4	1112	575							
13		MT1867	HRW	86.9	-0.42	17.2	78.5	0.02	24.2	8.4	332	0.86	0.60	-47.5	1427	742	0.91	0.58	-47.7	1084	578							
14	x	MT1872	HRW	86.7	-0.60	18.8	78.0	0.07	28.0	8.7	331	0.86	0.58	-40.7	1208	606	0.89	0.53	-40.9	991	465							
MIN				84.7	-0.60	15.0	74.5	0.02	22.0	8.4	271	0.86	0.58	-50.2	1165	606	0.87	0.53	-51.5	915	461							
MAX				87.9	0.03	19.0	79.2	1.33	28.0	11.1	335	0.95	0.63	-37.5	1427	761	0.91	0.60	-33.1	1187	595							
AVE				86.3	-0.21	17.4	76.8	0.62	25.6	9.5	313	0.89	0.61	-43.1	1295	706	0.90	0.57	-42.0	1034	527							

Table 18. 2019 Advanced Winter Wheat Nursery (Exp. 1402): Noodles

Location: Havre, MT			Noodle Color									Texture Profile Analysis								
Sample No.	Variety	Class	L* at 0 hour (Brightness)	a* at 0 hour (Green - Red)	b* at 0 hour (Blue - Yellow)	L* at 24 hour (Brightness)	a* at 24 hour (Green - Red)	b* at 24 hour (Blue - Yellow)	24 hour L * Stability (0hr-24hr)	Noodle Score	Springiness at 0 min	Cohesiveness at 0 min	Adhesiveness at 0 min	Hardness, g at 0 min	Chewiness at 0 min	Springiness at 5 min	Cohesiveness at 5 min	Adhesiveness at 5 min	Hardness, g at 5 min	Chewiness at 5 min
1	x Yellowstone	HRW	84.1	0.85	17.09	73.3	2.26	24.4	10.8	292	0.88	0.61	-66.7	1601	850	0.90	0.57	-44.4	1310	675
2	x Judee	HRW																		
3	x Warhorse	HRW																		
4	a SY Monumen	HRW																		
5	MTS1810	HRW	82.5	0.48	21.5	72.0	1.81	27.9	10.6	290	0.87	0.59	-61.8	1366	696	0.87	0.56	-50.4	1094	529
6	x MTS1831	HRW	85.2	0.18	17.5	74.3	1.05	25.0	10.9	293	0.89	0.60	-57.0	1435	763	0.88	0.57	-52.8	1172	590
7	x MTS18116	HRW	85.7	0.09	17.0	75.2	0.78	24.6	10.5	292	0.88	0.60	-53.0	1392	735	0.88	0.57	-44.8	1123	567
8	x MTS18149	HRW	83.7	0.38	19.8	70.4	1.38	26.3	13.3	231	0.92	0.62	-55.4	1340	762	0.90	0.59	-43.6	1071	573
9	MT1845	HRW	84.4	0.59	18.2	74.8	2.24	27.3	9.6	312	0.90	0.62	-50.5	1405	778	0.90	0.58	-38.1	1179	609
10	MT1848	HRW	83.2	0.71	19.5	73.5	2.33	27.4	9.7	313	0.87	0.60	-43.1	1402	733	0.88	0.58	-51.8	1154	583
11	x MTS1855	HRW	83.4	0.22	20.7	72.4	1.46	27.1	11.0	272	0.90	0.59	-61.0	1417	745	0.85	0.55	-49.8	1143	536
12	MT1866	HRW	84.4	0.48	18.3	72.7	1.32	27.0	11.7	270	0.93	0.62	-64.4	1471	847	0.93	0.59	-49.6	1201	658
13	MT1867	HRW	85.7	0.00	18.1	75.8	0.68	26.3	9.8	313	0.93	0.62	-67.6	1494	855	0.90	0.59	-50.7	1211	637
14	x MT1872	HRW	85.7	-0.39	20.3	76.8	0.50	28.4	8.9	333	0.84	0.55	-62.8	1384	641	0.87	0.52	-54.1	1147	514
MIN			82.5	-0.39	17.0	70.4	0.50	24.4	8.9	231	0.84	0.55	-67.6	1340	641	0.85	0.52	-54.1	1071	514
MAX			85.7	0.85	21.5	76.8	2.33	28.4	13.3	333	0.93	0.62	-43.1	1601	855	0.93	0.59	-38.1	1310	675
AVE			84.4	0.33	18.9	73.8	1.44	26.5	10.6	292	0.89	0.60	-58.5	1428	764	0.89	0.57	-48.2	1164	588

Table 19. 2019 Advanced Winter Wheat Nursery (Exp. 1408): Noodles

Location: Huntley, MT			Noodle Color								Texture Profile Analysis										
Sample No.	Variety	Class	L* at 0 hour (Brightness)		a* at 0 hour (Green - Red)		b* at 0 hour (Blue - Yellow)		L* at 24 hour (Brightness)	a* at 24 hour (Green - Red)	b* at 24 hour (Blue - Yellow)	24 hour L * Stability (0hr-24hr)	Noodle Score	Springiness at 0 min		Adhesiveness at 0 min		Hardness, g at 0 min		Chewiness at 0 min	
1	x Yellowstone	HRW	86.1	0.28	16.2	76.8	1.24	24.5	9.3	315	0.86	0.61	-46.7	1415	745	0.87	0.58	-56.0	1224	613	
2	x Judee	HRW																			
3	x Warhorse	HRW																			
4	a SY Monumen	HRW																			
5	MTS1810	HRW	85.9	-0.17	18.3	76.1	0.35	27.5	9.8	314	0.87	0.57	-67.9	1460	730	0.90	0.54	-56.1	1118	544	
6	x MTS1831	HRW	86.0	-0.14	18.0	76.7	0.40	25.5	9.3	315	0.90	0.61	-52.8	1441	786	0.92	0.56	-42.3	1144	586	
7	x MTS18116	HRW	86.3	-0.19	17.4	76.2	0.34	25.1	10.1	294	0.90	0.59	-54.7	1447	764	0.89	0.55	-46.7	1128	554	
8	x MTS18149	HRW	83.5	0.20	20.3	71.2	1.44	27.6	12.3	253	0.91	0.59	-48.2	1447	783	1.26	0.58	-34.3	1079	797	
9	MT1845	HRW	84.0	0.43	19.8	73.7	2.15	28.8	10.3	293	1.00	0.61	-45.5	1453	894	0.90	0.57	-57.3	1291	657	
10	MT1848	HRW	83.5	0.45	19.4	73.3	1.83	28.9	10.2	293	0.89	0.59	-55.8	1468	771	0.83	0.55	-52.3	1143	522	
11	x MTS1855	HRW	82.7	0.44	19.8	70.4	1.68	28.0	12.3	253	0.85	0.58	-51.4	1399	692	0.88	0.55	-41.8	1083	523	
12	MT1866	HRW	85.5	-0.16	18.9	75.6	0.49	26.5	9.8	314	0.93	0.57	-50.8	1376	736	0.93	0.55	-46.1	1088	556	
13	MT1867	HRW	84.6	0.09	19.0	73.9	0.74	26.5	10.8	294	0.85	0.60	-55.8	1492	761	0.93	0.55	-50.0	1281	658	
14	x MT1872	HRW	85.8	-0.71	20.8	77.3	0.19	28.3	8.5	333	0.88	0.56	-52.6	1286	625	0.88	0.51	-54.7	1042	468	
MIN			82.7	-0.71	16.2	70.4	0.19	24.5	8.5	253	0.85	0.56	-67.9	1286	625	0.83	0.51	-57.3	1042	468	
MAX			86.3	0.45	20.8	77.3	2.15	28.9	12.3	333	1.00	0.61	-45.5	1492	894	1.26	0.58	-34.3	1291	797	
AVE			84.9	0.05	18.9	74.7	0.99	27.0	10.2	297	0.90	0.59	-52.9	1426	753	0.93	0.55	-48.9	1147	589	

Table 20. 2019 Advanced Winter Wheat Nursery (Exp. 1418): Noodles

Location: Conrad, MT			Noodle Color									Texture Profile Analysis								
Sample No.	Variety	Class	L* at 0 hour (Brightness)	a* at 0 hour (Green - Red)	b* at 0 hour (Blue - Yellow)	L* at 24 hour (Brightness)	a* at 24 hour (Green - Red)	b* at 24 hour (Blue - Yellow)	24 hour L * Stability (0hr-24hr)	Noodle Score	Springiness at 0 min	Cohesiveness at 0 min	Adhesiveness at 0 min	Hardness, g at 0 min	Chewiness at 0 min	Springiness at 5 min	Cohesiveness at 5 min	Adhesiveness at 5 min	Hardness, g at 5 min	Chewiness at 5 min
1	x Yellowstone	HRW	84.9	0.63	17.2	73.7	1.87	26.2	11.2	274	0.87	0.60	-54.3	1547	808	0.85	0.57	-52.1	1259	614
2	x Judee	HRW																		
3	x Warhorse	HRW																		
4	a SY Monumen	HRW																		
5	MTS1810	HRW	83.9	0.29	20.6	72.7	1.59	28.6	11.2	270	0.87	0.58	-59.3	1431	721	0.90	0.56	-45.5	1046	520
6	x MTS1831	HRW	85.1	0.15	18.3	74.3	0.88	26.4	10.7	294	0.92	0.59	-41.3	1416	771	0.91	0.54	-46.0	1289	632
7	x MTS18116	HRW	84.8	0.30	18.5	73.3	1.17	26.4	11.4	273	0.89	0.59	-54.7	1586	833	0.87	0.56	-49.1	1235	605
8	x MTS18149	HRW	84.8	0.10	19.5	72.1	1.14	28.0	12.7	253	0.93	0.61	-54.9	1519	865	0.86	0.57	-44.9	1164	574
9	MT1845	HRW	85.0	0.39	18.9	75.1	1.78	29.3	9.9	311	0.86	0.62	-56.6	1522	802	0.90	0.56	-45.4	1253	629
10	MT1848	HRW	82.8	0.67	20.5	72.0	2.39	29.1	10.8	293	0.90	0.59	-54.1	1565	826	0.89	0.58	-41.1	1173	599
11	x MTS1855	HRW	84.4	0.06	20.1	72.6	1.26	28.8	11.8	272	0.91	0.59	-40.4	1381	747	0.90	0.55	-44.2	1162	572
12	MT1866	HRW	85.7	0.14	18.0	74.5	1.00	26.8	11.3	272	0.93	0.62	-54.5	1472	846	0.94	0.57	-41.2	1207	643
13	MT1867	HRW	86.4	-0.12	17.6	76.1	0.53	26.0	10.3	294	0.94	0.62	-44.5	1439	838	0.96	0.61	-53.2	1155	670
14	x MT1872	HRW	85.1	-0.29	21.4	75.7	0.66	29.7	9.5	312	0.92	0.58	-57.3	1305	692	0.85	0.52	-41.5	1044	463
MIN			82.8	-0.29	17.2	72.0	0.53	26.0	9.5	253	0.86	0.58	-59.3	1305	692	0.85	0.52	-53.2	1044	463
MAX			86.4	0.67	21.4	76.1	2.39	29.7	12.7	312	0.94	0.62	-40.4	1586	865	0.96	0.61	-41.1	1289	670
AVE			84.8	0.21	19.1	73.8	1.30	27.8	11.0	283	0.90	0.60	-52.0	1471	795	0.89	0.56	-45.8	1181	593

