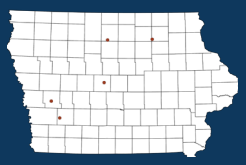
PRACTICAL FARMERS OF IOWA
COOPERATORS' PROGRAM Farmer-Led Research

EXPERIMENT



2020

Staff Contacts

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Oat Variety Trial 2020

In a Nutshell:

- 18 oat varieties were screened at four Iowa State University research farms and two varieties were compared on one organic commercial farm.

Key Findings:

- Across varieties and sites, average oat yield was 121 bu/ac. Saddle had the highest yield at three of the four research farms.
- Streaker (hulless variety) scored the highest test weight at each location, however it was also the lowest yielding variety at each location. Sumo, Shelby 427 and Rushmore (hulled varieties) made food grade test weight specifications at three of the four research farms.

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 – Lewis (Dallas Maxwell)
Ron Rosmann – Harlan

Collaborators

Margaret Smith,
Albert Lea Seed House

Funding

Walton Family Foundation, General Mills, Grain Millers, Inc., Albert Lea Seed House, Sustainable Food Lab, Welter Seed and Honey Co., Kuehl Seed Farm, UMN Foundation, SDSU Seed Foundation, Zabel Seeds

BACKGROUND

Careful management and proper choice of variety can make oats a profitable crop due to their low input requirements and beneficial effects on succeeding crops in a rotation. Oats can be used for grain and straw production, as a companion crop to establish hay and pastures, or for early-season forage as hay or haylage. Because oats are harvested in late July to early August, field management options for the remainder of the season are numerous. These include establishment of a perennial forage or summer cover crop, as well as an opportunity for mid-season manure application. In 2020, 240,000 acres of oats were planted in Iowa according to the USDA-National Agricultural Statistics Service. The state average yield for the year was 78 bu/ac; the five-year average yield is 70 bu/ac.

Planting oats before April 15 is recommended for optimal yields in Iowa. This helps avoid exposure to warmer weather during grain fill. Test weight is the most commonly used indicator of grain quality. High test-weight varieties should be chosen by growers who intend to market oat grain to food-grade buyers.

Oat growth is regularly affected by rust and barley yellow dwarf virus. Variety resistance to these diseases should be considered. Another option is the use of a foliar fungicide applied at Feekes 9 growth stage, defined as flag leaf emerged with ligule visible.

METHODS

Variety trials were conducted at five locations in 2020: 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 Lewis; Ron Rosmann's organic farm in Harlan.

Oat variety trial plots at the ISU Northeast Research Farm near Nashua on June 29, 2020. Photo credit: Margaret Smith

TABLE 1. Origin, PVP and disease ratings for oat varieties screened in 2020.

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
Deon	MN	2014	PVP	Late	MR	MS	MR	R
Esker 2020	WI	2020	PVP	Mid-Late	MS	MS	--	--
Goliath	SD	2013	PVP	Late	MS	R	MR	MR
Hayden	SD	2015	PVP	Mid-Late	MS	MS	MR	R
Jerry	ND	1994	PVP	Medium	MS	MS	MS	MS
MN Pearl	MN	2018	Pending	Mid-Late	MS	MR	--	--
Morton	ND	2001	PVP	Late	MS	--	MS	R
Natty	SD	2015	PVP	Medium	MR	MS	MR	R
Ogle	IL	1981	PVP	Medium	MS	S	R	S
Reins	IL	2016	PVP	Early	MR	MR	R	R
Rushmore	SD	2019	Pending	Medium	MR	--	MR	MR
Saber	IL	2010	PVP	Early	MS	S	MR	S
Saddle	SD	2018	Pending	Early	MR	S	--	--
Shelby 427	SD	2011	PVP	Medium	MS	MS	MR	MR
Streaker[e]	SD	2016	PVP	Medium	MS	--	MR	R
Sumo	SD	2017	PVP	Early	MR	R	MS	R
Warrior	SD	2019	Pending	Mid-Late	R	--	MS	--

a Origin: IL-University of Illinois, IN-Purdue University; MN-University of Minnesota; ND-North Dakota State University; SD-South Dakota State University; 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.
e Hulless variety.

