

Southern Minnesota Small Grains Research and Outreach Project

Jochum Wiersma, Dept. of Agronomy & Plant Genetics, NWROC

Research Questions

The objectives of the grant were to:

- 1) Establish variety performance evaluation trials for HRSW and HRWW near Montgomery, Kimball and Benson.
- 2) Organize extension programming focused on small grains production and management in southern Minnesota.

Results

The Southern Wheat Tour encompasses the winter extension programming efforts for small grains in central and southern Minnesota. These meetings were held in Cold Spring, LeCenter, Slayton, and Benson in the third week of February and were attended by nearly 150 producers. The average yield across the 3 locations funded by this grant was 86 bu/acre and 76 bu/acre for spring wheat and winter wheat, respectively. The variety trials near Montgomery suffered substantial lodging due to torrential rains and 50 mph. straight-line winds. All three locations served as sentinel plots for the small grains pest surveys and were used for summer plot tours that were attended by 30 producers. Detailed results can be found in tables 1 and 2 (Appendix I).

Application/Use

Hard red spring, winter wheat, winter rye, barley, and oats have been grown in central and southern Minnesota for decades but not in large acreages. Producers in these regions are now incorporating more intense management systems to maximize yield and quality on their small grain acres with genetics, input products, and fertility systems on productive soils including irrigation. The rising awareness of cover crops, crop rotation benefits, current economic markets and recent years have contributed to an increased awareness of the agronomic benefits and economic opportunities of small grains. Producers with dedicated intense production of small grains have demonstrated the ability to do so very successfully with yield and quality. Testimony of individual producers during plot tours and workshops suggest that 90 bushel spring and winter wheat and 150 bushel oat are routinely attained in production fields. This replicates what our research and demonstrations plots have documented. This underscores the importance that the University of Minnesota conducts high quality yield trials that demonstrate the maximum attainable yield rather than simply demonstrate relative differences between cultivars.

Material and Methods

The winter wheat and winter rye variety trials with 24 and 20 entries, respectively, were seeded on October 1st, 2015 near Montgomery and Kimball. The spring wheat, oats, and barley variety trials with 54, 29, and 18 entries, respectively, were seeded adjacent to the winter cereals at the same two locations in early April. In addition, a spring variety trial was seeded near Benson in the second week of April. All trials used a Randomized Complete Block design with 3 replications. Field preparations and some of the fertility management were done by the cooperators with planting, weed control, data collection, and harvest completed by the research group.

Economic Benefit to a Typical 500 Acre Wheat Enterprise

Spring and winter wheat should be an essential part of Minnesota's agriculture. Providing small grain producers with the latest and most recent production and management information and educating producers which cultivars are best suited for their production system are critical to the economic well-being of Minnesota. A 10% increase in yield equates to nearly \$14,000 in gross returns for a 500 acre wheat enterprise at today's market prices.

Related Research

These trials are an integral part of the University of Minnesota Spring Wheat, Barley, and Oat Breeding Programs and the Extension's Commodity Crops Team programming efforts. The rye variety trials are part of a Minnesota Department of Agriculture grant entitled 'The Flavor and Agronomic Performance of Winter Rye for the Craft Distillers in Minnesota'.

Publications

Results of yield trials for spring and winter wheat, barley, and oats are part of the variety trial results that will be published in the on-line publication '2016 Minnesota Field Crop Trials'. The 2015 trial results were published in:

1. Anderson J.A, J.J. Wiersma, S. Reynolds, R. Caspers, and C. Springer. 2015. Hard Red Spring Wheat. In: 2015 Minnesota Field Crop Trials. Minnesota Agricultural Experiment Station Publication MP 121-2016. University of Minnesota, St. Paul, MN.
2. Smith, K., E. Schiefelbein, J.J. Wiersma, R. Dill-Macky, M. Smith, and B. Steffenson. 2015. Barley. In: 2015 Min-

nesota Field Crop Trials. Minnesota Agricultural Experiment Station Publication MP 121-2016. University of Minnesota, St. Paul, MN.

3. Wiersma, J.J. and J.A. Anderson. 2015. Hard Red Winter Wheat. In: 2015 Minnesota Field Crop Trials. Minnesota Agricultural Experiment Station Publication MP 121-2016. University of Minnesota, St. Paul, MN.

4. Wiersma, J.J., R. Dill-Macky, and H. Rines. 2015. Oat. In: 2015 Minnesota Field Crop Trials. Minnesota Agricultural Experiment Station Publication MP 121-2016. University of Minnesota, St. Paul, MN.

