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Oat Variety Trial

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Abstract
Oats are a major spring-sown, small grain crop in Iowa. It 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 mature in late July to early August, it allows for cropping options for the remainder of the season including establishment of a perennial forage or cover crop, and timely window for a mid-season animal manure application.

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Introduction

Oats are a major spring-sown, small grain crop in Iowa. It 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 mature in late July to early August, it allows for cropping options for the remainder of the season including establishment of a perennial forage or cover crop, and timely window for a mid-season animal manure application.

Careful management and proper choice of variety can make oats a profitable crop due to its low input requirements and favorable effects on succeeding crops in a rotation. 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.

Oats regularly are affected by crown rust and barley yellow dwarf virus diseases in Iowa. Some varieties have adequate disease resistance. This should be considered when choosing a variety. Because the pathogen populations change from year-to-year, varietal resistance often breaks down within a few years, and growers should consider switching to a newer variety when this occurs.

Materials and Methods

Eleven oat varieties were tested in 2014 (Table 2). Three of 11 varieties also included a foliar fungicide comparison.

The soils at the site consist of 198B Floyd loam and 84 Clyde silty clay loam. The site was in soybean the previous year and has been in a corn-soybean crop rotation for over 20 years. No fertilizer was applied. Soil fertility was at optimal levels based on ISU soil fertility recommendations.

The site was field cultivated twice before planting on April 11. The planter was a John Deere BD1108 drill with 7.5-in. row spacing planted at a rate of four bushels/acre. Each plot of a variety occupied 1,544 sq ft, and there were four replications.

The trial was sufficiently weed-free to not require the use of herbicides or hand weeding. The foliar fungicide Headline SC was applied at 4 oz/acre on June 13 during late boot stage to three varieties — Badger, Jerry, and Shelby 427.

The trial was harvested on August 4 with a JD4420 combine with Weigh-Tronix load cells on weigh bin, concave set at 1.5, and cylinder speed at 1,000 RPM.

Straw yields were determined from 8-ft wide by 20-ft long windrows from the center of each plot. Subsamples were collected and dried for percent dry matter determination.

The 2014 season was cooler and wetter than normal (Table 1). Hail damage from a storm on June 29 caused some leaf shredding and stand lost.

Results and Discussion

Variety trial results for 2014 are presented in Table 2. Yields reported are on a 32 lb/bushel basis. Test weight is the most important indicator of grain milling quality. Minimum test weights are 36 lb/bushel for U.S. No. 1 oats and 33 lb/bushel for U.S. No. 2 oats.

A comparison with or without foliar fungicide was made with three varieties — Badger, Jerry, and Shelby. Results are presented in Table 3. All three varieties treated with a fungicide showed significantly higher grain moisture at harvest, while only Badger responded with significantly less lodging and higher grain yield. The fungicide application resulted in a net neutral return in dollars/acre for Badger, and a net loss for Jerry and Shelby.

Yield results from a single year are not reliable predictors of next year's yield. Environment and disease conditions can fluctuate greatly from year to year, so it is important to consider yields averaged over multiple years. Table 4 provides a summary of yield and test weight for varieties in trials conducted from 2010-2014.

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Table 1. Rainfall and oat growing degree days (GDD) for 2014 and the long-term normal.

	Rainfall, in.		GDD	
Month	2014	Normal	2014	Normal
April	7.2	3.6	380	498
May	2.9	4.5	827	823
June	10.4	5.1	1,122	1,098
July	1.4	4.7	1.101	1,250
Total	21.9	17.9	3,430	3,669

Table 2. State of origin, PVP[a], and disease ratings[b] for oat varieties included in the 2014 variety trial at the ISU Northeast Research and Demonstration Farm, Nashua.

			Disease name and disease ratings[b] by variety			
Variety	State of origin	PVP[a]	BYDV[c]	Crown rust	Stem rust	Smut
Badger	WI	PVP	MR	MR	MS	R
Deon	MN	PVP pending	MR	R	MR	R
Excel	IN	PVP	R	MR	MS	MS
Goliath	SD	PVP	MR	R	R	R
Horsepower	SD	PVP	MR	R	R	MR
IL06-5433	IL	- -	MR	MR	- -	R
Jerry	ND	PVP	MS	S	MS	MR
Saber	IL	PVP	MR	S	S	MS
SD111779	SD	- -	- -	- -	- -	- -
SD111972	SD	- -	- -	- -	- -	- -
Shelby 427	SD	PVP	MS	MS	MS	MR

[a]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.
[b]Disease ratings: S = susceptible, MS = moderately susceptible, MR = moderately resistant, R = resistant.
[c]Disease: BYDV = barley yellow dwarf virus.

