Southeast Kansas Crop Production Summary - 2019

G.F. Sassenrath, L. Mengarelli, J. Lingenfelser, X. Lin, and E. Adee

Summary
This is a summary of the crop production conditions in southeast Kansas in 2019, and the results of the variety testing for corn, soybean, sorghum, sunflower, and wheat.

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 2019 growing season in comparison to previous years and the historical averages. In 2019, full-season corn varieties were flooded out at the river bottom location at Erie. Thirty full-season corn varieties were compared at Ottawa; 9 short-season corn varieties were tested at Parsons and Ottawa. Both hard and soft wheat variety plots were abandoned at both locations due to excessive rain and poor stand establishment. There were 29 sorghum varieties tested and seven sunflower varieties at Parsons. Soybeans tested included 31 varieties of MG3-4 and 37 varieties of MG4-5 at both upland and river bottom locations at Parsons and Erie.

Growing degree day information is now available on the Kansas Mesonet website (*http://mesonet.k-state.edu/agriculture/degreedays/*) (Lin et al., 2019).

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, Erie, and Columbus, KS. Due to crop loss from flooding, results from variety testing at the Ottawa station in Franklin County are reported for comparison. Crop varieties were tested in river bottom fields (Lanton silt loam soil type) near Erie, KS; upland fields (Parsons silt loam soil) at the Southeast Research and Extension Center in Parsons; and the research fields outside of Columbus, KS (Parsons silt loam soil). The river bottom land near Erie, KS, was flooded and the corn crop was abandoned. Poor stand establishment from excessive rain led to abandonment of wheat plots at all testing locations. 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/services/crop-performance-tests/*).

Soybeans were planted in 30-in. rows on June 26, 2019, in Columbus and Erie, and harvested November 18, 2019. Fertilizer was broadcast at 18-46-60 lb/a N-P-K diammonium phosphate (DAP) and potash in Columbus; no fertilizer was applied at Erie. Weeds were controlled with Gramoxone (2 pt/a), Dual II Magnum (2 pt/a), metribuzin (1.5 lb/a), and Authority XL (6 oz/a).

Sorghum was planted on June 19, 2019, at a seeding rate of 87,120 seeds/a in Parsons and harvested October 3, 2019. Fertilizer was applied at a rate of 150-46-60 lb/a N-P-K. Weeds were controlled with atrazine (2 qt/a), Dual II (S-metolachlor, 2 pt/a), and 2,4-D Amine (2 qt/a).

Sunflowers were planted July 11, 2019, at a rate of 23,800 seed/a in 30-in. rows at Parsons. Plots were fertilized at a rate of 80-46-60 lb/a N-P-K. Weed control was Gramoxone (1 qt/a), Dual Magnum (1 pt/a), and Spartan (6 oz/a). Plots were harvested on November 12, 2019.

Weather information was downloaded from the Kansas Mesonet site (*http://mesonet.k-state.edu/weather/historical/*). Historical data from the Parsons and Columbus stations were used in preparing these reports. Rainfall is reported on a water year (WY) basis, that begins October 1 and ends September 30 of the next year. Cumulative rainfall during the summer growing season was also calculated. Growing degree days were calculated using a base temperature of 50°F.

Results and Discussion

Rainfall

Rainfall during the 2018-19 water year was near record highs (Figure 1A). Initial rainfall in the fall was slightly higher than average. However, beginning with a 3.7 in. rainfall on April 30, the next 8 months received 47.5 in. of rain. There were several periods of very high rainfall totals, such as the 4.4 in. rain received on August 1. While high single-day rain events are not uncommon in southeast Kansas, the continuous high rain events made for a very wet year, well above the 9-year average of 40.4 in. Water-year rainfall totals ranged from a low of 21.9 in. in WY2012 to 69.9 in. in WY2019. Total rainfall during the summer growing season (March-October, 60.7 in.; Figure 1B) greatly exceeded the 9-year average of 33.1 in. Summer rainfall can be quite variable, ranging from a low of 12.7 in. in 2011 to a high of 60.7 in. in 2017.

