

Wheat Variety Test Results for South Central Kansas - 2021

J. Seiler, R. Hein, R. Flaming, J. Carr, K. Nordyke, R. Lollato, and B. Pedreira

Summary

South central Kansas is an important winter wheat production area in the state. This report summarizes the results of winter wheat variety tests for 2020-2021 in five locations.

Introduction

Variety selection is one of the most important steps in assuring the success of a wheat crop. In 2021, Kansas was again the highest producing wheat state in the country. The main wheat production region of the state, south central Kansas, experiences great weather variability (Lollato et al., 2020). For this reason, coupled with the different variety-specific agronomic and genetic traits and area of adaptation (Sciarresi et al., 2019), wheat varieties can yield differently in response 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, disease, weeds, insects, and nutrient issues, along with others. Thus, regional variety tests can be helpful in supporting growers' decision-making process. Data from these trials can help producers choose varieties that will perform well in their fields, as well as improve management and variety-selection recommendations (Munaro et al., 2020).

Procedures

The South Central Kansas Extension Wheat Variety Tests were conducted in seven replicated trials in five locations in south central Kansas: Clearwater (Sedgwick Co.), Belle Plaine and Caldwell (Sumner Co.), Harper (Harper Co.), and Arkansas City (Cowley Co.). The same 30 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 Belle Plaine were no-till; minimum tillage in Caldwell and Arkansas City; and conventional till in Harper. All five locations received a fungicide application and were non-irrigated.

Plots were six, 9-in. wide rows, about 30-ft long, and were sown using a Hege plot drill. The locations, planted in the first week of October, were drilled at 1.2 million seeds/a: Clearwater (10/5/20), Harper (10/5/20), Belle Plaine (10/6/20), and Arkansas City

(10/6/20). Drilling in Caldwell was delayed due to a lack of soil moisture. This location was drilled on November 9. The seeding rate was increased to 1.4 million seeds/a to compensate for later planting which usually decreases yield environment (Bastos et al., 2020). All trial locations were harvested on June 18, 2021.

The study was established as a randomized complete block design with three replications and 30 varieties. All 30 varieties in a location were managed similarly and were recommended varieties for the area. Common management practices for the region were used. The 30 varieties had a range of yield potentials, maturities, abiotic tolerances, disease resistances/susceptibilities, and other agronomic characteristics which 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 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 events this crop experienced were dry planting conditions, an extreme cold period in February, a very dry April, and the growing season ended with a cooler, wetter period starting the second week of May that aided grain filling. None of the trials experienced heavy disease infestations.

All five sites presented good yield potential with an average yield of all locations of 57.9 bu/a. The highest yielding trials were at Belle Plaine (67 bu/a) and Clearwater (59.5 bu/a) (Table 1). Overall, wheat yield ranged from 32.5 to 76.4 bu/a. When evaluating the averages of all sites, the five highest yields varied from 62 to 67 bu/a.

Nineteen varieties yielded in the top statistical group in at least one of the five locations (Table 1). Varieties AP18 AX and Showdown both yielded in the highest statistical group in four locations. No varieties were in the top group at all five locations. Eleven varieties failed to reach the top yielding group at all locations. In the combined analysis, AP18 AX, Bob Dole, AG Radical, LCS Atomic AX, Gallagher, Showdown, Smith's Gold, Paradise, Rock Star, and WB4401 were in the highest yielding group.

Conclusions

A number of varieties in the trial provided great yields in South Central Kansas. The variety test indicates variability among sites and highlights the importance of choosing several varieties to improve yield stability. Each year brings different wheat growing conditions. How the wheat crop responds to the differences is dependent on variety.

Farmers should look for consistent performers offering agronomic characteristics that fit their goals for a particular field. It is beneficial to utilize multiple varieties to minimize the risks that come with each cropping season. While the trials provide valuable information for local farmers, they should be utilized along with other variety selection resources. When selecting wheat varieties, it is vital to use multiple years of yield data,

along with information provided by Extension Specialists and seed company representatives.

