

Oat Variety Trial 2023

In a Nutshell:

- 16 oat varieties were screened at four Iowa State University research farms and four oat varieties were trialed by Neil Peterson on his commercial farm.

Key Findings:

- Across varieties and sites, average oat yield was 130 bu/ac and average test weight was 36 lb/bu.
- Antigo was the only variety to score a test weight \geq 38 lb/bu (food grade) at each location where it was trialed. Reins, Rushmore, Shelby 427 and Sumo also scored test weights \geq 38 lb/bu at Kanawha.

BACKGROUND

In 2023, 200,000 acres of oats were planted in Iowa according to the USDA-National Agricultural Statistics Service; up from 130,000 acres in 2022 and 180,000 acres in 2021. The state average yield for the year was 80 bu/ac; the five-year average yield is 74.6 bu/ac ^[1]. Oat grain and straw yield and attributes like lodging propensity can vary by variety and growing conditions. This means that oat variety trials at sites across the state are important tools for farmers who grow oats. Since 2015, PFI has helped organize oat and other small grains variety trials at Iowa State research extension offices around the state, and four sites participated this year. A commercial farmer, Neil Peterson, also joined the variety trial this year and tested four oat varieties on his farm. At the beginning of the trial, Peterson reported that “I would like to figure out which oat varieties best fit my farm and my goals for growing oats. I also hope that the variety trial would give me some experience in conducting a more official trial and provide something of interest that I could show to visitors to our farm.”

METHODS

Variety trials were conducted at five locations in 2023: ISU Northern Research Farm in Kanawha; ISU Ag Engineering and Agronomy Farm in Boone; ISU Northeast

Research Farm in Nashua; ISU Southwest Research Farm in Greenfield; Neil Peterson’s farm near Fonda in northwest Iowa. These variety trials build on previous trials conducted at Kanawha, Charles City, Boone, Nashua and Greenfield from 2015–2022 ^{[2]–[9]}. Information about each of the varieties trialed in 2023 can be found in **Table 1**.



Oats at Neil Peterson’s farm near Fonda in northwest Iowa on July 7, 2023.

Cooperators

ISU Northern Research Farm
– Kanawha (Matt Schnabel)

ISU Ag Engineering and
Agronomy Farm – Boone
(Matt Schnabel)

ISU Northeast Research
Farm – Nashua (Ken
Pecinovsky)

ISU Southwest Research
Farm – Greenfield (Matt
Schnabel)

Neil Peterson – Fonda

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Welter Seed and Honey Co.,
SDSU Seed Foundation, UW
Foundation Seeds, Zabel
Seeds

Oat management information is provided with the results from each location. No herbicides or insecticides were applied at any location during the oat growing season. Statistical significance is determined at 90% confidence level and means separations are reported using Tukey's least significant difference (LSD). Data were analyzed by location, and varieties are listed in alphabetical order at each location. Reported yields are corrected for 13% moisture. Rainfall and temperature data were accessed from the nearest weather station ^[10]

TABLE 1. Origin, PVP and disease ratings for oat varieties trialed in 2023.

VARIETY	ORIGIN ^a	YEAR RELEASED	PVP ^b	MATURITY	DISEASE RATINGS ^c			
					CROWN RUST	STEM RUST	BYDV ^d	SMUT
Antigo	WI	2017	PVP	Early	MR	S	MR	MR
CS Camden	SW	2013	PVP	Medium	MS	S	--	MR
Deon	MN	2014	PVP	Late	MR	MS	MR	R
Esker 2020	WI	2020	PVP	Medium	MR	MR	MR	R
Goliath	SD	2013	PVP	Late	MS	R	MR	MR
Hayden	SD	2015	PVP	Med-Late	MS	MS	MR	R
Jerry	ND	1994	PVP	Medium	MS	MS	MS	MS
MN Pearl	MN	2018	PVP	Late	MS	--	MS	R
Morton	ND	2001	PVP	Late	MS	--	MS	R
Reins	IL	2016	PVP	Early	MR	MR	R	R
Rushmore	SD	2019	PVP	Medium	MR	--	MR	MR
Saddle	SD	2018	PVP	Early	MR	S	MR	--
Shelby 427	SD	2011	PVP	Medium	MS	MS	MR	MR
SD Buffalo	SD	2022	PVP	Medium	--	--	--	--
Sumo	SD	2017	PVP	Early	MR	R	MS	R
Warrior	SD	2019	PVP	Med-Late	R	--	MS	R

^a Origin: IL-University of Illinois; MN-University of Minnesota; ND-North Dakota State University; SD-South Dakota State University; SW-Lantmannen Seed, Sweden; WI-University of Wisconsin.