Temperature

Temperatures in 2019 were slightly cooler than average throughout the summer growing season (Figure 2A), especially later in the summer. Extreme values of cumulative GDD50 were experienced in 2012 and 2019, which also had the greatest and the least number of days, respectively, with maximum temperatures exceeding 90°F (Figure 2B). Higher temperatures reduce the yield of corn and soybeans. High temperatures days during 2019 were much lower than average (Figure 2B).

Crop Production

Winter wheat was planted on 6.9 million acres throughout Kansas. Wheat was particularly hard-pressed from the excessive rain. Wheat variety trials at many locations in the state were abandoned in 2019 due to poor stands. State-wide, wheat yields were slightly above average in 2019 at 52 bu/a (Figure 3).

Corn was planted in 6.4 million acres in Kansas in 2019, an increase from last year. Full-season corn varieties were tested in river bottom ground at Erie. Flooding eliminated the crop and the crop variety test at Erie was abandoned. Thirty full-season corn varieties were tested at Ottawa, with an average yield of 154.8 bu/a and a range from 110.7 to 196.6 bu/a (Figure 4A). Nine short-season corn varieties were tested on upland ground at Parsons, with an average yield of 143.5 bu/a, and a range of 121.3 to 158.7 bu/a (Figure 4B). This was greater than the state average yield for 2019 of 133 bu/a and the 10-year state average yield of 128.5 bu/a.

Soybeans were planted on 4.55 million acres in Kansas in 2019, with 1.19 million acres in southeast Kansas. Thirty-one cultivars of soybeans from maturity groups (MG) 3-4 were tested, with an average yield of 51.7 bu/a and a range of 40.4 to 61.7 bu/a, which was greater than the state average yield of 41.5 bu/a (Figure 5A). This was also greater than the state 10-year average of 36.4 bu/a. Thirty-seven cultivars of soybeans from MG 4-5 were tested, with an average yield of 51.6 bu/a and a range from 41.9 to 58.6 bu/a (Figure 5B).

Grain sorghum was planted on 2.6 million acres in Kansas in 2019. Grain sorghum yields were lower in 2019 for the twenty-eight cultivars tested, with an average yield of 91 bu/a and a range from 53.5 to 113.4 bu/a (Figure 6). This is higher than state average yield for 2019 of 85 bu/a and the 10-year average state yield of 73.6 bu/a.

Sunflowers were planted on 45,000 acres in Kansas in 2019. Six cultivars of oilseed sunflowers were grown in 2019, with an average yield of 2142 lb/a and a range from 1957 to 2377 lb/a (Figure 7). This was much higher than the 10-year state average yield of 1404 lb/a and the state average yield of 1372 lb/a.

Conclusions

2019 was a challenging year for crop production due to excessive rainfall. Mild temperatures reduced heat stress for summer crop production. State average crop yields for corn, sorghum, soybeans, and wheat were above the 10-year average; sunflower yields were slightly below the 10-year average.

