

2017 Oat Field Crop Trials Results



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

Oat variety evaluations were conducted in uniform replicated trials across Minnesota. Locations included Waseca, Rochester, Le Center, Lamberton, St. Paul, Kimball and Morris in Southern Minnesota (south of I-94). In Northern Minnesota (north of I-94) trials were conducted in Fergus Falls, Crookston, Stephen and Roseau. In addition, entries were evaluated for disease resistance to crown rust, barley yellow dwarf virus (BYDV) and smut in specific inoculated nurseries.

The results of the variety evaluations are summarized in Tables 1 to 3. The greatest challenges in oat production and performance evaluation is lodging and crown rust. All yield performance trials were treated with a propiconazole based fungicide when the flag leaf was fully extended (Feekes 9) to evaluate the yield potential. However, in some locations in Southern Minnesota crown rust infection was still present later in the season. In addition, lodging and bird damage caused yield trials at Kimball and Rochester had to be removed. Crookston was also disregarded this year. Locations in Le Center and Waseca may have had some yield loss to crown rust but are still included in final analysis.

Crown rust and other disease resistance ratings are listed in Table 1. All disease scores were converted to a “1-9” scale. Where “1” is very resistant and “9” is very susceptible. Crown rust continues to be a major limiting factor to oat production in

Minnesota that must be managed to achieve optimal yield. Buckthorn, the alternate host of crown rust is widespread in Minnesota, allowing the pathogen population to be present annually and particularly aggressive. Crown rust resistance was evaluated in the Buckthorn Nursery in St. Paul by the USDA-ARS and represents an exceptionally aggressive crown rust population. The most economical way of controlling crown rust is the use of a resistant variety. Application of fun-



Table 1. Disease characteristics of oat varieties in multiple-year comparisons (2015-2017).

Entry	Crown Rust (1-9) ^C	BYDV (1-9) ^D	SMUT (1-9) ^E
ANTIGO ^A	2	7	3
BADGER	6	5	1
BETAGENE	4	6	1
COLT	6	7	1
CS CAMDEN ^B	4	—	2
DEON	3	4	1
ESKER	5	5	1
GOLIATH	5	2	3
HAYDEN	5	3	1
HORSEPOWER	6	7	3
JURY	5	5	3
NATTY	6	4	1
NEWBURG	5	3	4
REINS ^B	6	—	1
ROCKFORD	6	3	2
RON	4	6	1
SABER	6	6	6
SHELBY 427	6	6	1
SOURIS	6	5	1
STREAKER ^B	5	—	1
SUMO ^A	5	—	1

^ALine tested in 2017 only.

^BLine tested in 2017 and 2016.

^C2017 only, 1 = most resistant and 9 = most susceptible.

^D2015 and 2016, 1 = most resistant and 9 = most susceptible.

^E2017 and 2016, 1 = most resistant and 9 = most susceptible.

gicide to a variety with rating of “4” or greater is prudent if crown rust is present in the lower canopy at Feekes 9. Deon continues to be one of the best varieties for crown rust resistance. In addition, the new variety Antigo has very good resistance. As crown rust is a rapidly evolving population the rust ratings are taken only from this year’s data. 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 (>3) should be chosen with caution particularly in the Southern Minnesota, where infected aphids 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 intended production is an organic system.

The origin and agronomic characteristics of oat varieties tested are listed

in Table 2. The U.S. Plant Variety Protection Act (PVP) status is also listed. 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. Maturity, height and test weight data are presented here as state wide averages from 2015-2017 except where noted (Table 2). Lodging data is also a state wide average from the same time period but only from locations where lodging was present. Maturity, height and lodging are important considerations for variety selection based on the intended location of the crop and the expected end use. In general earlier maturing varieties perform better in Southern Minnesota so flowering can occur during cooler periods. In these locations, a variety maturing similar to Saber or Reins may be a good choice. In Northern locations varieties that mature later such as Hayden or Deon may be prudent.

