

# 2022 Oat Field Crop Trials Results

Minnesota Agricultural Experiment Station and the College of Food, Agricultural and Natural Resource Sciences

Oat varieties were sown in trials plots in 2022 at Becker, Lamberton, Le Center and Waseca in Southern Minnesota (south of I-94). In Northern Minnesota (north of I-94), trials were conducted in Crookston, Fergus Falls, Roseau, and Stephen. Yield performance from single years should be viewed cautiously as environmental variability may significantly affect the yields in single locations or years. Maturity, height, and test weight data are presented as statewide averages from 2020-2022 except where noted. Straw strength data is also a statewide

average from the same period, but only from locations where lodging was present. Grain protein, oil and beta-glucan content are presented based on data from at least four trials from 2020. In addition, entries were evaluated for disease resistance to crown rust, barley yellow dwarf virus (BYDV), and loose smut in specific inoculated nurseries. The severe drought in 2021 prevented crown rust development in our screening nursery, so ratings are based on data from 2020 and 2022.



**Table 1. Origin and agronomic characteristics of oat varieties in Minnesota in multiple-year comparisons (2020-2022).**

Entry	Origin	Year of Release	Legal Status	Seed Color	Days to Heading (days)	Plant Height (inches)	Straw Strength <sup>4</sup> (1-9)	Test Weight (lbs/bu)	Grain Protein <sup>5,6</sup> (%)	Grain Oil <sup>5,6</sup> (%)	Grain Beta-glucan <sup>5,6</sup> (%)
Antigo	WI	2017	PVP(94)	Yellow	53.7	29.2	2.0	36.6	14.5	7.3	4.3
CS Camden <sup>1</sup>	Meridian Seeds	2013	PVP(94)	White	59.8	30.0	2.1	31.6	12.4	6.6	4.4
Deon	MN	2014	PVP(94)	Yellow	59.9	32.8	2.9	35.0	12.2	7.1	3.8
Esker 2020	WI	2020	PVP(94)	Yellow	55.4	29.9	2.2	32.4	12.6	6.2	4.2
George <sup>2</sup>	WI	2021	Pending	Yellow	62.6	33.8	4.0	32.0	-	-	-
Hayden	SD	2015	PVP(94)	White	58.6	32.2	2.9	34.8	11.9	7.3	4.5
MN Pearl	MN	2018	PVP(94)	White	57.8	31.5	4.2	35.0	11.2	7.4	4.1
ND Heart	ND	2020	PVP(94)	White	57.9	32.0	3.5	34.2	13.9	6.7	5.0
Reins	IL	2016	PVP(94)	White	54.1	24.2	0.9	35.7	13.8	6.3	4.2
Rushmore	SD	2020	PVP(94)	White	56.0	31.0	2.0	36.4	13.2	6.2	4.1
Saddle	SD	2018	PVP(94)	White	53.5	27.9	1.0	33.5	13.5	5.9	4.0
SD Buffalo	SD	2021	NA	White	56.5	31.7	2.3	34.8	12.6	7.2	4.5
Shelby 427	SD	2011	PVP(94)	White	55.1	31.8	2.2	35.7	12.5	7.2	4.1
Streaker <sup>3</sup>	SD	2016	PVP(94)	Hulless	56.1	31.1	4.2	44.0	13.3	7.4	4.2
Sumo	SD	2017	PVP(94)	White	51.6	29.7	2.0	35.0	14.5	6.0	3.8
Warrior	SD	2019	PVP(94)	White	56.6	29.5	1.4	35.0	12.8	6.5	4.1
WIX10305-4	WI	2022	NA	Yellow	59.8	29.3	1.4	32.0	14.6	6.8	4.4

<sup>1</sup>Line developed by Lantmannen Seed in Sweden.

<sup>2</sup>Line tested in 2021 and 2022.

<sup>3</sup>Hulless oat.

<sup>4</sup>1-9 scale where 1=most resistant, 9=most susceptible

<sup>5</sup>12% grain moisture.

<sup>6</sup>Trait measured for 3 locations in 2020.

**Variety Selection**

While yield is an important selection criterion, grain quality and disease resistance should also be considered. Millers have grain quality and variety preferences which can be considered if that is the intended target. Crown rust continues to be a major limiting factor to oat production in Minnesota that must be managed to achieve optimal yield. Rust in all yield trials was managed through treatment with a propiconazole-based fungicide when the flag leaf was fully extended (Feekes 9) to evaluate the yield potential without disease infection. All disease scores are on a “1-9” scale where “1” is very resistant and “9” is very susceptible. Crown rust resistance was evaluated in the Buckthorn Nursery in St. Paul by the USDA-ARS using an exceptionally aggressive crown rust population. The most

economical way of controlling crown rust is through resistant varieties; however, application of fungicide to a variety with rating of “4” or greater is prudent if crown rust is present in the lower canopy at Feekes 9.