Acknowledgment

References

Lin, X., Z. Zambreski, M. Knapp, R. Aiken, G. Sassenrath. 2019. Learn about the new monthly Kansas Ag-Climate Update. Agronomy eUpdate. Iss 731, Feb. 8, 2019. https://webapp.agron.ksu.edu/agr_social/m_eu_article.throck?article_id=2098
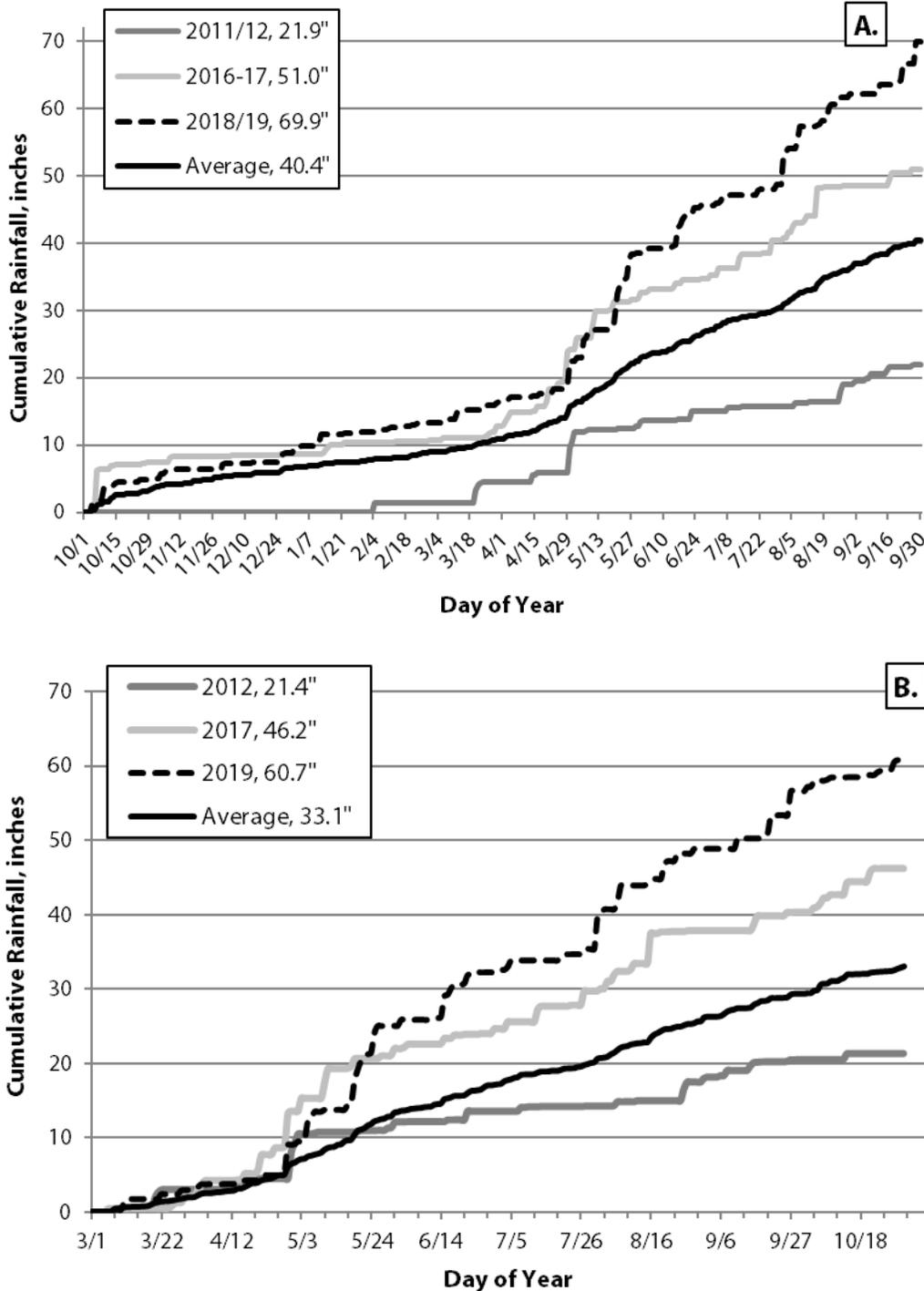
