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# Corn and Soybean Production – 2023 Summary

Gretchen F. Sassenrath
*Kansas State University*, gsassenrath@ksu.edu

Jane Lingenfelser
*Kansas State University*, jling@ksu.edu

Xiaomao Lin
*Kansas State University*, xlin@ksu.edu



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# Corn and Soybean Production – 2023 Summary

*G.F. Sassenrath, J. Lingenfelser[1], and X. Lin[1]*

## Summary

Soybean and corn varieties were tested in replicated field trials at the Southeast Research and Extension Center in Parsons through the Kansas State University variety testing program. In total, 21 corn varieties and full-, mid-, and short-season maturity checks were tested. Fifteen full-season and nine double-cropped soybean varieties were tested, with three maturity checks ranging in maturity from 3.1 to 5.2. Fourteen sunflower varieties were also tested. The 2023 summer crop growing season was nearly average for both temperature and rainfall. Yields from the variety tests were slightly lower than the 13-year average.

## Introduction

Kansas State University performs crop variety testing annually at several locations throughout the state. The Southeast Research and Extension Center tests crop varieties of corn, soybeans, and sunflowers. Variety selection is an important determinant of potential yield. Variety selection is also an important factor in disease and insect management. The crop variety tests performed through the Kansas State University variety testing program allow a comparison of variety performances under common growth conditions and management practices in multiple regions throughout the state.

Environmental conditions are key factors in determining crop success, together with soil characteristics, fertility, and management practices. Of the environmental factors, temperature and moisture (rainfall) are primary determinants of crop performance. Temperature is critical at certain crop developmental stages and plays a role in yield potential. Cumulative Growing Degree Days (GDD) are commonly used to estimate crop growth and developmental stage. Extreme Degree Days (EDD) are an indication of the high-temperature exposure during the growing season and can negatively affect crop growth, development, and yield (Zhang et al., 2015; Zhang and Lin, 2016).

This report summarizes corn, double-cropped soybean, and sunflower variety performance in Parsons, KS, for 2023. Full-season soybean varieties were abandoned because of a planting error.

[1] Department of Agronomy, College of Agriculture, Kansas State University.

## Experimental Procedures

The Kansas State University Crop Performance Tests were conducted in replicated research fields throughout the state. Individual variety results are available at the K-State Crop Performance Test webpage (*http://www.agronomy.k-state.edu/services/crop-performance-tests/*). This report summarizes crop production for southeast Kansas, focusing on crops grown at Parsons and southeast Kansas. In 2023, crop varieties of corn, soybeans, and sunflowers were planted in 30-in. rows in upland fields (Parsons silt loam soil) at the Southeast Research and Extension Center in Parsons using conventional management and fertility. All crop variety trials are managed with conventional tillage. All crops germinated and appeared healthy.

Twenty-one corn varieties were planted on April 18, 2023 in 30-in. rows at a rate of 22,500 seed per acre and harvested on October 30, 2023,. Plots were fertilized at a rate of 125-30-50 lb/acre N-P-K. Weed control was atrazine 4l (74 oz/acre), Charger Max (24 oz/acre), glyphosate (24 oz/acre) and 2-4D (24 oz/acre).

Full-season soybeans were planted in 30-in. rows but abandoned because of a planting error. Double-cropped soybeans were planted on June 26, 2023, in 30-in. rows after wheat harvest. No fertilizer was applied. Weeds were controlled with glyphosate (1 qt/acre), 2-4D lv6 (1.5 pt/acre), metribuzin (8 oz/acre), and Authority XL (6 oz/acre). Double-cropped beans were harvested on November 3, 2023.