Appendix

Table 1 – Grain yield, test weight, and grain protein of 38 named HRSW varieties at three on-farm trial locations in southern Minnesota in 2016.

Variety	Benson			Kimball			LeCenter			Combined		
	Grain Yield (bu/acre)	Test Weight (lbs/bu)	Grain Protein (%)	Grain Yield (bu/acre)	Test Weight (lbs/bu)	Grain Protein (%)	Grain Yield (bu/acre)	Test Weight (lbs/bu)	Grain Protein (%)	Grain Yield (bu/acre)	Test Weight (lbs/bu)	Grain Protein (%)
Bolles	100.8	56.0	15.0	63.2	55.2	16.6	82.8	57.7	17.2	74.4	56.5	17.0
Boost	106.3	58.2	14.3	57.4	57.0	15.8	75.1	60.0	15.4	70.2	57.9	15.4
Chevelle	119.4	61.3	12.7	59.5	55.1	13.4	77.0	58.2	14.1	71.1	59.5	13.9
Dyna-Gro Ar	104.6	60.3	14.3	62.7	58.2	15.4	79.1	60.1	15.4	70.5	59.7	15.3
Elgin-ND	103.1	59.6	13.9	53.0	55.6	15.1	61.0	58.0	14.2	62.6	58.5	14.3
Faller	112.9	59.0	12.8	63.1	53.7	14.1	79.9	59.2	14.3	79.0	57.9	14.2
Focus	104.8	58.7	14.6	59.7	60.1	15.3	62.9	59.2	16.0	62.7	59.0	15.9
Forefront	95.7	58.0	13.9	66.8	59.1	14.5	75.2	60.5	15.3	70.3	59.3	15.1
Glenn	91.6	58.8	14.4	63.0	58.0	14.8	55.5	59.7	15.6	60.3	58.4	15.6
HRS 3361	111.6	58.1	13.1	62.0	55.0	14.5	88.3	58.5	14.3	75.3	57.8	14.3
HRS 3419	121.9	58.4	12.3	84.1	57.5	13.3	107.7	58.5	14.2	97.5	58.1	14.0
HRS 3504	125.7	58.9	12.9	66.5	57.3	14.2	80.1	59.5	13.6	80.3	58.6	13.7
HRS 3530	126.9	59.6	13.9	69.9	57.9	14.2	85.6	60.2	15.1	88.8	59.2	15.0
HRS 3616	111.1	60.0	14.3	65.3	55.2	15.1	89.7	58.0	15.3	77.2	58.8	15.3
LCS Albany	119.4	59.3	12.8	73.3	57.7	14.3	91.4	59.0	14.5	90.5	59.1	14.3
LCS Anchor	104.2	57.0	13.9	70.5	57.5	15.4	58.3	57.1	15.2	67.2	57.1	15.1
LCS Breakav	103.4	58.6	14.3	70.8	57.7	15.9	72.7	57.6	15.0	78.8	58.4	15.1
LCS Iguacu	109.7	59.6	12.0	75.0	59.3	13.4	94.9	60.1	13.1	90.1	59.7	13.1
LCS Nitro	120.2	59.0	12.5	78.1	55.7	14.2	102.0	58.2	13.4	98.1	58.0	13.4
LCS Prime	122.7	58.0	12.6	59.7	53.8	14.0	76.7	56.9	13.7	72.3	56.9	13.6
Linkert	93.2	58.6	14.5	73.8	59.0	15.3	69.0	58.5	15.0	70.1	58.7	15.0
Norden	107.6	60.6	13.5	68.6	59.5	13.7	74.8	59.4	14.4	75.3	60.1	14.4
Prevail	112.9	59.5	13.6	75.6	57.4	14.0	79.5	57.9	14.7	83.6	58.5	14.7
Prosper	114.6	57.8	12.8	59.5	54.5	14.6	78.8	59.6	14.6	73.5	54.7	14.6
RB07	108.9	60.8	13.9	62.4	54.2	14.3	71.6	58.7	14.8	66.1	59.0	14.7
Rollag	106.7	59.1	14.0	63.2	59.7	14.4	72.0	59.8	15.3	72.7	59.1	15.2
Shelly	117.3	56.8	13.0	61.8	57.6	13.8	86.0	59.2	14.0	81.0	57.7	13.9
Surpass	106.8	56.8	14.3	54.2	56.2	16.0	59.2	57.8	15.6	60.1	56.7	15.6
SY Ingmar	121.7	59.9	13.9	79.9	58.1	13.8	90.2	59.2	15.1	84.2	59.5	15.0
SY Rowyn	120.9	61.0	13.0	68.2	56.9	14.9	88.1	61.4	14.3	86.6	60.6	14.3
SY Soren	110.6	57.7	13.1	72.3	56.3	15.7	88.1	58.5	14.7	86.6	58.1	14.7
SY Valda	125.1	61.2	13.2	62.4	57.8	14.8	89.2	60.4	14.4	82.8	60.5	14.3
TCG-Corners	104.3	60.3	14.2	63.7	57.7	15.1	79.9	58.5	14.8	76.3	59.2	14.8
TCG-Spifire	105.7	55.6	13.4	68.0	56.0	13.7	80.6	57.4	13.6	71.3	56.1	13.6
TCG-Wildfire	112.1	57.9	13.6	66.5	58.0	14.1	85.9	58.8	15.1	81.4	57.8	15.0
WB9507	114.0	60.2	13.1	60.8	55.8	14.3	92.1	59.8	14.8	80.5	58.8	15.2
WB9653	121.6	61.0	12.7	58.4	56.3	14.1	78.3	59.7	14.1	89.6	59.3	14.7
WB-Mayville	111.7	60.8	14.2	71.0	53.8	15.7	80.4	57.6	15.3	71.4	59.5	14.1
Mean	111.4	59.0	13.5	66.1	56.9	14.6	80.0	58.9	14.7	77.1	58.5	14.7
LSD (0.1)	6.7	2.5	0.4	8.8	2.2	1.6	6.6	1.6	0.6	10.2	2.1	0.5