Figure 1. Cumulative rainfall (A) during the water year from October 1 through September 30 and (B) during the summer crop production season. Nine-year average included for comparison. Rainfall total in inches given after each year in legend.
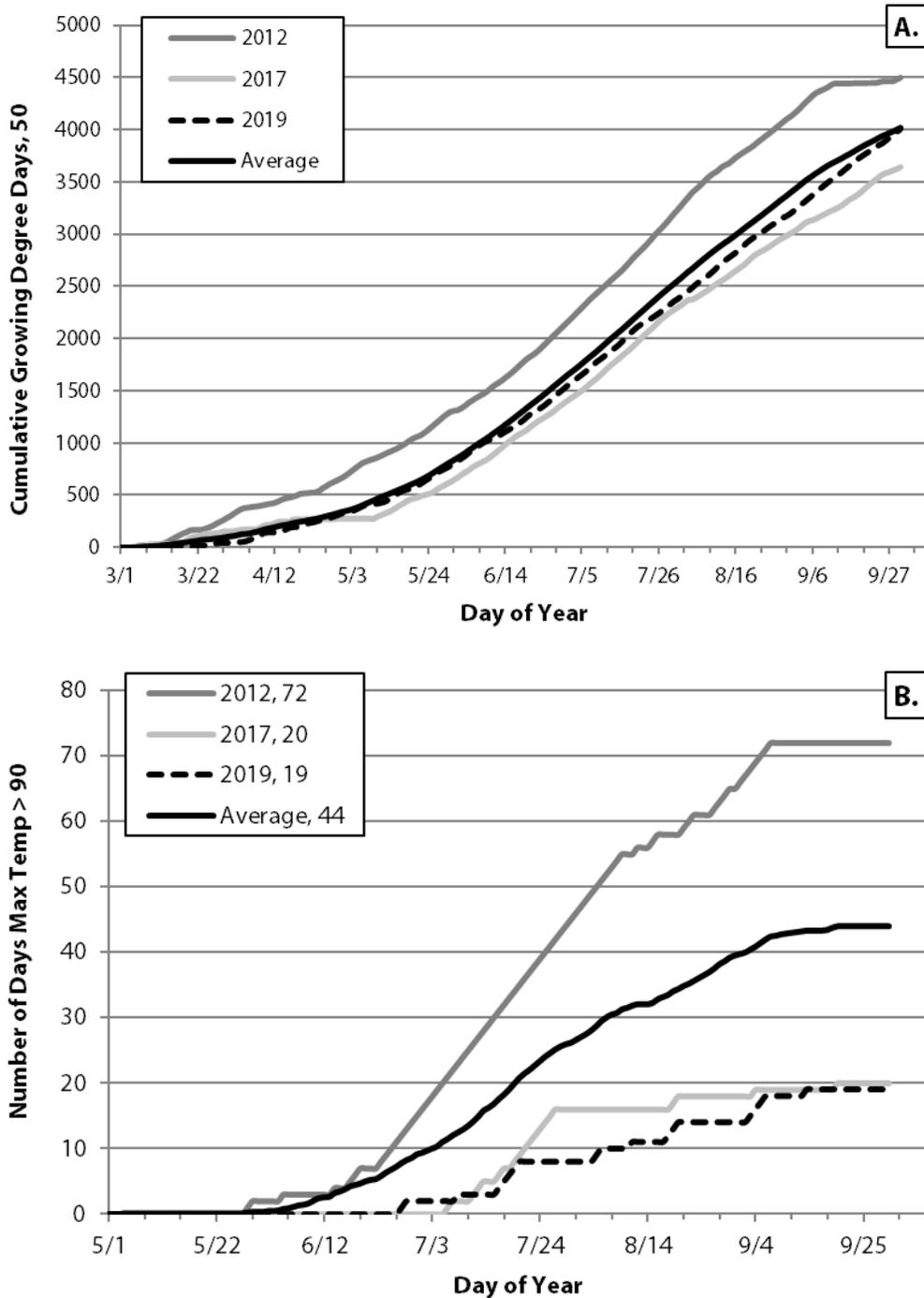