Table 21. 2019 Advanced Winter Wheat Nursery (Exp. 14): Noodles

Location: 4 Location M

Location: 4 Location M				Noodle Color							Texture Profile Analysis										
Sample No.	Variety	Class		L* at 0 hour (Brightness)	a* at 0 hour (Green - Red)	b* at 0 hour (Blue - Yellow)	L* at 24 hour (Brightness)	a* at 24 hour (Green - Red)	b* at 24 hour (Blue - Yellow)	24 hour L* Stability (0hr-24hr)	Noodle Score	Springiness at 0 min	Cohesiveness at 0 min	Adhesiveness at 0 min	Hardness, g at 0 min	Cheewiness at 0 min	Springiness at 5 min	Cohesiveness at 5 min	Adhesiveness at 5 min	Hardness, g at 5 min	Cheewiness at 5 min
1	x Yellowstone	HRW		85.6	0.43	16.5	75.6	1.58	24.3	10.0	304	0.88	0.61	-52.5	1468	786	0.88	0.57	-47.2	1202	608
2	x Judee	HRW																			
3	x Warhorse	HRW																			
4	a SY Monumen	HRW																			
5	MTS1810	HRW		84.6	0.06	19.8	74.3	1.09	27.8	10.3	297	0.89	0.59	-56.6	1356	707	0.89	0.55	-47.2	1043	513
6	x MTS1831	HRW		86.0	-0.03	17.2	76.2	0.61	25.0	9.9	309	0.90	0.60	-47.8	1383	746	0.90	0.56	-44.7	1150	573
7	x MTS18116	HRW		85.8	0.01	17.4	75.3	0.69	25.2	10.5	293	0.89	0.60	-51.3	1427	753	0.89	0.56	-44.9	1138	568
8	x MTS18149	HRW		84.4	0.12	19.4	72.1	1.10	26.9	12.4	252	0.91	0.61	-50.4	1408	785	0.98	0.59	-39.0	1075	619
9	MT1845	HRW		84.8	0.36	18.6	75.1	1.88	28.1	9.8	307	0.91	0.62	-49.2	1440	808	0.89	0.57	-48.1	1227	622
10	MT1848	HRW		83.6	0.47	19.6	73.6	1.96	28.1	10.0	303	0.90	0.60	-48.7	1432	771	0.88	0.57	-47.9	1118	561
11	x MTS1855	HRW		84.2	0.12	19.4	72.8	1.23	27.6	11.5	273	0.89	0.59	-50.8	1360	714	0.88	0.55	-45.2	1100	533
12	MT1866	HRW		85.4	0.11	18.2	74.6	0.97	26.5	10.8	288	0.92	0.60	-53.4	1423	792	0.93	0.57	-46.1	1152	608
13	MT1867	HRW		85.9	-0.11	18.0	76.1	0.49	25.7	9.8	308	0.89	0.61	-53.9	1463	799	0.92	0.58	-50.4	1183	636
14	x MT1872	HRW		85.8	-0.50	20.3	76.9	0.36	28.6	8.9	327	0.87	0.57	-53.3	1296	641	0.87	0.52	-47.8	1056	477
Average				85.1	0.09	18.6	74.8	1.09	26.7	10.3	296	0.90	0.60	-51.6	1405	755	0.90	0.56	-46.2	1131	574
LSD (0.05)				1.1	0.24	1.1	1.7	0.5	0.8	0.8	19	ns	0.02	ns	89	53	ns	0.02	ns	73	66
C.V.				0.9	180.9	4.0	1.6	78.6	2.1	5.6	4.4	3.7	1.9	12.4	4.4	4.9	6.7	1.9	12.2	4.8	8.0

Table 22. 2019 Sawfly Winter Wheat Nursery Mill & Bake (Exp. 5801)
Location: Bozeman, MT

Sample No.	Variety		Class	PPO	Single kernel hardness	Wheat Protein, % (12% m.b.)	Flour Yield, %	Flour Protein, % (14% m.b.)	L* Brightness			a* Green - Red		b* Blue - Yellow		Wheat Ash, %	Flour Ash, %	Mixograph Type	Mixing Tolerance	Mixo Mixing Time, min		Mixo Water Absorption, %	Bake Mixing Time, min	Bake Water Absorption, %	Loaf Volume	Crumb Grain Score		
1	x	Yellowstone	HRW	0.206	72.9	11.5	72.9	10.2	89.8	-1.70	10.6	1.32	0.40	M	4	5.0	61.1	11.4	73.8	960					6			
2	x	Judee	HRW	0.299	72.8	12.2	72.4	10.9	89.7	-1.79	10.9	1.50	0.39	M	4	4.8	63.5	10.2	73.2	1105					5			
3	x	Warhorse	HRW	0.265	81.7	12.5	72.2	11.3	89.6	-1.81	11.0	1.31	0.41	M	3	3.8	64.2	6.3	73.9	1115					6			
4	x	Loma	HRW	0.145	79.3	12.1	73.6	11.1	89.3	-2.26	13.0	1.49	0.41	M	5	5.2	65.5	15.2	76.2	995					6			
5	x	Bobcat	HRW	0.297	67.2	11.8	74.4	10.7	89.9	-2.40	13.3	1.41	0.38	M	4	4.7	63.3	13.2	79.0	915					6			
6	x	StandClear Cl	HRW	0.347	65.9	11.9	74.2	10.7	89.9	-2.17	12.2	1.43	0.37	M	4	3.7	62.8	6.7	72.5	1000					5			
7		MTS1810	HRW	0.240	73.9	12.2	72.3	11.0	90.2	-1.95	11.0	1.40	0.40	M	1	2.8	61.2	4.9	70.9	990					5			
8	x	MTS1831	HRW	0.217	76.7	11.1	73.6	9.8	90.0	-1.83	10.2	1.39	0.39	M	4	5.8	61.5	16.6	71.2	905					6			
9	x	MTS18116	HRW	0.204	80.3	11.3	72.2	10.0	90.2	-1.86	10.2	1.47	0.39	M	4	6.3	61.3	15.7	71.0	955					5			
10	x	MTS18149	HRW	0.128	78.1	11.9	74.8	10.8	89.3	-2.00	12.0	1.44	0.41	M	3	4.4	61.5	13.0	71.2	995					5			
11	x	MTS1903	HRW	0.129	73.3	11.7	73.3	10.7	90.0	-2.29	12.5	1.38	0.38	M	4	5.0	63.5	15.4	75.2	955					6			
12	x	MTS1908	HRW	0.114	69.5	11.5	73.2	10.6	90.1	-2.31	12.4	1.31	0.39	M	4	6.0	63.7	16.7	75.4	965					7			
13		MTS1914	HRW	0.163	73.9	11.8	74.8	10.7	89.5	-2.01	12.2	1.51	0.38	LM	1	2.9	61.4	5.8	70.1	1040					6			
14	x	MTS1915	HRW	0.190	82.0	12.6	74.4	11.5	88.9	-2.11	12.9	1.35	0.41	M	4	5.6	65.8	18.2	77.5	1060					6			
15		MTS1916	HRW	0.204	69.3	13.2	71.8	11.8	91.1	-2.09	11.2	1.42	0.40	M	4	6.8	66.4	26.4	77.1	1120					6			
16		MTS1918	HRW	0.201	69.9	12.2	72.9	11.1	90.5	-1.97	11.4	1.36	0.39	MH	3	2.9	59.7	7.0	69.4	1025					6			
17		MTS1919	HRW	0.258	79.1	13.2	72.9	11.8	90.9	-2.00	10.7	1.31	0.38	M	4	3.4	61.3	7.5	71	1145					5			
18		MTS1920	HRW	0.262	78.2	13.0	72.5	11.7	90.8	-1.85	10.2	1.23	0.39	M	3	2.9	63.7	7.0	73.4	1110					5			
19		MTS1922	HRW	0.237	81.1	11.9	70.3	10.7	90.8	-2.20	11.2	1.39	0.38	M	3	3.3	59.5	5.7	69.2	1050					6.00			
Average				0.114	65.9	11.1	70.3	9.8	88.9	-2.40	10.2	1.23	0.37	1	2.8	59.5	4.9	69.2	905.0	5								
LSD (0.05)				0.347	82.0	13.2	74.8	11.8	91.1	-1.70	13.3	1.51	0.41	5	6.8	66.4	26.4	79.0	1145.0	7								
C.V.				0.216	75.0	12.1	73.1	10.9	90.0	-2.03	11.5	1.39	0.39	3.5	4.5	62.7	11.7	73.2	1021.0	6								

Table 23. 2019 Sawfly Winter Wheat Nursery Mill & Bake (Exp. 5802)
Location: Havre, MT

Sample No.	Variety	Class	PO	Single kernel hardness	Wheat Protein, % (12% m.b.)	Flour Yield, %	Flour Protein, % (14% m.b.)	L* Brightness	a* Green - Red	b* Blue - Yellow	Wheat Ash, %	Flour Ash, %	Mixograph Type	Mixing Tolerance	Mixo Mixing Time, min	Mixo Water Absorption, %	Bake Mixing Time, min	Bake Water Absorption, %	Loaf Volume	Crumb Grain Score
1	x Yellowstone	HRW	0.259	76.8	14.3	71.3	13.3	88.9	-1.23	10.6	1.57	0.41	M	4	8.7	69.4	17.8	79.1	1120	6
2	x Judee	HRW	0.255	68.8	15.2	71.7	13.3	89.1	-1.36	10.3	1.55	0.37	MH	3	4.9	67.5	8.4	77.2	1245	6
3	x Warhorse	HRW	0.190	85.5	15.1	70.5	14.0	89.4	-1.42	10.3	1.49	0.46	MH	1	4.2	69.7	7	79.4	1115	7
4	x Loma	HRW	0.140	79.4	14.8	72.8	12.7	88.9	-1.89	12.8	1.58	0.36	MH	2	5.2	67.8	12.7	79.5	1150	7
5	x Bobcat	HRW	0.252	59.6	14.5	72.1	13.5	89.3	-2.04	12.3	1.47	0.39	M	2	3.7	67.7	7.9	78.4	1105	7
6	x StandClear Cl	HRW	0.290	64.9	14.3	72.1	12.9	89.5	-1.70	11.2	1.45	0.37	M	3	3.2	65.7	6.9	76.4	1100	7
7	MTS1810	HRW	0.188	79.2	15.1	70.5	14.0	89.6	-1.76	11.3	1.56	0.40	M	2	3.8	66.4	6.1	76.1	1095	6
8	x MTS1831	HRW	0.234	79.4	13.7	71.7	12.3	89.7	-1.63	10.3	1.58	0.39	MH	3	7.5	68.8	20.8	79.5	1065	5
9	x MTS18116	HRW	0.169	75.5	13.9	72.0	12.7	89.7	-1.61	10.2	1.58	0.42	M	3	7.8	69.3	19.5	80.0	1140	6
10	x MTS18149	HRW	0.154	71.3	14.8	73.3	12.2	89.1	-1.72	12.1	1.56	0.37	MH	3	5.7	67.8	18.2	80.0	1190	5
11	x MTS1903	HRW	0.105	68.1	14.1	72.1	13.1	89.8	-1.84	11.7	1.41	0.40	M	3	6.5	69.3	16.5	80	1125	7
12	x MTS1908	HRW	0.122	72.8	14.3	71.7	12.7	89.7	-1.80	11.5	1.41	0.37	MH	4	6.1	68.7	17.2	79.4	1200	7
13	MTS1914	HRW	0.116	61.8	14.2	74.0	13.0	89.1	-1.63	11.6	1.48	0.37	M	1	3.0	62.4	4.8	72.1	1130	7
14	x MTS1915	HRW	0.194	82.7	14.1	72.6	12.2	89.1	-1.87	12.4	1.49	0.39	MH	4	7.2	67.7	17.6	79.4	1120	7
15	MTS1916	HRW	0.152	69.6	14.5	71.8	13.0	89.6	-1.70	11.0	1.42	0.41	MH	4	6.8	67.2	17.6	77.9	1105	6
16	MTS1918	HRW	0.198	74.1	14.5	71.8	13.1	89.3	-1.57	11.2	1.46	0.39	M	2	4.1	65.4	6.5	75.1	1070	5
17	MTS1919	HRW	0.226	77.9	15.4	72.3	14.4	89.5	-1.55	10.4	1.43	0.39	MH	2	3.6	69.2	7.8	78.9	1150	7
18	MTS1920	HRW	0.242	80.0	14.7	72.1	13.3	89.8	-1.44	9.6	1.42	0.38	M	1	3.2	64.5	5.3	74.2	1150	4
19	MTS1922	HRW	0.191	84.2	14.4	70.1	13.2	89.3	-1.73	11.1	1.57	0.42	M	1	2.8	63.4	4.9	73.1	1105	7.00
Average				0.105	59.6	13.7	70.1	12.2	88.9	-2.04	9.6	1.41	0.36	1	2.8	62.4	4.8	72.1	1065.0	4
LSD (0.05)				0.290	85.5	15.4	74.0	14.4	89.8	-1.23	12.8	1.58	0.46	4	8.7	69.7	20.8	80.0	1245.0	7
C.V.				0.194	74.3	14.5	71.9	13.1	89.4	-1.66	11.2	1.50	0.39	2.5	5.2	67.3	11.8	77.7	1131.0	6