Other important diseases include BYDV and smut, which were evaluated in inoculated nurseries at the University of Illinois and the University of Minnesota, respectively. Varieties susceptible to BYDV (rating > 3) should be selected with caution particularly in Southern Minnesota, where aphid disease transmitters are more common early in the season. A seed treatment and certified seed should be used to manage smut. Disease resistance may be a driving factor if pesticides are not economical or if the intended production system is organic.

**PVP Status**

The U.S. Plant Variety Protection Act (PVP) status is listed for all varieties tested. PVP(94) notation indicates that seed of that variety may not be sold by a grower without the permission of the variety’s owner. If the PVP is pending, consider the variety as having PVP(94) protection.

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Dimitri von Ruckert, Curtis Reese, Mike Leiseth, Steve Quiring and Donn Vellekson supervised and carried out test plot establishment and management.

**Table 2. Disease characteristics of oat varieties.**

Entry	Crown Rust <sup>2</sup> (1-9)	Loose Smut <sup>3</sup> (1-9)	BYDV <sup>4</sup> (1-9)
Antigo	4	3	4
CS Camden	5	2	4
Deon	5	1	4
Esker 2020	4	1	3
George <sup>1</sup>	4	3	-
Hayden	5	2	3
MN Pearl	3	1	4
ND Heart <sup>1</sup>	4	6	4
Reins	5	1	4
Rushmore	4	2	4
Saddle	4	1	4
SD Buffalo	3	2	-
Shelby 427	5	1	4
Streaker	4	3	4
Sumo	4	2	4
Warrior	3	2	4
WIX10305-4	4	2	-

<sup>1</sup>Line tested in 2021 and 2022.

<sup>2</sup>Tested in 2020, 2021, and 2022 with a mixed race population of crown rust; 1 = most resistant, 9 = most susceptible. Dta is from 2020 and 2022 only; 2021 trial failed due to drought

<sup>3</sup>Tested in 2020 and 2021; 1 = most resistant, 9 = most susceptible. Dta based on 2020 trial; 2021 trial had very low disease pressure due to drought.

<sup>4</sup>Tested in 2021; 1 = most resistant, 9 = most susceptible.

<b>Oat</b>	
<b>Planting Rate and Date</b>	
Bushel Weight, Pounds.....	32
Seeds/Pound.....	16,200
Planting Rate, Pounds/Acre.....	80
Planting Rate, Seeds/Sq. Ft.....	28
Planting Date.....	Early Spring

**Table 3. Relative grain yield of oat varieties in Minnesota in single-year (2022) and multiple-year comparisons (2020-2022).**

Entry	Northern Minnesota			Southern Minnesota			Statewide		
	2022	2 Yr	3 Yr	2022	2 Yr	3 Yr	2022	2 Yr	3 Yr
----- % of mean -----									
Antigo	82	83	84	93	94	94	87	88	89
CS Camden	112	111	111	105	104	102	109	108	107
Deon	107	110	108	105	107	107	106	108	108
Esker 2020	102	101	100	109	106	105	105	104	102
George <sup>1</sup>	95	98	-	99	96	-	97	97	-
Hayden	111	110	112	108	111	110	110	110	111
MN Pearl	114	114	114	98	102	107	107	108	111
ND Heart	90	94	97	94	93	94	92	94	95
Reins	96	91	94	87	91	94	92	91	94
Rushmore	108	107	110	101	102	106	105	105	108
Saddle	102	98	97	99	95	96	100	97	96
SD Buffalo	113	111	111	110	109	110	111	110	110
Shelby 427	89	92	93	94	99	98	91	95	96
Streaker <sup>2</sup>	78	77	77	74	76	76	76	76	77
Sumo	89	88	83	91	92	93	90	90	88
Warrior	107	108	107	104	103	103	106	105	105
WIX10305-4	106	108	101	125	117	105	115	112	103
<b>Mean (Bu/Acre)</b>	<b>172</b>	<b>141</b>	<b>141</b>	<b>118</b>	<b>106</b>	<b>113</b>	<b>142</b>	<b>122</b>	<b>126</b>
<b>LSD (0.05)</b>	<b>20.3</b>	<b>13.3</b>	<b>11.1</b>	<b>16.1</b>	<b>10.4</b>	<b>9.2</b>	<b>13.4</b>	<b>8.5</b>	<b>7.3</b>
<b># of Environ-ments</b>	<b>4</b>	<b>8</b>	<b>12</b>	<b>5</b>	<b>10</b>	<b>15</b>	<b>9</b>	<b>18</b>	<b>27</b>

<sup>1</sup>Line was tested in 2022 and 2021 only.