Figure 2. Temperature patterns and extremes during 2018 and preceding years. (A) Cumulative growing degree days calculated with a base temperature of 50°F during the summer growing season. (B) Number of days the maximum temperature was greater than 90°F. Nine-year average included for comparison.
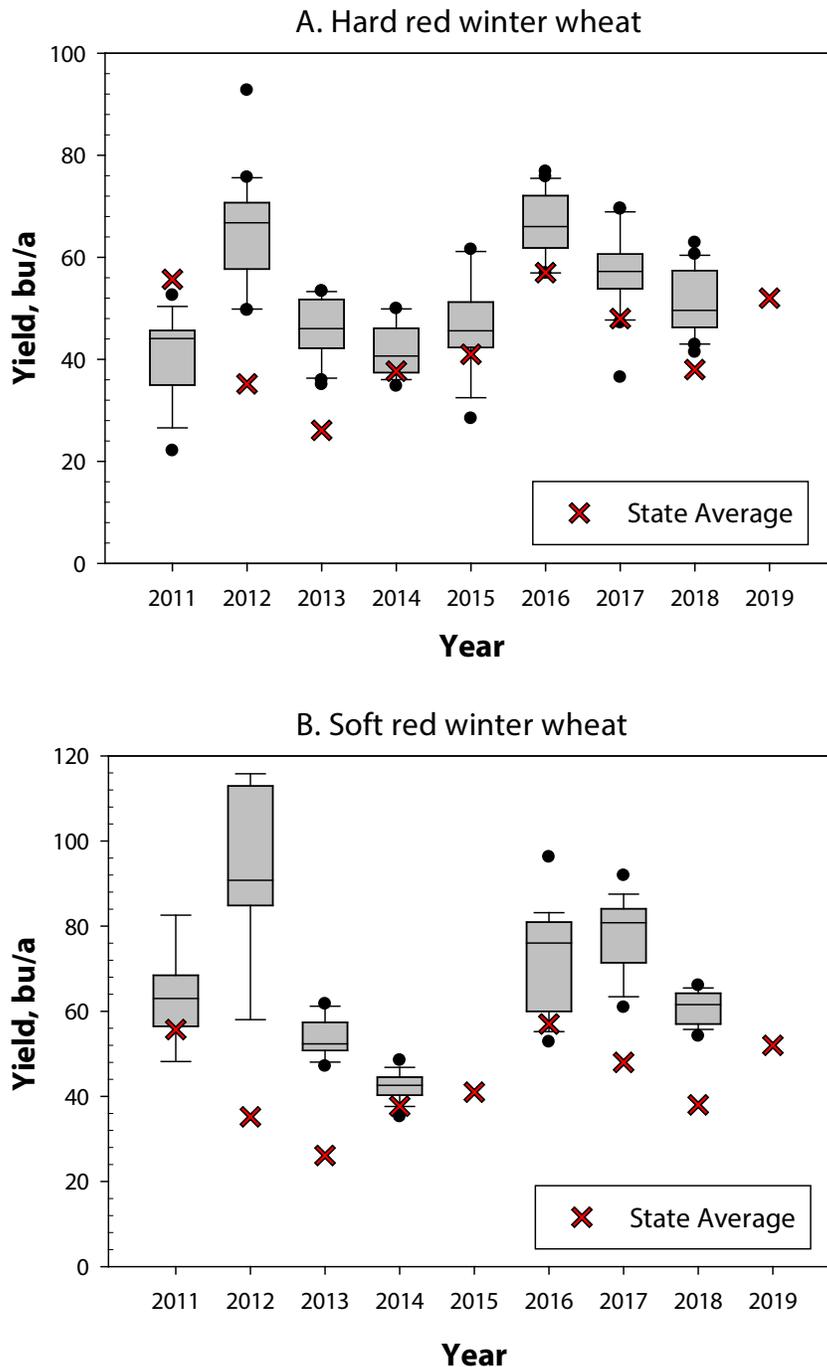
A. Hard red winter wheat