Table 3. Performance of oat varieties tested in 2014 at the ISU Northeast Research and Demonstration Farm, Nashua.

Variety	Foliar fungicide	Grain yield[a] Aug. 4 bu/ac	Grain moisture %	Test weight lb/bu	% Heading June 20 %	% Mature July 14 %	Plant height Aug. 3 inches	% Lodging Aug. 3 %	Straw yield Aug. 8 tons/ac
Badger	No	93.6	14.2	27.3	90	5.8	29.6	18.6	1.42
	Yes	102.9	17.1	28.4	90	5.8	30.8	6.5	1.70
Deon	No	104.5	15.4	30.7	30	1.0	33.5	2.0	1.80
Excel	No	82.9	13.6	27.2	50	5.0	32.9	22.3	1.06
Goliath	No	98.8	15.4	31.6	50	2.0	41.6	9.4	1.82
Horsepower	No	78.3	13.3	27.8	50	6.3	30.5	47.6	1.38
IL06-5433	No	89.0	14.0	31.5	60	52.5	26.9	3.9	1.10
Jerry	No	79.7	14.0	29.3	50	5.0	36.5	11.6	1.70
	Yes	85.7	15.4	30.1	50	5.0	36.9	3.3	1.91
Saber	No	102.2	14.0	30.2	50	11.3	31.4	7.4	1.46
SD111779	No	97.2	16.2	29.8	50	5.0	37.6	6.6	1.40
SD111972	No	92.2	14.4	30.7	50	3.0	33.9	3.1	1.35
Shelby 427	No	82.7	14.7	30.3	50	4.0	34.3	4.2	1.34
	Yes	84.2	16.1	30.4	50	4.3	34.1	2.0	1.60
Average		91.0	14.9	29.7	55	8.3	33.6	11.4	1.50
LSD[b] 0.05		8.2	1.4	1.2	- -	- -	2.7	10.3	0.32

[a]Grain yields are based on 32 lb/bushel test weight.
[b]LSD = least significant difference. Entries that differ by one LSD or more are considered to be in different classes with 95 percent certainty.

Table 4. Individual and multi-year summaries of oat variety trial results at the ISU Northeast Research and Demonstration Farm, Nashua, 2010-2014[a].

	2010		2011		2012		2013		2010 - 2013 avg.		2013 - 2014 avg.	
Variety	yield bu/ac	test wt lb/bu	yield bu/ac	test wt lb/bu	yield bu/ac	test wt lb/bu	yield bu/ac	test wt lb/bu	yield bu/ac	test wt lb/bu	yield bu/ac	test wt lb/bu
Excel	104	32.2	111	29.8	75	33.5	99	33.4	97	32.2	90.0	30.3
Goliath	- -	- -	- -	- -	- -	- -	97	35.4	- -	- -	97.9	33.5
Horsepower	- -	- -	105	34.7	99	36.6	99	35.4	- -	- -	88.7	31.6
Jerry	97	32.4	93	31.7	97	36.3	87	34.8	94	33.8	83.4	32.1
Newberg	- -	- -	104	31.3	- -	- -	- -	- -	- -	- -	- -	- -
Ogle	- -	- -	- -	- -	72	32.6	90	32.1	- -	- -	- -	- -
Robust	90	30.2	82	31.5	74	35.1	- -	- -	- -	- -	- -	- -
Rockford	126	34.9	96	32.5	- -	- -	- -	- -	- -	- -	- -	- -
Saber	117	32.0	113	30.6	86	34.7	100	35.0	104	33.1	103.1	32.6
Shelby 427	115	33.7	106	33.4	98	37.0	87	34.8	102	34.7	92.4	32.5
Souris	131	32.4	103	33.1	- -	- -	- -	- -	- -	- -	- -	- -
Spurs	114	32.5	95	32.6	80	35.9	- -	- -	- -	- -	- -	- -
Tack	98	34.0	99	34.1	81	34.7	93	35.4	93	34.6	- -	- -
Woodburn	97	32.2	- -	- -	86	36.2	- -	- -	- -	- -	- -	- -
Average	109	32.4	101	32.1	86	35.4	94	34.5	98	33.7	92.6	32.1
LSD 0.05	10	0.5	13	0.9	13	2.2	7	0.5	- -	- -	- -	- -

[a]Complete reports for the 2010, 2011, 2012, and 2013 Oat Variety Trials are available at: http://www.ag.iastate.edu/farms/progress_report.php.
[b]LSD = least significant difference. Entries that differ by one LSD or more are considered to be in different classes with 95 percent certainty.