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Crop Production Summary - 2021

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Crop Production Summary - 2021

Cover Page Footnote

This report summary is part of the 2021 Soybean and Corn Performance Tests, SRP1158.

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Crop Production Summary - 2021

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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, 26 corn varieties and 28 soybean varieties were tested. Weather during 2021 was near average for both rainfall and temperature, though there were periods of high rainfall and high temperatures. Corn and soybean production was also near average, both across the state and in the cultivar trials at Parsons.

Introduction

Cultivar selection is an important determinant of potential yield. Kansas State University tests crop cultivars through the variety testing program. These tests establish a consistent baseline of common production practices, allowing comparison of variety performance under common growth conditions.

Other factors, including environmental conditions, soil, and management practices also impact crop production and yield. The temperature and precipitation conditions during the 2021 growing season are summarized and compared to previous years and the historical averages. Temperature plays a critical role in crop production. Early season soil temperatures are important for seed germination and stand establishment, while temperatures throughout the growing season regulate crop development and stages of development (vegetative, reproductive, and maturation). Temperatures that are too high or too low can negatively impact crop production and development. Cumulative Growing Degree Days (GDD) are a common measure of estimating crop growth and development. Rainfall is critical for crop establishment, growth, and development. Excessive rainfall can also contribute to crop disease development, especially in high-rainfall areas such as southeast Kansas.

This report summarizes results of the variety testing for soybeans and corn from 2021. Soybeans tested included 28 varieties from maturity groups 3-5. Corn varieties tested included 23 cultivars and 3 maturity checks (full, mid, and short season).

Experimental Procedures

The Kansas State University Crop Performance Tests were conducted in replicated research fields throughout the state. This report summarizes crop production for southeast Kansas, focusing on crops grown at Parsons, and Columbus, KS. In 2021, all crop varieties were tested in upland fields (Parsons silt loam soil) at the Southeast Research and Extension Center in Parsons. All crop variety trials are managed with conventional

tillage. Individual variety results are available at the K-State Crop Performance Test web site (*http://www.agronomy.k-state.edu/services/crop-performance-tests/*).

Full-season soybeans were planted in 30-in. rows on June 8, 2021, in Parsons, and harvested October 7, 2021. No fertilizer was applied. Weeds were controlled with glyphosate (1.5 qt/a), Dual II Magnum (2 pt/a), metribuzin (0.5 lb/a), and Authority XL (6 oz/a).

Corn varieties were planted on April 9, 2021, in 30 in. rows at a rate of 22,500 seed per acre. Plots were fertilized at a rate of 180-46-60 lb/a N-P-K. Weed control was glyphosate (2 qt/a), atrazine 4L (2 qt/a) and 2,4-D (2 qt/a). Plots were harvested on September 14, 2021. Sunflower and sorghum variety plots were abandoned due to technical difficulties.

Weather data were collected from the Kansas Mesonet website (*http://mesonet.k-state.edu/agriculture/degreedays/*) from a weather station located at SEREC in Parsons. Cumulative rainfall was calculated throughout the year and during the summer growing season (March – September). Cumulative growing degree days were calculated using a 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.

Results and Discussion

Total rainfall received during 2021 (42.2 in.) exceeded the 12-year average (34.5 in.) (Figure 1A). Early season rainfall (March through May) was near average (Figure 1B). However, two substantial rainfalls in late June and early July contributed 16 in. of rain over a 22-day period. This time period is critical for double-cropped soybean establishment and corn pollination. Although total rainfall was above average because of these high rainfall amounts, the remainder of the growing season had near-normal precipitation.

Temperatures during 2021 were below average, as seen in the lower-than-average accumulation of GDD50 (Figure 2A). In early June, the number of high temperature days (Tmax > 90°F) was above average (Figure 2B). After this 10-day warm period, cooler temperatures were experienced during the middle of the growing season. Total high-temperature days were normal by the end of the season.

