

Oat Variety Trial 2019

In a Nutshell:

- 16 oat varieties were screened at three Iowa State University research farms and one commercial farm.

Key Findings:

- Saddle and Reins were among the top yield performers at all four locations.
- Antigo scored the highest test weight at each location.
- The application of Trivapro fungicide at Nashua significantly improved oat yield, test weight and straw yield for two of four varieties tested.



Oat variety trial plots at the ISU Northeast Research Farm in Nashua on June 26, 2019.

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 2019, 215,000 acres of oats were planted in Iowa according to the USDA-National Agricultural Statistics Service. The state average yield for the year was 58 bu/ac; the five-year average yield is 69 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 four locations in 2019: ISU Northern Research Farm in Kanawha; ISU Northeast Research Farm in Nashua; Wayne Koehler's farm in Charles City; ISU Ag Engineering and Agronomy Farm in Boone. A separate trial at Nashua assessed the impact of a foliar fungicide (Trivapro) on four oat varieties. These variety trials build on previous trials conducted at Kanawha, Charles City, Boone and Nashua from 2015–2018.^[1–4]

Information about each of the varieties 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. Fungicides were only applied to designated subplots containing the Deon, Hayden, Horsepower and Shelby 427 varieties at Nashua. Entries were screened for crown rust, barley yellow dwarf virus and septoria leaf blight by Margaret Smith from Albert Lea Seed House and Alison Robertson from the Department of Plant Pathology and Microbiology at ISU in late June and early to mid-July at Nashua, Boone and Kanawha.

Data were analyzed using JMP Pro 13 (SAS Institute Inc., Cary, NC). Statistical significance is determined at $P \leq 0.05$ level and means separations are reported using Tukey's least significant difference (LSD).

Cooperators

Matt Schnabel (ISU Northern Research Farm; ISU Ag Engineering and Agronomy Farm) – Kanawha, Boone
Ken Pecinovskiy (ISU Northeast Research Farm) – Nashua
Wayne Koehler – Charles City

Collaborators

Margaret Smith, Albert Lea Seed House
Alison Robertson, ISU Plant Pathology and Microbiology

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Sustainable Food Lab
Welter Seed and Honey Co.

RESULTS AND DISCUSSION

Data were analyzed by location, and varieties are listed in order of 2019 yield performance. Reported yields are corrected for 13% moisture. A “percentage of test average” calculation for 2019 is included to aid in comparing among entries at each location. Rainfall and temperature data were either provided from the farm manager or accessed from the nearest weather station.^[5]

Saddle and Reins were among the top yield performers at all four locations. Antigo scored the highest test weight at each location and several varieties made a test weight of 38 lb/bu – the standard minimum that many food companies require before dockage is applied. Ratings conducted by Smith and Robertson at the Nashua location on June 28, Boone location on July 1 and Kanawha location on July 15 indicated very low disease incidence (data not shown).

The application of Trivapro fungicide at Nashua significantly improved oat yield, test weight and straw yield for the Hayden and Horsepower varieties and reduced lodging for the Horsepower and Shelby 427 varieties. Straw yield and oat plant height of Shelby 427 were also increased by the fungicide application. The effectiveness of the application of Trivapro fungicide for control of rust could not be determined due to low incidence of crown and stem rust this season.

TABLE 1. Origin, PVP and disease ratings for oat varieties screened in 2019.

