Wheat Variety Test Results for South Central Kansas - 2022

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Cover Page Footnote

These data are part of the 2022 South Central Kansas Extension Wheat Plots, a collaboration of K-State Research and Extension county agriculture agents in Sedgwick, Sumner, Harvey, Harper, and Cowley counties with the help of K-State Research and Extension specialists. Each trial is hosted by a local cooperating farmer who provides chemicals and tillage operations, if applicable. Our cooperating farmers for 2022 were Greg Neville (Andale), Kohls Farm (Clearwater), Tim Turek (Caldwell), Stan Jost (Sedgwick), Ken Bryant (Arkansas City), Davis Farms (Harper), and Doug Hisken (Belle Plaine).

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Summary

South central Kansas is the highest producing wheat region in Kansas. This report summarizes the results of winter wheat variety tests for 2021-2022 in six locations.

Introduction

Selecting wheat varieties is a vital step in raising a successful winter wheat crop. In 2022, much of the Kansas wheat crop faced drought stress for the majority of the growing season. As a result, fields sown after fall crop harvest were impacted more by the lack of moisture than fields planted to wheat following wheat. With high crop production input costs, getting the most out of variety selection is important for wheat producers.

Each year's wheat crop encounters great weather variability in South central Kansas (Lollato et al., 2020). For this reason, wheat varieties can present different yield responses due to the environment (Jaenisch et al., 2021; Munaro et al., 2020) and soil characteristics (Lollato et al., 2019). This variability determines if, what, and/or when the crop will face yield-limiting factors such as drought, extreme temperatures, diseases, weeds, insects, nutrient issues, etc. Therefore, regional variety tests are an important tool to support growers' decision-making process. Generating regional data can help producers choose varieties that will perform well in their production systems, as well as improve management and variety-selection recommendations (Munaro et al., 2020).

Experimental Procedures

The South Central Kansas Extension Wheat Variety Tests were conducted in six replicated trials in five counties in south central Kansas: Andale and Clearwater (Sedgwick Co.), Caldwell (Sumner Co.), Newton (Harvey Co.), Arkansas City (Cowley Co.), and Harper (Harper Co.). The same 28 varieties were tested at each location.

Tillage practices and chemical applications were consistent with the host field and managed by the cooperating grower. The trials in Clearwater and Newton were no-till; minimum tillage in Caldwell and Arkansas City; and conventional till in Andale and Harper. Andale, Newton, and Caldwell trials received a fungicide application. Clear-

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water, Arkansas City, and Harper did not receive a fungicide application. All locations were non-irrigated.

Plots were six, 9-in. wide rows, about 30-ft long, and were sown using a Hege plot drill. All locations were drilled at 1.2 million seeds/a. Trials were planted on the following dates: Harper (10/5/21), Caldwell (10/5/21), Arkansas City (10/6/21), Andale (10/6/21), Newton (10/7/21), Clearwater (10/7/21). Harvest dates were: Arkansas City (6/16/22), Caldwell (6/16/22), Harper (6/16/22), Newton (6/27/22), Clearwater (6/30/22), and Andale (7/1/22). To compare the varieties, yield (Table 1) and test weight (Table 2) were assessed, however, test weight is not discussed in this manuscript.

The study was established as a randomized complete block design with 3 replications and 28 varieties. In each location, all 28 varieties (recommended for the area) were similarly managed, using common practices for the region. The 28 varieties had a range of yield potentials, maturities, abiotic tolerances, disease resistances/susceptibilities, and other agronomic characteristics that one year of yield data, one planting date, and one fertilizer/fungicide/herbicide management system may not highlight.

Grain yield was analyzed for each individual location through a one-way analysis of variance using PROC GLIMMIX of SAS v. 9.4. Varieties were considered fixed factors and replications were random effects. A combined analysis across locations was performed considering location and replication nested within location as random factors.

Results and Discussion

The main weather event this crop experienced was drought. The 2022 wheat crop had adequate moisture at sowing and establishment, a warmer than normal fall, and slightly cooler January to March with lower than normal precipitation. The cool dry conditions extended to the first week of May and the crop experienced drought stress. The second week of May brought temperatures 9–12 degrees above the long-term average. From late May through harvest, the 2022 south central Kansas wheat crop experienced above normal precipitation (Lollato et al., 2022). For wheat fields further in physiological development, the moisture arrived too late to have a major impact. Other fields received the moisture around grain fill time and yields benefited. None of the trials experienced heavy disease infestations, though isolated areas in the region were impacted significantly by wheat streak mosaic virus. A Belle Plaine trial was not included in this report as a result of heavy wheat streak mosaic virus infestation.