Double-crop oilseed sunflowers were planted in 30-in. rows following wheat harvest on April 28, 2023. Plots were fertilized at a rate of 110-46-60 lb/acre N-P-K. Weeds were controlled with glyphosate (1 qt/acre), 2-4D lv6 (1.5 pt/acre), Prowl (50 oz/acre), Brawl 2 (1 qt/acre), Spartan charge (8 oz/acre), and Clethodium (10 oz/acre). Sunflowers were harvested on Nov. 1, 2023

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 SEREC in Parsons. Cumulative rainfall was calculated throughout the year and during the summer growing season (March – Sept.). Cumulative growing degree days were calculated using base of 50°F during the summer growing season. The number of days of high temperatures (greater than 90°F) were calculated during the summer growing season. Extreme degree days were calculated as temperatures above 86°F.

## Results and Discussion

Rainfall during the 2023 summer growing season (beginning with corn planting in March through the end of September) was 27.2 in., slightly below the 13-year average of 33.1 in. (Figure 1). Rainfall was unevenly distributed, with two major rain events separated by long dry periods. The first major rainy period occurred from May 4 – May 18, a 16-day period that received 7.3 in. of rain. The subsequent 77-day period from May 19 through August 4 received only an additional 6.65 in. of rain. The second major rainy period from Aug. 5 – Aug. 14 brought an additional 6.67 in. of moisture over the 10-day period, bringing the total growing-season rainfall to near-normal levels. The

summer growing season had total precipitation above that received during the very dry 2012 and 2022 growing seasons (Figure 1).

Temperature during the 2023 summer growing season was average. The cumulative growing degree days (GDD, base 50) were well-below 2012, and slightly above the 13-year average (Figure 2). The extent of high temperatures during the growing season can be seen by the number of days with temperatures above 90°F (Figure 3). The total of high-temperature days (43) in 2023 was slightly less than average (46), and much less than the number of days recorded in 2012 (72) and 2022 (71). Similarly, the number of Extreme Degree Days (EDD, base 86°F) were just slightly above normal (Figure 4).

The area planted to corn has been increasing steadily in Kansas over the past 50 years. In 2023, 5.75 million acres of corn were planted in Kansas, a slight increase from 2022, with 89% harvested for grain. Grain yield statewide (Figure 5; 119 bu/acre) was below the 50-year average (125 bu/acre). Yield of corn in the variety trials was lower than the state average, and lower than in previous years (Figure 5).

Soybean acreage was less in 2023 than in 2022, with 4.43 million acres planted compared to 5.05 million acres planted in 2022. Planted soybean acres are more consistently harvested, with an average of 97% of planted acres harvested. This year saw an increase in abandoned soybean acres, as only 91% of planted acres were harvested. The average statewide yield in 2023 was also reduced, with an average of 26 bu/acre, significantly less than the previous 10 years. Soybean yields in the double-cropped test were lower than the previous years at Parsons, but slightly above the statewide average (Figure 6).

Sunflower acreage has declined steadily over the past few years. In 2023, only 34,000 acres of oilseed sunflowers were planted in Kansas, with 91% of those acres harvested. Yields statewide were also lower than in previous years, with 917 lb/acre, below the 13-year average of 1322 lb/acre. Yields from the variety trials at Parsons were at the state average (Figure 7).

## Conclusions

2023 was a more moderate growing season than 2022, which was reflected in the crop yields.

## Acknowledgements

This data is part of the 2023 Kansas Performance Tests with Corn Hybrids (*https://bookstore.ksre.ksu.edu/pubs/SRP1181.pdf)* , 2023 Kansas Performance Tests with Soybean Varieties (*https://bookstore.ksre.ksu.edu/pubs/SRP1180.pdf*), and 2023 Kansas Performance Tests with Sunflower Hybrids (*https://bookstore.ksre.ksu.edu/pubs/SRP1184.pdf*).

## References

Zhang, T., Lin, X. and Sassenrath, G.F., 2015. Current irrigation practices in the central United States reduce drought and extreme heat impacts for maize and soybean, but not for wheat. Science of the Total Environment, 508, pp.331-342.

