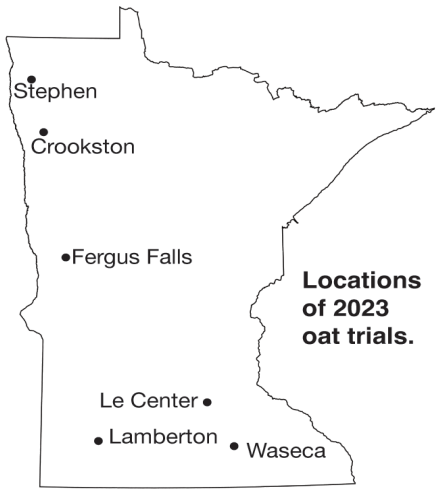
2023 Oat Field Crop Trials Results

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

Oat varieties were sown in trials in 2023 at Lamberton, Le Center and Waseca in Southern Minnesota (south of I-94) and Crookston, Fergus Falls and Stephen in Northern Minnesota (north of I-94). 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 2021-2023 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 2021. 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 2022 and 2023.



Variety Selection

While yield is an important selection criterion, grain quality and disease

Table 1. Origin and agronomic characteristics of oat varieties in Minnesota in multiple-year comparisons (2021-2023).

Entry	Origin	Year of Release	Legal Status	Seed Color	Days to Heading (days)	Plant Height (inches)	Straw Strength[1] (1-9)	Test Weight (lbs/bu)
Antigo	WI	2017	PVP	Yellow	53.5	26.8	1.7	36.1
CS Camden	Meridian Seeds	2013	PVP(94)	White	59.4	28.2	1.3	32.4
Deon	MN	2014	PVP(94)	Yellow	59.6	31.5	2.4	35.9
Esker2020	WI	2020	PVP	Yellow	56.5	28.0	1.9	33.5
Hayden	SD	2015	PVP(94)	White	58.7	30.0	2.3	33.7
Mink	WI	2022	PVP Pending	Yellow	62.0	29.4	1.8	35.5
MN-Pearl	MN	2018	PVP(94)	White	58.1	29.6	4.9	35.9
ND Carson	ND	2023	PVP(94) Pending	White	58.8	29.2	1.0	33.6
ND Heart	ND	2020	PVP(94)	White	58.6	29.8	3.0	34.9
ND Spilde	ND	2023	PVP(94) Pending	White	56.0	31.7	1.8	33.4
Reins	IL	2016	PVP(94)	White	52.0	21.7	0.6	35.6
Rushmore	SD	2020	PVP(94)	White	56.1	28.7	1.9	37.0
Saddle	SD	2018	PVP(94)	White	52.3	26.3	1.0	36.0
SD Buffalo	SD	2021	PVP(94) Pending	White	57.6	29.6	2.2	34.8
Streaker[2]	SD	2016	PVP(94)	Hulless	56.3	28.9	3.6	43.1
Sumo	SD	2017	PVP(94)	White	51.6	27.2	2.1	33.9
Warrior	SD	2019	PVP(94)	White	56.2	27.1	1.4	35.8
No. of Trials					9	9	10	15

[1]Straw strength evaluated on a 1-9 scale where 1 = most resistant and 9 = susceptible
Entry CS Camden was developed by Lantmannen Seed in Sweden.
Entries ND Carson and ND Spilde were only evaluated in 2023.
[2]Entry Streaker is a hulless oat.

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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Researchers

Curtis Reese, Mike Leiseth, Steve Quiring, Travis Vollmer, and Donn Vellekson supervised and carried out test plot establishment and management.

Table 2. Disease characteristics of oat varieties.

Entry	Crown Rust[1, 2] (1-9)	Loose Smut[1, 3] (1-9)	BYDV[1, 4] (1-9)
Antigo	5	4	4
CS Camden	7	3	4
Deon	6	1	4
Esker2020	4	2	3
Hayden	6	2	3
Mink	3	2	na
MN-Pearl	4	1	4
ND Carson	5	2	na
ND Heart	5	8	4
ND Spilde	4	1	na
Reins	7	1	4
Rushmore	6	3	4
Saddle	6	1	4
SD Buffalo	5	2	na
Streaker	6	3	4
Sumo	5	1	4
Warrior	4	3	4
No of Trials	2	3	1

[1]All traits evaluated on a 1-9 scale where 1 = most resistant and 9 = susceptible
[2]Crown Rust evaluated in 2022 and 2023; 2021 trial failed due to drought
[3]Loose Smut evaluated in 2021, 2022, and 2023
[4]BYDV evaluated in 2021 only
Entries ND Carson and ND Spilde were only evaluated in 2023.

Oat
Planting Rate and Date

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 (2023) and multiple-year comparisons (2021-2023).

