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Rye Grain Variety Trials at the Southeast Research Farm – 2024 Season

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Introduction

The SDSU Southeast Research Farm has been conducting rye grain variety trials, including hybrid rye entries, for the last six seasons. Among the small grains, rye has the greatest natural propensity to outcross, and hybrid lines have shown much improved yield potential over open-pollinated lines in our past trials. The market for rye seems to be expanding, and hopefully that will continue to be the case. Rye would be a valuable addition to the corn-soybean rotation. It is very competitive with weeds, and adding another crop from time to time would help disrupt the lifecycle of pests such as the western and northern corn rootworms. It is a cool-season grass with a fibrous root system which would benefit soil health. For farmers with livestock, it would provide an opportunity to produce straw, a place to put manure in the late summer, and potential to produce a cover crop for fall, winter, or spring grazing. To further evaluate this crop in our area, variety trials were conducted at several sites in eastern South Dakota (Arlington, Clear Lake, and Beresford) to compare both open-pollinated and hybrid lines of rye for grain yield production in our environment.

Methods

At each site, rye was direct-seeded using a small plot drill. Plot size was 5 by 20' and plots were laid out in a randomized complete block design with four replications. Planting dates were as follows: Clear Lake, 9/21/23; Beresford (Southeast Research Farm), 10/2/23; Arlington, 10/11/23. A trial was also established near Artesian; however, this site was later dropped due to field variability left from the previous season band application of P with strip tillage. Yields were determined at maturity by harvesting the plots with a small plot combine (Zurn model 150). All data were subjected to analysis of variance using the Proc GLM subroutine of SAS statistical software.

Results

The 2024 season was very good for rye production. Soil moisture in the fall of 2023 allowed for good establishment of the rye crop. May and June had 13.5" of rain, which caused flooding in low lying areas, but fields that did not flood had ample moisture for grain filling. Across three sites in the 2023 rye variety trial, the average yield was 47 bu/ac; whereas in 2024 across three sites the average yield was over twice that at 98 bu/ac (Table 1). In the production acres at the Southeast Farm the average yield across 43 acres was 103 bu/ac. In the variety trial at Beresford, the best yielding line ('Receptor') yielded 130 bu/ac while the average yield across all the lines in the trial was 110 bu/ac (Table 2). At both Clear Lake and Arlington, the average yield across all the lines tested was 90 bu/ac (Table 3 and 4). At Clear Lake the 'Andes' check plot of winter wheat was damaged by wildlife, so that data is not presented here.

Acknowledgements

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Table 1. Rye grain variety trial data pooled across sites of Beresford, Clear Lake, and Arlington, South Dakota in the 2024 growing season. Data on test weight and 100-seed weight are not included from Arlington (100-seed weight has not been processed yet, and combine test wt. measurements were not considered reliable in this case). Also data on 'Andes' wheat yield at Clear Lake was excluded from this analysis due to wildlife damage at that site. Note there were significant site by line interactions for yield, test weight, lodging, and height. Only one replication was measured for height at Arlington.

Line	Height (in)	Lodge (0-10)	100-Seed Wt. (g)	Moisture (%)	Test Wt. (lb.bu)	Grain Yield (bu/ac)
H9011	48.7	**2.0**	**2.84**	15.9	52.7	**117**
H20003	48.6	**1.8**	2.79	16.0	53.5	**116**
Receptor	49.7	3.5	2.57	16.5	54.4	**116**
H9008	49.8	2.5	2.77	15.8	53.8	**112**
H20005	48.4	**1.8**	2.66	15.9	53.1	111
SU Karlsson	48.9	2.8	2.57	16.0	54.2	107
SU Cossani	49.8	**2.1**	2.52	16.7	52.7	104
SU Perspectiv	48.7	2.4	2.67	15.8	53.5	104
Tayo	48.3	2.4	**2.93**	16.3	53.7	103
Serafino	48.8	2.6	2.56	16.7	53.0	103
SU Performer	49.4	2.8	2.37	15.7	51.9	102
SU Bebop	48.9	3.6	2.58	16.2	53.1	94
Danko	50.5	2.8	2.66	15.8	54.5	84
Aroostook	52.3	5.3	**2.95**	15.9	53.8	81
Hazlet	**54.3**	4.2	**2.92**	15.9	54.4	81
Andes	38.0	**2.1**	2.60	15.5	57.6	66
ND Gardner	**53.4**	5.8	2.55	15.8	52.2	58
Mean	49.5	3.0	2.68	16.0	53.5	98.2
CV (%)	3.4	24.6	4.8	8.9	2.1	7.2
Line P-Value	<0.01	<0.01	<0.01	NS	<0.01	<0.01
Site *Line P-Value	<0.01	<0.01	NS	NS	<0.01	<0.01
LSD (0.10)	1.2	0.5	0.11	-	1.0	5.0

Table 2. Rye variety trial data on height, lodging (0 to 10 score), 100-seed weight, moisture, test weight, and grain yield at Beresford, South Dakota in the 2024 growing season.

