

Cereal Rye and Triticale Variety Trial 2022

In a Nutshell:

- Eleven cereal rye varieties and one triticale variety were screened at four Iowa State University research farms.

Key Findings:

- Across sites and varieties, average cereal rye yield was 81.3 bu/ac.
- Hybrid cereal rye varieties, Bono, Receptor, Serafino and Tayo, were the top-yielding varieties at each site. Hazlet and Danko were the top yielding open-pollinated varieties.
- Across all sites and open-pollinated varieties, average germination was 94%.

Cooperators

ISU Northern Research Farm
(Matt Schnabel) – Kanawha

ISU Northeast Research Farm
(Ken Pecinovsky) – Nashua

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

ISU Southwest Research Farm
(Matt Schnabel) – Greenfield

Funding

USDA-NIFA
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Albert Lea Seed House

BACKGROUND

This was the fourth year that Practical Farmers of Iowa coordinated cereal rye variety trials at Iowa State University research farms at Kanawha (north-central Iowa) and Nashua (northeast Iowa); it was the second year of trials at ISU research farms at Boone (central Iowa) and Greenfield (southwest Iowa). In 2022, we included one winter triticale variety (Tulus) along with 11 cereal rye varieties. In 2019, the average cereal rye yield across three sites in northern Iowa was 43 bu/ac.^[1] In 2020, the average cereal rye yield across the same northern Iowa sites was 39 bu/ac.^[2] In 2021, the average cereal rye yield across the four research farms was 65.3 bu/ac.^[3] Cereal rye variety trials conducted by the University of Minnesota reported an average yield of 83.1 in 2021.^[4]

METHODS

Variety trials were conducted at four locations in 2022: ISU Northern Research Farm in Kanawha; ISU Northeast Research Farm in Nashua; ISU Ag Engineering and Agronomy Farm in Boone; ISU Southwest Research Farm in Greenfield. Production characteristics and some breeding history about each of the trialed varieties can be found in **Table 1**. Information on winter hardiness, days to heading, plant height and ergot susceptibility can be sourced from the University of Minnesota.^[4]



Plots at the cereal rye variety trial at Boone on July 17, 2022.

TABLE 1. Origin, characteristics and seeding rate of cereal rye and triticale varieties trialed in 2022.

VARIETY	SPECIES	ORIGIN	PVP ^a	TYPE ^b	SEEDING RATE (lb/ac) ^c
Aroostook	Cereal rye	USDA-ARS	N/A	Hybrid	74
Bono	Cereal rye	KWS	N/A ^b	Hybrid	68
Danko	Cereal rye	Danko Hodowla Roślin	None	Open-pollinated	88
Elbon	Cereal rye	Oklahoma St. Univ.	None	Open-pollinated	52
Hazlet	Cereal rye	SeCan	None	Open-pollinated	79
ND Dylan	Cereal rye	North Dakota St. Univ.	Pending	Open-pollinated	71
ND Gardner	Cereal rye	North Dakota St. Univ.	Pending	Open-pollinated	70
Receptor	Cereal rye	KWS	N/A ^b	Hybrid	51
Serafino	Cereal rye	KWS	N/A ^b	Hybrid	53
Spooner	Cereal rye	Univ. Wisconsin	None	Open-pollinated	58
Tayo	Cereal rye	KWS	N/A ^b	Hybrid	40
Tulus	Triticale	Nordsaat Saatzucht GmbH, Germany	None	Open-pollinated	52

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

^c Calculated from seed lot weights (no. seeds/lb) to achieve target populations of 25 seeds/ft² (open-pollinated) and 18.4 seeds/ft² (hybrid).

Rye management information is provided with the results from each location. No herbicide, insecticide or fungicide were applied at any location. Statistical significance is determined at the 90% confidence level and means separations were determined using Tukey's least significant difference (LSD).

Rye seed samples from each location were sent to the Iowa State Seed Testing Laboratory for germination testing roughly five weeks after harvest. Samples were pooled across replicates at each site and this precluded us from analyzing these germination data statistically. As such, please keep in mind: We present germination percentages in this report as a rough comparison among varieties and locations.

