K-STATE Research and Extension

2024 SEREC AGRICULTURAL RESEARCH

Hard Red and Soft Red Winter Wheat Variety Testing - 2023

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Summary

This is a summary of the winter wheat production conditions in Kansas, with particular emphasis on the variety trial results from southeast Kansas in 2023. After the dry conditions of 2022, adequate rain for wheat establishment and growth in the fall in southeast Kansas was received, although drought conditions were observed in central and western Kansas. The growing season had slightly below average rainfall, with adequate soil moisture in the fall for good stand establishment. Overall yields of hard and soft red wheat varieties were above multi-year averages, but slightly below the yields from 2022. 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 2022-2023 winter wheat growing season in comparison to previous years and the historical averages for the state of Kansas. Fifteen hard red and 19 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 the wheat crop.

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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 rainfall was calculated on a water year basis from October 1, 2022, through June 30, 2023.

Results and Discussion

After the very dry summer of 2022, rainfall during autumn and early winter (water year 2023 (WY23)) was slightly (2.8 in.) above average through February (Figure 1). March and April had very little rain, reducing totals to slightly below average. Although dry spring conditions can make establishment of summer crops challenging, wheat production usually benefits from dry conditions in southeast Kansas due to lower disease pressure. Winter wheat heading in the variety trials began on April 24 in the hard red and April 26 in the soft red varieties and ended May 3 and May 5 in the hard and soft varieties, respectively. During this 11-day period, Parsons received 2.6 in. of rain, increasing the likelihood of diseases, especially Fusarium head blight (scab). Rain increased during the spring of 2023, bringing the wheat growing season total rainfall for 2023 to just below average and very similar to 2022.

Acreage planted to winter wheat in Kansas increased slightly in 2023 to 8.1 million acres (Figure 2). This is below the long-term average of 11.5 million acres, and down from the peak of 17.1 million acres planted in 1937. However, of those acres planted, an estimated 70% of those acres were harvested. This is below the 102-year average of 88% harvested; the lowest harvested acres occurred in 1935, with only 51% of planted acres harvested. Average statewide yield was 35 bu/acres.

Yields for hard and soft winter wheat varieties in Parsons were very similar to those harvested in 2022 (Figure 3), with a slight increase in yield variability. The average hard red winter wheat yield in 2023 in Parsons was 73.1 bu/acre with a test weight of 60.8 lb/bu. (Table 1). Soft red wheat yield was 83.8 bu/acre, with a test weight of 59.3 lb/bu. While the soft red wheat yielded better than the hard red wheat, the difference was not as great as measured in previous years.

Conclusions

Winter wheat did well in 2023 in southeast Kansas. This was an exception for the state, as other regions of Kansas experienced exceptional drought conditions throughout much of the year (https://droughtmonitor.unl.edu/CurrentMap.aspx). Although rain was received during wheat bloom, disease was not a significant problem this year.

Acknowledgements

These data are part of the 2023 Kansas Performance Tests with Winter Wheat Varieties and will be available online.

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

		2017		2018		2020		2021		2022		2023	
Company	Variety	Yield, bu/a	Test weight, lb/bu	Yield, bu/a	Test weight, lb/bu	Yield, bu/a	Test weight, lb/bu	Yield, bu/a	Test weight, lb/bu	Yield, bu/a	Test weight, lb/bu	Yield, bu/a	Test weight, lb/bu
AgriMAXX	AM Cartwright					**82.9**	60.8	**70.5**	55.3	65.5	55.9	65.4	60.2
AgriMAXX	AM Eastwood	47.2	55.5	**56.8**	58.5	67.2	57.9	33.9	51.7				
Syngenta AgriPro	SY Benefit	56.9	57.7	45.2	57.4	77.5	59.5	37.5	50.3				
Syngenta AgriPro	Prolific									**82.2**	57.6	69.6	61.0
AGSECO	AG Icon			47.4	57.2	80.5	60	42.2	75.9				
AGSECO	AG Radical					76.1	56.6	28	50	**75.2**	56	**86.9**	60.7
KWA Wildcat Gen	KS16DH0010-17											71.1	61.1
KWA Wildcat Gen	Everest	**60.5**	58.1	48.6	59.3	78.9	60.8	49.8	54.1	64	57.8	65.5	61.0
KWA Wildcat Gen	Providence									66.5	56.5	77.2	61.4
KWA Wildcat Gen	Zenda	**60.7**	58.4	43.5	59.7	**86.1**	60.8	**66.1**	55.2	**75.3**	58.2	58.0	61.5
Polansky	High Country											64.7	60.4
Polansky	Paradise							**79.2**	54.2	73.7	56.2		
Polansky	Rock Star							**67.5**	54.6	**78.2**	55.6	71.4	60.9
WestBred	WB4269	55	57	48.5	58.9	**86.8**	60.3	**61.8**	54.3	67.1	55.7	**75.3**	60.4
WestBred	WB4401					**108.8**	61.5	**92**	57.8	73	53.8	**84.4**	60.4
WestBred	WB4422									**85**	58	**80.2**	61.7
WestBred	WB4523									72.3	54.1	**80.7**	61.0
WESTBRED	WB4632	**61.5**										61.5	60.5
WestBred	WB4699					**94.5**	58.7	39.5	50.7	**82.6**	56	**76.4**	60.0
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	72.5	60.8