All six sites were impacted by drought, which lead to an average yield across all locations of 47.4 bu/a, down 10.5 bu/a from 2021. The highest yielding trials were Andale (61.9 bu/a) and Arkansas City (51.3 bu/a) (Table 1). The lowest yielding trials were Harper (36.6 bu/a) and Clearwater (38.0 bu/a). Overall, wheat yields ranged from 26.2 to 70.5 bu/a. The maximum yield difference between the highest and lowest yielding varieties in one location was 25.6 bu/a in Caldwell.

When evaluating the average variety yield across all sites, the five highest yields varied from 50.4 (LCS Atomic AX) to 52.7 bu/a (WB4401.) Nineteen varieties yielded in the top fourth in at least one of the six locations (Table 1). The varieties WB4401, LCS

Helix AX, and AP18 AX yielded in the top fourth in four locations. No varieties were in the top 25% at all six locations. In the combined analysis, 22 varieties were in the highest statistical yielding group. Six varieties did not reach the top statistical group when yields were averaged across all locations: Strad CL+, Zenda, Uncharted, AM Cartwright, and Butler's Gold.

Conclusions

Overall, several varieties provided good yields in the south central trials. Variability among sites was observed, which highlights the importance of choosing different varieties to improve yield stability in wheat production systems. Each year has different weather conditions, and 2022 was a challenging year for wheat growers due to the drought condition. However, the results are important to highlight the varieties' responses in a drier than the average environment. While the trials provide valuable information for local growers, they should be utilized along with other variety selection resources. When selecting wheat varieties, it is important to use multiple years of yield data, along with information provided by K-State Research and Extension specialists and seed company representatives.

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Acknowledgments

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Table 1. Wheat grain yield (bu/a) results for 2022 at Andale, Clearwater, Caldwell, Newton, Arkansas City, Harper, and the average for all sites

Variety	Source	All	Andale	Clearwater	Caldwell	Newton	Ark City	Harper
AM Cartwright	AgriMaxx	41.0	53.9	31.2	31.8	47.6	41.5	**40.2**
AP Bigfoot	AgriPro	**45.8**	58.1	33.7	39.4	45.2	50.4	**41.8**
AP EverRock	AgriPro	**45.8**	**63.7**	33.7	46.7	**50.1**	49.0	**31.7**
AP18 AX	AgriPro	**50.6**	**65.6**	**41.9**	**54.7**	43.1	56.6	**41.4**
Bob Dole	AgriPro	**47.5**	**62.9**	39.9	**53.2**	**51.0**	50.0	27.8
SY Monument	AgriPro	**49.6**	**63.6**	**41.8**	**51.4**	47.7	**62.9**	30.2
SY Wolverine	AgriPro	**47.4**	62.9	37.7	46.1	**52.8**	51.8	**32.9**
AG Icon	AGSECO	**47.9**	60.3	39.3	**49.7**	43.9	**59.8**	**34.1**
AG Radical	AGSECO	**48.7**	**67.6**	35.8	45.2	**50.7**	**60.2**	**39.1**
KS Ahearn	KWA	**47.1**	**69.4**	**44.9**	46.1	**49.6**	40.6	**39.3**
KS Hatchett	KWA	**47.2**	59.8	36.8	44.8	**48.8**	49.3	**43.7**
KS Providence	KWA	**51.7**	**68.4**	38.8	X	**54.4**	51.5	**45.3**
Zenda	KWA	44.4	**62.0**	36.3	45.0	**51.2**	44.6	**33.3**
LCS Atomic AX	LCS	**50.4**	**64.5**	40.3	**48.8**	**51.1**	55.2	**42.5**
LCS Helix AX	LCS	**51.5**	**65.3**	**47.7**	**55.1**	**52.6**	55.0	33.7
LCS Julep	LCS	45.6	58.6	36.0	38.3	**50.7**	45.5	**44.2**
LCS Photon AX	LCS	**47.1**	55.3	37.1	**49.6**	45.4	54.8	**40.4**
LCS Valiant	LCS	**50.2**	**66.6**	35.8	**57.4**	**56.3**	52.0	**35.3**
Butler's Gold	OGI	39.9	54.2	31.6	42.8	35.0	40.0	**35.9**
Doublestop CL+	OGI	**47.6**	56.2	34.8	**48.6**	**51.3**	52.4	**39.5**
Smith's Gold	OGI	**46.9**	57.9	38.9	46.6	**49.3**	49.5	**39.3**
Strad CL+	OGI	45.1	53.8	33.6	**49.5**	41.0	50.5	**35.1**
Uncharted	OGI	42.4	55.2	34.2	44.3	42.1	46.6	26.9
Paradise	Polansky	**47.0**	58.8	39.2	47.2	44.0	52.9	**40.0**
Rock Star	Polansky	**49.3**	**68.2**	38.4	**48.5**	46.0	52.9	**41.8**
WB4269	WestBred	**47.4**	**61.8**	**42.2**	**54.1**	**50.9**	52.3	28.1
WB4401	WestBred	**52.7**	**70.5**	**41.9**	**50.1**	**52.4**	56.0	**36.2**
WB4699	WestBred	**48.4**	**68.9**	39.7	42.0	**51.7**	54.3	26.2
Average		47.4	61.9	38.0	47.3	48.4	51.3	36.6
Min		39.9	53.8	31.2	31.8	35.0	40.0	26.2
Max		52.7	70.5	47.7	57.4	56.3	62.9	45.3