These variety trials build on previous trials conducted at Kanawha, Charles City, Boone and Nashua from 2015–2019.[1–5] Information about each of the varieties trialed in 2020 can be found in **Table 1**.

Oat management information is provided with the results from each location. No herbicides or insecticides were applied at any location. Entries were screened for crown rust, barley yellow dwarf virus and septoria leaf blight by Margaret Smith from Albert Lea Seed House and Ken Pecinovsky in late June at Nashua only.

Data were analyzed using JMP Pro 15 (SAS Institute Inc., Cary, NC). Statistical significance is determined at $P \leq 0.10$ level (unless otherwise noted) and means separations are reported using Tukey's least significant difference (LSD).

RESULTS AND DISCUSSION

Data were analyzed by location, and varieties are listed in order of yield performance at each location. Reported yields are corrected for 13% moisture. A "percentage of test average" calculation is included to aid in comparing varieties at each location. Rainfall and temperature data were accessed from the nearest weather station.[6] Except for at Nashua, rainfall in 2020 was well below historical averages.

Streaker, a hulless variety, routinely yielded least but always scored the highest test weight at each location (>42 lb/bu). Several varieties made a test weight of 38 lb/bu – the standard minimum that many food companies require before dockage is applied. (A test weight of 36 lb/bu is a minimum processing facilities can use for food-grade milling.) Ratings conducted by Smith and Pecinovsky at the Nashua location on June 29 indicated very low disease incidence (data not shown).

ISU NORTHERN RESEARCH FARM, KANAWHA

Previous crop: Soybeans

Replications: 3

Harvested plot size: 5 ft x 47 ft

Fertilizer applied: 65 lb N/ac as urea on Apr. 2

Tillage: Soil finisher on Apr. 2 and Apr. 7

Planting date: Apr. 7, followed by cultipacker

Row spacing: 7.5 in.

Seeding rate: 4 bu/ac

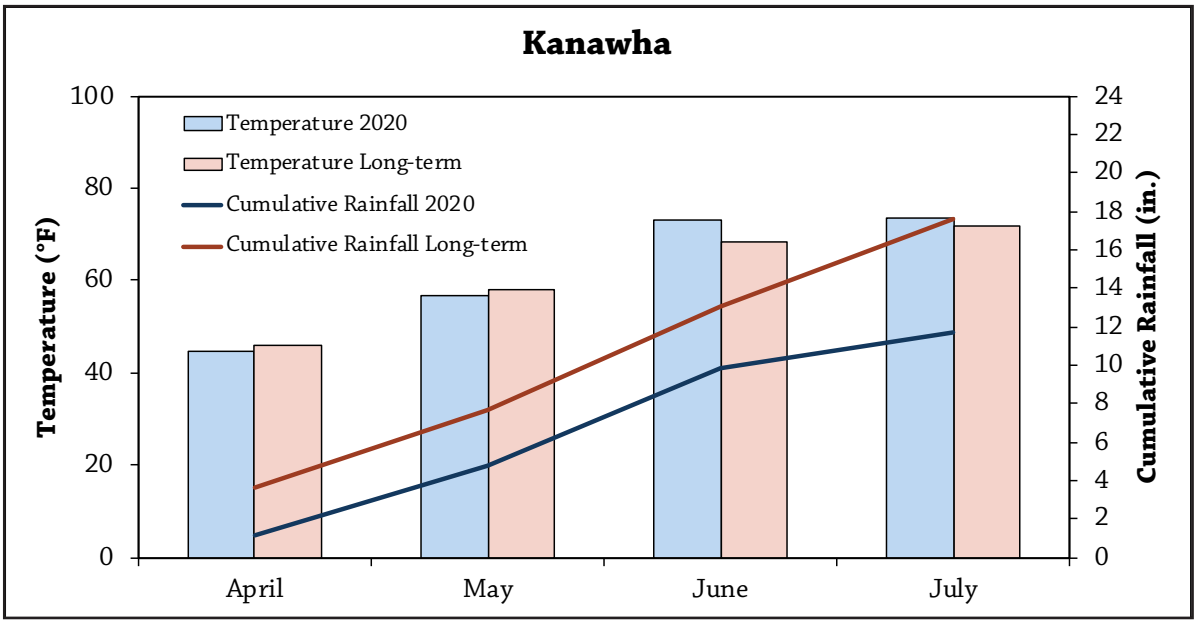
Seeding depth: 1 in.