RESULTS AND DISCUSSION

Data were analyzed by location and reported yields are corrected for 14% moisture. A "percentage of test average" calculation for 2022 is included to aid in comparing entries at each location. The yield average is provided for varieties that were also trialed in 2019, 2020 and 2021. Rainfall and temperature data were accessed from the nearest weather station.^[5]

Across all sites and varieties, the average yield was 81.3 bu/ac in 2022; higher than the yield averages of the previous three years. The hybrid varieties developed by KWS (Bono, Receptor, Serafino, and Tayo), were the top yield performers at each location. This was the first year that Receptor and Tayo were trialed. Over the four years of variety trials, hybrid varieties have out-yielded open-pollinated varieties by about 30 bu/ac. The hybrids were also shorter in stature than the open-pollinated varieties (on average by 7 in.). Of the seven open-pollinated cereal rye varieties trialed, Danko and Hazlet were the top yielding varieties across all four sites; similar to what we also observed in 2021.^[3]

Seed germination of open-pollinated varieties ranged from 89% (Tulus triticale) to 96% (Elbon) across the four sites (**Table 2**).

TABLE 2. Seed germination (%) for open-pollinated cereal rye and triticale varieties averaged across all locations.

VARIETY	SEED GERMINATION (%)
Aroostook	94
Danko	94
Elbon	96
Hazlet	95
ND Dylan	94
ND Gardner	94
Spooner	94
Tulus	89
MEAN	94



Cereal rye at Boone on July 17, 2022.

ISU NORTHERN RESEARCH FARM, KANAWHA

Previous crop: Soybeans
 Replications: 3
 Harvested plot size: 5 ft x 57 ft
 Fertilizer applied: 65 lb N/ac and 166 lb P/ac on Oct. 9, 2021
 288 lb K/ac on Oct. 26, 2021
 37 lb N/ac on Apr. 11, 2022
 Planting date: Sept. 29, 2021
 Row spacing: 7.5 in.
 Seeding rate: Open-pollinated = 25 seeds/ft²
 Hybrid = 18.4 seeds/ft²
*See **Table 1** for pounds per acre of each variety to reach target population.*
 Seeding depth: 1.25 in.
 Harvest date: July 20, 2022

Kanawha

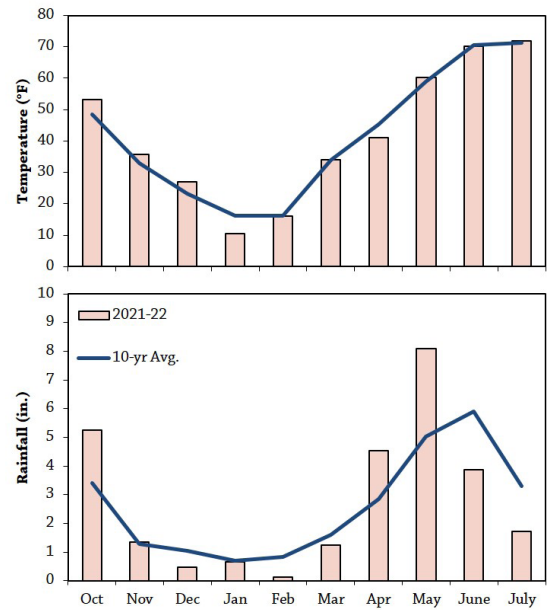


TABLE 3. 2022 Cereal Rye & Triticale Variety Trial at Kanawha in north-central Iowa.

VARIETY	YIELD (bu/ac)		YIELD (% of site avg.)	TEST WEIGHT (lb/bu)	PLANT HT AT HARVEST (in.)	LODGING (%)
	2022	4-yr				
Aroostook	93	46	83	58	52	7
Bono	149	92	134	58	41	0
Danko	100	75	89	57	43	3
Elbon	89	45	80	56	51	10
Hazlet	118	68	106	56	48	3
ND Dylan	78	49	70	57	53	10
ND Gardner	91	66	82	55	52	10
Receptor	135	--	121	57	42	2
Serafino	147	95	132	59	42	2
Spooner	84	56	76	56	50	7
Tayo	133	--	119	56	40	0
Tulus	122	--	109	52	35	0
LSD(90%)	51	--	--	2	4	5
MEAN	112	--	--	56	46	4

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.