VARIETY	ORIGIN ^a	PVP ^b	MATURITY	DISEASE RATINGS ^c			
				CROWN RUST	STEM RUST	BYDV ^d	SMUT
Antigo	WI	PVP	Early	MR	S	MR	MR
Deon	MN	PVP	Late	MR	MS	MR	R
Esker 2020	WI	PVP	Mid-Late	MS	MS	--	--
Excel	IN	PVP	Early	MS	S	R	MR
Goliath	SD	PVP	Late	MS	R	MR	MR
Hayden	SD	PVP	Mid-Late	MS	MS	MR	R
Horsepower	SD	PVP	Medium	MS	MS	MS	MR
Jerry	ND	PVP	Medium	MS	MS	MS	MS
Natty	SD	PVP	Medium	MR	MS	MR	R
Pearl	MN	Pending	Mid-Late	MS	MR	--	--
Reins	IL	PVP	Early	MR	MR	R	R
Ron	WI	PVP	Mid-Late	MR	--	--	--
Saddle	SD	Pending	Early	MR	S	--	--
Shelby 427	SD	PVP	Medium	MS	MS	MR	MR
Sumo	SD	PVP	Early	MR	R	MS	R
Warrior	SD	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.

ISU NORTHERN RESEARCH FARM, KANAWHA

Previous crop: Soybeans
 Replications: 3
 Plot size: 14.5 ft × 50 ft
 Fertilizer applied: 65 lb N/ac as urea on Apr. 17, 2019
 Tillage: Soil finisher on Apr. 17 and Apr. 24, 2019
 Planting date: Apr. 24, 2019
 Row spacing: 7.5 in.
 Seeding rate: 4 bu/ac
 Seeding depth: 1 in.
 Harvest date: Aug. 3, 2019

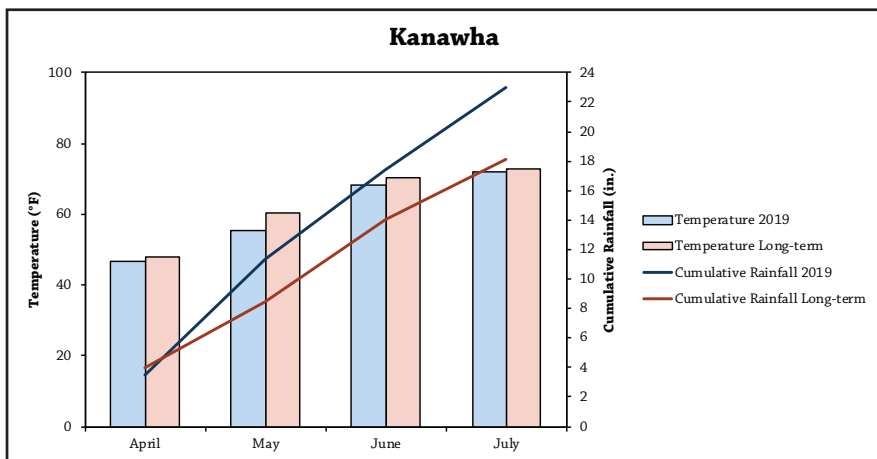


TABLE 2. Results for the 2019 Oat Variety Trial at Kanawha in north-central Iowa.

VARIETY	YIELD (bu/ac)					YIELD (% of site avg.) 2019	TEST WEIGHT (lb/bu) 2019	PLANT HEIGHT AT HARVEST (in.) 2019	% LODGING AT HARVEST 2019
	2019	2018	2017	2016	4-yr				
Saddle	94	62	--	--	78	145	36	43	0
Sumo	80	46	54	--	60	123	39	43	5
Reins	78	51	57	97	71	119	38	36	12
Ron	72	63	--	--	72	110	36	45	0
Hayden	72	59	71	75	69	110	38	43	5
Shelby 427	70	53	48	71	60	107	37	43	5
Natty	67	70	82	68	72	104	38	47	5
Esker 2020	67	--	--	--	67	103	34	42	5
Warrior	66	--	--	--	66	102	36	43	0
Pearl	65	67	--	--	66	101	36	41	0
Deon	65	57	77	74	68	99	36	44	0
Excel	59	--	--	79	69	91	34	40	25
Antigo	59	45	58	--	54	90	40	40	35
Goliath	51	--	63	66	60	79	37	51	15
Horsepower	41	53	75	66	59	62	37	38	30
Jerry	40	34	45	64	46	62	37	42	18
MEAN	65	56	63	73	65	--	37	42	10
LSD(0.05)^a	24	23	28	30	--	--	2	5	37

^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.