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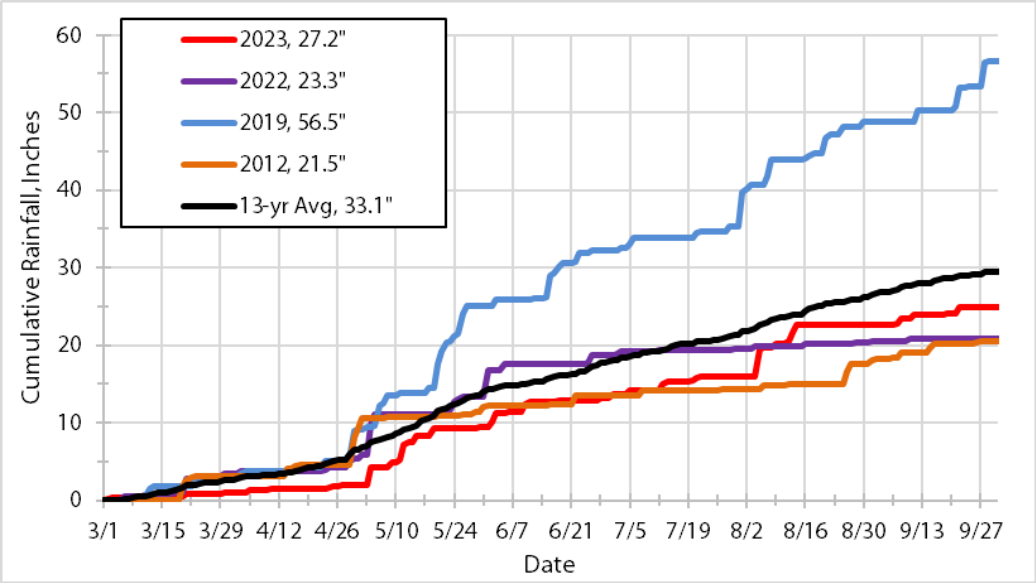


**Figure 1. Cumulative rainfall during the summer growing season (March – September) for 2023. Extreme years (2012 and 2019) and previous year (2022) are shown in comparison with the 13-year average. Total rainfall in inches is given after each year.**

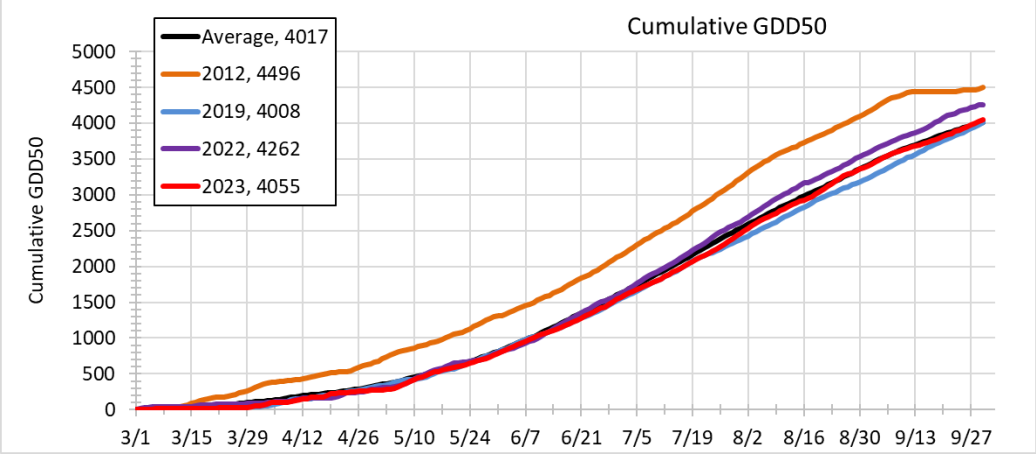


**Figure 2. Cumulative growing degree days (GDD, base 50) during the summer growing season (March – September) for 2023. Extreme years (2012 and 2019) and previous year (2022) are shown in comparison with the 13-year average. Cumulative GDD is given for each year.**