	Northern Minnesota			Southern Minnesota			Statewide		
Entry	2023	2 Yr	3 Yr	2023	2 Yr	3 Yr	2023	2 Yr	3 Yr
	% of mean								
Antigo	88	85	84	87	91	93	87	87	88
CS Camden	109	111	110	116	109	107	112	110	109
Deon	110	108	110	116	109	109	112	109	109
Esker2020	105	103	102	101	106	105	104	105	104
Hayden	104	108	108	106	108	110	105	108	109
Mink	118	111	111	101	117	114	112	114	112
MN-Pearl	107	111	112	104	100	103	106	106	108
ND Carson	106	.	.	102	.	.	104	.	.
ND Heart	98	93	95	84	91	91	93	92	93
ND Spilde	109	.	.	119	.	.	113	.	.
Reins	87	92	90	100	92	93	92	92	91
Rushmore	99	104	104	98	100	102	99	102	103
Saddle	98	100	98	97	99	96	98	99	97
SD Buffalo	106	109	109	112	111	110	108	110	110
Streaker	73	76	76	72	74	75	73	75	75
Sumo	84	87	87	84	89	91	84	88	88
Warrior	98	103	104	102	104	103	100	103	104
Mean (Bu/Acre)	**177.7**	**176.6**	**152.3**	**105.7**	**113.4**	**105.8**	**141.7**	**142.9**	**127.1**
LSD (0.1)	**10.5**	**7.3**	**6.4**	**14.9**	**9.1**	**7.1**	**9.4**	**5.9**	**4.9**
# of Environments	**3**	**7**	**11**	**3**	**8**	**13**	**6**	**15**	**24**

Entries ND Carson and ND Spilde were only evaluated in 2023.

Table 4. Relative grain yield of oat varieties in Northern Minnesota locations in single-year (2023) and multiple-year comparisons (2021-2023).

	Crookston			Fergus Falls			Roseau[1]		Stephen		
Entry	2023	2 Yr	3 Yr	2023	2 Yr	3 Yr	2 Yr	3 Yr	2023	2 Yr	3 Yr
	% of mean										
Antigo	86	87	86	88	76	81	81	80	89	91	89
CS Camden	112	108	110	112	112	113	114	104	106	111	112
Deon	106	107	107	102	105	104	111	118	119	110	111
Esker2020	108	107	109	95	93	96	111	102	110	104	102
Hayden	105	108	108	101	108	109	110	109	105	106	107
Mink	110	110	113	116	107	110	108	100	125	116	116
MN-Pearl	105	110	111	104	113	112	112	113	111	109	111
ND Carson	109	.	.	103	.	.	.	.	105	.	.
ND Heart	102	99	104	105	100	99	86	89	90	86	89
ND Spilde	114	.	.	118	.	.	.	.	98	.	.
Reins	90	94	90	86	85	86	93	91	86	94	91
Rushmore	94	99	97	99	101	101	111	115	102	106	106
Saddle	110	105	101	92	93	92	99	102	94	101	97
SD Buffalo	103	108	108	103	108	105	109	113	110	111	111
Streaker	70	73	71	78	84	83	76	77	72	72	74
Sumo	79	79	80	94	96	94	83	88	82	89	87
Warrior	96	105	106	103	118	116	96	99	96	93	97
Mean (Bu/Acre)	**171.5**	**179.4**	**159.2**	**151.6**	**146.3**	**127.9**	**191.3**	**154.8**	**215.7**	**196.0**	**169.6**
LSD (0.1)	**13.9**	**8.8**	**7.5**	**7.8**	**16.6**	**12.6**	**12.9**	**17.3**	**11.0**	**17.3**	**13.5**

[1]Trial data for Roseau is from 2021 and 2022.
Entries ND Carson and ND Spilde were only evaluated in 2023.

Table 5. Relative grain yield of oat varieties in Southern Minnesota locations in single-year (2023) and multiple-year comparisons (2021-2023).

	Becker[1]		Lamberton			Le Center			Rochester[1]		Waseca		
Entry	1 Yr	2 Yr	2023	2 Yr	3 Yr	2023	2 Yr	3 Yr	1 Yr	2 Yr	2023	2 Yr	3 Yr
Antigo	108	97	68	81	81	92	96	98	87	97	95	87	90
CS Camden	122	118	125	115	112	108	106	106	85	82	118	120	125
Deon	85	90	133	125	121	113	108	108	116	113	106	101	105
Esker2020	104	108	98	105	109	97	100	96	116	108	110	111	111
Hayden	106	111	97	109	109	117	114	113	109	112	99	96	100
Mink	112	114	115	120	116	88	104	103	125	116	108	131	127
MN-Pearl	89	95	96	97	103	107	102	103	104	100	107	106	113
ND Carson	.	.	133	.	.	87	.	.	.	.	96	.	.
ND Heart	86	90	90	97	95	88	93	94	84	91	72	88	81
ND Spilde	.	.	106	.	.	121	.	.	.	.	128	.	.
Reins	102	98	101	94	93	100	97	99	70	82	100	95	92
Rushmore	85	92	82	91	93	106	104	104	108	111	102	108	106
Saddle	109	102	98	96	90	96	97	98	105	104	97	93	84
SD Buffalo	113	109	116	109	110	109	105	104	129	121	112	107	108
Streaker	64	67	62	71	75	84	82	81	70	74	63	72	75
Sumo	97	97	82	90	94	86	89	92	92	88	83	79	82
Warrior	116	111	98	100	100	102	103	103	100	103	105	105	101
Mean (Bu/Acre)	**100.9**	**91.4**	**82.6**	**103.0**	**100.7**	**142.7**	**140.4**	**134.5**	**147.1**	**136.5**	**93.1**	**86.4**	**73.3**
LSD (0.1)	**18.2**	**16.9**	**25.9**	**14.2**	**12.1**	**8.2**	**13.0**	**8.9**	**16.6**	**19.5**	**17.0**	**22.2**	**19.9**

[1]Trial data for Becker and Rochester is from 2021 and 2022.
Entries ND Carson and ND Spilde were only evaluated in 2023.