Harvest date: July 24

TABLE 2. Results for the 2020 Oat Variety Trial at Kanawha in north-central Iowa.
Varieties with a test that meets food grade specification (≥ 38 lb/bu) are highlighted.

VARIETY	YIELD (bu/ac)	YIELD (% of site avg.)	YIELD 6-yr avg. (bu/ac)[b]	TEST WEIGHT (lb/bu)	PLANT HEIGHT AT HARVEST (in.)	LODGING AT HARVEST (%)
Saddle	141	118	99	36.0	31	0
Antigo	135	112	74	39.1	34	78
Reins	133	111	83	37.5	26	2
Saber	132	110	102	35.5	32	2
Warrior	132	110	99	34.9	33	0
Rushmore	130	108	--	38.7	35	2
MN Pearl	125	104	95	35.0	37	2
Natty	124	103	92	37.0	36	3
Hayden	123	103	88	35.7	34	7
Esker 2020	123	102	95	32.8	32	22
Shelby 427	123	102	81	38.1	36	2
Sumo	119	100	75	38.6	32	3
Ogle	117	98	--	32.1	33	2
Goliath	111	92	80	36.7	41	13
Deon	109	90	88	34.5	35	2
Morton	103	86	--	35.1	41	7
Jerry	102	85	65	37.8	35	22
Streaker	87	73	--	44.8	36	37
MEAN	120	--	--	36.7	34	11
LSD[a]	32	--	--	1.4	4	24

[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 only for those varieties trialed at least twice in the past six years at this location. This was the first year that Morton, Ogle, Rushmore and Streaker were trialed.



ISU AG ENGINEERING AND AGRONOMY FARM, BOONE

Previous crop: Soybeans

Replications: 3

Harvested plot size: 5 ft x 51.5 ft

Fertilizer applied: 30 lb N/ac; 100 lb P/ac; 25 lb S/ac; 2.5 lb Zn/ac as MESZ on March 31

Tillage: Field cultivator on Apr. 2

Planting date: Apr. 2

Row spacing: 7.5 in.

Seeding rate: 4 bu/ac

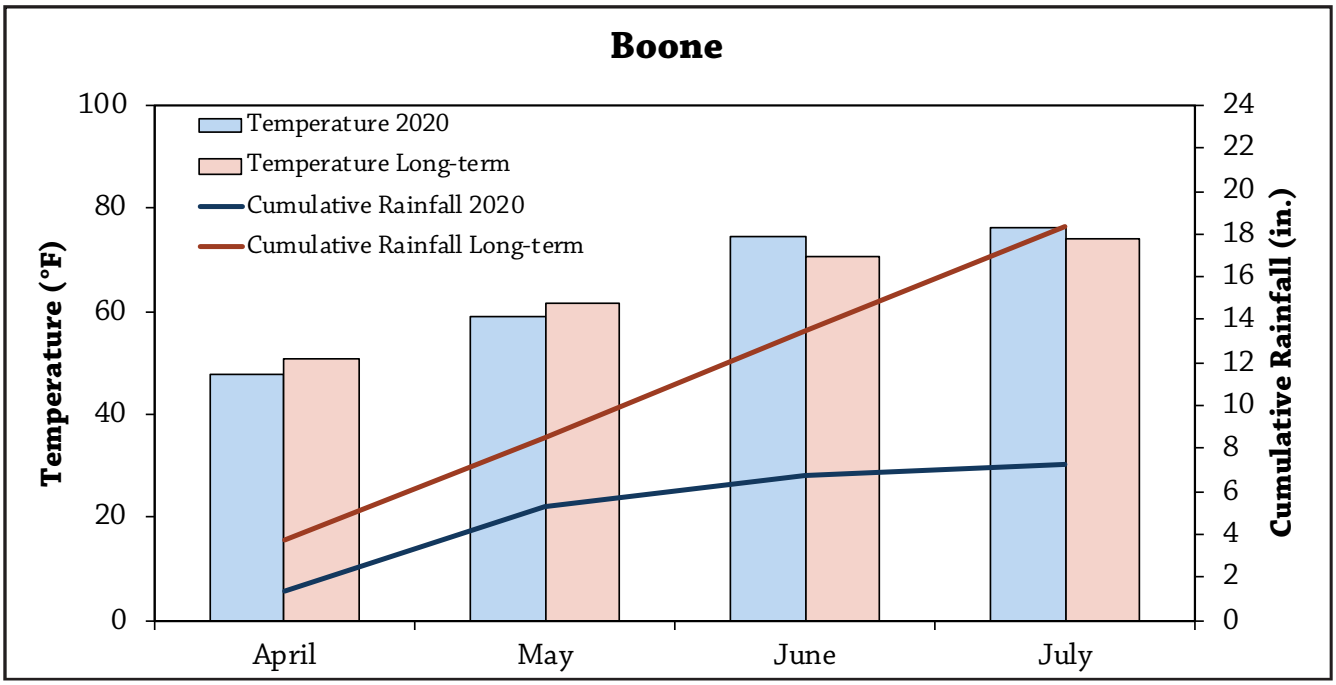
Seeding depth: 1 in.