Yields above average are highlighted in bold.

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

		2017		2018		2020		2021		2022		2023	
Company	Variety	Yield, bu/a	Test weight, lb/bu	Yield, bu/a	Test weight, lb/bu	Yield, bu/a	Test weight, lb/bu	Yield, bu/a	Test weight, lb/bu	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	**94**	55.2				
AgriMAXX	492							**99.9**	56.3	81	57.5		
AgriMAXX	503					**113.9**	60.1	**102.5**	56.2	80.6	55.7	77	58.8
AgriMAXX	505					**112.2**	60.7	**100.3**	57.2	**88.9**	57.7	**85.7**	60.2
AgriMAXX	513							**99.3**	55	**86.9**	56.7	81.4	59.5
AgriMAXX	514							**93.3**	54.4	**87.5**	55.3	**84.6**	58.8
AgriMAXX	516									83.8	55.9	**92.3**	59.4
AgriMAXX	525											80.1	58.7
AgriMAXX	535											84.2	60.2
AgriMAXX	EXP 2105									**87.1**	55.1		
Beachner	GB0206							**96.4**	53.7	**86.2**	55.8	**90.7**	58.4
Beachner	GB0208							89.9	55.1	**88.7**	56.2	83.4	59.6
Beachner	Roane							71.7	56.4				
Becks	726							**101**	54.8				
Becks	727							**95.2**	56.3				
Becks	730							76.3	53.9				
Becks	720											81.9	59.6
Becks	722											83.3	58.9
Becks	724											**88.1**	60.1
Becks	725											81.2	59.2
Becks	732											**90.9**	59.4

Yields above average highlighted in bold.

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

		2017		2018		2020		2021		2022		2023	
Company	Variety	Yield, bu/a	Test weight, lb/bu	Yield, bu/a	Test weight, lb/bu	Yield, bu/a	Test weight, lb/bu	Yield, bu/a	Test weight, lb/bu	Yield, bu/a	Test weight, lb/bu	Yield, bu/a	Test weight, lb/bu
DuPont Pioneer	25R40	79.5	56.8	**66.1**	56.7	**105.8**	58.1						
DuPont Pioneer	25R50			57.1	57	97.5	59.3			81.8	54.6		
DuPont Pioneer	25R61	71.4	57.8	**61.6**	57.9	87.5	58.3						
DuPont Pioneer	25R74	80.8	57.6	**65.4**	56.3	**110.4**	61.6			**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						
NSS	EXP1410							**98.0**	54.8				
NSS	EXP1415							85.2	54.7				
NSS	EXP1419							88.6	53.6			81.1	60.1
NSS	EXP1425							**103.8**	53.9				
NSS	EXP1450							78.6	54.0				
NSS	EXP1472							**96.1**	56.8				
NSS	EXP15											**89.4**	58.5
NSS	EXP24											82.7	59.7
NSS	EXP94											80.7	58.8
WestBred	WB2606									82.8	56.3	72.8	58.8
Overall average, soft red winter wheat		78.2	57.5	59.9	57	102.4	59.5	90.4	54.9	85.2	56	83.8	59.3

Yields above average highlighted in bold.