^b PVP = Plant Variety Protection. The PVP Act provides a certificate to the developer of a variety granting exclusive rights for reproducing and marketing the seed.

^c Disease Ratings: S = susceptible; MS = moderately susceptible; MR = moderately resistant; R = resistant.

^d Disease: BYDV = Barley Yellow Dwarf Virus.

RESULTS AND DISCUSSION

Rainfall in 2023 was generally at or below 10-year averages at all sites during all months of the oat growing season. At the time of oat harvest, all sites were impacted by abnormally dry to severe drought according to the U.S. Drought Monitor ^[11].

Yields at Boone, Greenfield and Kanawha were generally higher in 2023 than the 4 or 8-year yield averages from these sites (Tables 2-5). Yields at Nashua were similar to the 8-year average for each variety. Across sites, four oat varieties were significantly higher yielding; Rushmore (142 bu/ac), SD Buffalo (142 bu/ac), Saddle (141 bu/ac) and Esker 2020 (140 bu/ac). At individual sites, these varieties tended to be among the highest yielding varieties, but this difference was not consistently

statistically significant. At Peterson's, SD Buffalo was higher yielding in both grain and straw than the other three trialed varieties, and Peterson reports that he will definitely start growing this variety instead of the Saddle oats he has grown in the past. He explains that he was very satisfied with the trial because "I knew there were different oat varieties and they have different strengths/weaknesses but it was really fun to see those differences in the field. I did the planting management system that I want to use and got to see which variety did best under that system. I learned a lot doing this."

Test weights at all sites were similar to averaged test weights from previous years at the ISU sites. The standard minimum test weight that many companies require for food grade oats is 38 lb/bu. One variety

(Antigo) made food-grade test weight at all four sites where it was trialed (Boone, Greenfield, Kanawha and Nashua). Four additional varieties at Kanawha made food-grade test weight, while none did at Peterson's farm. Four additional varieties at Kanawha and three at Greenfield made food-grade test weight, while none did at Peterson's farm.

PFI plans to continue oat variety trials in future years and ISU research farms. Peterson reports that there is more for him to learn about growing oats that extends beyond variety trials, and he is interested in conducting issues on those questions. "Some issues I had this year that I want to address are residue management from the previous crop, reducing herbicide carryover injury, and getting a better stand of red clover underseeding."

ISU NORTHERN RESEARCH FARM, KANAWHA

Previous crop: Soybeans
 Replications: 3
 Harvested plot size: 5 ft × 47 ft
 Fertilizer applied: 60 lb/ac K as potash, 11 lb/ac N as MAP and 52 lb/ac P as MAP on Oct. 24, 2022
 46 lb/ac N as urea on April 11, 2023
 Planting date: Apr. 11, 2023
 Row spacing: 7.5 in.
 Seeding rate: 4 bu/ac
 Seeding depth: 1 in.
 Harvest date: July 27, 2023

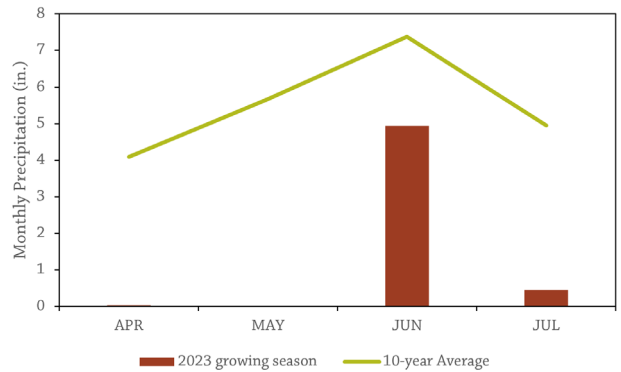
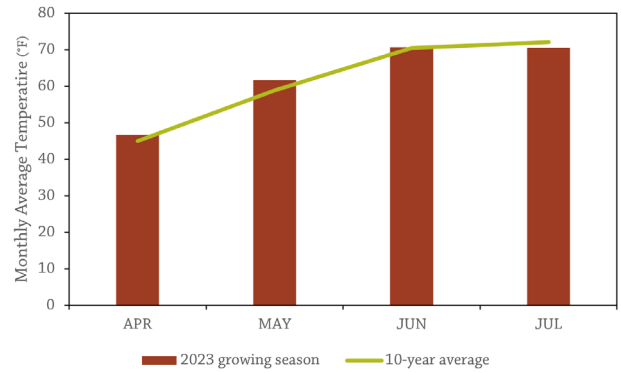


TABLE 2. 2023 Oat Variety Trial at Kanawha in north-central Iowa.
 Varieties with a test weight that meets food grade specification (≥ 38 lb/bu) are highlighted.

