

Cereal Rye Variety Trial 2019

RFR-A1963

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Introduction

Cereal rye has recently gained attention as a winter cover crop in corn-soybean production systems. Seeded in the fall, cereal rye will grow before going into winter dormancy and resume growth early the following spring. Because cereal rye is harvested for grain in mid- to late-July, 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, the average cereal rye yield for Minnesota was 39 bushels/acre and for Wisconsin was 34 bushels/acre, according to the USDA-National Agricultural Statistics Service (no such recent data is available for Iowa). Recent cereal rye variety trials conducted by the University of Minnesota, however, reported an average yield of 77 bushels/acre.

Currently most cereal rye planted as cover crop in Iowa is VNS (variety not stated). As farmers begin to plant cereal rye for other purposes—cover crop seed, grain, straw, forage, hay or haylage production—they may seek to plant cereal rye varieties with distinct production characteristics. The 2019 Cereal Rye Variety Trial reports on some of these characteristics with Iowa-specific growing conditions.

Materials and Methods

Variety trials were conducted at three Iowa locations in 2019: ISU Northern Research Farm, Kanawha; ISU Northeast Research Farm, Nashua; and the Johnson's farm, Charles City. Six cereal rye varieties were tested in 2019. The sites had been soybean the previous year, soil tested in fall, then fertilized to maintain optimum yields.

The sites were seeded October 24–26, 2018, with a John Deere no-till drill, set to seed 59 to 93 lb/acre (rate determined on weight basis to achieve target population) in 7.5-in. row spacing. Each plot of a variety occupied 600 sq ft and there were three replications. The trial was sufficiently weed-free and did not require herbicides or hand weeding. The trials were harvested from July 24 to August 2, 2019.

Production characteristics and some breeding history on each of the trialed varieties can be found in Table 1. Information on winter hardiness, days to heading, plant height, and ergot susceptibility was sourced from the University of Minnesota.

Rye management information is provided with the results from each location. No herbicide, insecticide, or fungicide were applied at any location. 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).

Results and Discussion

Data were analyzed by location (Table 2 Kanawha; Table 3, Charles City; and Table 4, Nashua) and varieties are listed in order of 2019 yield performance. Reported yields are corrected for 13 percent 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.

The hybrid varieties, Bono and Brasetto, were the top yield performers at each location. The hybrids also were significantly shorter in stature than the open-pollinated varieties. The newer open-pollinated varieties, Hazlet and ND Dylan, were intermediate in terms of yield at each location.

Conclusions

Desired cereal rye characteristics vary depending on intended purpose of the crop. For instance, if harvesting grain for livestock feed was the main priority in planting cereal rye, high-yielding hybrid varieties such as Bono and Brasetto might be optimal choices. If the intended purpose is haylage, the varieties ND Dylan or Aroostook, with their tall plant height, might be preferable to the

shorter hybrids. In contrast, if someone were growing a cereal rye crop for cover crop seed to be used on their own farm, they would avoid hybrid varieties and seek high yield with little lodging. Farmers intending to sell cereal rye seed for cover crops to be sold off their farm need to be familiar with intellectual property considerations and the licensing process for those varieties with plant variety protection.

With the compiled information on plant protection status, winter hardiness, days to heading, plant height, and ergot susceptibility, alongside the researched characteristics of yield, test weight, plant height, and percent lodging, a farmer in Iowa can determine which cereal rye variety will best meet their production goals.

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Table 1. Characteristics of cereal rye varieties screened in 2019.

Variety	Origin ^a	Year of release	PVP ^b	Type ^c	Winter hardiness ^d	Time to heading ^e	Plant height ^f	Ergot resistance ^g
Aroostook	USDA-NRCS	1981	None	OPV	1	1	6	4
Bono	KWS	2013	None	Hybrid ^h	4	6	1	1
Brasetto	KWS	2007	None	Hybrid ^h	3	7	2	1
Elbon	OK	1956	None	OPV	9	1	5	5
Hazlet	SeCan	2006	None	OPV	4	7	4	1
ND Dylan	ND	2016	Pending	OPV	5	6	7	2

^aOrigin: OK = Oklahoma State University; ND = North Dakota State University.

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

^cOPV = Open Pollinated Variety.

^d1 = most hardy; 9 = least hardy. Ratings are average of 2016–2018 trials at University of Minnesota.

^e1 = earliest; 9 = latest. Ratings are average of 2016–2018 trials at University of Minnesota.

^f1 = shortest; 9 = tallest. Ratings are average of 2016–2018 trials at University of Minnesota.

^g1 = most resistant; 9 = least resistant. Ratings are average of 2016–2018 trials at University of Minnesota.

^hHybrids from KWS are protected from propagation by license agreements entered into with KWS upon seed purchase.

Variety	Yield (bu/ac)	Yield (% of site avg.)	Test weight (lb/bu)	Plant height at harvest (in.) ^b	% Lodging at harvest ^b
Bono	77	160	54	47	0
Brasetto	70	146	52	48	0
Hazlet	45	94	53	58	5
ND Dylan	40	83	51	63	3
Elbon	25	52	52	58	3
Aroostook	23	48	51	62	5
MEAN	48	--	52	56	3
LSD(0.05) ^a	20	--	1	--	--

^aBy 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.

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

Variety	Yield (bu/ac)	Yield (% of site avg.)	Test weight (lb/bu)	Plant height at harvest (in.)	% Lodging at harvest
Bono	63	180	54	45	3
Brasetto	55	157	53	46	3
Hazlet	31	89	54	55	25
ND Dylan	28	80	54	61	58
Aroostook	18	51	53	58	63
Elbon	13	37	53	68	82
MEAN	35	--	54	54	39
LSD (0.05) ^a	11	--	2	6	18

^aBy 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.

Variety	Yield (bu/ac)	Yield (% of site avg.)	Test weight (lb/bu)	Plant height on July 19 (in.)	% Lodging on July 19
Bono	62	138	54	40	0
Brasetto	57	127	53	39	0
Hazlet	43	96	54	53	0
ND Dylan	43	96	53	52	3
Aroostook	35	78	53	53	7
Elbon	32	71	53	49	13
MEAN	45	--	53	48	4
LSD(0.05) ^a	6	--	1	4	5

^aBy 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.