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Hard Red and Soft Red Winter Wheat Variety Testing - 2023

G.F. Sassenrath, J. Lingenfelter,¹ and X. Lin¹

Summary

This is a summary of the winter wheat production conditions in southeast Kansas in 2021-2022 and the results of the winter wheat variety testing. Wheat production in 2022 benefited from dry conditions at flowering and harvest. Overall yields of hard red wheat were above multi-year averages, while soft red wheat yields were below the 15-year average. As in previous years, soft red winter wheat out-yielded hard red winter wheat varieties, but the extent was not as dramatic as in previous years.

Introduction

Crop production is dependent on many factors including cultivar selection, environmental conditions, soil, and management practices. This report summarizes the environmental conditions during the 2021-2022 winter wheat growing season in comparison to previous years and the historical averages. Thirteen hard red and thirteen soft red wheat varieties were tested at Parsons.

Experimental Procedures

The Kansas State University Crop Performance Tests were conducted in replicated research fields throughout the state. This report summarizes winter wheat production for Parsons, KS. Wheat varieties were tested in Parsons silt loam soil at the Southeast Research and Extension Center (SEREC) in Parsons. All crop variety trials are managed with conventional tillage. Individual variety results are available at the K-State Crop Performance Test webpage (<http://www.agronomy.k-state.edu/outreach-and-services/crop-performance-tests/>).

Wheat was drilled in 7-in. rows at 1.2 million seed/acre (approx. 90 lb/acre) in conventional tillage with an Almaco plot drill in Parsons and harvested in June. Plots were 7-ft wide by 27.5-ft long. Fertilizer was applied before planting at a rate of 50-46-30 lb/acre N-P-K (dry), with an additional 60-46-30 lb/acre N-P-K (dry) applied in February for both hard red and soft red cultivars. No fungicide or herbicides were applied in wheat.

State reported crop yield data were downloaded from the National Agricultural Statistic Service Crop database (<https://quickstats.nass.usda.gov/>). Weather data were collected from the Kansas Mesonet website (<http://mesonet.k-state.edu/agriculture/degreedays/>) for a weather station located at the SEREC in Parsons. Cumulative rain-

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fall was calculated on a water year basis from October 1, 2021, through September 30, 2022.

Results and Discussion

The rainfall during autumn and early winter (water year 2022, WY22) was very near average (Figure 1). The spring green-up period had high rainfall events, interspersed with long dry periods. These long dry periods coincided with wheat flowering, and reduced Fusarium infection rates. While rainfall during the WY22 was above the severe drought of 2012, the 27.4 in. of rain was well below the 12-year average of 38.8 in.

Statewide, acres planted to wheat have been steadily declining in Kansas, in contrast to acreage planted to corn and soybeans (Sassenrath et al., 2023²), with only 7.3 M acres of wheat planted in 2021 (compared to the maximum of 14.1 M acres planted in 1982). The percentage of planted acres harvested in 2022 (90.4%) was also slightly below the 50-year average of 91% planted acres harvested. Statewide average yield in 2022 was exactly at the 50-year average yield of 37 bu/acre, but below the recent 10-year average of 43.2 bu/acre, and well below the high yield of 57 bu/acre harvested in 2016.

Hard red wheat in Parsons yielded better in 2022 than in 2021, with much less variability across cultivars (Figure 3A). The average hard red winter wheat in Parsons was 74.6 bu/acre (Table 1). Soft red wheat yield was reduced slightly in 2022, but also had much less cultivar variability (Figure 3B). While the soft red wheat yielded better than the hard red wheat, the difference was not as great as measured in previous years. Test weights were higher in 2022 than in 2021 in both hard and soft wheat, but lower than in previous years.

Conclusions

Winter wheat did well in 2022. The hard red wheat, which tends to have more disease, benefited from the dryer conditions during flowering. Conversely, the soft red wheat had slightly lower yields due to the dryer conditions.

Acknowledgments

This data is part of the 2022 Kansas Performance Tests with Winter Wheat Varieties (<https://www.bookstore.ksre.ksu.edu/pubs/SRP1172.pdf>).

