

2023 Winter Rye Field Crop Trials Results

Minnesota Agricultural Experiment Station and the College of Food, Agricultural and Natural Resource Sciences

Winter rye (*Secale cereale* L.), also known as cereal rye, is the most winter hardy and drought tolerant of all small grains. Winter rye performs best in sandy loam, well-drained soils compared to fine textured soils with poor internal drainage. Soil pH for optimum growth ranges from 5.6 to 7.0 but rye can tolerate pH as low as 4.5 and as high as 8. Expect winter rye to be more productive than other small grains on infertile, sandy soils. Winter rye will continue to grow until late fall, overwinter, and resume growth quickly in the early spring. The aforementioned attributes explain

the popularity of winter rye as a cover crop/green manure in both organic and conventional production systems. Other primary uses of winter rye are pasture/forage and grain crop.

Results of the University of Minnesota's variety performance evaluations are summarized in Tables 1 and 2. The rye performance trials were grown near Lamberton, LeCenter, Becker, Grand Rapids, Crookston and Roseau in 2023. The primary use, agronomic characteristics, and grain quality are summarized in Table 1. Winter hardiness, days to heading, plant

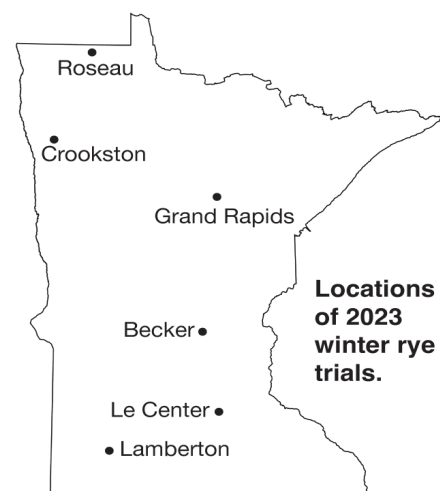


Table 1. Origin and agronomic characteristics of winter rye varieties in Minnesota in single-year (2023) and multi-year comparisons (2021-2023).

| Entry | Agent or Breeder ¹ | Year of Release | Type ² | Legal Status ³ | Primary Use | Seed Color | Winter Hardiness | Days to Heading | Plant Height | Straw Strength | Ergot | Test Weight | Grain Protein |
|--------------------------------|-------------------------------|-----------------|-------------------|---------------------------|--------------|------------|------------------|-----------------|--------------|----------------|----------|-------------|---------------|
| ------(1-9) ⁴ ----- | | | | | | | | | | | | | |
| Danko | Danko Hodowla Roślin | 1976 | OPV | None | Grain | Blue/Grey | 7 | 6 | 4 | 1 | 3 | 2 | 7 |
| Elbon | OK | 1956 | OPV | None | Forage | Green | 6 | 1 | 7 | 3 | 9 | 9 | 1 |
| Hazlet | SeCan | 2006 | OPV | None | Grain | Blue/Grey | 5 | 8 | 7 | 4 | 1 | 4 | 6 |
| KWS Receptor | KWS | 2019 | Hybrid | N/A | Grain | Green | 1 | 9 | 2 | 1 | - | 3 | 9 |
| KWS Serafino | KWS | 2017 | Hybrid | N/A | Grain | Green | 6 | 8 | 3 | 1 | 1 | 1 | 9 |
| KWS Tayo | KWS | 2018 | Hybrid | N/A | Grain | Green | 1 | 8 | 2 | 1 | 1 | 9 | 9 |
| ND Dylan | NDSU | 2016 | OPV | PVP(94) | Dual Purpose | Blue/Green | 5 | 7 | 9 | 9 | 2 | 9 | 6 |
| ND Gardner | NDSU | 2019 | OPV | PVP(94) | Dual Purpose | Blue/Green | 6 | 1 | 8 | 5 | 3 | 9 | 3 |
| Remington | SeCan | 2000 | OPV | None | Grain | Blue/Grey | 4 | 4 | 7 | 5 | 2 | 9 | 4 |
| Rymin | MN | 1973 | OPV | None | Grain | Blue/Grey | 1 | 5 | 5 | 6 | 4 | 9 | 5 |
| SU Bebop ⁵ | FP Genetics | 2021 | OPV | PVP(94) | Grain | Green | - | 8 | 4 | 1 | - | 5 | 8 |
| SU Cossani ⁵ | FP Genetics | 2020 | Hybrid | N/A | Grain | Blue/Grey | - | 6 | 2 | 1 | - | 5 | 9 |
| SU Performer ⁵ | FP Genetics | 2013 | Hybrid | N/A | Grain | Green/Grey | - | 6 | 2 | 1 | - | 2 | 9 |
| LSD (0.1) | | | | | | | 3 | 1 | 2 | 2 | 1 | 1 | 1 |

¹OK = Oklahoma State University; NDSU = North Dakota State University; UM = University of Minnesota

²OPV= Open Pollinated Variety.

³Status under the Plant Variety Protection Act.