Soybeans were planted on 4.85 million acres in 2021, a slight increase over the 4.8 million acres planted in 2020. Statewide average soybean yield (39.5 bu/a) was slightly less than in recent years but above the 10-year statewide average yield of 38.4 bu/a (Figure 3). Twenty-eight cultivars from maturity groups 3-5 were tested at Parsons. Average yield in the full-season test was 35.0 bu/a, with a range from 29 to 41, below the statewide average and well below yields observed in variety trials in recent years.

Corn was planted on 5.7 million acres in Kansas in 2021, a decrease in acreage from the 6.4 M acres in 2019 and 6.1 M acres in 2020. Statewide average yield in 2021 was 139 bu/a, slightly above the yields harvested recently, though well above the 10-year average statewide yield of 118 bu/a that includes the extreme drought years of 2012 and

2013 (Figure 4). Average yield in the corn variety trials was 131 bu/a, with a range from 109 bu/a to 154 bu/a, similar to yield trends in previous years.

Conclusions

Weather in 2021 was fairly typical. Above-average rainfall was the result of two very heavy periods of rain in late June/early July. The rather dry period prior to that reduced double-cropped soybean establishment. Temperatures were also cooler than average, except for a period of high temperatures in early- to mid-June that coincided with the dry conditions, further reducing double-cropped stand establishment. Corn and soybean yields reflected the average weather conditions, as both crops produced near average yields both statewide and in the variety trials.

Acknowledgment

This report summary is part of the 2021 Soybean and Corn Performance Tests, SRP1158.