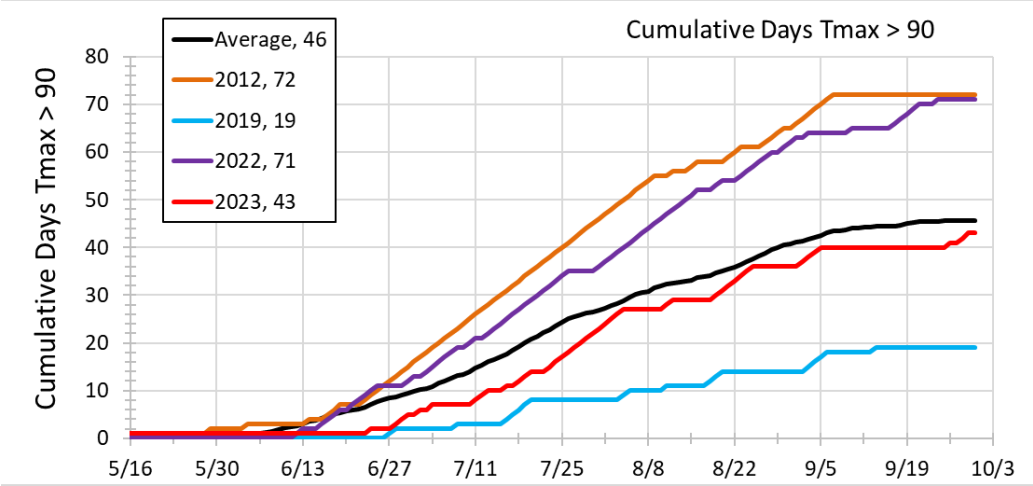


**Figure 3. Cumulative number of days with high temperature exceeding 90°F during the summer growing season (March – September) for 2023. Extreme years (2012 and 2019) and previous year (2022) are shown in comparison with the 13-year average. Total number of days is given after each year.**

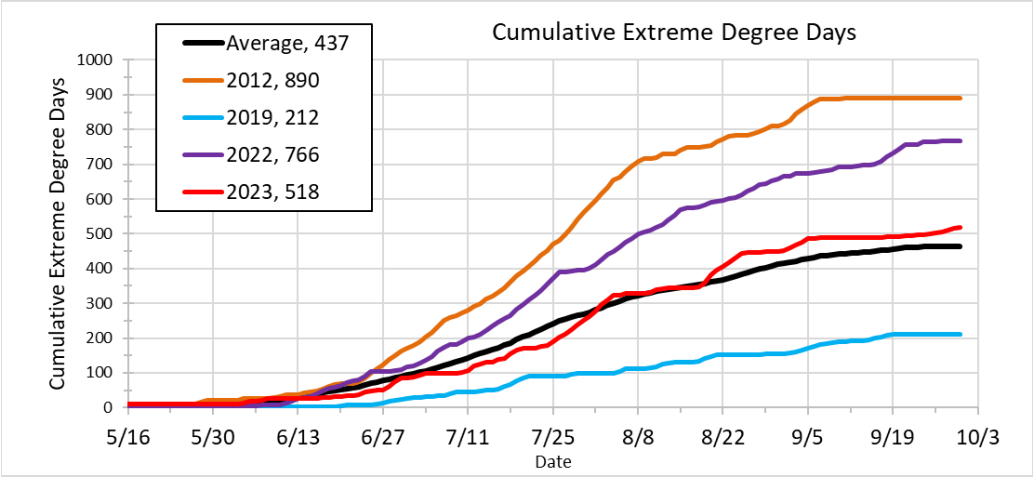


**Figure 4. Cumulative extreme degree days (EDD, base 86°F) during the summer growing season (March – September) for 2023. Extreme years (2012 and 2019) and previous year (2022) are shown in comparison with the 13-year average. EDD are given after each year.**