² Sassenrath, G.;Lingenfelter, J., Lin, X.. (2023) “Corn and Soybean Production – 2022 Summary,” *Kansas Agricultural Experiment Station Research Reports*: Vol. 9: Iss. 2. <https://newprairiepress.org/kaesrr/vol9/iss2/>

Table 1. Multiyear comparison of hard red winter wheat yields from variety trials at Parsons, KS

Company	Variety	2017		2018		2020			2021		2022		
		Yield, bu/a	Test weight, lb/bu	Yield, bu/a	Test weight, lb/bu	Yield, bu/a	Test weight, lb/bu	Fusarium rating	Stripe rust rating	Yield, bu/a	Test weight, lb/bu	Yield, bu/a	Test weight, lb/bu
AgriMAXX	AM Cartwright					82.9	60.8	1	1	70.5	55.3	65.5	55.9
AgriMAXX	AM Eastwood	47.2	55.5	56.8	58.5	67.2	57.9	3	8	33.9	51.7		
Syngenta AgriPro	SY Benefit	56.9	57.7	45.2	57.4	77.5	59.5	1	7	37.5	50.3		
Syngenta AgriPro	Prolific											82.2	57.6
AGSECO	AG Icon			47.4	57.2	80.5	60	2	4	42.2	75.9		
AGSECO	AG Radical					76.1	56.6	0	3	28	50	75.2	56.0
KWA Wildcat Genetics	Everest	60.5	58.1	48.6	59.3	78.9	60.8	1	8	49.8	54.1	64.0	57.8
KWA Wildcat Genetics	Providence											66.5	56.5
KWA Wildcat Genetics	Zenda	60.7	58.4	43.5	59.7	86.1	60.8	1	2	66.1	55.2	75.3	58.2
Polansky	Paradise									79.2	54.2	73.7	56.2
Polansky	Rock Star									67.5	54.6	78.2	55.6
WestBred	WB4269	55	57	48.5	58.9	86.8	60.3	2	3	61.8	54.3	67.1	55.7
WestBred	WB4401					108.8	61.5	1	1	92	57.8	73.0	53.8
WestBred	WB4422											85.0	58.0
WestBred	WB4523											72.3	54.1
WestBred	WB4699					94.5	58.7	2	2	39.5	50.7	82.6	56.0
Overall average, hard red winter wheat		57.1	57.4	51.7	58.1	81.1	59.2			55.5	55.1	74.6	56.3

Yields above average are highlighted in bold.

Table 2. Multiyear comparison of soft red winter wheat yields from variety trials at Parsons, KS

Company	Variety	2017		2018		2020			2021		2022		
		Yield, bu/a	Test weight, lb/bu	Yield, bu/a	Test weight, lb/bu	Yield, bu/a	Test weight, lb/bu	Fusarium rating	Stripe rust rating	Yield, bu/a	Test weight, lb/bu	Yield, bu/a	Test weight, lb/bu
AgriMAXX	473	83.2	57.9	65.1	57.5	106.1	59	0	1	94.0	55.2		
AgriMAXX	492									99.9	56.3	81.0	57.5
AgriMAXX	503					113.9	60.1	0	1	102.5	56.2	80.6	55.7
AgriMAXX	505					112.2	60.7	2	5	100.3	57.2	88.9	57.7
AgriMAXX	513									99.3	55.0	86.9	56.7
AgriMAXX	514									93.3	54.4	87.5	55.3
AgriMAXX	516											83.8	55.9
AgriMAXX	EXP 2105											87.1	55.1
Beachner	GB0206									96.4	53.7	86.2	55.8
Beachner	GB0208									89.9	55.1	88.7	56.2
Beachner	Roane									71.7	56.4		
Becks	726									101.0	54.8		
Becks	727									95.2	56.3		
Becks	730									76.3	53.9		
DuPont Pioneer	25R40	79.5	56.8	66.1	56.7	105.8	58.1	3	1				
DuPont Pioneer	25R50			57.1	57	97.5	59.3	0	1			81.8	54.6
DuPont Pioneer	25R61	71.4	57.8	61.6	57.9	87.5	58.3	0	7				
DuPont Pioneer	25R74	80.8	57.6	65.4	56.3	110.4	61.6	0	1			92.6	54.8
DuPont Pioneer	25R76											79.1	55.8
DuPont Pioneer	25R77	84.4	57.9	54.2	56.9	103	61.6	2	3				
WestBred	WB2606											82.8	56.3
Overall average, soft red winter wheat		78.2	57.5	59.9	57	102.4	59.5			90.4	54.9	85.2	56.0

Yields above average highlighted in bold.