Table 24. 2019 Sawfly Winter Wheat Nursery Mill & Bake (Exp. 5853)
Location: Big Sandy, MT

Sample No.	Variety		Class	PPO	Single kernel hardness	Wheat Protein, % (12% m.b.)	Flour Yield, %	Flour Protein, % (14% m.b.)	L* Brightness			a* Green - Red		b* Blue - Yellow		Wheat Ash, %	Flour Ash, %	Mixograph Type	Mixing Tolerance	Mixo Mixing Time, min	Mixo Water Absorption, %	Bake Mixing Time, min	Bake Water Absorption, %	Loaf Volume	Crumb Grain Score	
	1	2							3	4	5	6	7	8												
1	x	Yellowstone	HRW	0.148	74.5	13.6	72.2	11.7	89.5	-1.43	10.3	1.29	0.39	MH	4	6.4	66	13.4	75.7	1065	6					
2	x	Judee	HRW	0.205	77.9	14.1	72.2	12.7	89.8	-1.61	10.5	1.32	0.39	MH	4	4.6	62.3	9.2	72.0	1160	6					
3	x	Warhorse	HRW	0.201	83.3	13.7	71.9	12.3	89.5	-1.63	10.7	1.23	0.40	MH	3	4.6	64.7	7.2	75.4	1120	6					
4	x	Loma	HRW	0.127	78.6	13.5	73.3	12.4	88.7	-2.07	13.1	1.30	0.40	M	4	6.4	65.4	14.6	76.1	1105	6					
5	x	Bobcat	HRW	0.234	72.9	13.2	73.1	11.9	89.8	-2.21	12.7	1.25	0.37	M	4	5.5	63.9	12.6	74.6	1000	6					
6	x	StandClear CI	HRW	0.309	73.0	12.9	73.9	11.9	89.6	-1.92	11.6	1.28	0.37	M	4	4.6	63.7	10.6	75.4	1020	5					
7		MTS1810	HRW	0.213	67.2	13.8	71.0	12.7	89.8	-1.80	10.9	1.23	0.40	M	1	3.2	62.5	4.1	72.2	1025	6					
8	x	MTS1831	HRW	0.194	74.6	13.1	72.6	11.9	89.8	-1.77	10.4	1.39	0.42	M	3	7.7	65.2	21	75.9	1100	6					
9	x	MTS18116	HRW	0.180	76.2	12.6	74.9	11.4	89.5	-1.71	10.3	1.31	0.44	M	3	7.1	64.5	20	76.2	1075	6					
10	x	MTS18149	HRW	0.122	78.5	13.5	74.5	11.9	89.1	-1.84	12.0	1.34	0.45	MH	4	6.3	65.7	19.0	77.4	1085	5					
11	x	MTS1903	HRW	0.108	80.1	13.3	72.3	12.0	89.4	-2.07	12.6	1.25	0.39	M	5	8.2	67.8	20.7	79.5	1035	5					
12	x	MTS1908	HRW	0.101	75.2	13.3	72.7	12.2	89.6	-2.05	12.3	1.27	0.39	M	4	8.5	68.7	24.3	80.4	1040	5					
13		MTS1914	HRW	0.130	66.3	12.8	75.2	11.0	89.2	-1.81	11.7	1.26	0.36	M	1	3.4	61.8	6.9	71.5	1060	6					
14	x	MTS1915	HRW	0.206	83.1	13.1	74.1	11.9	89.0	-2.01	12.6	1.24	0.42	M	3	8.3	67.5	26.0	78.2	1060	7					
15		MTS1916	HRW	0.193	70.1	13.0	72.5	11.2	89.9	-1.90	11.0	1.32	0.39	M	5	7.9	65.5	22.5	76.2	1050	5					
16		MTS1918	HRW	0.196	80.9	13.6	71.6	12.4	89.3	-1.76	11.5	1.57	0.41	M	2	4.4	64.7	8.0	74.4	1120	5					
17		MTS1919	HRW	0.241	83.1	13.7	73.1	12.4	89.7	-1.70	10.4	1.27	0.38	M	1	4.0	65.9	7.7	75.6	1095	6					
18		MTS1920	HRW	0.225	76.7	13.7	72.8	12.3	89.8	-1.62	10.1	1.23	0.37	M	2	3.4	62.4	6.2	72.1	1100	6					
19		MTS1922	HRW	0.156	87.0	13.7	71.4	11.6	89.2	-1.85	11.4	1.23	0.39	M	3	4.2	61.1	5.6	70.8	1055	6.00					
Average				0.101	66.3	12.6	71.0	11.0	88.7	-2.21	10.1	1.23	0.36	1	3.2	61.1	4.1	70.8	1000.0	5						
LSD (0.05)				0.309	87.0	14.1	75.2	12.7	89.9	-1.43	13.1	1.57	0.45	5	8.5	68.7	26.0	80.4	1160.0	7						
C.V.				0.184	76.8	13.4	72.9	12.0	89.5	-1.83	11.4	1.29	0.40	3.2	5.7	64.7	13.7	75.2	1072.0	6						

Table 25. 2019 Sawfly Winter Wheat Nursery Mill & Bake (Exp. 58)

Location: Means Across Locations

Sample No.	Variety	Class	PPO	Single kernel hardness	Wheat Protein, % (12% m.b.)	Flour Yield, %	Flour Protein, % (14% m.b.)	L* Brightness			a* Green - Red		b* Blue - Yellow		Wheat Ash, %	Flour Ash, %	Mixing Tolerance	Mixo Mixing Time, min	Mixo Water Absorption, %	Bake Mixing Time, min	Bake Water Absorption, %	Loaf Volume	Crumb Grain Score
								L*	a*	b*	a*	b*	a*	b*									
1	x Yellowstone	HRW	0.204	74.7	13.1	72.1	11.7	89.4	-1.45	10.5	1.39	0.40	4.0	6.7	65.5	14.2	76.2	1048				6.0	
2	x Judee	HRW	0.253	73.1	13.8	72.1	12.3	89.5	-1.59	10.6	1.46	0.38	3.7	4.8	64.4	9.3	74.1	1170				5.7	
3	x Warhorse	HRW	0.219	83.5	13.8	71.5	12.5	89.5	-1.62	10.7	1.34	0.42	2.3	4.2	66.2	6.8	76.2	1117				6.3	
4	x Loma	HRW	0.138	79.1	13.5	73.2	12.1	89.0	-2.07	13.0	1.46	0.39	3.7	5.6	66.2	14.2	77.3	1083				6.3	
5	x Bobcat	HRW	0.261	66.6	13.2	73.2	12.0	89.7	-2.22	12.8	1.38	0.38	3.3	4.6	65.0	11.2	77.3	1007				6.3	
6	x StandClear CL	HRW	0.315	67.9	13.0	73.4	11.8	89.6	-1.93	11.6	1.39	0.37	3.7	3.8	64.1	8.1	74.8	1040				5.7	
7	MTS1810	HRW	0.214	73.4	13.7	71.3	12.6	89.9	-1.84	11.0	1.40	0.40	1.3	3.3	63.4	5.0	73.1	1037				5.7	
8	x MTS1831	HRW	0.215	76.9	12.6	72.6	11.3	89.8	-1.74	10.3	1.45	0.40	3.3	7.0	65.2	19.5	75.5	1023				5.7	
9	x MTS18116	HRW	0.184	77.3	12.6	73.0	11.4	89.8	-1.73	10.2	1.45	0.42	3.3	7.1	65.0	18.4	75.7	1057				5.7	
10	x MTS18149	HRW	0.135	76.0	13.4	74.2	11.6	89.2	-1.85	12.0	1.45	0.41	3.3	5.5	65.0	16.7	76.2	1090				5.0	
11	x MTS1903	HRW	0.114	73.9	13.0	72.6	11.9	89.7	-2.07	12.3	1.35	0.39	4.0	6.6	66.9	17.5	78.2	1038				6.0	
12	x MTS1908	HRW	0.112	72.5	13.0	72.5	11.8	89.8	-2.05	12.1	1.33	0.38	4.0	6.9	67.0	19.4	78.4	1068				6.3	
13	MTS1914	HRW	0.137	67.3	12.9	74.7	11.6	89.3	-1.82	11.8	1.42	0.37	1.0	3.1	61.9	5.8	71.2	1077				6.3	
14	x MTS1915	HRW	0.196	82.6	13.3	73.7	11.9	89.0	-2.00	12.6	1.36	0.41	3.7	7.0	67.0	20.6	78.4	1080				6.7	
15	MTS1916	HRW	0.183	69.7	13.6	72.0	12.0	90.2	-1.90	11.1	1.39	0.40	4.3	7.2	66.4	22.2	77.1	1092				5.7	
16	MTS1918	HRW	0.198	75.0	13.4	72.1	12.2	89.7	-1.77	11.4	1.46	0.40	2.3	3.8	63.3	7.2	73.0	1072				5.3	
17	MTS1919	HRW	0.242	80.0	14.1	72.8	12.9	90.0	-1.75	10.5	1.34	0.38	2.3	3.7	65.5	7.7	75.2	1130				6.0	
18	MTS1920	HRW	0.243	78.3	13.8	72.5	12.4	90.1	-1.64	10.0	1.29	0.38	2.0	3.2	63.5	6.2	73.2	1120				5.0	
19	MTS1922	HRW	0.194	84.1	13.3	70.6	11.8	89.8	-1.93	11.2	1.40	0.40	2.3	3.4	61.3	5.4	71.0	1070				6.3	
Average			0.198	75.0	13.3	72.6	12.0	89.6	-1.84	11.4	1.39	0.39	3.1	5.1	64.9	12.4	75.4	1075				5.9	
LSD (0.05)			0.038	6.3	0.6	0.9	0.7	0.5	0.09	0.4	ns	0.03	1.2	1.2	2.5	3.8	2.9	74				ns	
C.V.			11.5	5.0	2.5	0.8	3.7	0.3	2.9	2.1	4.7	4.6	23.5	14.0	2.3	18.7	2.3	4.2				11.1	

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 26. 2019 Preliminary A Winter Wheat Nursery Mill & Bake (Exp. 3601)
Location: Bozeman, MT

Sample No. x = lines in 2021 tests	Variety	Class	PPO	Single kernel hardness	Wheat Protein, % (12% m.b.)	Flour Yield, %	Flour Protein, % (14% m.b.)	L* Brightness	a* Green - Red	b* Blue - Yellow	Wheat Ash, %	Flour Ash, %	Mixograph Type	Mixing Tolerance	Mixo Mixing Time, min	Mixo Water Absorption, %	Bake Mixing Time, min	Bake Water Absorption, %	Loaf Volume	Crumb Grain
1	x Yellowstone	HRW	0.160	68.5	11.6	72.8	10.4	90.0	-1.68	10.4	1.29	0.40	M	3	5.0	61.5	9.2	71.2	900	5.0
2	x Judee	HRW	0.284	75.9	11.8	71.2	10.7	90.2	-1.88	10.9	1.43	0.38	M	3	4.5	61.2	9.1	70.9	1020	5.0
3	x SY Monument	HRW	0.196	70.9	10.8	73.4	9.2	90.2	-1.78	10.5	1.26	0.37	M	4	4.7	57.5	9.0	69.2	900	3.0
4	x MTCL19149	HRW	0.258	81.0	12.0	71.8	11.1	89.9	-1.73	10.5	1.37	0.42	M	3	2.5	60.3	2.8	69.0	920	5.0
5	x MTCL19151	HRW	0.126	73.1	11.5	74.7	10	90.2	-1.77	10.8	1.26	0.41	M	3	4.9	63.4	9.9	74.1	970	5.0
6	MTCL19152	HRW	0.158	71.2	11.4	73.5	10.2	90.1	-1.76	10.8	1.31	0.45	M	3	4.6	58.5	7.3	68.2	960	5.0
7	MTCL19153	HRW	0.108	75.6	11.9	74.2	10.7	89.8	-1.77	11.1	1.39	0.44	M	3	3.0	59.4	4.5	69.1	990	7.0
8	x MT19159	HRW	0.139	73.7	11.7	74.8	10.9	89.6	-1.65	11.1	1.42	0.44	M	3	3.9	60.4	6.1	70.1	970	5.0
9	MT19173	HRW	0.363	58.7	11.8	72.7	10.3	90.7	-1.82	10.2	1.44	0.39	M	3	2.5	58.4	4.7	68.1	920	5.0
10	x MT19175	HRW	0.145	67.3	11.3	73.1	10.0	90.3	-1.47	9.6	1.36	0.42	M	4	3.9	59.4	4.0	69.1	890	6.0
11	MT19176	HRW	0.255	62.6	13.0	70.7	11.2	90.7	-2.19	11.0	1.26	0.40	M	1	3.5	60.5	5.4	70.2	975	5.0
12	MT19183	HRW	0.115	69.7	11.7	73.9	10.4	89.8	-1.54	10.4	1.41	0.44	M	5	3.3	61.2	6.0	70.9	1040	6.0
13	MT19186	HRW	0.233	71.8	11.8	72.6	10.4	90.1	-1.67	10.1	1.36	0.43	M	4	5.0	64.5	11.1	75.2	930	4.0
14	MT19189	HRW	0.294	71.0	11.3	74.0	10.4	90.1	-1.91	11.4	1.43	0.41	M	3	3.0	61.7	5.2	70.4	890	4.0
15	MT19193	HRW	0.315	69.4	11.7	72.4	9.6	90.2	-1.98	11.5	1.43	0.41	M	3	3.2	57.4	5.2	67.1	860	4.0
13	MT19196	HRW	0.122	77.1	11.6	72.1	10.4	89.9	-1.59	10.2	1.42	0.43	M	3	4.2	63.4	6.6	74.1	950	5.0
	MIN		0.108	58.7	10.8	70.7	9.2	89.6	-2.19	9.6	1.26	0.37		1	2.5	57.4	2.8	67.1	860	3.0
	MAX		0.363	81.0	13.0	74.8	11.2	90.7	-1.47	11.5	1.44	0.45		5	5.0	64.5	11.1	75.2	1040	7.0
	AVE		0.204	71.1	11.7	73.0	10.4	90.1	-1.76	10.7	1.37	0.42		3.2	3.9	60.5	6.6	70.4	943	5.0