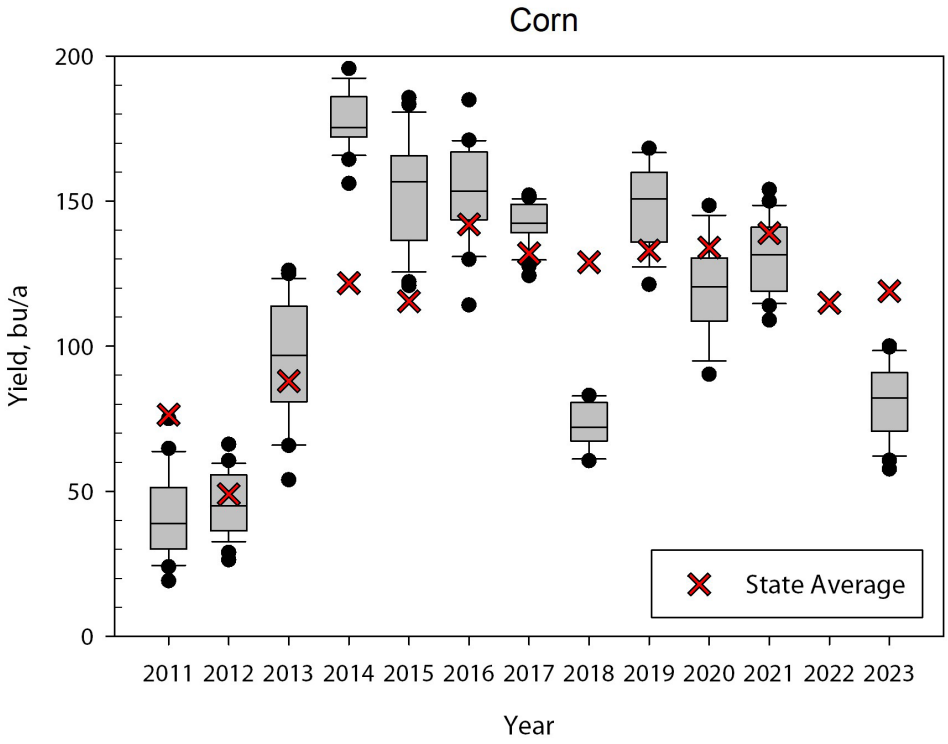


**Figure 5. Corn variety test results at Parsons, KS, from 2011 – 2023. The line in the middle of the box plots is the median yield of all varieties. The upper and lower quartiles are given by the upper and lower edges of the boxes. The maximum and minimum values are given by the upper and lower "whiskers" extending from the box. Outliers are given as solid circles. For comparison, average reported yields from Kansas are highlighted as a red X. Corn variety tests were abandoned at Parsons in 2022 because of insufficient rainfall.**