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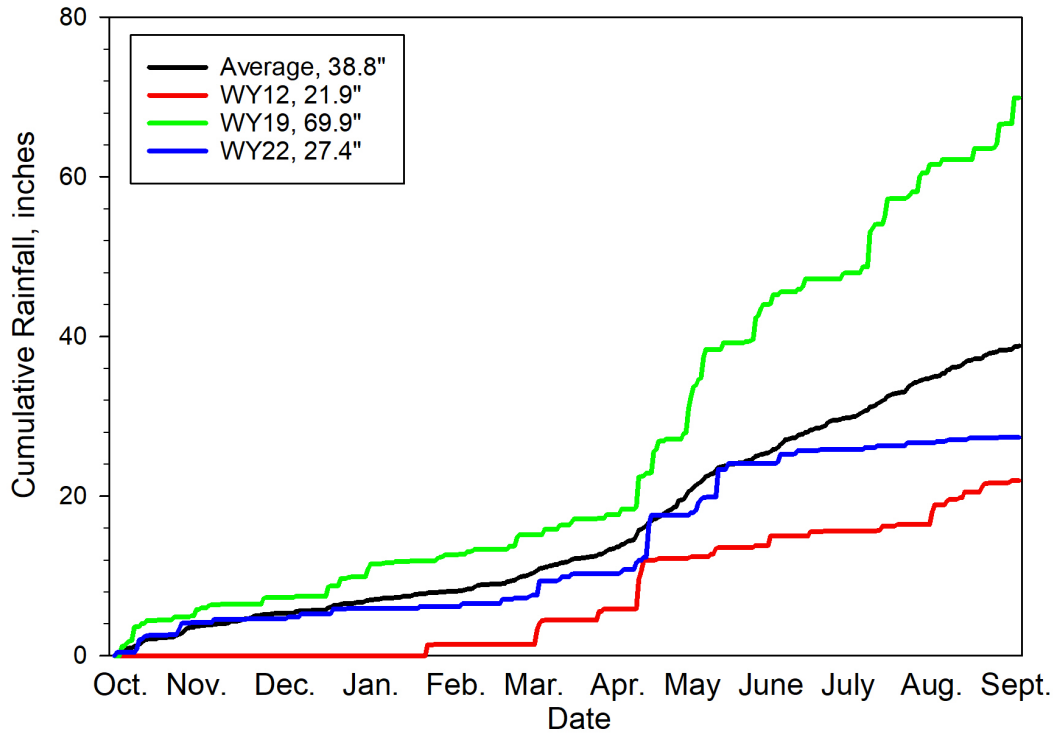


Figure 1. Cumulative rainfall during the 2022 water year (WY22; October 1, 2021 - September 30, 2022).

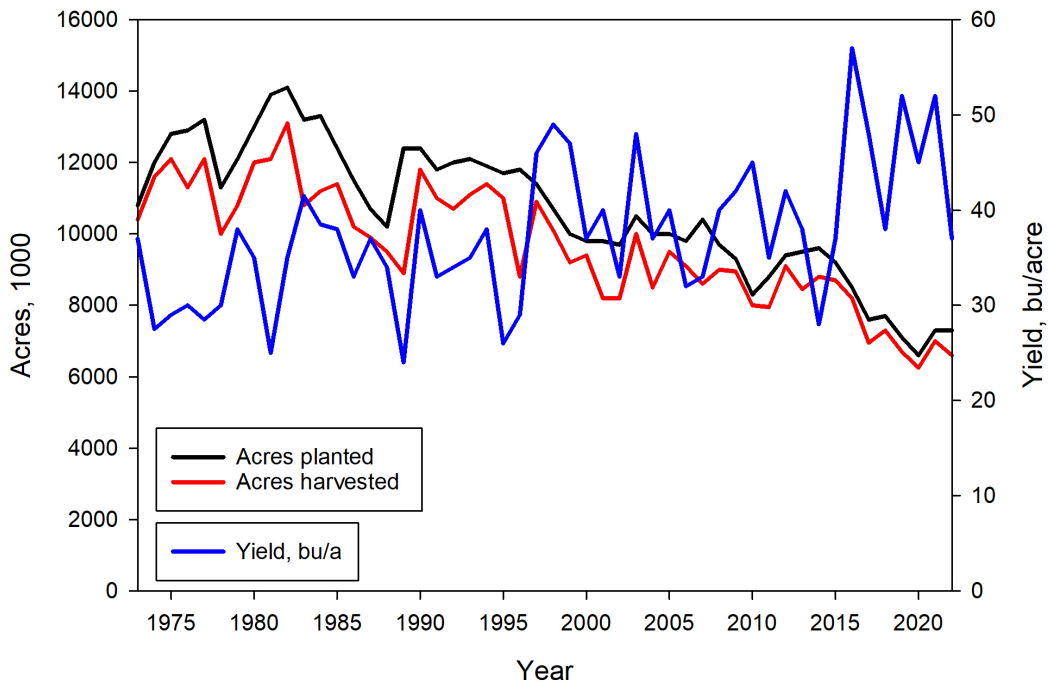
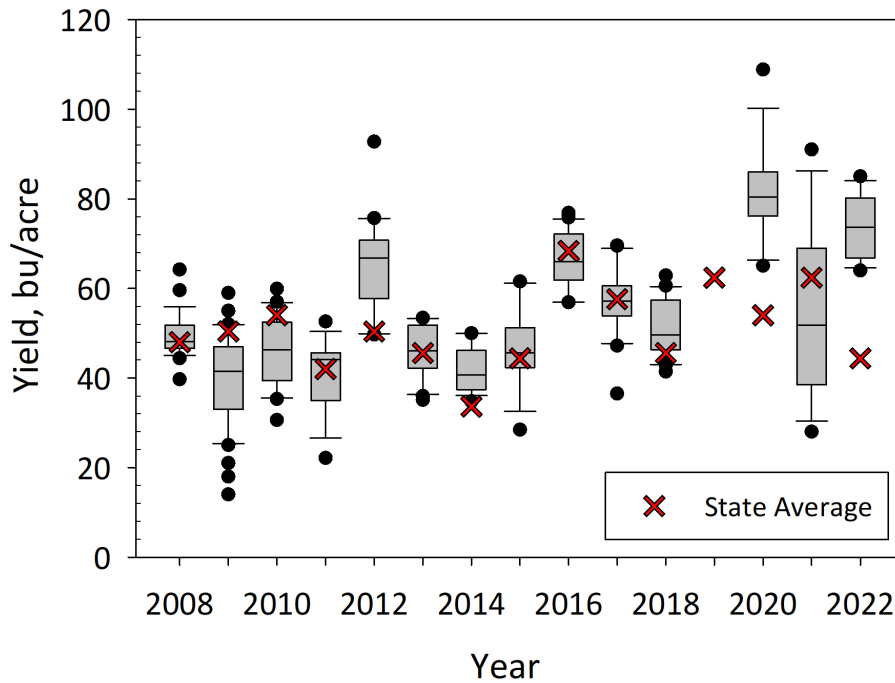