⁴1 = best and 9 = worst.

⁵Agronomic ratings are a statistical prediction based on single year data.

height, straw strength, test weight, and grain protein have been converted to a 1-9 scale to allow for more straightforward interpretation of the data. Differences in days to heading, plant height and straw strength are generally much less in the northern half of the state. In the southern half of Minnesota, the differences between varieties for these characteristics are greater as the period of vegetative growth is generally longer in the south, especially with early and mild springs. Therefore, the averages of the actual data can be misleading. The differences in winter hardiness are very small and all winter rye varieties tested are more winter hardy than the most winter hardy winter wheat varieties. Likewise, the difference between the lowest and highest reported test weight is less than 2 lbs/bu. Varieties with lodging scores greater than 6 should be chosen

with caution as lodging can reduce harvestability, yield, and quality. This is especially important if soils are highly fertile.

For comparison, single year and the 3-yr average of relative grain yield of tested varieties is presented in Table 2. The average yield across the six testing locations included was 91.9 bu/acre in 2023. This compares to a three-year average of 92.5 bu/acre. Danko and Hazlet are the most productive and best adapted of the open pollinated varieties.

Hybrid winter rye varieties that are commercially available yield 30% to 40% more compared to the best performing open pollinated varieties.

Varieties differ in their susceptibility to several economically important fungal pathogens, including powdery mildew, leaf rust, leaf spotting diseases, Fusarium head blight, and ergot.

Not enough observations have been made to-date to reliably differentiate winter rye varieties based on their susceptibility to these diseases. A preliminary rating to susceptibility to ergot is included due to the economic importance of this disease. Note that no variety tested is immune to ergot. Application of a fungicide should be considered if powdery mildew is present before jointing. Likewise, control of leaf rust may be warranted if the disease is found near the top of the canopy just as the flag leaf is emerging.

Authors and Researchers

This report is authored by Jochum Wiersma.

Test plot establishment and management are supervised by: Dave Grafstrom, Fernando de Paula Alberto, Alaina Mousel, Donn Vellekson, and Travis Vollmer.

Table 2. Relative grain yield of winter rye varieties in five Minnesota locations in single-year (2023) and multiple-year comparisons (2021-2023).

| Entry | Lamberton | | Le Center | | Becker (irrigated) | | Grand Rapids | Crookston | | Roseau | | State | |
|-----------------------|-------------|-------------|-------------|--------------|--------------------|-------------|--------------|-------------|-------------|--------------|--------------|-------------|-------------|
| | 2023 | 3 Yr | 2023 | 3 Yr | 2023 | 3 Yr | 2023 | 2023 | 3 Yr | 2023 | 3 Yr | 2023 | 3 Yr |
| Danko | 94 | 91 | 82 | 84 | 100 | 93 | 93 | 91 | 83 | 100 | 87 | 93 | 88 |
| Elbon | 76 | 68 | 68 | 63 | 70 | 59 | 87 | 69 | 62 | 75 | 58 | 72 | 62 |
| Hazlet | 73 | 84 | 54 | 74 | 77 | 80 | 68 | 78 | 86 | 86 | 86 | 75 | 81 |
| KWS Receptor | 132 | 126 | 117 | 113 | 107 | 107 | 75 | 120 | 118 | 93 | 112 | 116 | 115 |
| KWS Serafino | 123 | 118 | 124 | 113 | 127 | 119 | 132 | 124 | 122 | 105 | 115 | 123 | 118 |
| KWS Tayo | 122 | 117 | 127 | 119 | 115 | 119 | 132 | 115 | 107 | 109 | 117 | 119 | 117 |
| ND Dylan | 87 | 77 | 90 | 80 | 89 | 77 | 89 | 102 | 100 | 85 | 87 | 92 | 83 |
| ND Gardner | 82 | 76 | 80 | 74 | 73 | 70 | 97 | 75 | 73 | 89 | 77 | 80 | 74 |
| Remington | 84 | 78 | 88 | 77 | 84 | 72 | 96 | 83 | 84 | 96 | 88 | 86 | 78 |
| Rymin | 91 | 79 | 88 | 77 | 83 | 74 | 85 | 91 | 81 | 94 | 83 | 89 | 78 |
| SU Bebop | 102 | - | 101 | - | 116 | - | 111 | 103 | - | 132 | - | 106 | - |
| SU Cossani | 102 | - | 115 | - | 129 | - | 121 | 115 | - | 116 | - | 115 | - |
| SU Performer | 107 | - | 145 | - | 114 | - | 99 | 115 | - | 116 | - | 116 | - |
| Mean (bu/acre) | 99.6 | 94.4 | 99.2 | 106.7 | 84.5 | 89.2 | 74.3 | 83.8 | 81.0 | 100.0 | 107.0 | 91.9 | 92.5 |
| LSD (0.1) | 9 | 7 | 11 | 6 | 15 | 8 | 27 | 10 | 9 | 24 | 10 | 6 | 4 |