Table27. 2019 Preliminary A Winter Wheat Nursery Mill & Bake (Exp. 3607)

Location: Moccasin, MT

Sample No.	Variety	Class	PP0	Single kernel hardness	Wheat Protein, % (12% m.b.)	Flour Yield, %	Flour Protein, % (14% m.b.)	L* Brightness	a* Green - Red	b* Blue - Yellow	Wheat Ash, %	Flour Ash, %	Mixograph Type	Mixing Tolerance	Mixing Time, min	Mixing Water Absorption, %	Bake Mixing Time, min	Bake Water Absorption, %	Loaf Volume	Crumb Grain
1	x Yellowstone	HRW	0.206	79.4	9.9	68.6	8.6	90.6	-1.78	10.3	1.50	0.42	M	5	7.4	57.4	20	68.1	780	4.0
2	x Judee	HRW	0.217	83.3	11.8	68	10.4	90.5	-1.89	10.7	1.59	0.42	M	4	6.5	59.3	11.5	69.0	875	4.0
3	x SY Monument	HRW	0.114	78.7	11.1	70.3	9.5	90.6	-1.70	10.4	1.50	0.39	M	5	8.9	57.9	19.0	74.1	950	4.0
4	x MTCL19149	HRW	0.180	96.6	12.7	70.1	11.3	89.6	-1.99	12.7	1.71	0.44	M	3	2.7	61.2	4.6	70.9	1000	5.0
5	x MTCL19151	HRW	0.081	84.4	11.3	70.8	10.3	90.5	-1.77	11.1	1.52	0.42	M	4	10.3	59.5	19.5	70.2	925	5.0
6	MTCL19152	HRW	0.108	85.4	10.9	70.0	9.7	90.6	-1.83	11.2	1.52	0.42	M	4	10.3	58.8	22.4	74.0	975	5.0
7	MTCL19153	HRW	0.074	84.3	11.1	72.4	9.9	90.2	-1.88	11.5	1.45	0.43	M	3	5.5	59.3	9.5	71.0	955	5.0
8	x MT19159	HRW	0.061	85.9	11.5	70.5	9.5	90.1	-1.91	11.9	1.62	0.53	M	4	7.3	58.5	14.0	70.2	830	5.0
9	MT19173	HRW	0.298	70.1	11.3	69.8	9.8	91.3	-1.89	10.5	1.64	0.40	M	3	6.1	59.4	11.2	69.1	900	5.0
10	x MT19175	HRW	0.064	76.5	11.7	68.8	10.2	90.6	-1.50	9.5	1.65	0.43	LM	2	7.8	58.9	17.0	69.1	930	4.0
11	MT19176	HRW	0.211	74.3	11.2	66.9	10.0	91.1	-2.21	10.8	1.54	0.43	LM	2	6.0	55.4	9.1	66.1	885	5.0
12	MT19183	HRW	0.098	84.1	11.4	69.7	9.7	90.5	-1.65	11.0	1.67	0.45	M	4	7.7	59.0	18.5	73.2	965	6.0
13	MT19186	HRW	0.207	84.8	10.6	67.6	9.3	90.7	-1.69	10.1	1.43	0.44	LM	4	10.0	59.5	24.6	74.2	855	5.0
14	MT19189	HRW	0.254	82.0	11.9	69.3	10.6	90.4	-1.96	11.9	1.56	0.44	M	3	6.8	61.3	14.9	72.0	900	4.0
15	MT19193	HRW	0.151	83.8	10.9	68.4	9.3	90.9	-2.02	11.4	1.47	0.41	LM	4	5.7	54.5	11.4	66.2	850	5.0
13	MT19196	HRW	0.075	87.4	11	68.4	9.6	90.6	-1.79	10.8	1.52	0.44	M	4	7.3	59.9	14.6	73.1	920	6.0
	MIN		0.061	70.1	9.9	66.9	8.6	89.6	-2.21	9.5	1.43	0.39		2	2.7	54.5	4.6	66.1	780	4.0
	MAX		0.298	96.6	12.7	72.4	11.3	91.3	-1.50	12.7	1.71	0.53		5	10.3	61.3	24.6	74.2	1000	6.0
	AVE		0.150	82.6	11.3	69.4	9.9	90.5	-1.84	11.0	1.56	0.43		3.6	7.3	58.7	15.1	70.7	906	5.0

Table 28. 2019 Preliminary A Winter Wheat Nursery Mill & Bake (Exp. 3608)
Location: Huntley, MT

Sample No. x = lines in 2021 tests	Variety	Class	PPO	Single kernel hardness	Wheat Protein, % (12% m.b.)	Flour Yield, %	Flour Protein, % (14% m.b.)	L* Brightness	a* Green - Red	b* Blue - Yellow	Wheat Ash, %	Flour Ash, %	Mixograph Type	Mixing Tolerance	Mixo Mixing Time, min	Mixo Water Absorption, %	Bake Mixing Time, min	Bake Water Absorption, %	Loaf Volume	Crumb Grain
1	x Yellowstone	HRW	0.321	76.0	13.0	71.6	11.8	89.8	-1.50	11.1	1.43	0.41	M	3	7.3	67.8	15.3	79.5	950	5.0
2	x Judee	HRW	0.232	78.8	12.1	71.6	11	89.9	-1.80	12.0	1.53	0.41	M	4	4.6	62.3	7.8	72.0	1010	5.0
3	x SY Monument	HRW	0.177	83.2	11.9	72.4	10.7	89.9	-1.51	11.4	1.44	0.40	M	4	6.5	62.7	14.6	73.4	910	4.0
4	x MTCL19149	HRW	0.213	92.5	11.6	71.9	10.3	90.1	-2.07	13.4	1.51	0.41	M	0	1.7	56.1	1.8	63.8	860	5.0
5	x MTCL19151	HRW	0.121	80.8	12.1	72.6	10.8	90.8	-1.85	12.2	1.44	0.43	M	4	4.8	62.7	10.0	74.4	970	5.0
6	MTCL19152	HRW	0.145	84.6	12.1	73.2	11.3	90.6	-1.89	12.6	1.13	0.43	M	4	4.1	62.3	7.1	72.0	960	7.0
7	MTCL19153	HRW	0.112	88.9	12.2	72.7	11.1	90.4	-1.83	12.4	1.44	0.43	M	3	3.5	64.2	8.4	74.4	985	5.0
8	x MT19159	HRW	0.109	83.3	12.9	74.2	11.1	89.1	-1.61	12.5	1.40	0.52	M	3	3.2	62.4	6.8	72.6	950	6.0
9	MT19173	HRW	0.334	65.4	11.8	72.1	10.8	90.5	-1.81	11.3	1.41	0.41	M	1	2.0	61.8	3.8	70.5	900	3.0
10	x MT19175	HRW	0.148	68.2	11.7	73.4	10.5	90.3	-1.39	10.3	1.41	0.41	M	2	3.4	61.0	6.5	70.7	920	5.0
11	MT19176	HRW	0.202	71.6	12.6	70.3	11.5	90.2	-2.15	12.4	1.50	0.42	M	1	2.7	57.7	3.6	67.4	980	5.0
12	MT19183	HRW	0.156	79.5	12.3	73.5	11.1	89.7	-1.54	11.9	1.43	0.42	M	3	3.3	60.0	6.3	70.7	960	6.0
13	MT19186	HRW	0.243	77.4	13.0	72.3	11.8	89.8	-1.52	11.3	1.40	0.42	MH	4	4.3	60.5	7.9	72.7	1030	5.0
14	MT19189	HRW	0.238	84.7	12.0	73.0	10.6	89.9	-1.95	13.0	1.44	0.42	M	3	2.2	58.9	4.6	68.6	950	6.0
15	MT19193	HRW	0.278	75.1	12.4	72.3	11.2	89.8	-1.84	12.6	1.58	0.45	M	3	2.7	57.8	5.6	68.0	960	5.0
13	MT19196	HRW	0.132	83.8	11.9	70.6	10.6	89.9	-1.78	12.0	1.57	0.41	M	2	3.0	59.5	5.0	71.7	990	6.0
	MIN		0.109	65.4	11.6	70.3	10.3	89.1	-2.15	10.3	1.13	0.40		0	1.7	56.1	1.8	63.8	860	3.0
	MAX		0.334	92.5	13.0	74.2	11.8	90.8	-1.39	13.4	1.58	0.52		4	7.3	67.8	15.3	79.5	1030	7.0
	AVE		0.198	79.6	12.2	72.4	11.0	90.0	-1.75	12.0	1.44	0.43		2.8	3.7	61.1	7.2	71.4	955	5.0

Table 29. 2019 Preliminary A Winter Wheat Nursery Mill & Bake (Exp. 3618)
Location: Conrad, MT