VARIETY	YIELD			TEST WEIGHT (lb/bu)	PLANT HT at HARVEST (in.)	LODGING (%)
	(bu/ac)	(% of site avg.)	9-yr avg. (bu/ac)			
Antigo	139	88	98	39	33	5
Deon	156	98	105	36	35	3
Esker 2020	161	102	121	34	32	2
Goliath	153	97	97	36	42	25
Hayden	174	110	108	37	35	3
Jerry	144	91	88	37	31	0
Mink	160	101	160	37	28	0
MN-Pearl	181	114	127	36	36	3
Morton	154	97	115	34	39	0
Reins	165	104	106	38	28	0
Rushmore	188	118	146	38	38	2
Saddle	167	105	123	37	33	0
SD Buffalo	175	110	149	36	37	0
Shelby 427	146	92	97	38	35	0
Sumo	129	81	91	39	32	5
Warrior	148	93	121	34	32	0
Mean	159	--	--	37	34	3
LSD (90%) ^a	21	--	--	1	3	10

^a By response variable, if the difference between any two entries is greater than the least significant difference (LSD) the entries are considered statistically different with 90% confidence.

^b 9-yr. average yields are listed for varieties trialed at least twice in the past nine years at this location.

ISU AG ENGINEERING AND AGRONOMY FARM, BOONE

Previous crop: Soybeans
 Replications: 3
 Harvested plot size: 5 ft × 49 ft
 Fertilizer applied: 30 lb N/ac; 100 lb P/ac; 40 lb K/ac; 37 lb S/ac on Apr. 10, 2023
 Planting date: Apr. 14, 2023
 Row spacing: 7.5 in.
 Seeding rate: 4 bu/ac
 Seeding depth: 1 in.
 Harvest date: July 26, 2023

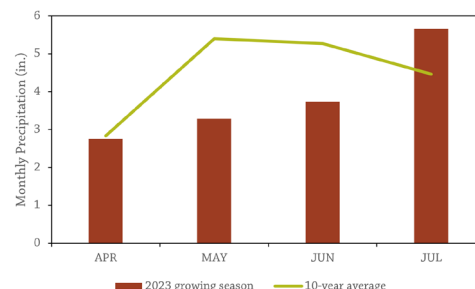
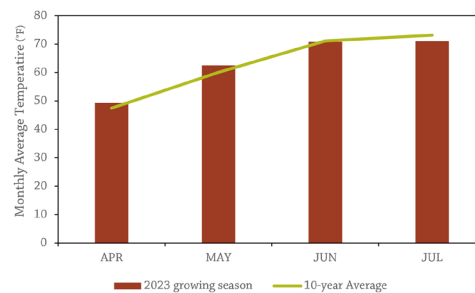


TABLE 3. 2023 Oat Variety Trial at Boone in central Iowa.
 Varieties with a test weight that meets food grade specification (≥ 38 lb/bu) are highlighted.

VARIETY	YIELD			TEST WEIGHT (lb/bu)	PLANT HT at HARVEST (in.)	LODGING (%)
	(bu/ac)	(% of site avg.)	6-yr avg. (bu/ac)			
Antigo	168	98	98	38	34	77
Deon	169	98	103	34	36	50
Esker 2020	181	106	117	32	32	25
Goliath	170	99	107	35	44	92
Hayden	169	98	100	34	35	52
Jerry	174	101	97	35	32	52
Mink	169	98	169	37	28	3
MN-Pearl	173	101	110	34	35	30
Morton	158	92	110	32	40	18
Reins	173	101	111	36	28	2
Rushmore	187	109	132	36	37	53
Saddle	189	110	114	35	33	8
SD Buffalo	188	110	146	35	36	53
Shelby 427	158	92	95	35	35	22
Sumo	155	90	94	36	33	52
Warrior	166	97	116	33	32	15
Mean	172	--	--	35	34	38
LSD (90%) ^a	14	--	--	1	2	29

^a By response variable, if the difference between any two entries is greater than the least significant difference (LSD) the entries are considered statistically different with 90% confidence.

^b 6-yr. average yields are listed for varieties trialed at least twice in the past six years at this location..