<sup>2</sup>Hulless oat.

**Table 4. Relative grain yield of oat varieties in Northern Minnesota locations in single-year (2022) and multiple-year comparisons (2020-2022).**

Entry	Crookston		Fergus Falls		Roseau		Stephen	
	2022	3 Yr	2022	2 Yr	2022	3 Yr	2022	3 Yr
----- % of mean -----								
Antigo	88	91	61	81	82	76	94	87
CS Camden	104	112	112	112	115	104	118	116
Deon	109	107	107	100	112	118	98	108
Esker 2020	107	108	90	91	112	103	96	97
George <sup>1</sup>	88	-	104	-	94	-	98	-
Hayden	110	113	116	113	111	113	106	107
MN Pearl	114	113	124	118	114	113	106	113
ND Heart	97	102	94	98	87	92	82	94
Reins	98	93	84	92	94	95	105	97
Rushmore	104	103	102	107	113	116	112	115
Saddle	100	93	93	92	101	102	111	101
SD Buffalo	113	109	113	111	111	113	113	112
Shelby 427	88	93	81	93	86	89	97	98
Streaker <sup>2</sup>	76	73	89	91	77	76	72	72
Sumo	80	78	97	80	84	88	97	87
Warrior	113	107	135	121	97	105	90	98
WIX10305-4	110	106	97	100	110	98	105	99
<b>Mean (Bu/Acre)</b>	<b>187</b>	<b>157</b>	<b>135</b>	<b>124</b>	<b>189</b>	<b>136</b>	<b>177</b>	<b>149</b>
<b>LSD (0.05)<sup>3</sup></b>	<b>29.8</b>	<b>20.2</b>	<b>27.4</b>	<b>24.8</b>	<b>28.5</b>	<b>21.7</b>	<b>30.6</b>	<b>24.1</b>

<sup>1</sup>Line was tested in 2022 and 2021 only.

<sup>2</sup>Hulless oat.

<sup>3</sup>A large LSD suggests large variability from year to year for the specific location.

**Table 5. Relative grain yield of oat varieties in Southern Minnesota locations in single-year (2022) and multiple-year comparisons (2020-2022).**

Entry	Becker <sup>3</sup>		Lamberton		Le Center		Rochester		St. Paul <sup>4</sup>	Waseca	
	2022	2 Yr	2022	3 Yr	2022	3 Yr	2022	2 Yr	2020	2022	3 Yr
Antigo	110	97	89	91	101	101	86	98	85	78	85
CS Camden	124	118	106	100	105	104	84	85	101	121	120
Deon	86	90	118	114	104	105	115	111	111	93	107
Esker 2020	105	108	109	111	104	97	115	103	102	111	109
George <sup>1</sup>	90	100	103	-	86	-	112	-	-	103	-
Hayden	107	111	116	103	113	113	108	112	120	92	105
MN Pearl	90	95	97	108	97	101	103	102	130	104	119
ND Heart	87	90	101	99	99	98	83	91	92	106	88
Reins	102	97	87	93	95	97	69	86	103	88	97
Rushmore	87	92	95	103	103	109	107	111	100	114	110
Saddle	110	102	94	89	98	100	104	103	98	89	79
SD Buffalo	114	109	103	112	101	103	128	117	106	100	109
Shelby 427	93	100	91	86	96	103	104	106	105	81	91
Streaker <sup>2</sup>	65	67	75	73	81	81	69	73	78	82	82
Sumo	98	97	93	102	94	91	91	93	81	75	89
Warrior	118	112	100	108	104	97	99	100	114	104	98
WIX10305-4	114	114	121	109	121	100	124	107	75	157	114
<b>Mean (Bu/Acre)</b>	<b>100</b>	<b>91</b>	<b>125</b>	<b>114</b>	<b>136</b>	<b>130</b>	<b>149</b>	<b>137</b>	<b>126</b>	<b>80</b>	<b>82</b>
<b>LSD (0.05)<sup>5</sup></b>	<b>21.4</b>	<b>19.9</b>	<b>19.4</b>	<b>21.1</b>	<b>27.4</b>	<b>16.9</b>	<b>28.4</b>	<b>22.2</b>	<b>13.0</b>	<b>16.7</b>	<b>19.8</b>

<sup>1</sup>Line was tested in 2022 and 2021 only.

<sup>2</sup>Hulless oat.

<sup>3</sup>Location was tested in 2022 and 2021.

<sup>4</sup>Line was tested in 2020 only.

<sup>5</sup>A large LSD suggests large variability from year to year for the specific location.