WAYNE KOEHLER'S FARM, CHARLES CITY

Previous crop: Soybeans
 Replications: 3
 Plot size: 8 ft × 50 ft
 Fertilizer applied: 65 lb N/ac as urea on Apr. 16, 2019
 Tillage: Soil finisher on Apr. 16, 2019
 Planting date: Apr. 16, 2019
 Row spacing: 7.5 in.
 Seeding rate: 4 bu/ac
 Seeding depth: 1 in.
 Harvest date: Aug. 2, 2019

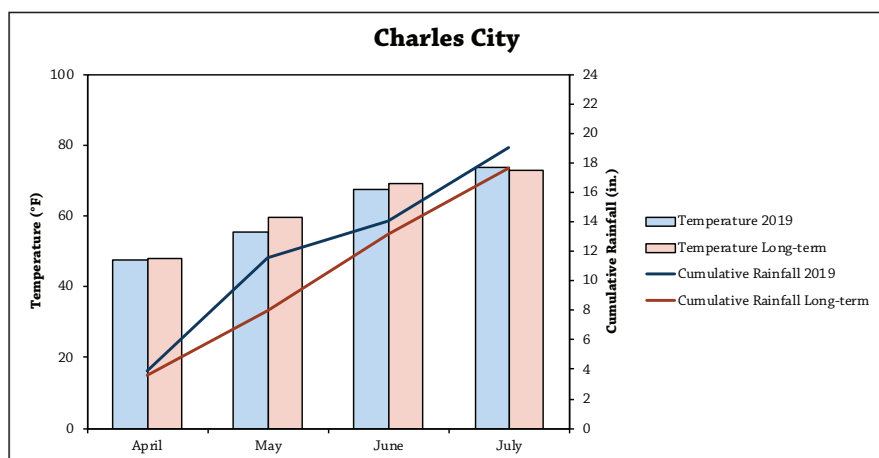


TABLE 3. Results for the 2019 Oat Variety Trial at Charles City in north-central Iowa.

VARIETY	YIELD (bu/ac)					YIELD (% of site avg.) 2019	TEST WEIGHT (lb/bu) 2019	PLANT HEIGHT AT HARVEST (in.) 2019
	2019	2018	2017	2016	4-yr			
Reins	90	78	75	90	83	126	37	37
Saddle	89	76	--	--	82	124	34	39
Pearl	84	66	--	--	75	117	35	41
Esker 2020	83	--	--	--	83	116	33	38
Warrior	81	--	--	--	81	113	33	39
Excel	77	--	70	70	72	108	34	38
Antigo	73	60	43	--	59	102	39	39
Natty	71	62	58	78	67	100	38	41
Hayden	69	50	71	55	61	96	37	40
Sumo	69	55	52	--	59	96	37	40
Deon	67	54	68	99	72	94	34	40
Shelby 427	62	50	66	63	60	87	36	38
Goliath	61	--	70	43	58	86	35	46
Ron	58	42	--	--	58	81	34	41
Horsepower	57	35	67	56	54	79	33	36
Jerry	54	30	55	59	50	76	34	41
MEAN	72	55	63	68	67	--	35	40
LSD(0.05)^a	23	42	22	36	--	--	2	8

^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.