References

- Jaenisch, B. R., Munaro, L. B., Bastos, L. M., Moraes, M., Lin, X., & Lollato, R. P. (2021). On-farm data-rich analysis explains yield and quantifies yield gaps of winter wheat in the US central Great Plains. *Field Crops Research*, 272, 108287. <https://doi.org/10.1016/j.fcr.2021.108287>
- Lollato, R. P., Ochsner, T. E., Arnall, D. B., Griffin, T. W., & Edwards, J. T. (2019). From field experiments to regional forecasts: Upscaling wheat grain and forage yield response to acidic soils. *Agronomy Journal*, 111(1), 287-302. <https://doi.org/10.2134/agronj2018.03.0206>
- Lollato, R. P., Bavia, G. P., Perin, V., Knapp, M., Santos, E. A., Patrignani, A., & DeWolf, E. D. (2020). Climate-risk assessment for winter wheat using long-term weather data. *Agronomy Journal*, 112(3), 2132–2151. <https://doi.org/10.1002/agj2.20168>
- Munaro, L. B., Hefley, T. J., DeWolf, E., Haley, S., Fritz, A. K., Zhang, G., ... & Lollato, R. P. (2020). Exploring long-term variety performance trials to improve environment-specific genotype × management recommendations: A case-study for winter wheat. *Field Crops Research*, 255, 107848. <https://doi.org/10.1016/j.fcr.2020.107848>
- Sciarresi, C., Patrignani, A., Soltani, A., Sinclair, T., & Lollato, R. P. (2019). Plant traits to increase winter wheat yield in semiarid and subhumid environments. *Agronomy Journal*, 111(4), 1728-1740. <https://doi.org/10.2134/agronj2018.12.0766>

Acknowledgments

These data are part of the 2021 South Central Kansas Extension Wheat Plots, a collaboration of K-State Research and Extension County Agriculture Agents in Sedgwick, Sumner, Harvey, Harper, and Cowley County with the help of K-State Extension Specialists. Each trial is hosted by a local cooperating farmer who provides chemicals and tillage operations, if applicable. Our cooperating farmers for 2021 were Kohls Farm (Clearwater), Doug Hisken (Belle Plaine), Tim Turek (Caldwell), Davis Farms (Harper), Ken Bryant (Arkansas City), Greg Neville (Andale), and Stan Jost (Sedgwick).

Brand names appearing in this publication are for product identification purposes only. No endorsement is intended, nor is criticism implied of similar products not mentioned. Persons using such products assume responsibility for their use in accordance with current label directions of the manufacturer.

2022 SEREC AGRICULTURAL RESEARCH

Table 1. Wheat grain yield (bu/a) and test weight (TW; lb/bu) results for 2021 at Clearwater, Belle Plaine, Caldwell, Arkansas City, Harper, and the average for all sites