Figure 2. Statewide historical wheat production, acres planted, acres harvested, and yield (bu/acre).

A. Hard red winter wheat



B. Soft red winter wheat

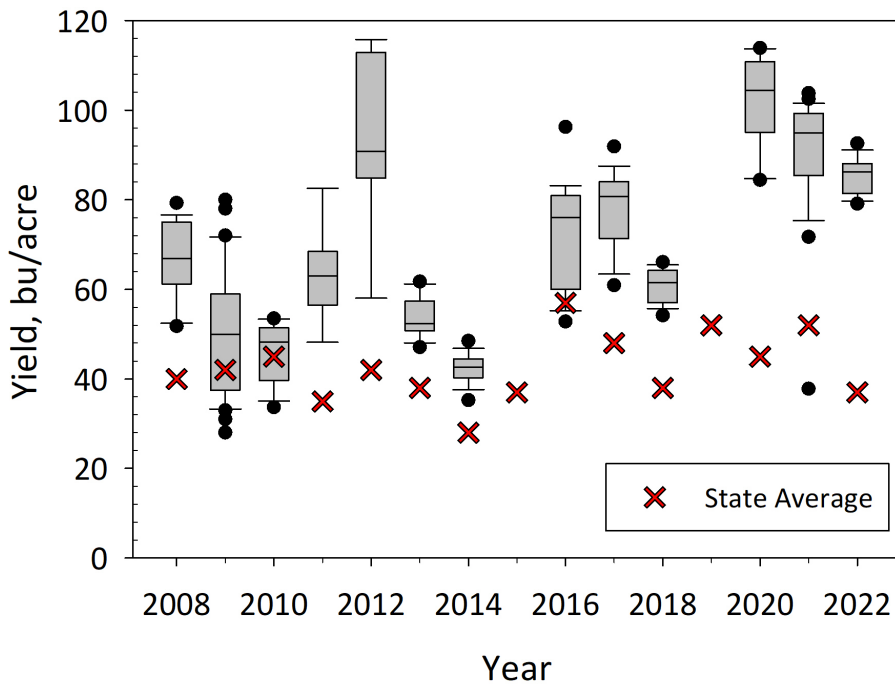


Figure 3. Winter wheat yield for (A) hard red wheat and (B) soft red wheat from variety trials in southeast Kansas from 2008 through 2022. In 2019, variety testing was abandoned due to flooding and poor stands. The line in the middle of the box plots is the median yield of all varieties. The upper and lower quartiles are given by the upper and lower edges of the boxes. The maximum and minimum values are given by the upper and lower “whiskers” extending from the box. Outliers are given as solid circles. For comparison, average reported state yields for hard red winter wheat from Kansas are highlighted as a red X.