**Cereal Rye and Triticale Variety Trial 2022**

**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

**YEAR**: 2022

**PFI Contacts**: Stefan Gailans

**Funding**: USDA-NIFA; Walton Family Foundation; Albert Lea Seed House

**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 65.3 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%.

**Cover photo: IMG\_1644**

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

**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]

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| TABLE 1. Origin, characteristics and seeding rate of cereal rye and triticale varieties trialed in 2022. | | | | | |
| **VARIETY** | **SPECIES** | **ORIGIN** | **PVPa** | **TYPE** | **SEEDING RATE**  **(lb/ac)c** |
| Aroostook | Cereal rye | USDA-ARS | N/A | Hybrid | 74 |
| Bono | Cereal rye | KWS | N/Ab | 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/Ab | Hybrid | 51 |
| Serafino | Cereal rye | KWS | N/Ab | Hybrid | 53 |
| Spooner | Cereal rye | Univ. Wisconsin | None | Open-pollinated | 58 |
| Tayo | Cereal rye | KWS | N/Ab | 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 |

**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 Weather Figure – TIFF file**

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| TABLE 3. 2022 Cereal Rye & Triticale Variety Trial at Kanawha in north-central Iowa. | | | | | | |
|  | **YIELD**  **(bu/ac)** | | **YIELD**  **(% of site avg.)** | **TEST WEIGHT (lb/bu)** | **PLANT HT**  **at HARVEST (in.)** | **LODGING (%)** |
| **VARIETY** | **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. | | | | | | |
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**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 Weather Figure – TIFF file**

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| TABLE 4. 2022 Cereal Rye & Triticale Variety Trial at Nashua in northeast Iowa. | | | | | | |
|  | **YIELD**  **(bu/ac)** | | **YIELD**  **(% of site avg.)** | **TEST WEIGHT (lb/bu)** | **STRAW YIELD (ton/ac)** | **PLANT HT**  **at HARVEST (in.)** |
|  | **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. | | | | | | |
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**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 reach target population.*

Seeding depth: 1.25 in.

Harvest date: July 29, 2022

**Boone Weather Figure – TIFF file**

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| --- | --- | --- | --- | --- | --- | --- |
| TABLE 5. 2022 Cereal Rye & Triticale Variety Trial at Boone in central Iowa. | | | | | | |
|  | **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. | | | | | | |
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**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 Weather Figure – TIFF file**

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| --- | --- | --- | --- | --- | --- | --- |
| TABLE 6. 2022 Cereal Rye & Triticale Variety Trial at Greenfield in southwest Iowa. | | | | | | |
|  | **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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**OTHER PHOTO IMG\_1647**

Caption: Cereal rye at Boone on July 17, 2022.