Harvest date: July 28

TABLE 3. Results for the 2020 Oat Variety Trial at Boone in central Iowa.
Varieties with a test that meets food grade specification (≥ 38 lb/bu) are highlighted.

VARIETY	YIELD (bu/ac)	YIELD (% of site avg.)	YIELD 3-yr avg. (bu/ac)[b]	TEST WEIGHT (lb/bu)	PLANT HEIGHT AT HARVEST (in.)	LODGING AT HARVEST (%)
Rushmore	132	119	--	39.3	33	57
Esker 2020	127	114	101	35.1	30	42
Saddle	124	112	96	37.9	31	5
Reins	120	108	90	39.0	26	5
Deon	117	106	86	37.2	33	20
Saber	117	106	87	36.8	28	18
Ogle	115	103	--	34.4	29	23
Natty	114	103	79	38.1	33	18
Warrior	114	102	101	35.6	31	5
Antigo	111	100	79	39.9	32	43
Shelby 427	107	96	74	39.5	33	67
MN Pearl	105	95	93	37.1	33	27
Sumo	105	94	79	39.3	32	13
Hayden	104	94	82	37.1	32	75
Goliath	101	91	74	37.4	35	95
Morton	100	90	--	35.4	35	62
Jerry	95	86	65	38.8	33	90
Streaker	87	78	--	46.9	31	90
MEAN	111	--	--	38.0	32	42
LSD[a]	27	--	--	2.6	3	33

[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] 3-yr. average yields are listed only for those varieties trialed at least twice in the past three years at this location. This was the first year that Morton, Ogle, Rushmore and Streaker were trialed.



ISU NORTHEAST RESEARCH FARM, NASHUA

Previous crop: Soybeans

Replications: 3

Harvested plot size: 8 ft x 93 ft

Fertilizer applied: 30 lb N/ac urea; 20 lb P as TSP; 35 lb K/ac as potash on March 23

Tillage: Field cultivator on March 30 and 31

Planting date: March 31, followed by cultipacker on Apr. 2

Row spacing: 7.5 in.