B. Soft red winter wheat

Figure 3. Winter wheat yield for (A) hard red wheat and (B) soft red wheat from variety trials in southeast and eastern Kansas from 2011 through 2018. Variety testing at Ottawa and Parsons were 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. Note the difference in scale between the hard red and soft red variety results. For comparison, average reported yields from Kansas are highlighted as a red X.
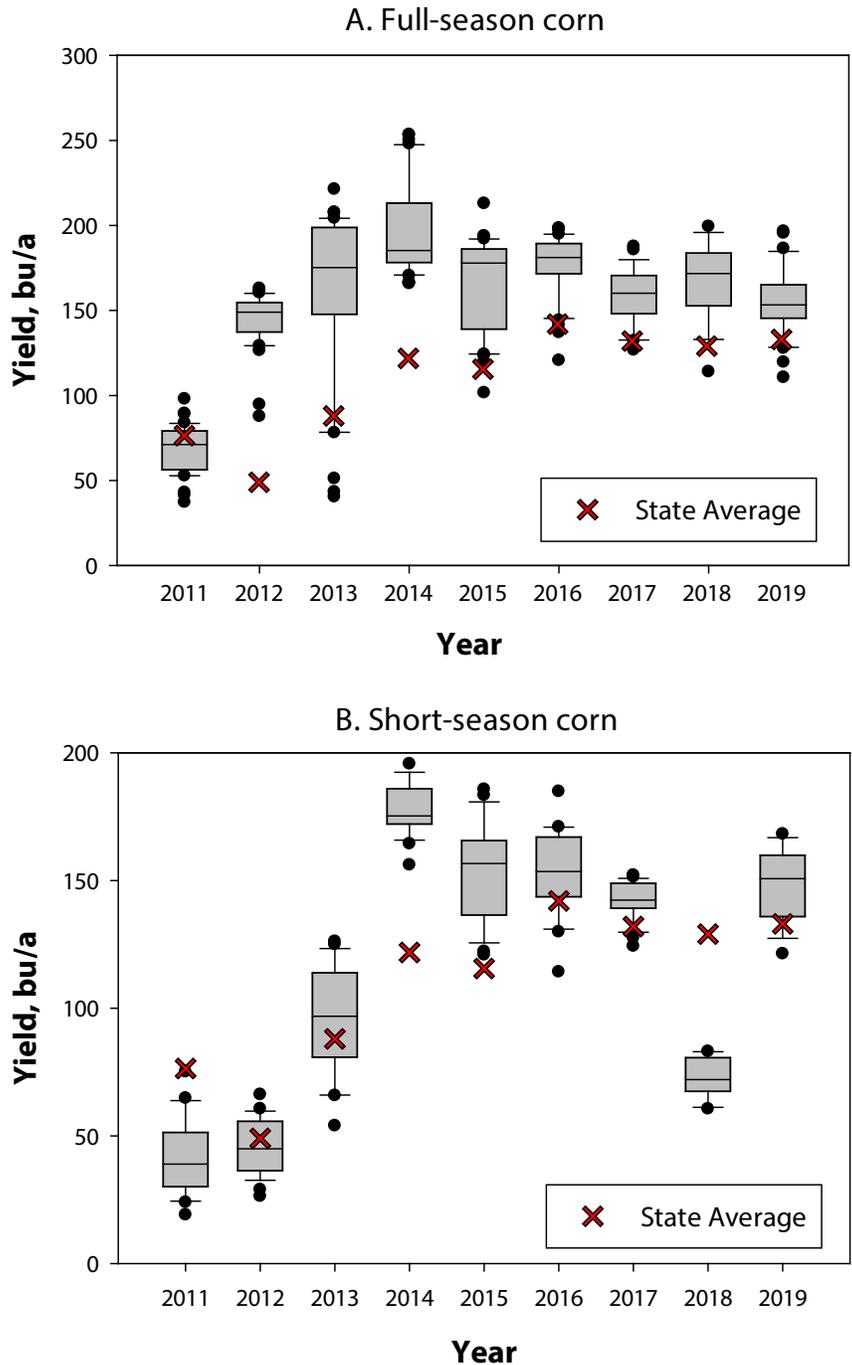
Figure 4. (A) Full-season corn at Ottawa and **(B)** and short-season corn at Parsons and Ottawa, KS, from variety trials grown from 2011 through 2019. For comparison, reported state average yields are highlighted as a red X.