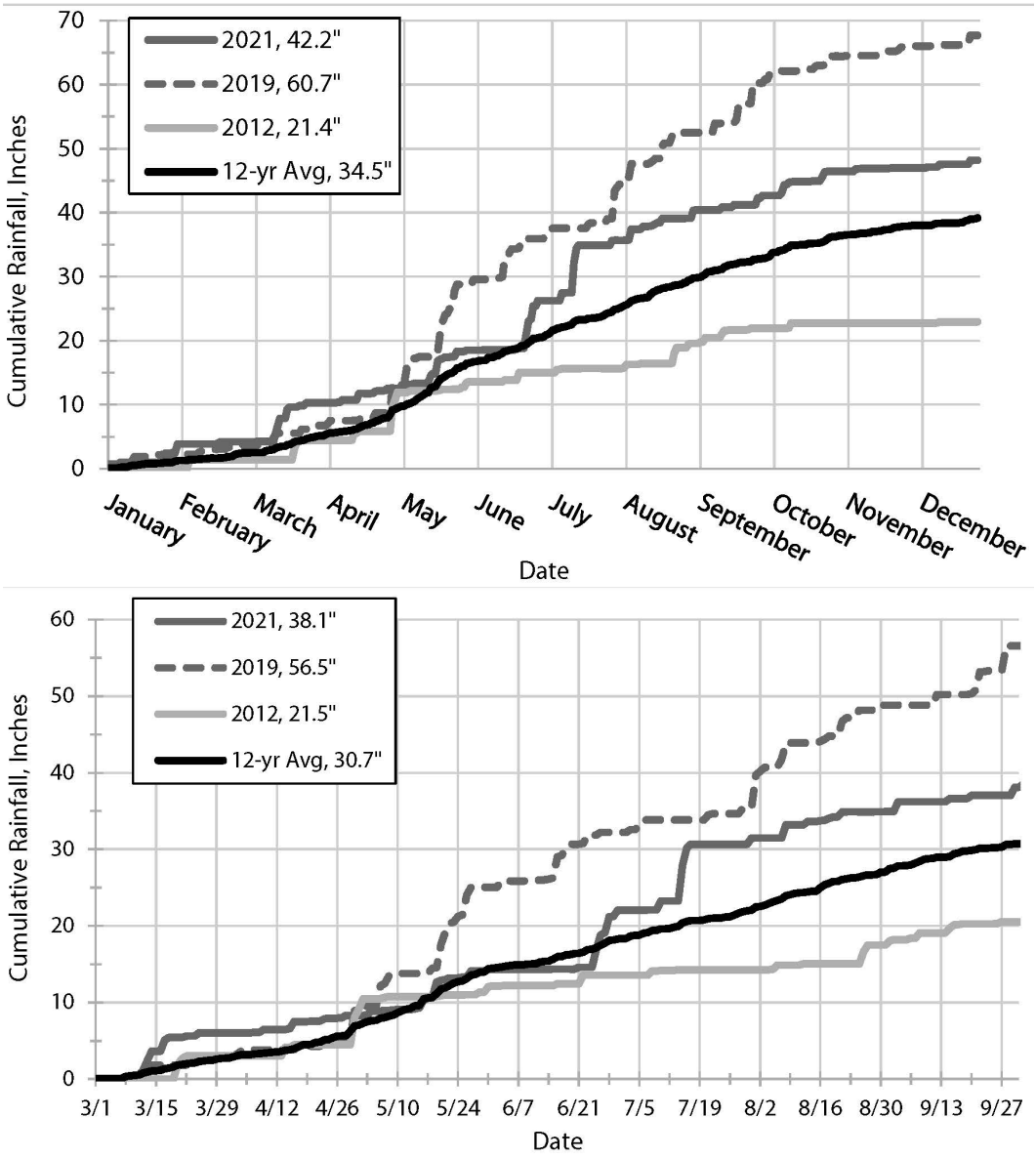

Figure 1. Cumulative rainfall during the calendar year (A) and summer growing season (March – September) for 2021. Extreme years (2012 and 2019) are shown in comparison with the 12-year average.