Seeding rate: 4 bu/ac

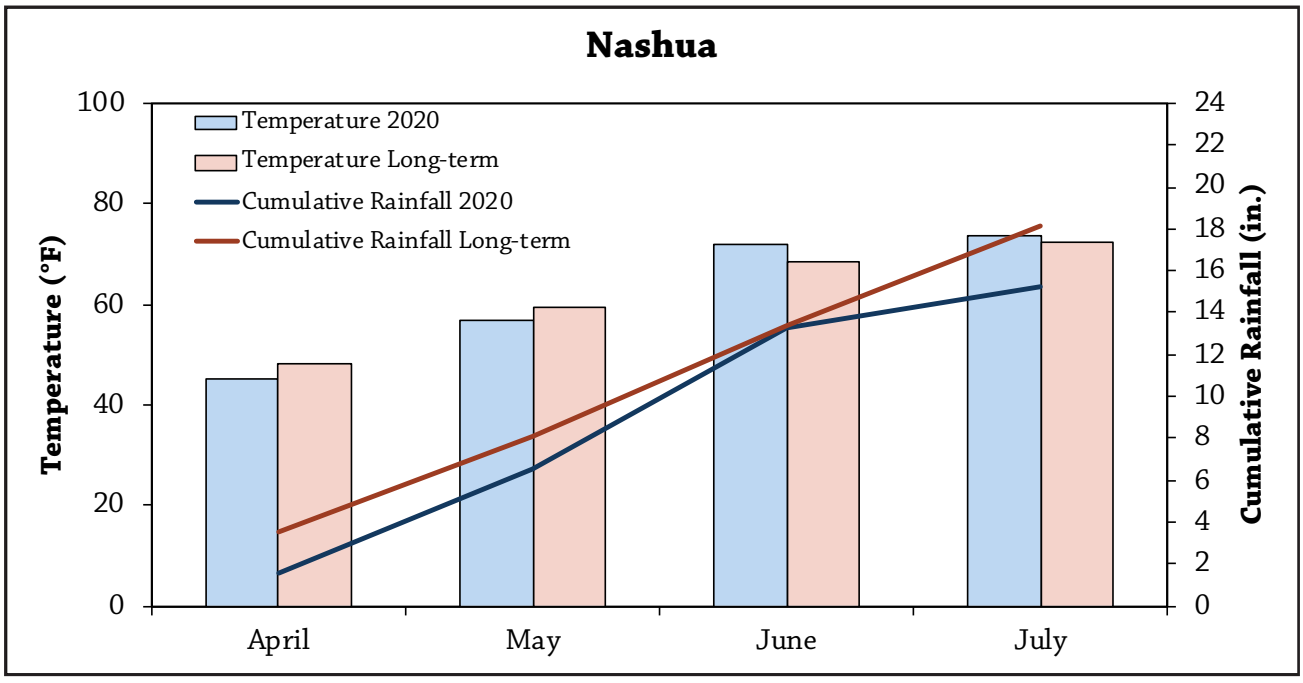
Seeding depth: 1 in.

Harvest date: July 20

TABLE 4. Results for the 2020 Oat Variety Trial at Nashua in northeast Iowa.
Varieties with a test that meets food grade specification (≥ 38 lb/bu) are highlighted.

VARIETY	YIELD (bu/ac)	YIELD (% of site avg.)	YIELD 6-yr avg. (bu/ac)[b]	TEST WEIGHT (lb/bu)	PLANT HEIGHT AT HARVEST (in.)	LODGING AT HARVEST (%)
Saddle	144	116	126	35.2	32	2.5
Rushmore	143	115	--	37.2	34	2.2
Esker 2020	138	111	134	33.3	33	2.2
MN Pearl	136	110	139	34.7	37	1.7
Reins	135	109	117	36.4	27	1.9
Ogle	131	105	--	32.7	33	2.3
Hayden	130	105	129	35.9	35	2.5
Goliath	128	104	127	36.3	41	2.6
Saber	127	102	124	34.6	33	1.8
Warrior	126	102	120	34.9	32	2.4
Antigo	125	101	106	37.1	32	2.2
Shelby 427	120	97	113	36.7	36	2.3
Natty	120	97	124	35.4	38	2.4
Sumo	118	95	110	37.8	33	2.1
Deon	116	94	125	33.9	37	2.2
Jerry	112	90	108	35.9	36	1.9
Morton	108	87	--	33.8	40	2.2
Streaker	81	65	--	42.5	36	2.3
MEAN	124	--	--	35.8	35	2.2
LSD[a]	15	--	--	0.3	3	0.6

[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 only for those varieties trialed at least twice in the past six years at this location. This was the first year that Morton, Ogle, Rushmore and Streaker were trialed.



ISU SOUTHWEST RESEARCH FARM, LEWIS

Previous crop: Soybeans

Replications: 3

Harvested plot size: 5 ft x 55 ft

Fertilizer applied: 70 lb N/ac as urea

Tillage: Disked on Apr. 2

Planting date: Apr. 7, 2020, followed by cultipacker

Row spacing: 7.5 in.