ISU AG ENGINEERING AND AGRONOMY FARM, BOONE

Previous crop: Soybeans
 Replications: 3
 Plot size: 14.5 ft × 50 ft
 Fertilizer applied: 65 lb N/ac as urea on Apr. 16, 2019
 Tillage: Soil finisher on Apr. 16
 Planting date: Apr. 16, 2019
 Row spacing: 7.5 in.
 Seeding rate: 4 bu/ac
 Seeding depth: 1 in.
 Harvest date: Aug. 5, 2019

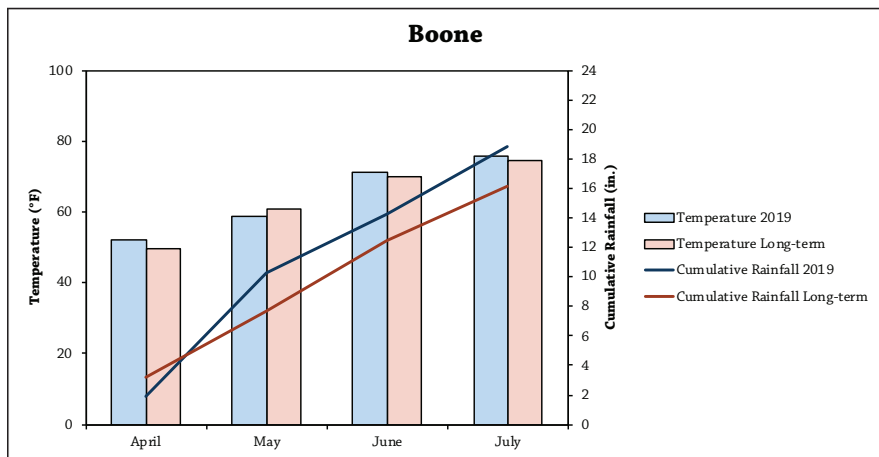


TABLE 4. Results for the 2019 Oat Variety Trial at Boone in central Iowa.

VARIETY	YIELD (bu/ac)			YIELD (% of site avg.) 2019	TEST WEIGHT (lb/bu) 2019	PLANT HEIGHT AT HARVEST (in.) 2019	% LODGING AT HARVEST 2019
	2019	2018	2-yr				
Saddle	105	59	82	146	36	42	5
Reins	91	59	75	127	37	36	53
Warrior	89	--	89	123	34	39	5
Pearl	80	63	72	111	35	40	25
Antigo	78	48	63	109	38	39	62
Esker 2020	76	--	76	105	33	41	60
Sumo	72	60	66	100	38	43	8
Natty	71	53	62	99	36	46	72
Hayden	71	70	70	98	35	39	60
Shelby 427	68	46	57	95	36	44	87
Ron	67	80	74	94	34	42	32
Excel	66	--	66	92	29	39	77
Deon	62	79	71	87	34	43	32
Jerry	58	41	50	81	33	42	95
Horsepower	49	47	48	68	30	37	95
Goliath	47	--	47	66	32	50	93
MEAN	72	59	67	--	34	41	54
LSD(0.05)^a	26	21	--	--	2	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.

^b Take caution. Too much variability and experimental error precluded statistical analysis of plant height and lodging data.

ISU NORTHEAST RESEARCH FARM, NASHUA

Previous crop: Soybeans
 Replications: 4
 Plot size: 8 ft × 90 ft
 Fertilizer applied: 30 lb N/ac as urea on Apr. 8, 2019
 Tillage: Field cultivator on Apr. 8 and 9, 2019
 Planting date: Apr. 9, 2019 followed by cultipacker
 Row spacing: 7.5 in.
 Seeding rate: 4 bu/ac
 Seeding depth: 1 in.
 Harvest date: July 24, 2019