continued on page 42

Table 2 – Grain yield, test weight, and grain protein of 23 named HRWW varieties at two on-farm trial locations in southern Minnesota in 2016

Variety	Kimball			LeCenter			Combined		
	Grain Yield	Test Weight	Grain Protein	Grain Yield	Test Weight	Grain Protein	Grain Yield	Test Weight	Grain Protein
	(bu/acre)	(lbs/bu)	(%)	(bu/acre)	(lbs/bu)	(%)	(bu/acre)	(lbs/bu)	(%)
AAC Gateway	64.7	56.4	11.5	93.4	58.7	14.0	73.3	56.9	11.9
Arapahoe	41.3	51.7	12.0	59.1	51.0	13.5	41.1	51.6	12.3
Branson	95.6	54.5	10.0	137.9	56.0	13.9	112.8	54.7	10.6
Broadview	60.5	56.1	11.4	82.2	54.6	13.8	67.3	55.6	11.7
CDC Chase	64.9	57.1	11.5	97.9	59.0	13.8	76.7	57.3	12.0
CDC Falcon	65.9	56.0	11.3	104.4	56.3	13.7	79.0	56.0	11.9
Decade	61.9	56.2	11.2	93.0	57.2	14.0	73.1	56.3	11.4
Emerson	56.0	57.2	12.2	84.9	58.4	13.8	64.1	57.2	12.8
Expedition	62.7	55.0	10.8	82.6	54.4	13.8	63.8	54.8	11.6
Flourish	62.7	53.7	11.3	104.5	56.0	14.0	81.5	54.2	11.9
Freeman	83.3	54.3	10.3	122.8	56.8	13.7	104.2	54.7	11.6
Jerry	58.4	55.7	11.6	84.3	57.6	13.9	66.2	56.2	11.4
Millenium	60.3	54.6	11.2	107.2	57.4	13.8	80.4	55.2	12.0
Minter	46.3	56.3	12.6	65.3	57.8	13.8	48.3	56.5	13.1
Moats	63.9	57.9	11.8	91.2	57.6	13.7	71.7	57.7	12.7
Overland	68.1	55.2	10.8	107.6	58.2	13.9	89.6	55.8	11.7
Redfield	81.3	56.1	11.3	115.0	58.0	13.8	88.6	56.4	11.8
Roughrider	52.5	57.4	12.5	80.0	59.7	13.6	61.0	57.9	12.7
SY Wolf	71.5	54.9	10.5	113.2	57.1	13.9	85.8	55.2	12.2
WB 4614	46.7	55.6	11.2	83.7	55.5	14.0	62.0	55.6	12.7
WB Grainfield	80.7	55.5	10.6	127.0	59.3	13.7	103.6	56.5	11.2
WB Matlock	62.3	56.5	11.7	84.9	58.7	13.8	68.3	57.0	12.1
Yellow stone	57.2	54.9	11.3	105.7	53.5	14.0	81.6	54.5	10.7
Mean	63.9	55.6	11.3	96.9	56.9	13.8	75.8	55.8	11.9
LSD (0.1)	7.6	1.2	0.4	12.7	1.8	0.2	13.5	1.2	0.7