Seeding rate: 4 bu/ac

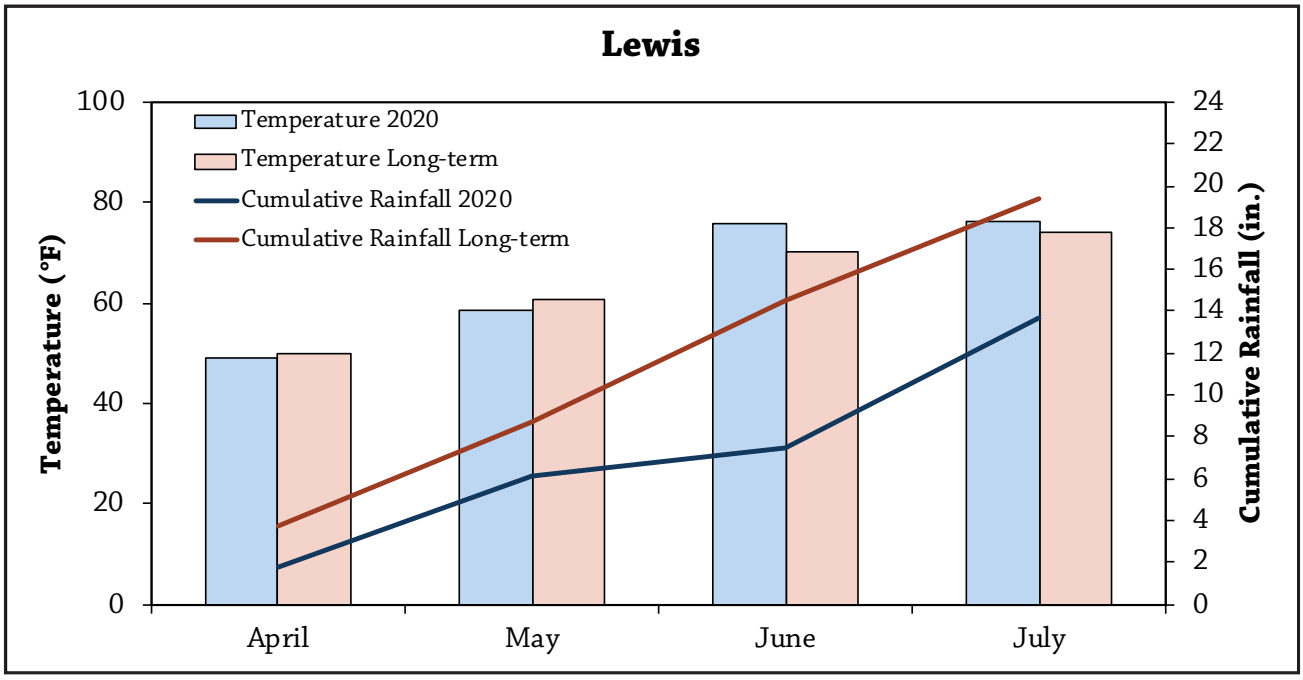
Seeding depth: 1 in.

Harvest date: July 30

TABLE 5. Results for the 2020 Oat Variety Trial at Lewis in southwest Iowa.
Varieties with a test that meets food grade specification (≥ 38 lb/bu) are highlighted.

VARIETY	YIELD (bu/ac)	YIELD (% of site avg.)	TEST WEIGHT (lb/bu)	PLANT HEIGHT AT HARVEST (in.)	LODGING AT HARVEST (%)
Saddle	144	118	37.1	33	38
Natty	143	117	37.4	34	95
MN Pearl	142	116	34.6	33	88
Esker 2020	141	116	34.3	33	93
Saber	140	115	36.3	31	93
Rushmore	140	114	38.2	33	90
Shelby 427	139	114	39.5	34	93
Ogle	134	110	33.1	32	93
Reins	134	110	39.0	29	67
Sumo	129	105	39.5	34	45
Antigo	125	103	37.9	33	93
Deon	124	102	34.7	34	93
Morton	117	96	34.2	35	95
Warrior	113	93	34.3	31	57
Hayden	111	91	35.3	32	93
Goliath	88	72	35.4	36	95
Jerry	87	71	36.8	33	93
Streaker	58	48	45.0	33	95
MEAN	122	--	36.8	33	--
LSD[a]	52	--	2.3	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.