Sample No. x = lines in 2021 tests	Variety	Class	PPO	Single kernel hardness	Wheat Protein, % (12% m.b.)	Flour Yield, %	Flour Protein, % (14% m.b.)	L* Brightness	a* Green - Red	b* Blue - Yellow	Wheat Ash, %	Flour Ash, %	Mixograph Type	Mixing Tolerance	Mixo Mixing Time, min	Mixo Water Absorption, %	Bake Mixing Time, min	Bake Water Absorption, %	Loaf Volume	Crumb Grain
1	x Yellowstone	HRW	0.112	83.9	12.7	70.5	11.8	89.7	-1.70	12.3	1.26	0.39	M	3	9.0	63.9	17.9	73.6	1035	5.0
2	x Judee	HRW	0.217	86.8	14	68	13	89.8	-1.85	12.8	1.26	0.37	M	3	5.9	65.7	10.2	75.4	1240	4.0
3	x SY Monument	HRW	0.146	82.5	12	71	10.8	90.0	-1.85	12.6	1.34	0.35	M	4	6.9	62.1	16.5	73.8	970	3.0
4	x MTCL19149	HRW	0.165	96.3	13.0	69.2	11.7	89.0	-2.07	14.5	1.32	0.39	M	2	2.6	63.8	2.9	71.5	980	3.0
5	x MTCL19151	HRW	0.060	84.9	12.7	72	11.5	89.7	-1.88	13.2	1.31	0.39	M	3	8.0	64.9	18.6	75.6	1115	6.0
6	MTCL19152	HRW	0.072	81.2	13.5	69.5	12.5	89.8	-1.91	13.2	1.35	0.42	M	2	9.0	68.0	19.7	79.7	1190	5.0
7	MTCL19153	HRW	0.054	88.1	13.1	72.0	12.9	89.4	-1.76	13.1	1.21	0.42	M	4	8.8	67.2	17.8	78.9	1100	6.0
8	x MT19159	HRW	0.092	84.8	13.7	72.1	12.1	89.4	-2.00	13.9	1.28	0.38	M	3	5.6	65.8	11.9	75.5	1140	6.0
9	MT19173	HRW	0.195	71.7	13.2	69.8	12.4	90.4	-1.97	11.9	1.32	0.38	M	3	4.4	65.9	12.8	75.6	1020	5.0
10	x MT19175	HRW	0.078	73.4	12.5	71.5	11.4	90.4	-1.56	11.3	1.24	0.40	M	4	5.7	63.9	15.1	74.6	1030	5.0
11	MT19176	HRW	0.192	69.5	13.6	69.0	12.4	91.0	-2.25	12.4	1.27	0.39	LM	1	5.1	62.9	8.4	72.6	1120	6.0
12	MT19183	HRW	0.111	77.6	12.6	71.7	11.4	90.0	-1.65	12.0	1.30	0.40	M	3	6.9	60.0	10.4	70.7	1035	5.0
13	MT19186	HRW	0.148	79.1	13.7	70.1	12.2	90.2	-1.70	11.8	1.27	0.41	M	4	9.6	67.0	20.3	78.7	1060	6.0
14	MT19189	HRW	0.195	78.3	13.4	70.0	12.4	90.0	-1.98	13.3	1.43	0.39	M	3	4.6	67.9	9.4	76.6	990	5.0
15	MT19193	HRW	0.142	80.4	14.0	67.0	12.4	90.0	-1.91	12.8	1.46	0.41	LM	3	8.0	63.7	11.3	73.4	1020	5.0
13	MT19196	HRW	0.085	86.3	13.5	68.7	12.1	89.7	-1.80	12.9	1.32	0.39	M	4	7.5	68.0	14.8	79.7	1175	5.0
	MIN		0.054	69.5	12.0	67.0	10.8	89.0	-2.25	11.3	1.21	0.35		1	2.6	60.0	2.9	70.7	970	3.0
	MAX		0.217	96.3	14.0	72.1	13.0	91.0	-1.56	14.5	1.46	0.42		4	9.6	68.0	20.3	79.7	1240	6.0
	AVE		0.129	81.5	13.2	70.1	12.1	89.9	-1.87	12.7	1.31	0.39		3.1	6.7	65.0	13.6	75.4	1076	5.0

Table 30. 2019 Preliminary A Winter Wheat Nursery Mill & Bake (Exp. 36)
Location: Means Across 4 Locations

Sample No.	Variety	Class	PO	Single kernel hardness	Wheat Protein, % (12% m.b.)	Flour Yield, %	Flour Protein, % (14% m.b.)	L* Brightness	a* Green - Red	b* Blue - Yellow	Wheat Ash, %	Flour Ash, %	Mixing Tolerance	Mixing Time, min	Mixing Water Absorption, %	Bake Mixing Time, min	Bake Water Absorption, %	Loaf Volume	Crumb Grain
1	x Yellowstone	HRW	0.200	77.0	11.8	70.9	10.7	90.0	-1.67	11.0	1.37	0.41	3.5	7.2	62.7	15.6	73.1	916	4.8
2	x Judee	HRW	0.237	81.2	12.4	69.7	11.3	90.1	-1.86	11.6	1.45	0.40	3.5	5.4	62.1	9.7	71.8	1036	4.5
3	x SY Monumen	HRW	0.158	78.8	11.5	71.8	10.1	90.2	-1.71	11.2	1.39	0.38	4.3	6.8	60.1	14.8	72.6	933	3.5
4	x MTCL19149	HRW	0.204	91.6	12.3	70.8	11.1	89.6	-1.97	12.8	1.48	0.42	2.0	2.4	60.4	3.0	68.8	940	4.5
5	x MTCL19151	HRW	0.097	80.8	11.9	72.5	10.7	90.3	-1.82	11.8	1.38	0.41	3.5	7.0	62.6	14.5	73.6	995	5.3
6	MTCL19152	HRW	0.121	80.6	12.0	71.6	10.9	90.3	-1.85	11.9	1.33	0.43	3.3	7.0	61.9	14.1	73.5	1021	5.5
7	MTCL19153	HRW	0.087	84.2	12.1	72.8	11.2	89.9	-1.81	12.0	1.37	0.43	3.3	5.2	62.5	10.1	73.4	1008	5.8
8	x MT19159	HRW	0.100	81.9	12.5	72.9	10.9	89.6	-1.79	12.3	1.43	0.47	3.3	5.0	61.8	9.7	72.1	973	5.5
9	MT19173	HRW	0.298	66.5	12.0	71.1	10.8	90.7	-1.87	11.0	1.45	0.40	2.5	3.8	61.4	8.1	70.8	935	4.5
10	x MT19175	HRW	0.109	71.4	11.8	71.7	10.5	90.4	-1.48	10.2	1.42	0.42	3.0	5.2	60.8	10.7	70.9	943	5.0
11	MT19176	HRW	0.215	69.5	12.6	69.2	11.3	90.8	-2.20	11.6	1.39	0.41	1.3	4.3	59.1	6.6	69.1	990	5.3
12	MT19183	HRW	0.120	77.7	12.0	72.2	10.7	90.0	-1.60	11.3	1.45	0.43	3.8	5.3	60.1	10.3	71.4	1000	5.8
13	MT19186	HRW	0.208	78.2	12.3	70.7	10.9	90.2	-1.65	10.8	1.37	0.43	4.0	7.2	62.9	16.0	75.2	969	5.0
14	MT19189	HRW	0.245	79.0	12.2	71.6	11.0	90.1	-1.95	12.4	1.47	0.42	3.0	4.2	62.5	8.5	71.9	933	4.8
15	MT19193	HRW	0.222	77.2	12.3	70.0	10.6	90.2	-1.94	12.1	1.49	0.42	3.3	4.9	58.4	8.4	68.7	923	4.8
13	MT19196	HRW	0.104	83.6	12.0	70.0	10.7	90.0	-1.74	11.5	1.46	0.42	3.3	5.5	62.7	10.3	74.7	1009	5.5
Average			0.170	78.7	12.1	71.2	10.8	90.2	-1.81	11.6	1.42	0.42	3.2	5.4	61.4	10.6	72.0	970	5.0
LSD (0.05)			0.046	3.6	0.7	1.1	ns	0.4	0.12	0.5	ns	0.03	1.0	1.5	3.0	3.7	3.4	75	1.1
C.V.			18.9	3.2	4.2	1.1	4.8	0.3	4.5	3.0	5.3	4.5	23.0	19.9	3.4	24.7	3.3	5.4	15.0

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 31. 2019 Preliminary B Winter Wheat Nursery Mill & Bake (Exp. 3701)
Location: Bozeman, MT

Sample No.	Variety	Class	PPO	Single kernel hardness	Wheat Protein, % (12% m.b.)	Flour Yield, %	Flour Protein, % (14% m.b.)	L* Brightness		a* Green - Red		b* Blue - Yellow		Wheat Ash, %	Flour Ash, %	Mixograph Type	Mixing Tolerance	Mixo Mixing Time, min	Mixo Water Absorption, %	Bake Mixing Time, min	Bake Water Absorption, %	Loaf Volume	Crum Grain				
1	MT19106	HRW	0.282	73.2	10.8	72.5	9.6	90.2	2.19	12.3	1.45	0.38	M	4	4.5	59.9	11.2	70.6	950	6							
2	MT19115	HRW	0.195	79.3	11.3	72.1	10.2	90.3	1.81	11.0	1.42	0.39	M	3	2.6	60.9	4.1	69.6	950	5							
3	MT19116	HRW	0.223	65.3	12.9	73.5	11.4	90.1	1.70	10.7	1.46	0.40	M	3	2.7	61.4	4.6	71.6	935	5							
4	MT19117	HRW	0.221	66.9	11.5	70.4	10.1	90.4	1.53	9.4	1.39	0.40	M	2	2.2	57.4	3.6	67.1	925	5							
5	MT19122	HRW	0.168	82.9	12.6	71.8	11.3	90.3	1.91	11.5	1.40	0.38	MH	2	2.1	59.1	2.2	66.8	975	5							
6	MT19123	HRW	0.291	73.7	11.9	71.2	10.8	90.2	1.69	11.1	1.41	0.40	MH	4	4.3	59.4	8.9	70.6	935	5							
7	MT19128	HRW	0.247	70.3	11.9	72.7	10.8	90.1	1.46	10.2	1.46	0.43	MH	4	4.0	59.9	10.6	70.1	945	4							
8	MT19132	HRW	0.197	67.7	11.3	74.7	10.5	90.1	1.35	9.9	1.26	0.41	M	4	3.8	59.2	8.6	70.4	990	5							
9	MT19133	HRW	0.192	72.3	11.3	70.4	10.1	90.5	1.98	11.3	1.48	0.39	M	4	4.8	59.0	12.1	69.7	1000	7							
10	MT19134	HRW	0.237	66.8	11.5	69.9	10.2	90.7	2.22	12.3	1.49	0.36	M	3	4.4	59.4	10.4	69.6	940	5							
11	MT19135	HRW	0.250	69.3	13.1	70.8	11.9	90.7	1.78	10.8	1.63	0.39	M	3	5.0	62.1	13.4	72.8	1045	5							
12	MT19142	HRW	0.271	66.8	11.7	73	10.3	90.3	2.26	12.9	1.50	0.35	M	3	4.4	60.5	10.3	71.7	1010	5							
13	MT19143	HRW	0.224	74.0	12.9	73.3	11.8	90.8	2.00	11.6	1.45	0.38	M	3	4.8	63.1	13.2	72.8	1125	6							
14	MT19144	HRW	0.221	88.2	12.5	73.6	11.1	89.6	2.25	13.6	1.36	0.41	MH	2	3.5	62.8	9.7	73.0	1000	5							
15	MT19145	HRW	0.137	67.8	11.8	71.2	10.6	90.0	2.64	14.9	1.49	0.43	M	3	4.6	60.5	11.1	70.7	950	4							
16	Decade	HRW	0.306	70.2	12.0	71.3	10.7	90.5	1.57	10.0	1.56	0.39	MH	4	4.9	62.0	14.4	73.7	955	5							
17	x Yellowstone	HRW	0.196	66.6	11.5	73.1	10.3	90.2	1.70	11.0	1.34	0.39	M	4	5.2	61.5	9.9	71.7	920	4							
18	MT1793	HRW	0.238	68.1	12.4	72.9	11.1	90.3	1.45	9.6	1.37	0.38	M	4	3.6	62.6	10.1	72.8	1010	5							
AVE																					3.3	4.0	60.6	9.4	70.9	976	5.1

Table 32. 2019 Preliminary C Winter Wheat Nursery Mill & Bake (Exp. 3901)
Location: Bozeman, MT

Sample No.	Variety	Class	PO	Single kernel hardness	Wheat Protein, % (12% m.b.)	Flour Yield, %	Flour Protein, % (14% m.b.)	L* Brightness	a* Green - Red	b* Blue - Yellow	Wheat Ash, %	Flour Ash, %	Mixograph Type	Mixing Tolerance	Mixing Time, min	Mixing Water Absorption, %	Bake Mixing Time, min	Bake Water Absorption, %	Loaf Volume	Crumb Grain
1	x Yellowstone	HRW	0.195	74.0	11.9	72.4	10.7	89.9	1.67	11.3	1.44	0.39	M	4	4.8	63.1	10	72.8	955	5.0
2	x Warhorse	HRW	0.232	84.9	12.6	71.2	11.5	90.0	1.82	11.6	1.42	0.39	M	2	3.3	64.5	6.5	74.7	980	5.0
3	x Loma	HRW	0.152	79.8	11.7	73.2	10.4	89.8	2.41	14.1	1.49	0.38	M	3	4.8	63.1	12.9	74.8	1000	5.0
4	x Bobcat	HRW	0.285	70.2	12.2	74.1	11.2	90.1	2.41	14.2	1.42	0.37	M	3	4.3	63.5	10.9	74.7	910	4.0
5	MTS1943	HRW	0.164	69.7	12.5	71.3	10.6	90.4	2.42	13.5	1.50	0.37	LM	3	4.3	63.2	10.8	72.9	985	5.0
6	MTS1945	HRW	0.144	75.6	12.5	72.3	11.0	89.9	2.77	16.0	1.57	0.39	M	3	4.3	63.6	12.2	73.8	980	5.0
7	MTS1954	HRW	0.146	76.7	12.2	71	11	89.9	2.68	15.6	1.59	0.41	M	4	5.0	63.5	14.1	74.7	970	6.0
AVE			0.188	75.8	12.2	72.2	10.9	90.0	2.31	13.7	1.49	0.39		3.1	4.4	63.5	11.1	74.1	969	5.0