If the intended end use of the variety is forage or alfalfa nurse crop a taller variety with lodging resistance such as Goliath may be a good choice. If for grain production, lodging is still an important consideration as lodging is a significant production challenge. In addition, the grain quality traits of groat percent, protein percent and oil percent are also shown in Table 2. Groat percent is from 2016 crop year only, whereas the others are from the 2017 crop year. Test weight and groat percentage are an important consideration for grain production. Perhaps carrying equal consideration to yield if the crop is intended for food or feed. Hull color may also be a consideration for different end uses. Percent protein and oil are important considerations for human food oat production, where high protein and low oil may be desirable.

Yield performance evaluation from locations in 2017 and the associated 2 years and 3 years averages are listed

Table 2. Origin and agronomic characteristics of oat varieties in Minnesota in multiple-year comparisons (2015-2017).

Entry	Origin	Year of Release	PVP Status	Seed Color	Maturity (Days)	Lodging (1-9) ^D	Height (in)	Test Weight (lb/bu)	Groat (%) ^E	Protein (%) ^F	Oil (%) ^F
ANTIGO ^A	U of Wisconsin	2017	Pending	Yellow	59	2	37	38	—	14.2	5.2
BADGER	U of Wisconsin	2010	PVP(94)	Yellow	58	3	35	36	68	13.1	4.5
BETAGENE	U of Wisconsin	2015	PVP(94)	Yellow	62	4	38	35	72	12.9	4.8
COLT	S. Dakota State	2010	PVP(94)	White	58	4	37	38	70	13.8	4.6
CS CAMDEN ^B	Meridian Seeds	2013	Pending	White	64	2	39	35	67	13	5
DEON	U of Minnesota	2014	PVP(94)	Yellow	64	4	42	37	68	12.6	5.1
ESKER	U of Wisconsin	2006	PVP(94)	Yellow	61	3	38	36	69	13.8	4.4
GOLIATH	S. Dakota State	2013	PVP(94)	White	64	6	47	37	69	12.9	4.9
HAYDEN	S. Dakota State	2015	PVP(94)	White	63	5	41	38	69	12.5	5.7
HORSEPOWER	S. Dakota State	2012	PVP(94)	White	61	5	35	36	70	12.7	4.8
JURY	N. Dakota State	2012	PVP(94)	White	64	5	43	37	70	12.4	5.6
NATTY	S. Dakota State	2015	PVP(94)	White	61	4	42	38	72	13.8	4.1
NEWBURG	N. Dakota State	2011	PVP(94)	White	64	6	44	35	67	12	5.4
REINS ^B	U of Illinois	2016	PVP(94)	White	60	2	33	38	69	14.1	4.4
ROCKFORD	N. Dakota State	2008	PVP(94)	White	65	4	41	37	68	13	6
RON	U of Wisconsin	2014	PVP(94)	Yellow	63	4	40	36	69	13.9	5.1
SABER	U of Illinois	2010	PVP(94)	Yellow	59	4	36	37	72	14.1	4.6
SHELBY 427	S. Dakota State	2011	PVP(94)	White	60	4	40	38	69	13.2	5.5
SOURIS	N. Dakota State	2008	PVP(94)	White	63	5	38	36	69	12.6	4.6
STREAKER ^B	S. Dakota State	2016	PVP(94)	Hulless	61	5	40	— ^C	— ^C	— ^C	— ^C
SUMO ^A	S. Dakota State	2017	Pending	White	58	1	38	37	—	14.8	4.2

^ALine tested in 2017 only.

^BLine tested in 2017 and 2016.

^CHulless oat.

^D1 = resistant and 9 = susceptible.

^ETrait measured in 2016 only.