RON ROSMANN FARM, HARLAN

Previous crop: Soybeans

Replications: 4

Harvested plot size: 13.5 ft x 1,500 ft

Fertilizer applied: 4 tons/ac composted hog and cattle manure on March 21

Tillage: Disked twice on March 21

Planting date: Apr. 1, undersown with alfalfa, red clover and orchardgrass

Row spacing: 7.5 in.

Seeding rate: 4 bu/ac

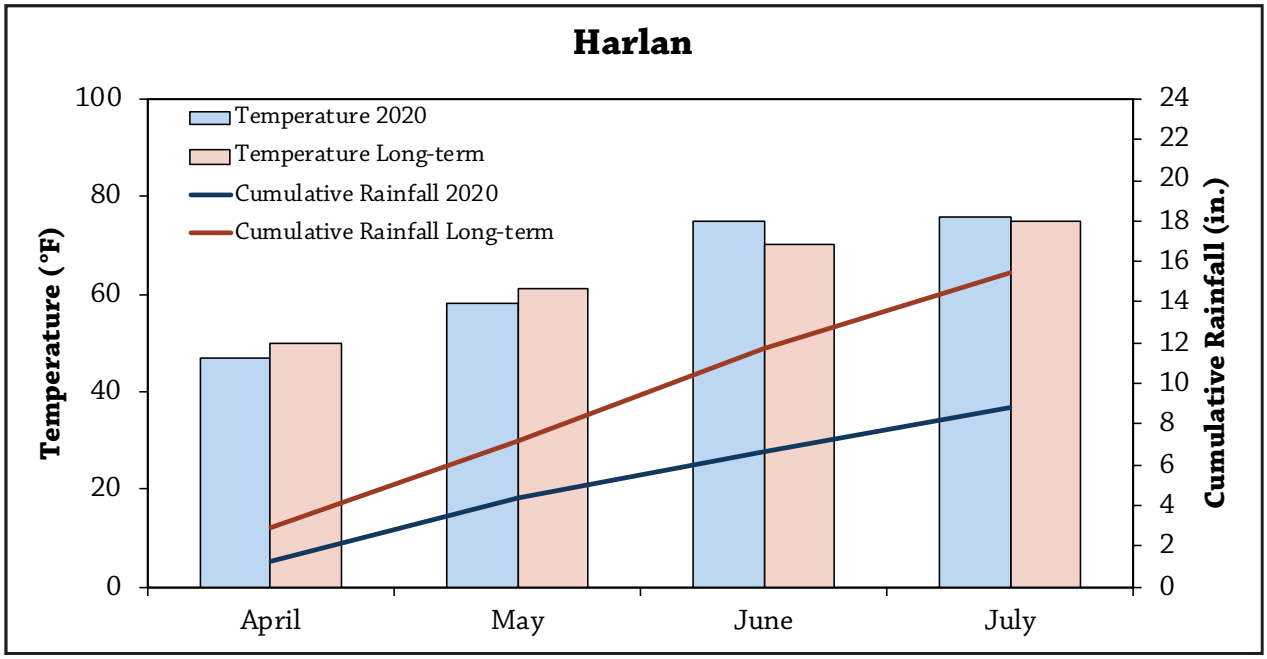
Seeding depth: 1 in.

Harvest date: July 21 (swathed); July 22 (picked up)

TABLE 6. Oat variety comparison at Ron Rosmann's organic farm near Harlan in 2020.
Varieties with a test that meets food grade specification (≥ 38 lb/bu) are highlighted.

VARIETY	YIELD (bu/ac)	YIELD (% of site avg.)	TEST WEIGHT (lb/bu)
Reins	132	105	38.1
Hayden	119	94	37.6
MEAN	126	--	--
LSD[a]	6	--	--

[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 95% confidence.



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PRACTICAL FARMERS of Iowa

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PFI's Cooperators' Program helps farmers find practical answers and make informed decisions through on-farm research projects. The Cooperators' Program began in 1987 with farmers looking to save money through more judicious use of inputs. If you are interested in conducting an on-farm trial contact Stefan Gailans @ 515-232-5661 or stefan@practicalfarmers.org.