ISU NORTHEAST RESEARCH FARM, NASHUA

Previous crop: Soybeans
 Replications: 3
 Harvested plot size: 8 ft x 50 ft
 Fertilizer applied: 60 lb P/ac and 267 lb K/ac on Oct. 21, 2021
 30 lb N/ac on Apr. 5, 2022
 Planting date: Oct. 1, 2021 with no-till drill followed by cultipacker
 Row spacing: 7.5 in.
 Seeding rate: Open-pollinated = 25 seeds/ft²
 Hybrid = 18.4 seeds/ft²
*See **Table 1** for pounds per acre of each variety to reach target population.*
 Seeding depth: 1.25 in.
 Harvest date: July 14, 2022

Nashua

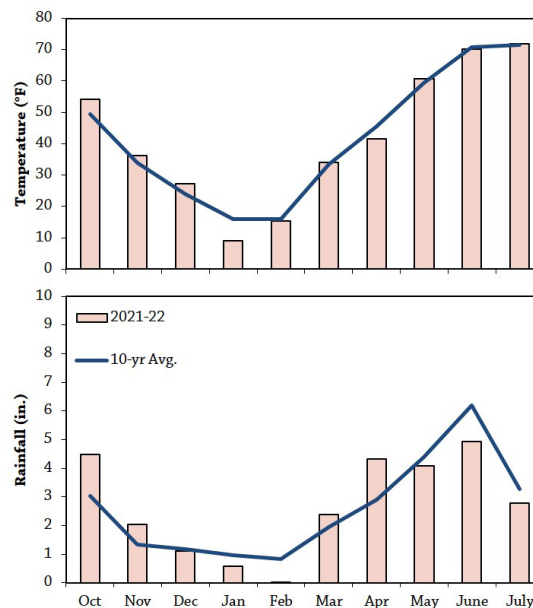


TABLE 4. 2022 Cereal Rye & Triticale Variety Trial at Nashua in northeast Iowa.

VARIETY	YIELD (bu/ac)		YIELD (% of site avg.)	TEST WEIGHT (lb/bu)	STRAW YIELD (ton/ac)	LODGING (%)
	2022	4-yr				
Aroostook	56	41	81	55	2.3	50
Bono	84	69	122	54	2.8	39
Danko	64	64	93	56	2.3	41
Elbon	50	38	73	56	2.1	47
Hazlet	65	51	94	54	2.8	48
ND Dylan	62	50	90	55	3.0	52
ND Gardner	57	57	82	55	2.7	49
Receptor	89	--	128	56	2.6	39
Serafino	85	72	124	56	3.3	41
Spooner	59	41	85	56	2.8	51
Tayo	95	--	137	53	2.8	41
Tulus	64	--	92	51	2.6	33
LSD(90%)	33	--	--	1	1.1	5
MEAN	69	--	--	55	2.7	44

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.

ISU AG ENGINEERING AND AGRONOMY FARM, BOONE

Previous crop: Soybeans
 Replications: 3
 Harvested plot size: 5 ft x 61 ft
 Fertilizer applied: 30 lb N/ac, 11 lb P/ac, 40 lb K/ac, 25 lb S/ac on Apr. 11, 2021
 Planting date: Oct. 8, 2021
 Row spacing: 7.5 in.
 Seeding rate: Open-pollinated = 25 seeds/ft²
 Hybrid = 18.4 seeds/ft²
*See **Table 1** for pounds per acre of each variety to each target population.*
 Seeding depth: 1.25 in.
 Harvest date: July 29, 2022