^FWhole grain NIRS, trait measured in 2017 only.

in Table 3. In addition, the state wide averages are also listed. To standardize the data across locations the yield is expressed as percent of the trial mean. Deon remains among the top yielder in state wide averages for 2017 and in multi-year comparisons. However, Hayden and CS Camden may have surpassed Deon in yield this year. CS Camden appears to mostly derive the yield advantage from locations in Southern Minnesota whereas Hayden may be more adapted to Northern Minnesota. Among the newer varieties in evaluation are CS Camden, Antigo, and Sumo. CS Camden looks to be a promising variety given its good yield potential and good crown rust resistance. Antigo has very good crown rust resistance and good yield potential in Southern Minnesota. Although Sumo may lack the yield potential of other varieties the moderate crown rust resistance, early maturity and lodg-

ing resistance suggest it may be well adapted for both grain production or an alfalfa nurse crop in an organic setting. In general, yield performance from single years should be viewed cautiously as environmental variability may significantly affect the yields in single locations or years. For example, crown rust in Le Center and lodging in Morris and Roseau may have skewed yield results to favor varieties with resistance to these production issues.

Project Leaders

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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 trail means) of oat varieties in Minnesota in single-year (2017) and multiple-year comparisons (2015-2017).

	Waseca		Le Center		Lamberton			Morris	Fergus Falls	Crookston	Stephen			Roseau		State		
	2017	2 Yr	2017	2 Yr	2017	2 Yr	3 Yr	2017	2017	2 Yr ^D	2017	2 Yr	3 Yr	2017	2 Yr	2017	2 Yr	3 Yr
ANTIGO ^A	98	—	106	—	88	—	—	95	82	—	90	—	—	84	—	92	91	93
BADGER	110	104	125	112	90	89	82	105	90	91	97	100	95	103	94	103	100	96
BETAGENE	105	105	113	103	107	103	111	132	87	104	106	102	101	111	97	109	104	106
COLT	99	90	94	93	82	78	77	57	99	87	83	80	77	93	93	86	86	84
CS CAMDEN ^B	115	100	133	113	119	110	—	117	117	88	100	94	—	103	114	113	107	109
DEON	94	101	116	107	126	119	125	110	100	95	109	116	113	119	114	113	112	113
ESKER	111	111	38	81	105	101	104	100	104	100	103	102	98	93	97	97	101	102
GOLIATH	112	104	98	97	101	99	95	64	112	100	110	111	104	91	82	100	99	97
HAYDEN	105	100	94	105	109	104	95	114	116	117	117	108	94	121	120	116	113	110
HORSEPOWER	72	78	73	93	93	85	80	87	115	103	106	100	102	110	105	96	95	95
JURY	76	88	97	95	99	100	99	96	110	104	103	105	101	98	96	101	101	100
NATTY	111	113	101	102	97	101	101	88	101	100	101	100	103	96	104	100	104	103
NEWBURG	77	83	106	104	98	100	96	107	117	106	107	107	101	105	88	102	100	99
REINS ^B	108	110	135	116	88	91	—	98	76	101	87	84	—	94	101	95	98	100
ROCKFORD	69	68	60	83	100	91	85	108	119	96	103	100	93	106	99	99	95	92
RON	115	112	123	113	99	107	111	119	114	100	111	107	101	104	96	112	109	108
SABER	113	116	120	114	108	111	102	119	80	107	104	98	97	102	97	108	109	107
SHELBY 427	81	92	95	99	85	88	86	103	100	97	90	89	92	94	94	92	94	95
SOURIS	80	74	53	83	96	90	79	97	120	103	107	102	101	100	108	94	94	92
STREAKER ^{BC}	66	67	37	51	80	80	—	89	28	88	81	76	—	73	68	67	70	71
SUMO ^A	88	—	62	—	81	—	—	99	80	—	71	—	—	77	—	80	79	81
Mean (Bu/Acre)	106	111	109	137	149	142	149	122	134	187	184	149	151	193	174	141	142	138
LSD (0.10)	12	18	44	37	17	18	26	45	20	21	14	16	16	30	38	15	10	11

^ALine tested in 2017 only.

^BLine tested in 2017 and 2016.

^CHulless oat.

^D2015 and 2016 only.