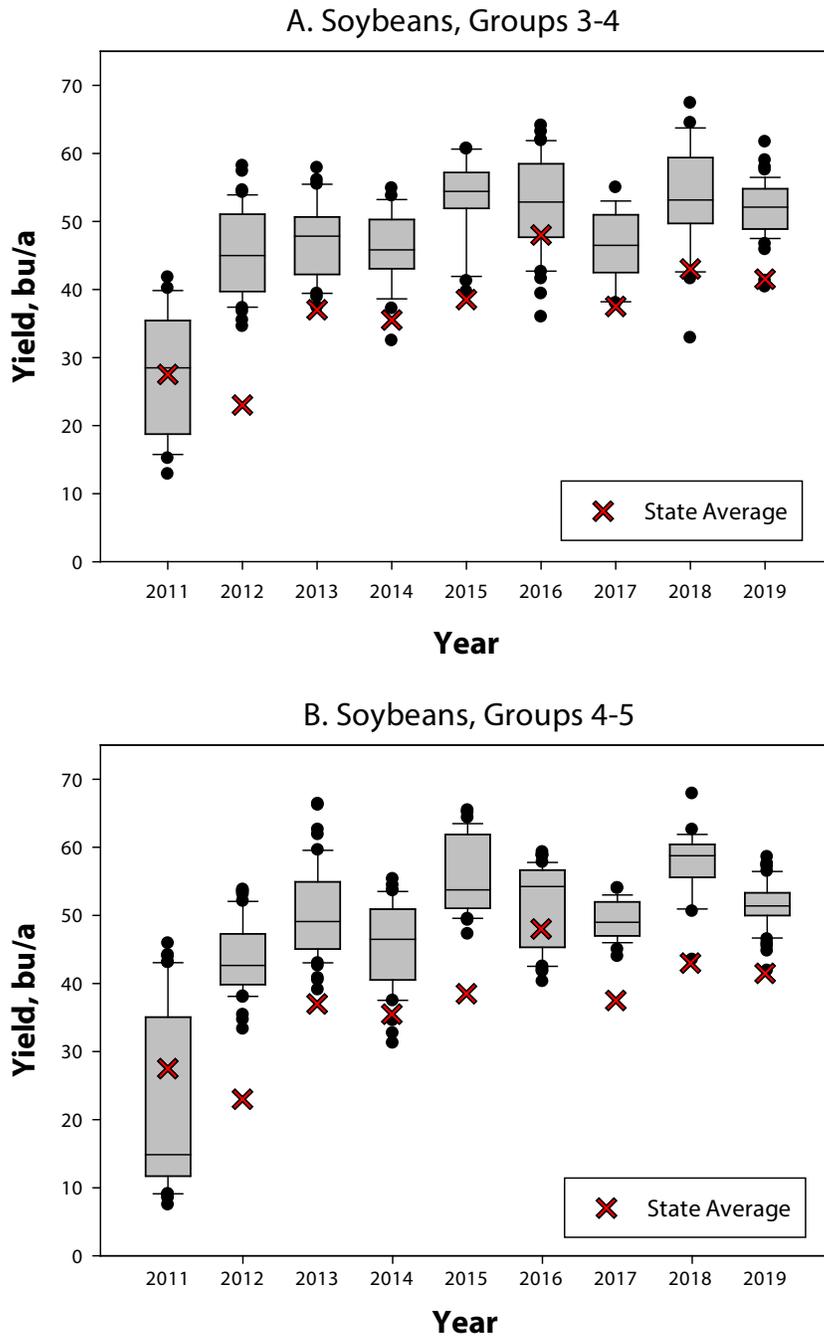## A. Soybeans, Groups 3-4

B. Soybeans, Groups 4-5

Figure 5. Soybeans from (A) MG3-4 and (B) MG4-5 from variety trials grown at Columbus, Erie, and Parsons, KS, from 2011 through 2019. For comparison, average reported yields from Kansas are highlighted as a red X.
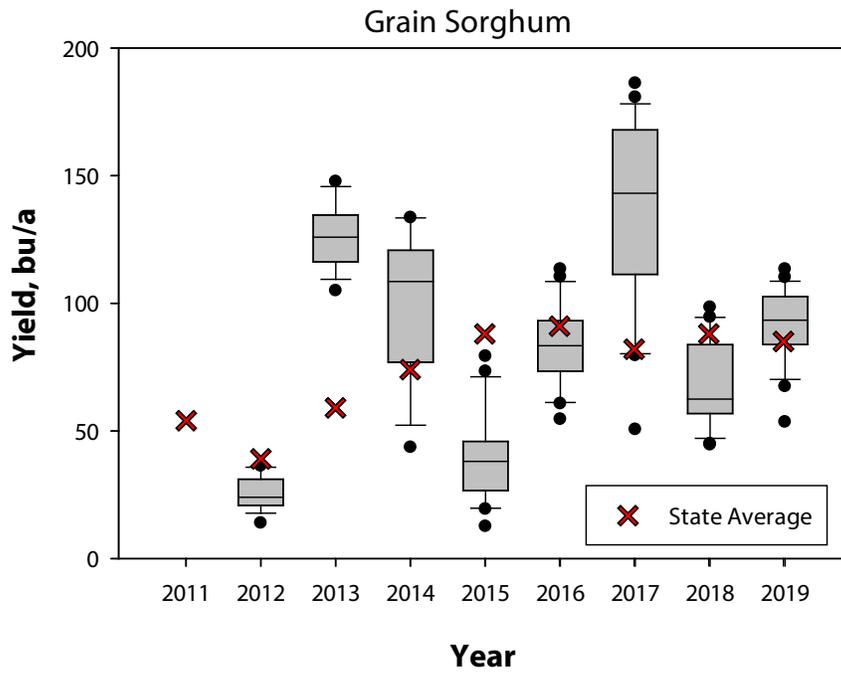
Grain Sorghum

Figure 6. Grain sorghum from variety trials grown at Parsons, KS, from 2011 through 