Boone

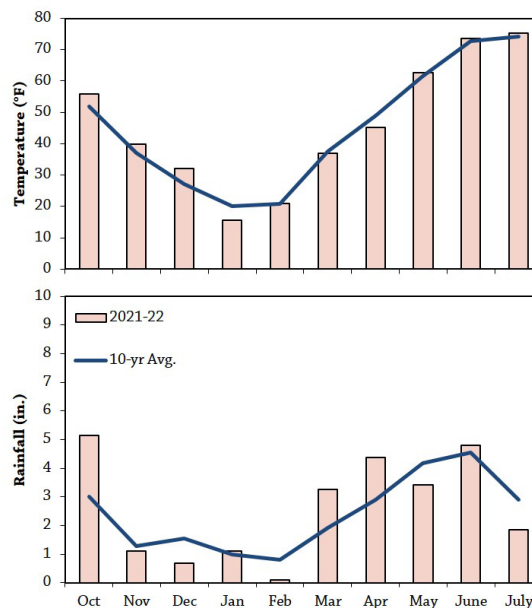


TABLE 5. 2022 Cereal Rye & Triticale Variety Trial at Boone in central Iowa.

VARIETY	YIELD (bu/ac)		YIELD (% of site avg.)	TEST WEIGHT (lb/bu)	PLANT HT at HARVEST (in.)	LODGING (%)
	2022	2-yr				
Aroostook	57	--	96	55	52	8
Bono	74	78	125	55	43	5
Danko	59	61	99	55	49	12
Elbon	34	33	58	54	51	53
Hazlet	50	55	85	54	50	12
ND Dylan	57	50	97	53	53	48
ND Gardner	41	41	69	53	55	68
Receptor	82	--	138	56	46	17
Serafino	72	75	121	55	44	10
Spooner	46	48	77	54	51	25
Tayo	86	--	145	54	46	7
Tulus	53	--	90	44	37	0
LSD(90%)	23	--	--	3	4	20
MEAN	59	--	--	54	48	22

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.

ISU SOUTHWEST RESEARCH FARM, GREENFIELD

Previous crop: Soybeans
 Replications: 3
 Harvested plot size: 5 ft x 50 ft
 Fertilizer applied: 30 lb N/ac on March 28, 2022
 Planting date: Oct. 8, 2021
 Row spacing: 7.5 in.
 Seeding rate: Open-pollinated = 25 seeds/ft²
 Hybrid = 18.4 seeds/ft²
*See **Table 1** for pounds per acre of each variety to reach target population.*
 Seeding depth: 1.25 in.
 Harvest date: July 22, 2022

Greenfield

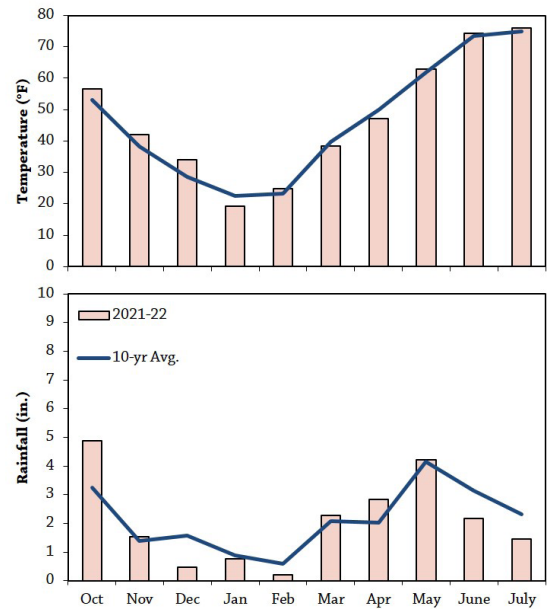


TABLE 6. 2022 Cereal Rye & Triticale Variety Trial at Greenfield in southwest Iowa.

VARIETY	YIELD (bu/ac)		YIELD (% of site avg.)	TEST WEIGHT (lb/bu)	PLANT HT at HARVEST (in.)	LODGING (%)
	2022	2-yr				
Aroostook	79	--	92	56	52	5
Bono	111	100	129	57	45	0
Danko	83	78	97	57	48	0
Elbon	55	50	65	55	54	7
Hazlet	87	73	101	58	48	2
ND Dylan	67	58	78	56	52	8
ND Gardner	63	52	74	55	54	10
Serafino	113	100	132	57	47	0
Spooner	65	57	76	56	54	0
Tayo	116	--	135	56	45	0
Tulus	102	--	119	49	37	0
LSD(90%)	12		--	3	6	4
MEAN	85		--	56	50	3

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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