Line	Height (in)	Lodge (0-10)	100-Seed Wt. (g)	Moisture (%)	Test Wt. (lb.bu)	Grain Yield (bu/ac)
Receptor	49.8	2.0	2.51	14.6	56.7	**130**
H20003	48.3	**1.5**	2.66	13.7	55.5	**129**
H9011	49.5	**1.5**	2.65	13.5	54.9	**128**
H9008	49.5	**1.8**	2.64	14.4	55.8	**125**
Tayo	49.7	**1.3**	**2.86**	13.4	56.7	**125**
H20005	48.8	**1.3**	2.48	13.4	54.7	**124**
SU Karlsson	48.8	2.8	2.37	14.3	56.4	120
Serafino	**51.8**	**1.8**	2.44	13.5	55.5	117
SU Perspectiv	49.3	2.0	2.57	13.7	55.6	117
SU Cossani	**50.5**	2.0	2.27	13.6	55.0	113
SU Performer	49.8	2.0	2.25	13.4	54.2	112
SU Bebop	49.3	2.8	2.44	13.6	55.2	102
Danko	49.8	2.5	2.55	13.7	56.2	95
Hazlet	**52.5**	3.8	**2.88**	13.5	56.3	91
Aroostook	49.8	4.5	**2.80**	12.9	55.6	85
ND Gardner	**52.0**	3.5	2.46	12.7	55.6	84
Andes	39.3	**1.0**	2.60	**15.2**	**57.6**	71
Mean	49.3	2.2	2.55	13.7	55.7	110
CV (%)	3.5	27.4	4.60	5.6	1.0	4.5
LSD (0.10)	2.3	0.8	0.16	1.1	0.8	6.7

Table 3. Rye variety trial data on height, lodging (0 to 10 score), 100-seed weight, moisture, test weight, and grain yield at Clear Lake, South Dakota in the 2024 growing season. Note that the 'Andes' variety of wheat was damaged by wildlife at this site - so data from that line is not shown in this table.

Line	Height (in)	Lodge (0-10)	100-Seed Wt. (g)	Moisture (%)	Test Wt. (lb.bu)	Grain Yield (bu/ac)
H9011	49.0	**2.0**	**3.04**	16.7	50.5	**116**
H20003	49.5	**2.0**	**2.92**	16.6	**51.6**	**114**
H20005	49.3	**2.0**	2.83	16.3	**51.5**	**107**
H9008	51.0	**2.4**	2.90	15.8	**51.9**	105
Receptor	50.5	3.5	2.63	16.2	**52.1**	105
SU Karlsson	49.3	2.8	2.78	16.7	**52.1**	104
SU Cossani	50.3	**2.5**	2.78	17.2	50.5	102
Tayo	48.8	**2.5**	**2.99**	16.4	**51.4**	101
SU Performer	50.0	3.0	2.49	16.5	49.6	101
SU Perspectiv	49.5	**2.3**	2.78	16.5	**51.3**	99
Serafino	47.8	2.8	2.73	17.7	50.4	98
SU Bebop	49.3	3.0	2.71	16.7	**51.1**	93
Aroostook	**54.5**	3.8	**3.11**	16.9	**51.9**	78
Hazlet	**55.8**	3.0	**2.95**	16.4	**52.6**	78
Danko	52.0	3.3	2.77	16.2	**52.7**	74
ND Gardner	**54.5**	5.8	2.65	15.2	48.8	35
Mean	49.8	3.2	2.80	16.4	50.9	89.8
CV (%)	3.3	19.6	4.9	8.8	3.3	9.8
LSD (0.10)	2.0	0.7	0.19	NS	2.0	10.5

Table 4. Rye variety trial data on height (one replication only), lodging (0 to 10 score), moisture, and grain yield at Arlington, South Dakota in the 2024 growing season. Data on test weight is not shown as the combine test wt. was not considered reliable and insufficient sample was retained to measure it later.

Line	Height (in)	Lodge (0-10)	Moisture (%)	Grain Yield (bu/ac)
Receptor	46.7	5.0	18.7	**112**
H9011	44.5	**2.5**	17.5	**107**
H20003	46.7	**2.0**	17.5	**105**
H9008	46.5	3.3	17.0	**104**
H20005	44.0	**2.3**	18.1	101
SU Cossani	45.3	**1.8**	19.2	98
SU Perspectiv	43.5	**3.0**	17.1	96
SU Karlsson	48.5	**3.0**	17.1	95
SU Performer	45.5	3.5	17.1	94
Serafino	41.2	3.3	18.9	93
Tayo	42.2	**3.0**	18.2	90
SU Bebop	46.0	5.0	18.4	87
Danko	47.5	**2.8**	17.6	83
Aroostook	53.3	7.5	18.0	81
Hazlet	55.5	5.8	17.7	74
Andes	32.8	3.3	15.8	61
ND Gardner	54.7	8.0	19.3	56
Mean	46.1	3.8	17.8	90.4
CV (%)	-	25.7	10.1	7.9
LSD (0.10)	-	1.2	NS	8.5