ISU NORTHEAST RESEARCH FARM, NASHUA

Previous crop: Soybeans
 Replications: 3
 Harvested plot size: 8.125 ft x 127 ft
 Fertilizer applied: 30 lb N/ac as urea on April 3, 2023
 Tillage: Field cultivator to incorporate urea on April 3, 2023
 Planting date: Apr. 4, 2023 followed by cultipacking
 Row spacing: 7.5 in.
 Seeding rate: 4 bu/ac
 Seeding depth: 1.5 in.
 Harvest date: July 17, 2023 (grain) followed by July 18, 2023 (straw)

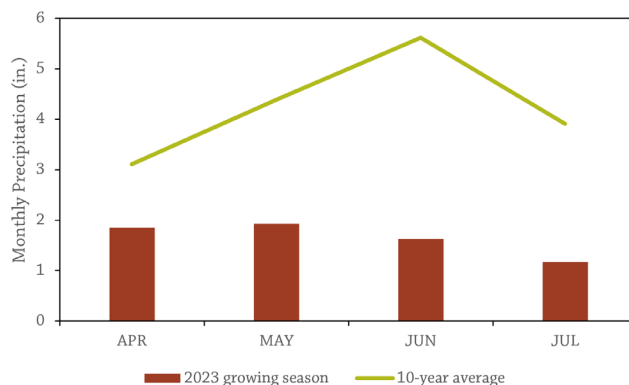
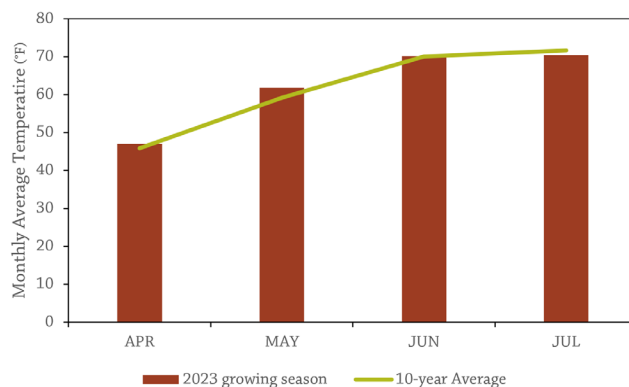


TABLE 4. 2023 Oat Variety Trial at Nashua in northeast Iowa.
 Varieties with a test weight that meets food grade specification (≥ 38 lb/bu) are highlighted.

VARIETY	YIELD		TEST WEIGHT (lb/bu)	PLANT HT at HARVEST (in.)	LODGING (%)	STRAW YIELD (ton/ac)
	(bu/ac)	(% of site avg.)				
Antigo	115	95	112	38	0	1.2
Deon	121	100	125	35	0	1.4
Esker 2020	133	110	135	33	0	1.2
Goliath	132	109	129	36	0	1.5
Hayden	130	107	129	36	0	1.5
Jerry	109	90	110	36	0	1.4
Mink	110	94	129	37	0	1.3
MN Pearl	114	91	110	35	0	1.3
Morton	125	103	117	33	0	1.7
Natty	130	107	127	36	2	1.2
Reins	125	103	122	37	0	1.3
Rushmore	121	100	134	37	0	1.5
SD Buffalo	115	94	128	34	0	1.5
Saddle	123	101	128	36	0	1.5
Shelby 427	120	99	117	37	0	1.6
Sumo	114	94	113	36	2	1.1
Warrior	123	102	124	35	0	1.4
Mean	121	--	--	36	0	1.4
LSD (90%) ^a	12	--	--	0.5	< 0.1	0.2

^a By response variable, if the difference between any two entries is greater than the least significant difference (LSD) the entries are considered statistically different with 90% confidence.

^b 9-yr. average yields are listed for varieties trialed at least twice in the past nine years at this location.

ISU SOUTHWEST RESEARCH FARM, GREENFIELD

Previous crop: Soybeans
 Replications: 3
 Harvested plot size: 8 ft × 50 ft
 Fertilizer applied: 11 lb N/ac as MAP; 52 lb P/ac as MAP; 60 lb K/ac; 150 lb gypsum/ac on March 29, 2023
 46 lb N/ac as Urea on April 3, 2023
 Tillage: Field cultivator
 Planting date: Apr. 4, 2023
 Row spacing: 7.5 in.
 Seeding rate: 4 bu/ac
 Seeding depth: 1.5 in.
 Harvest date: July 21