2019. Yield was not available for the variety trials in 2011. For comparison, average reported yields from Kansas are highlighted as a red X.
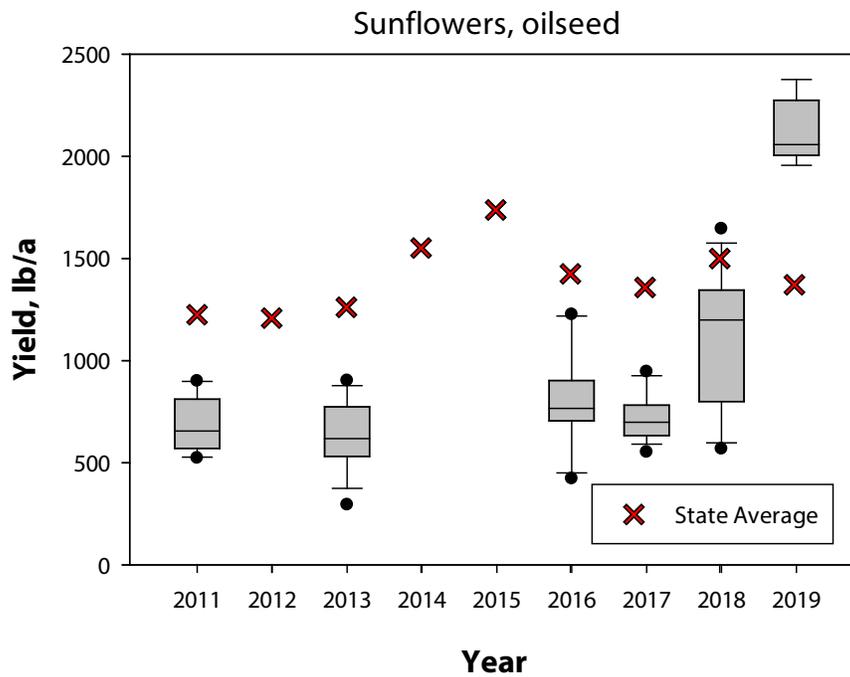
Sunflowers, oilseed

Figure 7. Oilseed sunflowers from variety trials grown at Parsons, KS, from 2011 through 2019. Yield data were not available from the variety plots in 2012, 2014, or 2015. For comparison, average reported Kansas state yields are highlighted as a red X.