Table 33. 2019 Preliminary C Winter Wheat Nursery Mill & Bake (Exp. 3952)
Location: Big Sandy, MT

Sample No.	Variety	Class	PPO	Single kernel hardness	Wheat Protein, % (12% m.b.)	Flour Yield, %	Flour Protein, % (14% m.b.)	L* Brightness			a* Green - Red	b* Blue - Yellow	Wheat Ash, %	Flour Ash, %	Mixograph Type	Mixing Tolerance	Mixo Mixing Time, min	Mixo Water Absorption, %	Bake Mixing Time, min	Bake Water Absorption, %	Loaf Volume	Crumb Grain
1	x	Yellowstone	HRW	0.107	72.7	13.5	72.1	12.1	89.8	1.53	11.6	1.39	0.39	M	4	7.8	66.2	16.4	76.9	1050	5.0	
2	x	Warhorse	HRW	0.182	84.5	13.3	71.6	12.3	90.0	1.72	11.9	1.30	0.39	M	2	4.8	65.6	7.3	75.8	1070	7.0	
3	x	Loma	HRW	0.111	78.6	13.4	72.8	11.8	89.7	2.20	14.3	1.48	0.37	M	4	6.9	66.2	22.7	80.9	1050	5.0	
4	x	Bobcat	HRW	0.248	68.8	13.4	73.2	12.2	90.5	2.24	13.3	1.37	0.36	M	3	6.0	66.6	15.1	76.8	1035	5.0	
5	MTS1943	HRW	0.145	66.8	12.2	72.2	72.2	11	90.7	2.16	12.4	1.23	0.37	M	2	3.7	63.0	10.3	72.7	960	5.0	
6	MTS1945	HRW	0.126	72.5	13.2	73.6	73.6	11.8	90.1	2.60	15.4	1.28	0.38	M	3	4.6	61.5	11.1	73.7	965	5.0	
7	MTS1954	HRW	0.122	74.1	13.2	72.1	72.1	11.5	90.0	2.40	14.9	1.36	0.39	M	2	5.1	63.1	11.8	73.8	1000	4.0	
AVE			0.149	74.0	13.2	72.5	72.5	11.8	90.1	2.12	13.4	1.34	0.38	2.9	5.6	64.6	13.5	75.8	1019	5.1		

Table 34. 2019 Preliminary C Winter Wheat Nursery Mill & Bake (Exp. 36)
Location: Means Across Locations

Sample No.	Variety	Class	PPO	Single kernel hardness	Wheat Protein, % (12% m.b.)	Flour Yield, %	Flour Protein, % (14% m.b.)	L* Brightness	a* Green - Red	b* Blue - Yellow	Wheat Ash, %	Flour Ash, %	Mixing Tolerance	Mixing Time, min	Mixing Water Absorption, %	Bake Mixing Time, min	Bake Water Absorption, %	Loaf Volume	Crumb Grain
1	x Yellowstone	HRW	0.151	73.3	12.7	72.3	11.4	89.9	1.60	11.4	1.42	0.39	4.0	6.3	64.7	13.2	74.9	1003	5.0
2	x Warhorse	HRW	0.207	84.7	13.0	71.4	11.9	90.0	1.77	11.8	1.36	0.39	2.0	4.1	65.1	6.9	75.3	1025	6.0
3	x Loma	HRW	0.131	79.2	12.6	73.0	11.1	89.7	2.31	14.2	1.49	0.38	3.5	5.9	64.7	17.8	77.9	1025	5.0
4	x Bobcat	HRW	0.267	69.5	12.8	73.7	11.7	90.3	2.33	13.8	1.40	0.37	3.0	5.2	65.1	13.0	75.8	973	4.5
5	MTS1943	HRW	0.155	68.2	12.4	71.8	10.8	90.5	2.29	13.0	1.37	0.37	2.5	4.0	63.1	10.6	72.8	973	5.0
6	MTS1945	HRW	0.135	74.1	12.9	73.0	11.4	90.0	2.69	15.7	1.43	0.39	3.0	4.5	62.6	11.7	73.8	973	5.0
7	MTS1954	HRW	0.134	75.4	12.7	71.6	11.3	90.0	2.54	15.2	1.48	0.40	3.0	5.1	63.3	13.0	74.3	985	5.0
Average			0.168	74.9	12.7	72.4	11.4	90.1	2.22	13.6	1.42	0.38	3.0	5.0	64.1	12.3	74.9	994	5.1
LSD (0.05)			0.042	1.8	ns	ns	ns	0.4	0.11	1.0	ns	0.01	ns	ns	ns	sn	ns	ns	ns
C.V.			10.3	1.0	3.8	0.8	2.5	0.2	2.1	3.1	5.8	1.4	22.4	18.0	2.3	25.6	2.4	4.1	16.9

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 35. 2019 Preliminary D Winter Wheat Nursery Mill & Bake (Exp. 3901)
Location: Bozeman, MT

Sample No.	Variety	Class	PO	Single kernel hardness	Wheat Protein, % (12% m.b.)	Flour Yield, %	Flour Protein, % (14% m.b.)	L* Brightness	a* Green - Red	b* Blue - Yellow	Wheat Ash, %	Flour Ash, %	Mixograph Type	Mixing Tolerance	Mixing Time, min	Mixing Water Absorption, %	Bake Mixing Time, min	Bake Water Absorption, %	Loaf Volume	Crumb Grain
1	x Yellowstone	HRW	0.196	75.3	11.5	72.5	10.4	90.0	-1.72	11.3	1.54	0.39	M	4	5.3	62.9	11.6	73.6	900	4.0
2	x Warhorse	HRW	0.257	89.8	12.3	71.5	11	90.2	-1.87	11.6	1.44	0.39	M	2	3.6	63.6	7.1	73.8	1000	6.0
3	x Loma	HRW	0.110	81.1	11.3	73.6	10.2	89.8	-2.39	13.9	1.50	0.39	M	5	4.5	62.5	12.8	72.7	985	5.0
4	x Bobcat	HRW	0.292	70.7	12.3	73.4	10.8	90.3	-2.42	14.0	1.60	0.37	M	4	3.9	63.7	12.4	73.9	940	5.0
5	MTS1971	HRW	0.178	76.5	11.5	73.6	10.4	90.2	-2.46	14.2	1.51	0.40	M	3	4.5	63.1	14.3	72.8	950	6.0
6	MTS1976	HRW	0.133	80.6	12.2	74.3	11.3	89.8	-2.10	13.1	1.59	0.41	M	3	4.7	64.0	14.8	73.7	1005	6.0
7	MTS19102	HRW	0.192	72.2	12.8	69.5	11.2	90.0	-1.98	12.0	1.56	0.41	M	2	2.3	63.0	4.7	73.2	1000	5.0
AVE			0.194	78.0	12.0	72.6	10.8	90.1	-2.13	12.9	1.53	0.39		3.3	4.1	63.3	11.1	73.4	969	5.3

x = lines in 2021 tests

Table 36. 2019 Preliminary C Winter Wheat Nursery Mill & Bake (Exp. 3952)
Location: Carter/Ft. Benton, MT

Sample No.	Variety	Class	PO	Single kernel hardness	Wheat Protein, % (12% m.b.)	Flour Yield, %	Flour Protein, % (14% m.b.)	L* Brightness	a* Green - Red	b* Blue - Yellow	Wheat Ash, %	Flour Ash, %	Mixograph Type	Mixing Tolerance	Mixing Time, min	Mixing Water Absorption, %	Bake Mixing Time, min	Bake Water Absorption, %	Loaf Volume	Crumb Grain
1	x Yellowstone	HRW	0.186	89.3	12.9	72	11.9	89.4	-1.71	12.6	1.58	0.39	M	4	6.9	65.5	15.9	76.7	1040	5.0
2	x Warhorse	HRW	0.268	91.2	13.4	70.2	12.8	89.6	-1.79	12.5	1.43	0.41	M	1	3.7	66.7	7.4	76.9	1045	5.0
3	x Loma	HRW	0.120	84.7	13.2	72.3	12.1	89.3	-2.28	15.1	1.51	0.38	M	3	6.7	65.8	16.1	77.0	1050	5.0
4	x Bobcat	HRW	0.235	75.9	12.9	73.4	11.8	90.2	-2.44	14.5	1.45	0.36	M	4	5.6	65.5	14.9	76.2	1010	5.0
5	MTS1971	HRW	0.255	84.4	13.3	72.9	12.3	89.4	-2.39	15.7	1.35	0.39	M	2	5.7	66.5	11.2	76.2	1055	6.0
6	MTS1976	HRW	0.153	87.7	13.3	74.4	12.2	89.5	-1.99	13.7	1.46	0.39	M	4	6.6	65.8	15.9	77.0	1050	4.0
7	MTS19102	HRW	0.225	85.5	12.9	68.9	11.4	90.2	-2.01	12.5	1.33	0.38	M	1	3.1	62.6	4.8	72.3	1010	5.0
AVE			0.206	85.5	13.1	72.0	12.1	89.6	-2.09	13.8	1.44	0.39		2.7	5.5	65.5	12.3	76.0	1037	5.0

x = lines in 2021 tests

Table 37. 2019 Preliminary D Winter Wheat Nursery Mill & Bake (Exp. 36)
Location: Means Across Locations

Sample No.	Variety	Class	PPO	Single kernel hardness	Wheat Protein, % (12% m.b.)	Flour Yield, %	Flour Protein, % (14% m.b.)	L* Brightness	a* Green - Red	b* Blue - Yellow	Wheat Ash, %	Flour Ash, %	Mixing Tolerance	Mixing Time, min	Mixing Water Absorption, %	Bake Mixing Time, min	Bake Water Absorption, %	Loaf Volume	Crumb Grain
1	x Yellowstone	HRW	0.191	82.3	12.2	72.3	11.2	89.7	-1.72	12.0	1.56	0.39	4.0	6.1	64.2	13.8	75.2	970	4.5
2	x Warhorse	HRW	0.263	90.5	12.9	70.9	11.9	89.9	-1.83	12.0	1.44	0.40	1.5	3.7	65.2	7.3	75.4	1023	5.5
3	x Loma	HRW	0.115	82.9	12.3	73.0	11.2	89.6	-2.34	14.5	1.51	0.39	4.0	5.6	64.2	14.5	74.9	1018	5.0
4	x Bobcat	HRW	0.264	73.3	12.6	73.4	11.3	90.3	-2.43	14.2	1.53	0.37	4.0	4.8	64.6	13.7	75.1	975	5.0
5	MTS1971	HRW	0.217	80.5	12.4	73.3	11.4	89.8	-2.43	14.9	1.43	0.40	2.5	5.1	64.8	12.8	74.5	1003	6.0
6	MTS1976	HRW	0.143	84.1	12.8	74.4	11.8	89.6	-2.05	13.4	1.53	0.40	3.5	5.7	64.9	15.4	75.4	1028	5.0
7	MTS19102	HRW	0.209	78.8	12.9	69.2	11.3	90.1	-2.00	12.2	1.45	0.40	1.5	2.7	62.8	4.8	72.8	1005	5.0
Average			0.200	82.0	12.6	72.3	11.4	89.8	-2.11	13.3	1.49	0.39	3.0	4.8	64.4	11.7	74.7	1003	5.1
LSD (0.05)			0.071	8.2	ns	1.0	ns	ns	0.10	0.7	ns	ns	1.7	1.2	ns	4.3	ns	ns	ns
C.V.			14.4	4.1	3.6	0.5	4.0	0.3	2.0	2.2	4.9	2.9	23.0	10.6	1.5	14.8	1.6	3.0	13.1

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's protected LSD (p=0.05)