*Values, highlighted in gray and bold, belong statistically to the highest yielding group. We cannot say values within the group are different from each other.

X - Plots lost to planting or harvest errors. Not enough data to post.

Table 2. Wheat test weight (lb/bu) results for 2022 at Andale, Clearwater, Caldwell, Newton, Arkansas City, Harper, and the average for all sites

Variety	Source	All	Andale	Clearwater	Caldwell	Newton	Ark City	Harper
AM Cartwright	AgriMaxx	57.5	56.0	57.3	57.8	56.2	57.7	60.3
AP Bigfoot	AgriPro	58.4	**57.2**	57.3	59.3	56.7	58.9	60.9
AP EverRock	AgriPro	58.0	**56.8**	57.7	59.6	57.4	59.2	57.6
AP18 AX	AgriPro	57.5	56.4	56.7	57.5	55.7	58.1	60.5
Bob Dole	AgriPro	57.5	**57.0**	57.4	59.4	54.9	58.7	57.8
SY Monument	AgriPro	57.5	55.1	57.0	59.6	54.6	60.1	58.8
SY Wolverine	AgriPro	57.1	53.6	56.4	60.0	56.5	59.8	56.4
AG Icon	AGSECO	58.1	**56.9**	57.7	59.7	55.2	59.9	59.2
AG Radical	AGSECO	57.8	**56.7**	57.2	58.7	55.3	59.4	59.2
KS Ahearn	KWA	57.2	55.5	57.4	57.3	56.4	57.4	58.6
KS Hatchett	KWA	57.3	56.3	56.6	57.3	56.8	57.5	59.1
KS Providence	KWA	58.2	**56.7**	56.8	X	57.2	58.8	**61.5**
Zenda	KWA	**59.5**	**58.1**	58.5	60.2	57.5	60.6	**61.5**
LCS Atomic AX	LCS	58.0	**57.6**	57.0	59.3	57.0	58.4	58.9
LCS Helix AX	LCS	**59.1**	**57.8**	**59.6**	**61.4**	57.5	59.3	58.7
LCS Julep	LCS	**59.9**	55.6	**59.3**	**61.6**	57.3	**60.8**	**64.9**
LCS Photon AX	LCS	**60.0**	**57.4**	**60.1**	**60.7**	**58.8**	60.1	**62.8**
LCS Valiant	LCS	**58.8**	**57.6**	58.1	59.6	57.3	60.0	59.7
Butler's Gold	OGI	58.1	**57.2**	55.6	60.1	56.3	58.3	60.8
Doublestop CL+	OGI	**59.9**	**58.0**	57.7	60.5	**59.8**	**61.5**	**62.5**
Smith's Gold	OGI	**59.2**	**56.9**	**59.8**	60.2	57.2	59.5	**61.7**
Strad CL+	OGI	58.6	**57.0**	57.2	60.7	56.4	60.1	60.8
Uncharted	OGI	57.0	55.9	56.6	57.4	56.1	57.9	X
Paradise	Polansky	57.8	56.3	56.4	59.4	56.5	58.7	59.2
Rock Star	Polansky	58.4	**57.4**	57.7	59.6	55.8	59.7	60.0
WB4269	WestBred	58.2	56.2	58.1	**60.7**	57.1	59.0	58.3
WB4401	WestBred	57.1	54.3	56.1	58.8	55.9	58.0	60.2
WB4699	WestBred	56.0	55.5	55.3	57.6	55.4	56.7	55.4
Average		58.1	56.5	57.4	59.4	56.6	59.1	59.8
Min		56.0	53.6	55.3	57.3	54.6	56.7	55.4
Max		60.0	58.1	60.1	61.6	59.8	61.5	64.9

*Values, highlighted in gray and bold, belong statistically to the highest yielding group. We cannot say values within the group are different from each other.

X - Plots lost to planting or harvest errors. Not enough data to post.