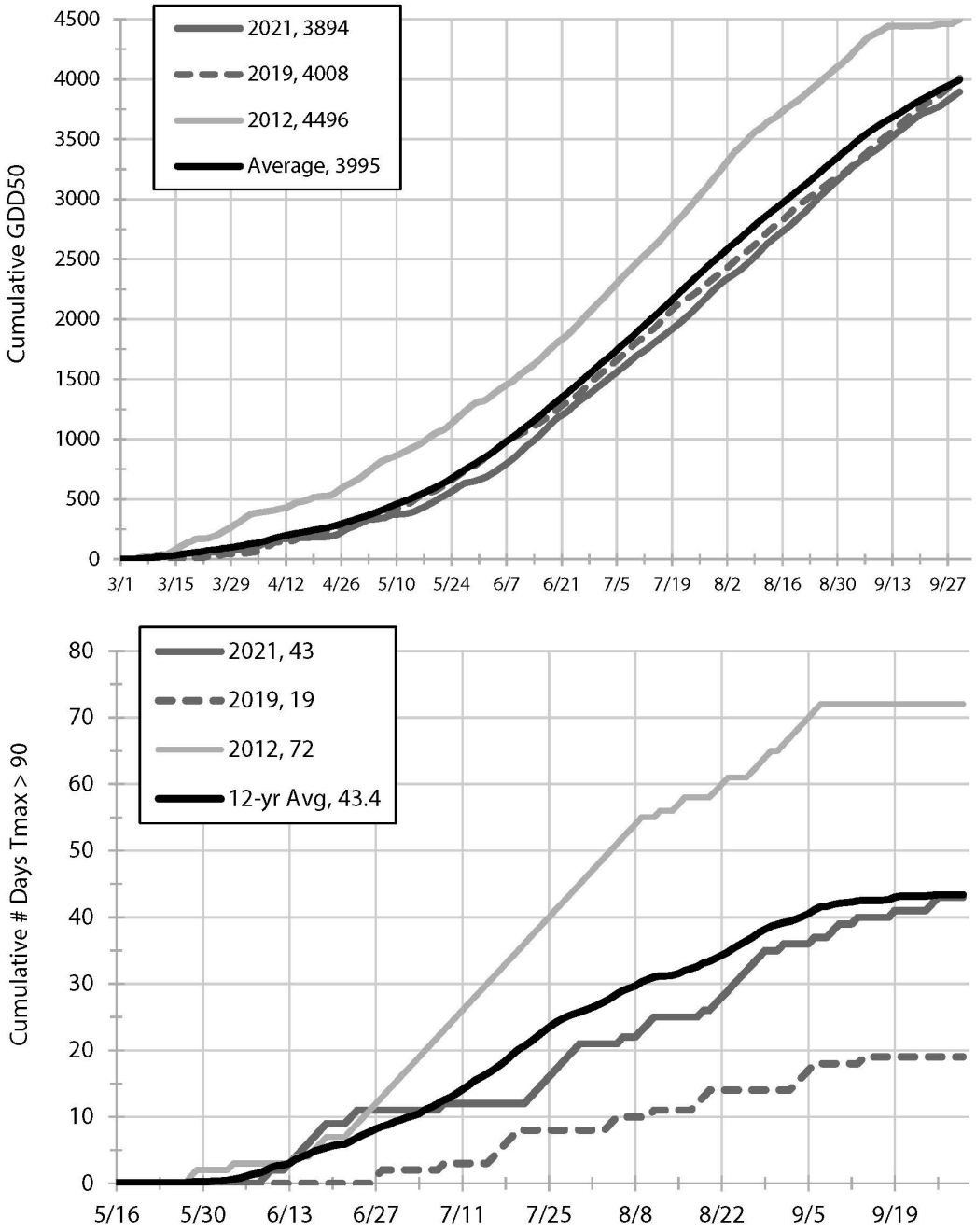

Figure 2. Cumulative growing degree days (50°F) (A) and cumulative number of high temperature (>90°F) days during the summer growing season (March – September) for 2021. Extreme years (2012 and 2019) are shown in comparison with the 12-year average.