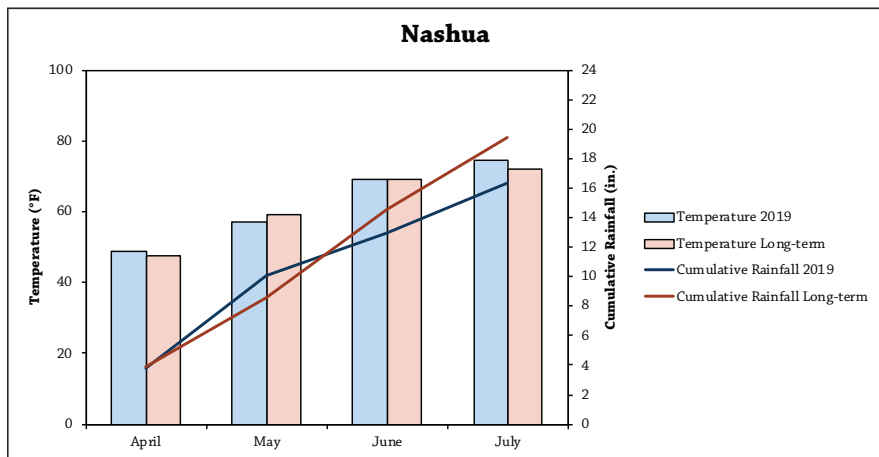


TABLE 5. Results for the 2019 Oat Variety Trial at Nashua in northeast Iowa.

VARIETY	YIELD (bu/ac)					YIELD (% of site avg.) 2019	TEST WEIGHT (lb/bu) 2019	PLANT HEIGHT ON JULY 16 (in.) 2019	STRAW (tons/ac) 2019	% HEADING ON JUNE 15 ^b 2019	PLANT HEIGHT AT HARVEST (in.) 2019
	2019	2018	2017	2016	4-yr						
Saddle	142	86	--	--	114	111	36	39	2.0	88	2
Pearl	141	97	--	--	119	110	35	38	1.6	2	4
Natty	135	98	120	129	121	106	37	44	1.6	90	29
Esker 2020	132	--	--	--	132	103	34	40	1.6	68	28
Hayden	131	101	129	132	123	103	36	40	1.7	7	14
Reins	131	90	110	116	112	103	37	35	1.3	94	31
Excel	131	--	--	131	131	103	35	38	1.4	55	28
Ron	128	101	--	--	114	100	34	39	1.7	6	4
Sumo	127	86	104	--	106	100	38	40	1.6	94	14
Shelby 427	124	81	102	115	105	97	37	40	1.5	78	33
Goliath	124	--	119	132	125	97	37	44	1.9	2	31
Horsepower	121	70	120	116	107	95	36	36	1.2	60	80
Antigo	121	79	98	--	99	95	39	38	1.4	86	28
Jerry	121	80	94	115	102	95	37	42	1.7	16	73
Deon	117	109	127	140	123	92	36	41	2.0	2	3
Warrior	115	--	--	--	115	90	33	37	1.8	9	2
MEAN	127	90	112	125	116	--	36	3	1.6	47	25
LSD(0.05)^a	16	17	15	26	--	--	0	39	0.4	--	--

^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 95% confidence.

^b Take caution. Too much variability and experimental error precluded statistical analysis of plant height and lodging data.

OAT FUNGICIDE TRIAL, ISU NORTHEAST RESEARCH FARM, NASHUA

Previous crop: Soybeans
 Replications: 4
 Plot size: 8 ft × 90 ft
 Fertilizer applied: 30 lb N/ac as urea on Apr. 8, 2019
 Tillage: Field cultivator on Apr. 8 and 9, 2019
 Planting date: Apr. 9, 2019 followed by cultipacker
 Row spacing: 7.5 in.
 Seeding rate: 4 bu/ac
 Seeding depth: 1 in.
 Fungicide application: Trivapro on June 13, 2019
 Harvest date: July 24, 2019