Variety	Yield	All sites		Clearwater		Belle Plaine		Caldwell		Arkansas City		Harper	
		TW	Yield	TW	Yield	TW	Yield	TW	Yield	TW	Yield	TW	Yield
Name	Source	bu/a	lb/bu	bu/a	lb/bu	bu/a	lb/bu	bu/a	lb/bu	bu/a	lb/bu	bu/a	lb/bu
AM Cartwright	AgriMaxx	55.8	59.2	57.3	59.3	64.4	57.9	52.7	58.8	47.9	62.0	56.9	57.9
AP EverRock	AgriPro	54.1	58.9	59.4	59.3	62.8	58.4	45.6	59.9	55.0	60.9	47.6	56.1
SY Achieve CL2	AgriPro	56.3	60.8	60.1	60.0	64.9	59.9	52.5	61.6	47.7	61.9	*	*
SY AP18 AX	AgriPro	67.0	59.5	68.9	58.6	72.1	58.8	53.4	59.9	68.5	61.3	72.1	58.7
SY Bob Dole	AgriPro	62.0	61.0	60.2	60.4	69.1	59.6	62.5	60.2	52.4	65.2	65.9	59.6
SY Monument	AgriPro	55.6	57.8	56.9	58.3	60.7	56.9	53.8	58.6	57.6	58.9	49.1	56.2
AG Icon	AGSECO	55.9	59.3	56.1	59.4	63.7	59.6	51.3	59.5	56.2	61.2	52.1	57.1
AG Radical	AGSECO	60.7	60.2	60.9	60.7	70.7	59.9	51.3	60.9	69.4	62.6	51.4	56.8
KS Hatchett	KWA	54.4	60.1	60.1	59.7	64.6	61.2	47.5	62.5	*	*	45.3	56.9
KS Western Star	KWA	52.2	59.0	55.1	60.2	65.0	59.1	49.4	58.2	52.6	61.4	38.9	56.0
Larry	KWA	58.1	58.9	63.3	59.6	66.9	58.0	50.1	59.4	57.2	60.6	53.0	57.1
Zenda	KWA	55.4	61.2	55.4	61.1	67.3	60.2	47.4	62.0	51.2	62.5	55.7	60.2
LCS Atomic AX	LCS	60.6	60.4	65.9	60.0	69.2	58.8	54.3	61.0	52.9	61.6	*	*
LCS Chrome	LCS	58.4	59.7	58.7	60.3	69.3	58.6	57.2	58.9	54.9	62.5	51.6	58.3
LCS Helix AX	LCS	57.8	59.4	59.0	60.3	67.8	59.5	56.0	59.5	54.8	61.1	51.2	56.5
LCS Julep	LCS	56.0	60.2	61.0	60.8	64.7	58.2	52.8	61.2	55.2	61.2	46.4	59.6
LCS Photon AX	LCS	56.6	61.7	56.8	62.1	67.4	61.8	47.9	61.0	50.6	62.6	60.3	61.1
Butler's Gold	OGI	49.5	60.2	51.8	59.0	59.2	59.3	44.2	61.5	32.5	61.0	59.7	60.4
Doublestop CL+	OGI	56.1	61.4	57.8	61.3	62.2	60.9	56.4	61.3	41.2	61.6	62.9	61.8
Gallagher	OGI	61.7	60.9	67.7	60.3	67.6	58.9	49.6	61.1	61.8	63.3	*	*
Green Hammer	OGI	57.5	60.1	55.9	59.3	63.2	59.6	53.6	59.9	47.6	61.8	67.1	59.8
Showdown	OGI	64.2	59.5	66.1	59.9	76.4	59.3	62.1	61.0	58.8	60.3	57.5	57.1
Smith's Gold	OGI	61.1	60.5	58.8	60.8	74.6	59.8	49.4	60.6	62.3	61.7	60.2	59.5
Strad CL+	OGI	57.2	60.2	59.7	61.0	66.8	60.3	56.1	60.4	38.2	59.8	65.3	59.5
Uncharted	OGI	56.7	59.5	55.8	58.9	67.9	59.0	49.6	59.6	52.7	61.5	57.3	58.3
Paradise	Polansky	62.8	60.1	59.8	59.9	66.1	60.6	57.6	59.3	55.4	60.5	75.0	60.3
Rockstar	Polansky	64.9	59.2	63.8	60.0	76.2	58.1	63.4	59.4	56.2	61.2	65.0	57.5
WB4269	WestBred	53.2	59.8	56.4	60.3	61.5	60.1	48.3	59.5	50.6	61.7	48.9	57.3
WB4401	WestBred	61.9	61.3	59.7	60.8	72.2	59.5	51.4	61.5	57.0	63.0	69.3	61.4
WB4699	WestBred	53.9	58.3	56.9	58.9	66.5	57.9	43.9	60.1	58.2	60.3	44.2	54.6
Average		57.9	59.9	59.5	60.0	67.0	59.3	52.4	60.3	53.7	61.6	56.7	58.3
Min		49.5	57.8	51.8	58.3	59.2	56.9	43.9	58.2	32.5	58.9	38.9	54.6
Max		67.0	61.7	68.9	62.1	76.4	61.8	63.4	62.5	69.4	65.2	75.0	61.8

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.

*Plots lost to planting or harvest errors.