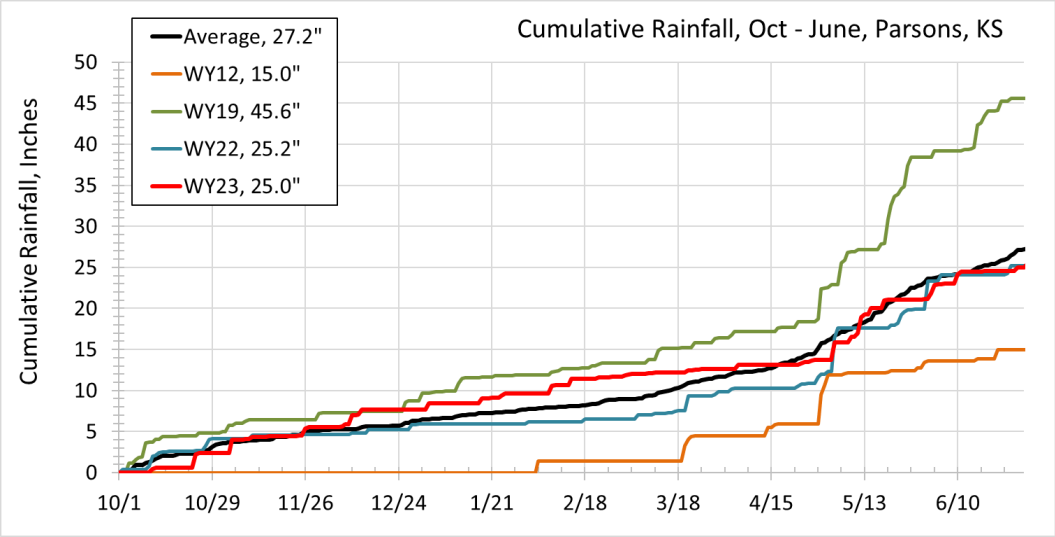

Figure 1. Cumulative rainfall during the winter wheat growing season (October 1 - June 30). Rainfall totals during this period are given for each year.

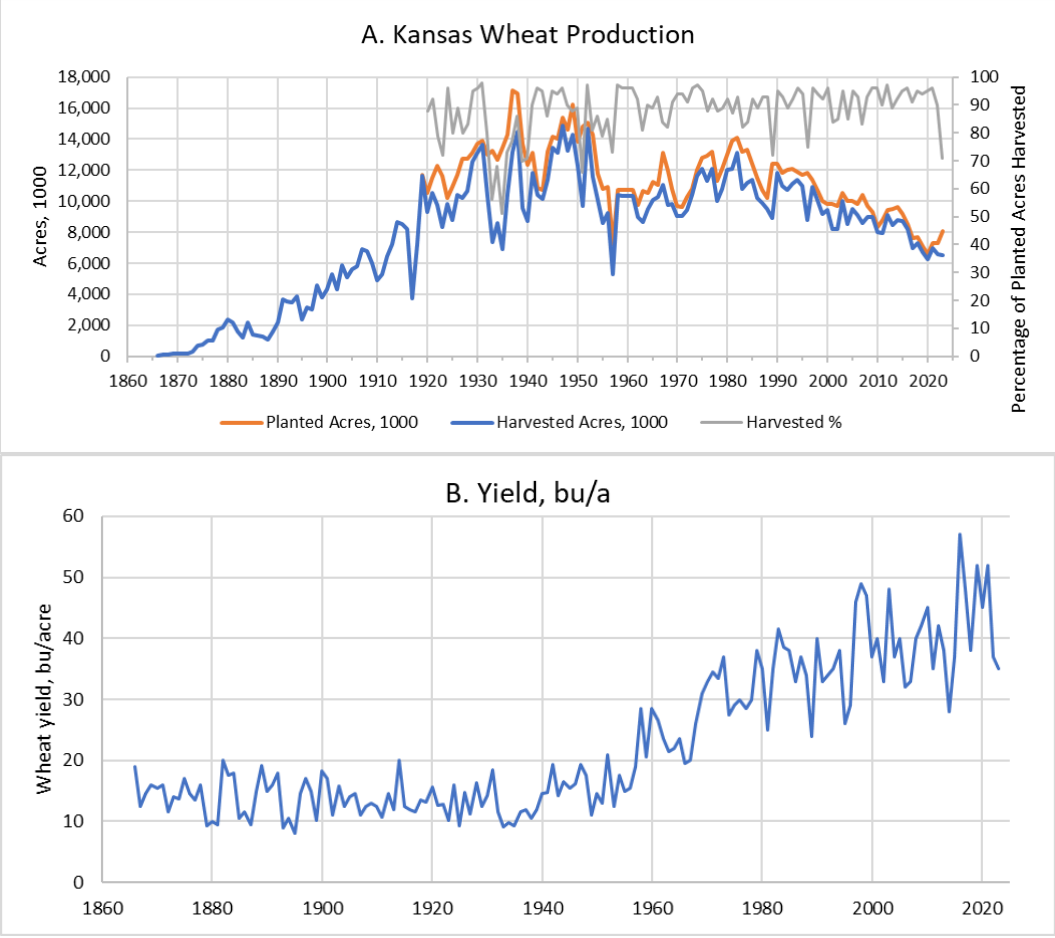

Figure 2. A. Statewide historical wheat production, (left axis) acres planted (1,000), acres harvested (1,000), and (right axis) percent of planted acres harvested. B. Average statewide winter wheat yields bu/acre for Kansas.