Table 38. 2019 Sawfly Observation Nursery (SFO)
Location: Bozeman, MT

Sample No. x = in 2021 tests	Variety	Pedigree	Class	PPO	Single Kernel Hardness	Wheat Protein, % (12% m.b.)	Flour					Mixograph			Test Bake					
							Flour Yield, %	Flour Protein, % (14% m.b.)	L* Brightness	a* Green - Red	b* Blue - Yellow	Wheat Ash, %	Flour Ash, %	Type	Tolerance	Mixing Time, min	Water Absorption, %	Mixing Time, min	Water Absorption, %	Loaf Volume
1	Warhorse	check	HRW	0.259	85.7	13.0	71.2	11.8	89.7	-1.85	11.4	1.39	0.41	MH	5	3.0	61.7	5.3	71.4	960
2	MTCS2061	Warhorse/MTCS1203	HRW	0.174	75.1	12.8	72.9	11.3	89.6	-2.37	13.5	1.35	0.40	M	1	2.4	62.2	3.8	71.9	900
3	MTCS2062	Warhorse/MTCS1203	HRW	0.211	75.7	12.7	72.1	11.3	90.0	-2.49	13.4	1.32	0.41	MH	3	2.8	60.8	4.2	70.5	910
4	MTCS2063	MTCS1203/MTS1021/MTCL1003	HRW	0.259	71.5	12.9	73.3	11.7	89.7	-2.41	13.4	1.38	0.41	MH	3	3.5	61.7	7.5	71.4	890
5	Warhorse	check	HRW	0.174	90.7	12.5	71.6	11.3	89.6	-1.91	11.5	1.36	0.39	M	5	3.7	63.7	5.5	73.4	975
6	MTS2064	(Judee sib, MTS0819-98)/MTS1011	HRW	0.211	84.8	12.4	71.7	11.0	89.2	-2.00	12.3	1.31	0.42	MH	4	4.0	63.9	7.3	75.6	875
7	MTS2065	Warhorse//MTS1028/MTS1030	HRW	0.181	78.5	12.3	71.8	11.0	90.1	-1.72	10.4	1.37	0.36	M	6	5.4	66.8	11.4	77.5	1000
8	Warhorse	check	HWW	0.302	86.8	12.8	70.9	11.3	89.6	-1.88	11.5	1.48	0.42	M	3	3.7	64.3	5.1	74.5	930
9	MTS2066	Warhorse*2/Loma	HRW	0.336	89.4	12.9	72.4	11.4	89.3	-1.97	12.2	1.35	0.38	M	2	2.7	67.0	5.5	77.2	1010
10	MTS2067	Warhorse/Loma/MTS1594	HRW	0.265	79.8	12.2	72.7	10.8	89.4	-1.73	11.1	1.36	0.38	M	5	6.4	65.2	10.6	77.4	880
11	x MTS2068	(Judee sib, MTS0819)/08X350-A6/	HRW	0.093	79.5	11.4	72.8	10.2	89.8	-2.35	13.2	1.43	0.40	M	4	4.7	64.2	9.4	75.4	900
12	x MTS2069	(Judee sib, MTS0819)/MV17-04/Ju	HRW	0.270	80.9	12.4	74.0	11.2	90.1	-1.88	10.5	1.39	0.36	M	4	3.8	62.7	6.7	72.4	920
13	x MTS2070	Decade/(MTS0819, Judee sib)	HRW	0.201	77.7	11.6	72.7	10.5	90.2	-1.77	10.5	1.44	0.40	M	3	3.0	61.7	5.5	71.4	900
14	x MTS2071	Decade/(MTS0819, Judee sib)	HRW	0.181	80.1	12.8	74.5	11.7	90.0	-1.92	11.1	1.45	0.39	M	4	3.7	64.2	7.7	75.4	980
15	MTS2072	MTS0832/Spur	HRW	0.233	78.3	12.4	73.7	11.5	90.2	-2.32	12.5	1.44	0.39	M	4	3.5	63.7	6.3	73.4	980
16	Warhorse	check	HRW	0.211	84.3	12.8	71.7	11.4	89.6	-1.84	11.3	1.41	0.41	M	4	3.3	62.0	5.3	72.2	950
17	MTS2073	MTS1054/Warhorse/MTS1008	HRW	0.243	74.0	12.3	70.0	11.0	90.0	-1.56	10.0	1.53	0.40	M	2	3.0	64.3	5.4	74.5	930
18	x MTS2074	(Colter sib, MT08177)/MTS0916/M	HRW	0.186	80.9	11.4	73.2	10.2	90.1	-2.67	13.9	1.41	0.41	M	4	5.6	62.4	14.4	75.6	880
19	MTS2075	MT10105W/warhorse/MTS1011	HRW	0.233	86.9	12.1	72.7	10.9	89.0	-1.82	11.9	1.34	0.45	M	3	2.7	60.9	4.8	71.1	915
20	MTS2076	MT10105W/warhorse/MTS1011	HRW	0.265	75.8	11.8	72.3	10.5	90.2	-1.80	10.2	1.50	0.43	M	3	2.6	62.3	5.4	72.5	945
21	MTS2077	Judee//16FAWWON-lrr-87/(MT097	HRW	0.093	87.5	11.8	72.4	11.0	89.2	-1.70	11.8	1.47	0.42	M	4	2.2	62.5	3.3	70.7	880
22	MTS2078	Judee//MTS1023/16FAWWON-lrr-8	HRW	0.270	81.0	11.6	73.4	10.4	90.2	-1.99	11.4	1.40	0.40	LM	4	8.7	66.5	22.7	76.7	800
23	MTS2079	(Judee sib, MTS0819)/MV17-04/Ju	HRW	0.201	79.5	12.3	74.3	11.0	89.8	-1.78	10.5	1.45	0.38	M	2	3.7	65.0	8.1	75.2	920
24	MTS2080	Decade/(MTS0819, Judee sib)	HRW	0.181	82.2	12.2	74.2	11.0	90.0	-1.97	11.1	1.41	0.40	M	4	3.6	64.9	6.8	74.6	965
25	MTS2081	Judee/MTS1014	HRW	0.233	75.5	11.3	71.6	9.9	90.0	-1.64	9.9	1.53	0.43	M	3	2.3	62.2	4.2	69.4	900
26	MTS2082	Warhorse*2/Accipiter	HRW	0.211	90.0	13.0	72.0	11.4	89.6	-1.85	11.4	1.39	0.40	M	3	3.8	65.0	5.7	76.2	1080
27	MTS2083	Warhorse*2/Accipiter	HRW	0.243	82.8	12.0	71.4	10.6	90.2	-1.92	11.0	1.40	0.42	M	3	2.5	63.9	5.5	74.1	965
28	MTS2084	Warhorse*2/Accipiter	HRW	0.186	86.4	13.1	71.9	11.6	89.7	-1.83	11.3	1.44	0.41	MH	3	3.2	65.5	5.9	76.2	1080
					MIN	11.3	70.0	9.9	89.0	-2.67	9.9	1.31	0.36		1.0	2.2	60.8	3.3	69.4	800
					MAX	13.1	74.5	11.8	90.2	-1.56	13.9	1.53	0.45		6.0	8.7	67.0	22.7	77.5	1080
					AVE	12.3	72.5	11.0	89.8	-1.96	11.6	1.41	0.40		3.5	3.7	63.6	7.1	73.9	936

Table 39. 2019 Single Rep Observation 'A' Nursery (SROA)

Location: Bozeman, MT

Sample No. x in 2021 tests	Variety	Pedigree	Class	PPO	Single Kernel Hardness	Wheat Protein, % (12% m.b.)	Flour					Mixograph			Test Bake					
							Flour Yield, %	Flour Protein, % (14% m.b.)	L* Brightness	a* Green - Red	b* Blue - Yellow	Wheat Ash, %	Flour Ash, %	Type	Tolerance	Mixing Time, min	Water Absorption, %	Mixing Time, min	Water Absorption, %	Loaf Volume
1	Yellowstone	check	HRW	0.233	75.1	11.6	73.3	10.4	90.0	-1.66	10.7	1.35	0.41	M	4	4.7	63.1	7.9	71.8	920
2	x MTSM2001	Yellowstone*4/Cap19/Vida/3/MT08	HRW	0.265	80.3	11.7	72.0	10.3	89.8	-2.20	13.3	1.32	0.42	M	4	3.0	58.2	7.7	67.9	885
3	MT2002	MT0871/MT1088/Decade	HRW	0.093	77.0	12.4	74.7	11.1	90.0	-1.63	10.6	1.42	0.42	MH	4	3.9	61.6	6.9	72.8	1005
4	MT2003	MT1088*2/Decade	HRW	0.270	68.7	12.9	74.7	11.5	90.1	-1.47	9.7	1.39	0.40	M	4	5.9	67.2	11.9	78.9	955
5	MT2004	MT1088*2/Decade	HRW	0.201	72.4	12.6	73.5	11.3	90.1	-1.13	8.7	1.42	0.42	MH	4	6.1	66.5	11.2	77.7	990
6	MTCL2005	MTCL1260/MTCL1125/MT1091	HRW	0.181	70.0	12.6	72.5	11.3	90.0	-1.72	10.7	1.37	0.40	M	4	4.8	64.1	8.4	73.8	980
7	MTCL2006	MT1137/MTCL1067	HRW	0.233	71.6	11.3	73.8	10.0	90.2	-2.29	13.0	1.34	0.39	M	4	3.4	60.2	5.5	69.9	805
8	Yellowstone	check	HRW	0.211	74.1	11.7	73.0	10.3	90.1	-1.75	11.0	1.37	0.41	MH	4	4.4	59.2	7.0	68.9	880
9	x MTCL2007	MTCL1125/MT1091	HRW	0.243	88.3	11.7	72.2	10.3	89.4	-1.99	12.6	1.44	0.45	M	3	2.1	55.2	2.5	59.9	810
10	x MTCL2008	MTCL1125/MT1091	HRW	0.186	90.2	12.1	72.8	10.9	89.9	-1.80	11.3	1.40	0.41	MH	3	2.9	57.2	2.7	65.9	915
11	x MTCL2009	MTCL1125/MT1091	HRW	0.233	91.3	11.0	72.4	9.7	89.5	-2.04	12.8	1.39	0.43	M	3	2.1	55.0	2.3	63.7	860
12	x MTCL2010	MT0871/06X445B1-2, SY Clearstd	HRW	0.265	78.5	11.8	74.6	10.6	90.0	-1.78	11.3	1.28	0.42	MH	4	4.3	64.1	8.5	73.8	1075
13	MTCL2011	MT0871/06X445B1-2, SY Clearstd	HRW	0.093	83.3	12.0	73.3	11.1	89.8	-1.59	10.9	1.32	0.42	M	4	5.5	66.1	10.1	75.8	1025
14	MTCL2012	MT0871/06X445B1-2, SY Clearstd	HRW	0.270	64.6	11.7	70.2	10.3	91.0	-1.77	10.0	1.27	0.41	M	4	4.2	62.2	10.8	72.9	965
15	MTCL2013	MT0871/06X445B1-2, SY Clearstd	HRW	0.201	75.9	12.1	74.9	11.0	90.0	-1.69	11.2	1.31	0.42	M	4	5.0	65.1	8.9	75.8	985
16	x MTCL2014	MT0871/06X445B1-2, SY Clearstd	HRW	0.095	89.8	11.8	72.4	10.7	89.6	-1.69	11.7	1.43	0.44	MH	3	4.4	65.6	9.7	75.8	990
17	MTCL2015	MT0871/06X445B1-2, SY Clearstd	HRW	0.126	87.6	12.0	73.4	10.7	89.6	-1.77	11.7	1.33	0.43	MH	4	5.1	66.2	10.8	76.9	1085
18	MT2016	MT1137/MT1078/MT1149	HRW	0.176	75.4	11.5	71.8	10.1	90.4	-2.14	12.0	1.38	0.38	M	3	2.9	61.2	4.9	70.9	1095
19	MT2017	MT10113/MT1145/MT10102	HRW	0.274	71.6	13.1	72.1	11.6	90.1	-1.52	9.8	1.49	0.40	MH	3	2.3	63.2	3.8	72.9	1035
20	MT2018	MT1149/MT10102/MT10116	HRW	0.195	81.7	11.7	72.5	10.2	90.0	-2.08	12.5	1.50	0.40	M	3	3.7	61.0	4.9	70.7	1000
21	x MT2019	MT10114/MT10128/MTW1251	HRW	0.277	83.1	11.9	73.9	10.6	89.9	-1.98	12.1	1.35	0.41	M	3	3.7	62.7	6.8	73.9	1025
22	MT2020	Northern/MT1143/06X424B6	HRW	0.263	77.0	12.4	73.5	11.1	89.3	-1.52	11.5	1.32	0.44	M	4	3.0	63.2	3.9	72.9	1040
23	MT2021	MT10113/(474-23, winter McNealy)	HRW	0.243	76.9	12.2	73.5	11.0	90.3	-1.54	10.2	1.41	0.39	M	3	4.5	65.2	8.6	78.9	1090
24	MT2022	Overland/(457-12, winter McNealy)	HRW	0.300	81.0	12.2	69.4	10.6	89.8	-1.62	10.6	1.39	0.40	M	3	2.1	60.0	2.8	69.7	960
25	MTW2023	WB3768*2/(10K1726w, Yellowstone)	HWW	0.099	78.4	11.5	75.3	10.4	90.0	-2.09	13.1	1.35	0.41	LM	3	6.0	64.2	13.5	76.9	985
26	x MT2024	Northern/(10K1676w, Yellowstone)	HRW	0.180	78.0	11.3	74.0	10.2	89.8	-1.78	11.5	1.34	0.41	M	4	2.7	59.5	4.2	69.2	970
27	MT2025	YLL/Cap19/Vida	HRW	0.209	75.1	12.5	71.5	11.0	90.2	-1.75	10.9	1.43	0.40	MH	4	2.1	60.4	3.8	70.1	1015
28	MT2026	YLL/Cap19/Vida	HRW	0.283	73.0	12.6	71.4	11.1	90.0	-1.70	10.6	1.46	0.40	M	4	2.4	60.7	4.1	70.4	975
29	MT2027	YLL/Cap19/Vida	HRW	0.285	63.9	13.0	70.8	11.4	90.4	-1.60	10.2	1.49	0.40	M	4	2.8	61.2	5.2	70.9	1075
30	MT2028	MT10113/MT0871/MT1151	HRW	0.362	73.7	12.2	74.6	11.1	89.6	-1.58	11.5	1.48	0.40	MH	5	3.6	61.3	4.2	71.0	985
31	Yellowstone	check	HRW	0.201	76.8	11.5	73.2	10.2	90.6	-1.68	11.4	1.41	0.40	M	4	4.7	59.9	8.1	71.1	960
32	MT2029	MT1240/MT1088/02X172E31-4	HRW	0.243	71.0	13.3	73.2	11.8	89.8	-1.78	12.4	1.47	0.42	M	4	4.5	64.4	6.7	74.1	1050
33	MTW2030	Northern/03X378cE8/MT0990	HWW	0.106	77.7	11.8	73.7	10.7	90.4	-1.60	11.2	1.40	0.41	MH	4	3.3	61.4	5.3	71.1	1060
34	x MTW2031	Northern/03X378cE8/MT0990	HWW	0.186	82.3	12.0	73.1	10.7	90.4	-1.65	11.2	1.45	0.41	M	3	3.2	60.7	4.8	70.4	1025
35	MT2032	MT1285/03X378cE8/MT10102	HRW	0.324	72.4	11.5	72.4	10.3	90.3	-1.53	10.9	1.42	0.41	M	4	3.9	59.4	6.5	69.1	965
36	MT2033	MT1285/03X378cE8/MT10102	HRW	0.284	73.1	11.1	72.7	9.8	90.3	-1.57	10.8	1.35	0.40	M	4	3.8	59.4	5.4	69.1	960
37	MT2034	MT1285/03X378cE8/MT10102	HRW	0.312	74.6	11.5	72.8	10.2	90.4	-1.55	10.9	1.41	0.41	M	4	3.7	62.0	7.7	71.7	985
38	MT2035	MT1235/03X378cE8/MT10122	HRW	0.311	79.6	12.6	74.3	11.2	90.4	-2.13	12.6	1.50	0.43	M	1	2.6	61.8	3.7	71.5	880
39	MTW2036	MT1235/03X378cE8/MT10122	HWW	0.137	76.7	11.7	73.9	10.2	90.6	-2.01	12.1	1.39	0.41	M	2	2.8	60.3	4.2	70.0	975
40	MT2037	Northern/MT1088/SY Wolf	HRW	0.103	75.1	12.7	75.7	11.6	90.2	-1.65	11.4	1.36	0.40	M	3	2.2	60.2	3.1	69.9	975
41	x MT2038	MT1088*2/SY Wolf	HRW	0.281	70.1	11.7	71.4	10.3	90.5	-1.94	12.4	1.42	0.37	LM	1	3.9	60.3	9.3	70.0	955
42	MT2039	Colter/MT1105	HRW	0.189	76.2	11.5	73.3	10.2	90.5	-1.97	12.2	1.44	0.39	M	4	5.5	63.3	13.4	74.0	935