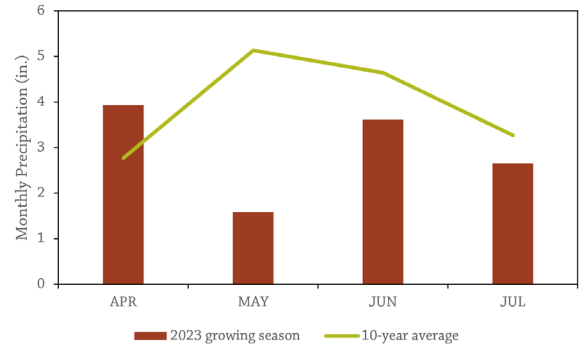
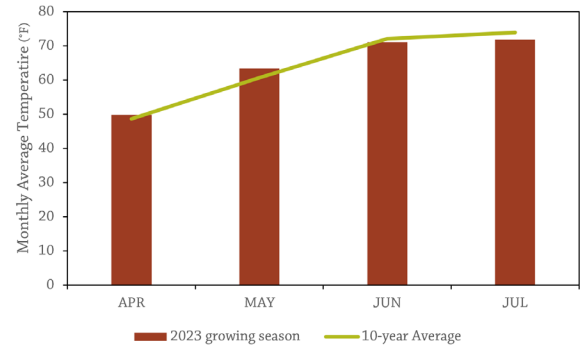


TABLE 5. 2023 Oat Variety Trial at Greenfield in southwest Iowa.
 Varieties with a test weight that meets food grade specification (≥ 38 lb/bu) are highlighted.

VARIETY	YIELD			TEST WEIGHT (lb/bu)	PLANT HT at HARVEST (in.)	LODGING (%)
	(bu/ac)	(% of site avg.)	4-yr avg. (bu/ac)			
Antigo	72	109	102	40	35	68
Deon	79	120	106	35	35	15
Esker 2020	85	130	114	35	36	37
Goliath	55	84	82	36	41	63
Hayden	81	123	114	36	37	43
Jerry	45	69	80	36	36	40
Mink	59	97	113	39	29	10
MN-Pearl	64	90	59	35	33	15
Morton	57	86	90	33	39	8
Reins	47	71	117	37	33	5
Rushmore	72	109	118	38	38	58
Saddle	84	128	110	35	37	17
SD Buffalo	98	149	126	36	34	25
Shelby 427	50	77	109	37	37	12
Sumo	44	67	96	38	35	48
Warrior	59	90	108	35	33	5
Mean	66	--	--	36	35	29
LSD (90%) ^a	10	--	--	1	4	31

^a By response variable, if the difference between any two entries is greater than the least significant difference (LSD) the entries are considered statistically different with 90% confidence.

^b 4-yr. average yields are listed for varieties trialed at least twice in the past four years at this location.

NEIL PETERSON'S FARM, FONDA

Previous crop: Soybeans
 Replications: 4
 Harvested plot size: 5 ft × 50 ft
 Fertilizer applied: 1.5 ton/ac cattle manure on Nov. 1, 2022
 Tillage: None
 Planting date: Apr. 3, 2023
 Row spacing: 7.5 in.
 Seeding rate: 110 lb/ac
 Seeding depth: 1 in.
 Harvest date: Swathed on July 20; Combined July 24; Straw baled July 28, 2023.

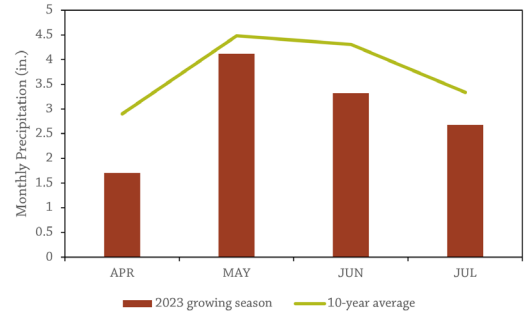
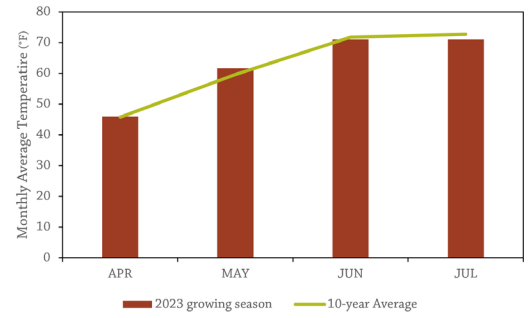


TABLE 6. 2023 Oat Variety Trial at Neil Peterson's in Fonda, Iowa.
 Varieties with a test weight that meets food grade specification (≥ 38 lb/bu) are highlighted.

	YIELD (bu/ac)	TEST WEIGHT (lb/bu)	STRAW YIELD (bales/ac)
MN Pearl	130	36	53
Reins	132	37	50
Saddle	130	36	53
SD Buffalo	144	37	64
Mean	134	36	55
LSD (90%) ^a	5	1	4

^a By response variable, if the difference between any two entries is greater than the least significant difference (LSD) the entries are considered statistically different with 90% confidence.

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