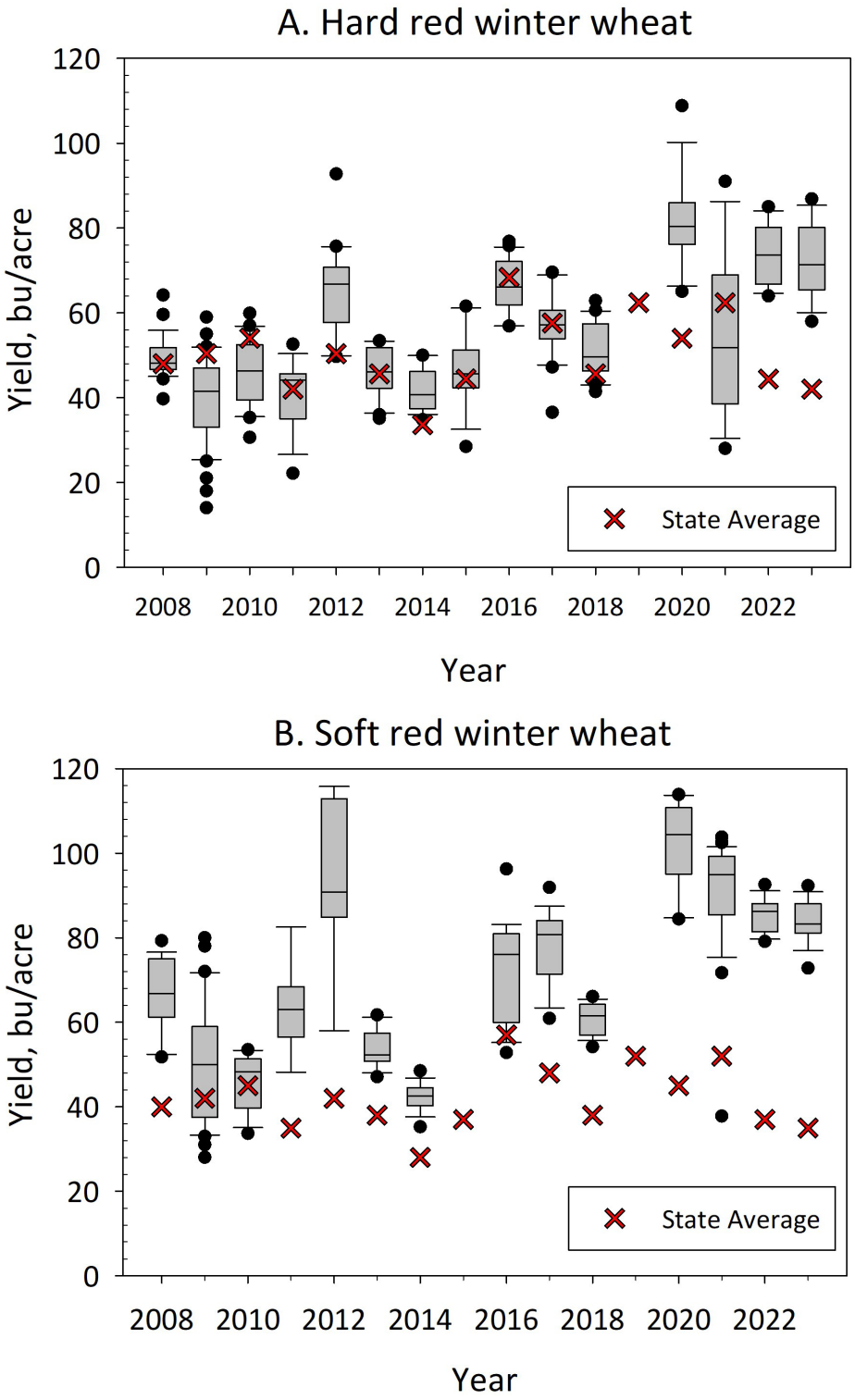

Figure 3. Winter wheat yield for (A) hard-red wheat and (B) soft-red wheat from variety trials in southeast Kansas from 2008 through 2023. In 2019, variety testing was abandoned due to flooding and poor stands. The line in the middle of the box plots is the median yield of all varieties. The upper and 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 statewide yields for hard red winter wheat from Kansas are highlighted as a red X in both graphs.