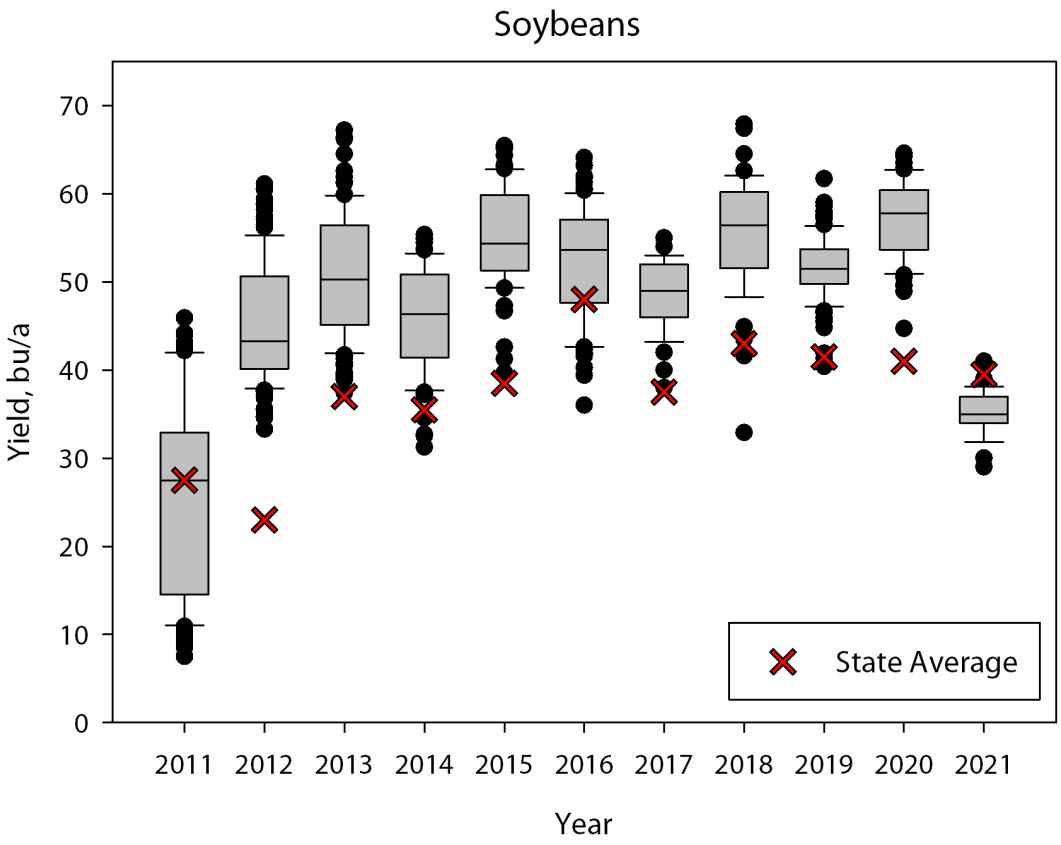

Figure 3. Comparison of soybean yield for full-season tests at Parsons. The line in the middle of the box plots is the median yield of all varieties. The upper and lower quartiles are given by the upper and lower edges of the boxes. The maximum and minimum values are given by the upper and lower "whiskers" extending from the box. Outliers are given as solid circles. For comparison, average reported yields from Kansas are highlighted as a red X.

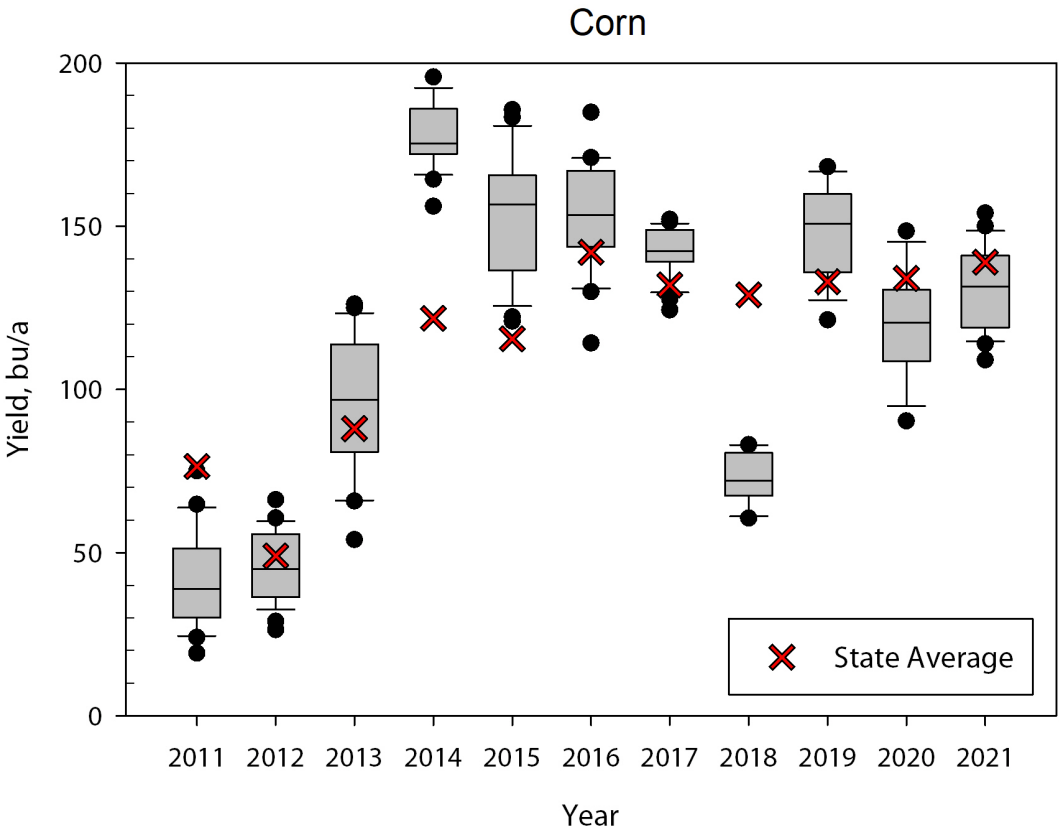

Figure 4. Corn from variety trials grown at Parsons, KS from 2011 through 2021. For comparison, average reported Kansas state yields are highlighted as a red X. The upper and lower quartiles are given by the upper and lower edges of the boxes. The maximum and minimum values are given by the upper and 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.