Table 39. 2019 Single Rep Observation 'A' Nursery (SROA)

Location: Bozeman, MT

Sample No. x = in 2021 tests	Variety	Pedigree	Class	PPO	Single Kernel Hardness	Wheat Protein, % (12% m.b.)	Flour					Mixograph			Test Bake					
							Flour Yield, %	Flour Protein, % (14% m.b.)	L* Brightness	a* Green - Red	b* Blue - Yellow	Wheat Ash, %	Flour Ash, %	Type	Tolerance	Mixing Time, min	Water Absorption, %	Mixing Time, min	Water Absorption, %	Loaf Volume
43	MT2040	MT1088/MT1156	HRW	0.251	71.8	13.0	71.3	11.7	90.4	-1.63	11.1	1.54	0.38	M	4	4.3	64.9	8.1	76.1	1065
44	Yellowstone	check	HRW	0.230	75.6	12.2	72.5	10.8	90.3	-1.68	11.5	1.47	0.40	M	4	5.5	63.4	9.4	75.1	1020
45	MT2041	MT1088/MT1156	HRW	0.237	72.5	12.6	72.3	11.2	90.1	-1.87	12.5	1.62	0.41	MH	4	3.4	62.4	6.1	74.1	975
46	MT2042	MT1090/MT1276	HRW	0.271	66.5	11.8	73.4	10.7	90.6	-1.90	11.7	1.45	0.38	M	4	4.3	60.1	7.4	69.8	990
47	x MT2043	MT1105/MT1156	HRW	0.300	79.9	12.1	73.4	11.0	90.3	-1.72	11.4	1.46	0.41	MH	5	3.3	60.2	4.5	69.9	990
48	MT2044	MT1285/OK08539	HRW	0.216	83.8	12.5	73.0	11.2	90.1	-1.81	12.0	1.41	0.40	MH	4	3.1	63.2	4.1	72.9	1080
49	MT2045	MT0871/NI10712	HRW	0.218	71.2	11.5	75.0	10.2	90.3	-1.80	11.4	1.48	0.39	M	3	4.1	61.2	8.4	70.9	960
50	MT2046	MT1240/Redfield	HRW	0.236	69.6	12.8	69.6	11.1	90.7	-1.22	8.7	1.51	0.39	MH	4	3.5	64.3	5.5	74.0	1100
51	MT2047	Yellowstone/(493-22, Reeder/6*Pa	HRW	0.318	80.0	12.5	74.0	11.6	89.9	-1.57	11.4	1.43	0.41	M	3	2.7	61.3	3.5	70.0	1075
52	MT2048	Northern/02X22cE38/MT10121	HRW	0.101	82.1	11.9	74.7	10.7	89.9	-1.79	12.2	1.58	0.41	M	4	4.0	62.2	7.0	71.9	985
53	MT2049	Colter/03X273cEx/MT10105	HRW	0.255	81.0	13.0	72.1	11.6	90.0	-1.57	11.4	1.64	0.40	MH	4	3.1	62.3	8.1	73.0	1145
54	MT2050	MT10121/Yellowstone/SD08W015	HRW	0.178	76.3	12.2	71.1	10.6	90.5	-2.01	12.5	1.52	0.40	MH	4	3.5	56.4	4.7	67.1	915
55	MT2051	Overland/MTW1098/KS08HW88	HRW	0.217	82.2	13.1	72.5	11.8	90.3	-1.52	10.7	1.45	0.38	M	4	5.9	63.1	8.2	73.8	1170
56	MT2052	Judith/OK06332//MT0990	HRW	0.271	67.0	12.5	72.2	11.2	90.3	-1.72	11.5	1.61	0.37	MH	4	4.2	60.7	6.2	71.9	1105
57	Yellowstone	check	HRW	0.216	73.1	11.5	72.9	10.2	90.3	-1.69	11.3	1.44	0.40	M	4	5.2	62.8	9.1	75.0	1015
58	MT2053	HV9W04-1594R/Accipiter	HRW	0.225	68.6	12.2	72.8	10.8	90.8	-1.83	11.0	1.50	0.37	M	4	2.6	61.2	4.0	71.4	1020
59	MT2054	MT10104//MTW0785/Yellowstone-I	HRW	0.077	73.4	13.0	73.1	11.9	90.4	-1.99	12.2	1.50	0.39	M	4	4.0	62.2	5.6	72.4	1095
60	MT2055	MT10104//MTW0785/Yellowstone-I	HRW	0.219	72.4	13.0	71.8	11.5	90.9	-2.25	12.0	1.47	0.39	MH	4	2.9	62.7	5.2	72.9	1065
61	x MT2056	(Northern sib, MT0977)//MT0859/M	HRW	0.077	81.6	11.2	74.4	10.0	90.5	-2.41	14.0	1.43	0.40	M	3	4.0	63.1	9.8	72.8	970
62	MT2057	Robidoux//MT08185/MT0861	HRW	0.149	78.6	12.5	73.3	11.3	90.4	-1.91	12.0	1.48	0.40	M	4	4.4	66.4	14.6	77.1	1100
63	MT2058	MT10116//MT0861/MTW0785	HRW	0.253	72.6	12.5	74.3	11.1	90.0	-2.48	14.6	1.58	0.42	M	1	2.4	61.4	3.2	71.1	935
64	MT2059	MT08185/YLL*2/PI640431/3/PROJ	HRW	0.214	73.0	11.8	72.8	10.5	90.3	-1.73	11.6	1.48	0.41	MH	5	3.3	57.3	5.9	69.0	915
65	MT2060	MT08185/YLL*2/PI640431/3/PROJ	HRW	0.213	70.2	11.7	72.4	10.3	90.4	-1.84	11.7	1.42	0.41	M	3	3.1	55.4	3.7	65.1	900
						11.0	69.4	9.7	89.3	-2.48	8.7	1.27	0.37	1.0	2.1	55.0	2.3	59.9	805	
MIN						13.3	75.7	11.9	91.0	-1.13	14.6	1.64	0.45	5.0	6.1	67.2	14.6	78.9	1170	
MAX						12.1	73.0	10.8	90.2	-1.78	11.5	1.43	0.40	3.6	3.8	61.7	6.7	71.8	995	
AVE																				

Table 40. 2019 Foundation Seed Bozeman - Holen Zinc Mill & Bake

Sample	Class					Mixograph				Test Bake			
		Wheat protein, % (12 m.b.)	Single Kernel Hardness	Flour Yield %	Flour Protein%(14% m.b)	Flour Ash, %	Wheat Ash, %	Type	Tolerance	Mixing Time Min	Water Absorption%	Mixing Time Min	Crumb Grain Score
1	FourOsix ZINC	13.3	66	72.5	12.0	0.43	1.51	M	4	4.2	62.9	9.5	7
2	FourOsix	12.8	71	72.7	11.5	0.42	1.40	M	4	5.0	62.6	10.4	6
3	FLATHEAD ZINC	13.0	74	71.8	11.6	0.43	1.39	M	4	11.1	59.0	17.6	6
4	FLATHEAD	12.5	74	72.9	11.1	0.42	1.32	LM	4	9.2	58.0	15.9	6
5	BOBCAT ZINC	12.6	64	72.4	11.4	0.39	1.43	LM	3	5.5	61.0	10.4	6
6	BOBCAT	12.6	67	72.0	11.0	0.40	1.45	LM	3	7.4	61.5	14.4	7
7	RAY ZINC	12.4	81	73.0	11.2	0.41	1.67	M	4	4.5	62.0	11.7	6
8	RAY	12.1	77	73.4	10.9	0.41	1.61	M	4	4.4	60.2	11.9	6
Zinc		12.8	71.2	72.4	11.6	0.42	1.50		3.8	6.3	61.2	12.3	6.3
no Zinc		12.5	72.4	72.8	11.1	0.41	1.45		3.8	6.5	60.6	13.2	6.3