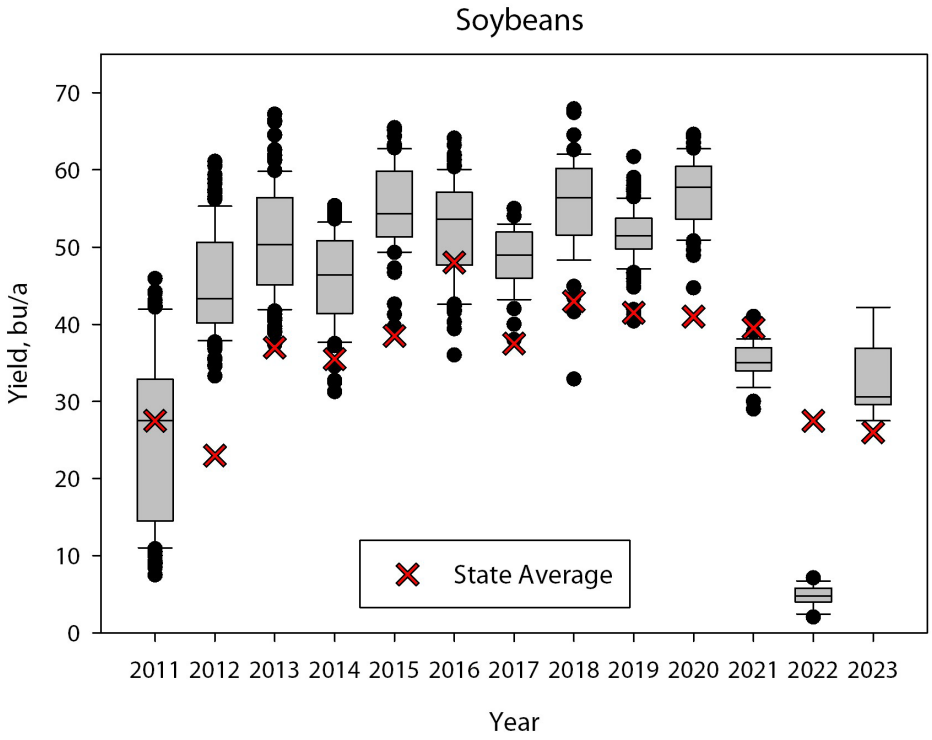


**Figure 6. Soybean variety test results at Parsons, KS, from 2011 – 2023. Yields before 2023 are from full-season tests; soybean yields from 2023 are from double-cropped tests. For comparison, average reported Kansas state yields are highlighted as a red X.**

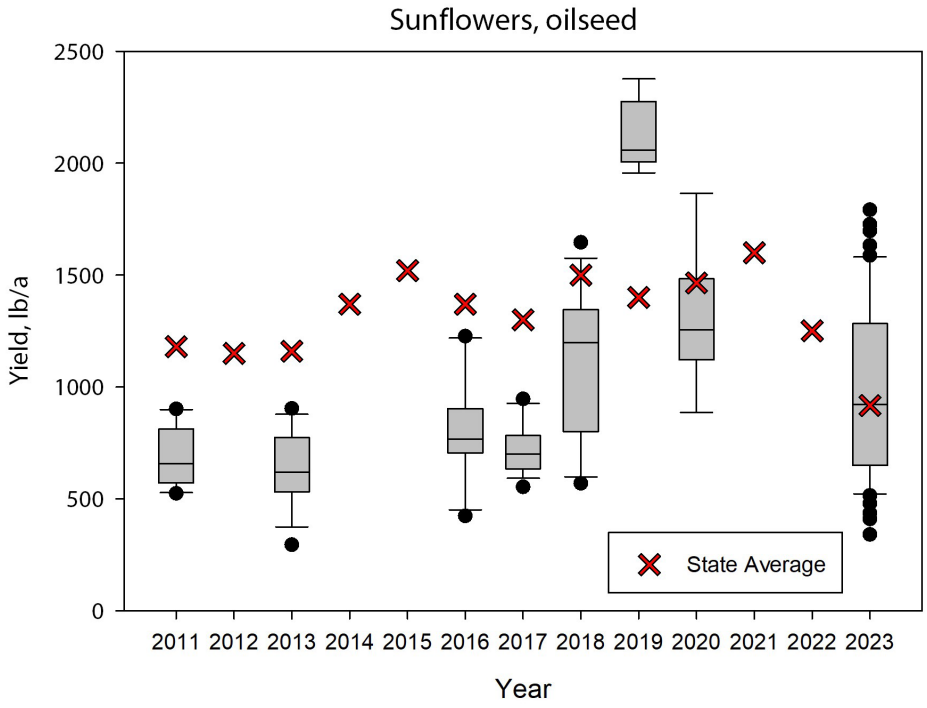


**Figure 7. Oilseed sunflower variety test results from Parsons, KS from 2011 – 2023. For years with no bars, the variety tests failed. For comparison, average reported Kansas state yields are highlighted as a red X.**