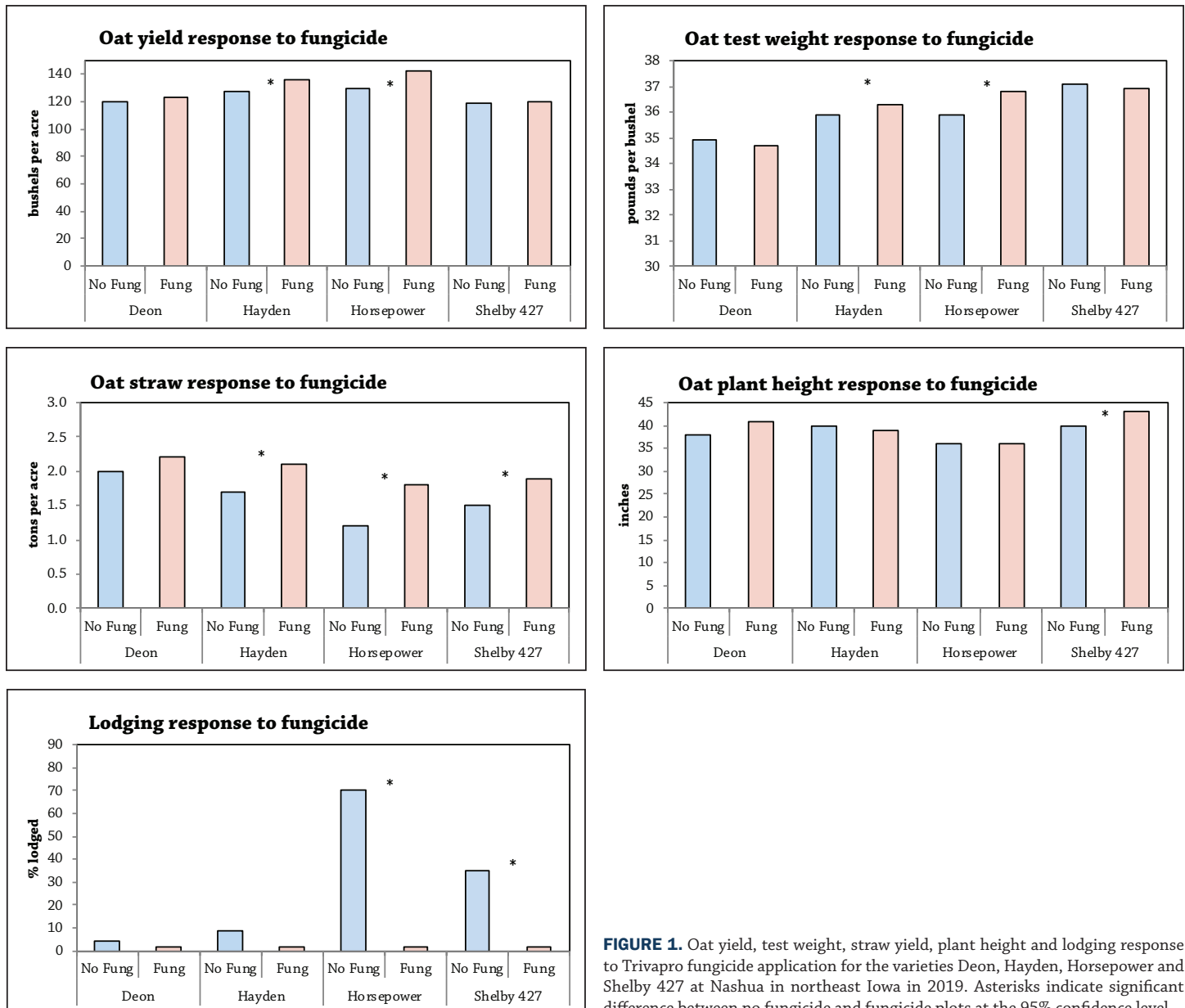


FIGURE 1. Oat yield, test weight, straw yield, plant height and lodging response to Trivapro fungicide application for the varieties Deon, Hayden, Horsepower and Shelby 427 at Nashua in northeast Iowa in 2019. Asterisks indicate significant difference between no fungicide and fungicide plots at the 95% confidence level.

REFERENCES

1. Gailans, S., S. Carlson, K. Pecinovsky and B. Lang. 2015. Oat Variety and Fungicide Trials. Practical Farmers of Iowa Cooperators' Program. <https://practicalfarmers.org/research/oat-variety-and-fungicide-trials/> (accessed October 2019).
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