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Southeast Kansas Crop Production Summary – 2018

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Abstract

This is a summary of the crop production conditions in southeast Kansas in 2018, and the results of the variety testing for corn, soybean, sorghum, sunflower, and wheat.

Keywords

crop production, corn, wheat, soybeans, sorghum, sunflowers

Cover Page Footnote

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Southeast Kansas Crop Production Summary – 2018

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Summary

This is a summary of the crop production conditions in southeast Kansas in 2018, 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 2018 growing season in comparison to previous years and the historical averages. Information on crop yields from the variety trials at Parsons and Columbus, KS, are reported.

The impact of temperature on crop growth can be described by calculating the accumulated "heat units" or growing degrees (Lin et al., 2019) and correlating cumulative growing degree days (GDD) to specific crop stage. Each crop is sensitive to a different range of temperatures. To better capture the dependence of crop development on temperature, a base temperature is used, below which crop growth and development is delayed or absent. Corn and soybeans grow best at temperatures from 50 to 86°F. The GDD for these crops are calculated as the average daily temperature minus 50°F. The daily GDD are then summed to determine the cumulative GDD. When a base temperature of 50°F is used this number is reported as GDD50. Note that the different soybean maturity groups may have different GDD requirements for each crop growth stage.

Winter wheat has three separate periods of growth: the initial germination and vegetative growth in the fall, the vernalization period during the winter, and the spring green up and reproductive stage in the spring. Wheat growth and development is sensitive to different temperatures during each of these stages, so developing a temperature model for wheat growth and development is a bit more complex. Details of wheat growth and development are given in the following publication in this volume (Zhao et al., 2019). Growing degree day information is now available on the Kansas Mesonet website (http://mesonet.k-state.edu/agriculture/degreedays/).

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, Columbus, and Erie, KS. Crop varieties were tested in river bottom fields (Lanton silt loam soil type) near Erie, KS, and upland (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). 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/).

Wheat was drilled in 7.5-in. rows at 90 lb/a with an Almaco plot drill on November 1, 2017, in Parsons and harvested June 15, 2018. Fertilizer was applied before planting at a rate of 50-46-30 lb/a N-P-K, with an additional 60 lb N applied in the spring for both hard red and soft red cultivars. Finesse (1/3 oz/a) was applied with the fertilizer in the spring to control weeds. No fungicide was used in wheat.

Corn was planted in 30-in. rows on April 10 in Parsons (short-season varieties) and on April 11 in Erie (full-season varieties). Fertility of corn at Parsons was 180-50-50 lb/a N-P-K and 225-50-0 lb/a N-P-K at Erie. Weed control was Powermax (1qt/a), Dual II Magnum (1.5 pt/a), atrazine (2 qt/a) and 2,4-D (2 qt/a). Corn was harvested August 28, 2018, in Parsons and September 17, 2018, in Erie.

Soybeans were planted in 30-in. rows on June 8, 2018, in Columbus and Erie, and harvested November 29, 2018, in Columbus and December 10, 2018, in Erie. 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. Weed control was gramoxone (2 pt/a), Dual II Magnum (2 pt/a), metribuzen (1.5 lb/a) and Authority XL (6 oz/a). A post-emerge application of UltraBlazer (1 pt/a) and Cobra (12 oz/a) was made to control cocklebur.

Sorghum was planted on May 14, 2018, at a seeding rate of 87120 seeds/a in Parsons and harvested October 3, 2018. Fertilizer was applied at a rate of 150-46-50 lb/a N-P-K. Weed control was atrazine (2 qt/a) and 2,4-D Amine (2 qt/a).

Sunflowers were planted July 20, 2018 at a rate of 28,000 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 December 12, 2018.

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 2017-18 water year was very close to average throughout the year (Figure 1A). Initial rainfall in the fall was slightly higher than average, but a long dry period in November to February reduced total levels to normal. There were several rainy periods followed by long intervals without moisture, but overall, total rainfall levels (38.0 in.) were very close to the 7-year average (36.2 in.). Water-year rainfall totals ranged from a low of 20.5 in. in WY2012 to 51 in. in WY2017. Similarly, total rainfall during the summer growing season (March–October, 31.6 in.; Figure 1B) was very close to the 8-year average of 29.7 in. Summer rainfall can be quite variable, ranging from a low of 12.7 in. in 2011 to a high of 46.2 in. in 2017.

Temperature

Temperatures in 2018 were very close to average throughout the summer growing season (Figure 2A). An initial cool spell in early spring reduced the number of growing degree days in April, but temperatures quickly warmed up to near-normal temperatures. Extreme values of cumulative GDD50 were experienced in 2012 and 2017, which also had the greatest and least number of days, respectively, with maximum temperatures exceeding 90°F (Figure 2B). Higher temperatures reduce the yield of corn and soybeans. Again, days of high temperatures during 2018 were nearly normal (Figure 2B). A warm period in early summer increased the number of days with high temperatures, but this lasted only a short time.

Crop Production

Winter wheat was planted on 324,000 acres in southeast Kansas in 2018 and 7.7 million acres throughout Kansas. Twenty-one hard red wheat cultivars were grown at Parsons in 2018. The average yield of hard red winter wheat across all cultivars (51.3 bu/a) ranged from 41.4 to 62.9 bu/a and were slightly less than the 10-year average yield of 55.9 bu/a from the variety trials but higher than the state average yield of 38 bu/a (Figure 3). Eighteen soft red wheat cultivars produced an average of 60.8 bu/a and ranged from 54.2 to 66.1 bu/a, which was slightly less than the 10-year average yield of 61.4 bu/a from the variety trials but higher than the state average yield. Fungal pressure was much less in 2018. Fungicide studies showed no yield increase in 2018 with fungicide use (Zhao et al., 2019).

Corn was planted in 5.45 million acres in Kansas in 2018, with 92% of those corn acres harvested for grain and 7% harvested as silage. Seventeen varieties of full season corn were tested in river bottom ground at Erie, with an average yield (168 bu/a) higher than the 7-year average yield (136 bu/a) and a range from 114 to 199 bu/a (Figure 4A). This was greater than the state average yield for 2018 of 129 bu/a and the 10-year state average yield of 131 bu/a. Ten short-season corn varieties were tested in upland ground at Parsons, with an average yield of 73 bu/a, and a range of 61 to 83 bu/a (Figure 4B). This was less than the 7-year average variety test yield of 103 bu/a.

Soybeans were planted on 4.75 million acres in Kansas in 2018. Twenty-nine cultivars of soybeans from maturity groups (MG) 3-4 were tested, with an average yield of

54 bu/a and a range of 31.8 to 67.5 bu/a, which was greater than the state average yield of 43.5 bu/a (Figure 5A). This was also greater than the 8-year variety-testing average (47 bu/a) and the state 8-year average of 36 bu/a. Twenty-six cultivars of soybeans from MG 4-5 were tested, with an average yield of 57.9 bu/a and a range from 42.6 to 70.2 bu/a, which was greater than the 8-year variety test average yield of 47.8 bu/a (Figure 5B).

Grain sorghum was planted on 2.8 million acres in Kansas in 2018. Grain sorghum yields were lower in 2018 for the 29 cultivars tested, with an average yield of 69 bu/a and a range from 45 to 98 bu/a (Figure 6). This is lower than the 7-year average variety trial yield of 83 bu/a and 10-year average state yield of 74 bu/a.

Sunflowers were planted on 49,500 acres in Kansas in 2018. Twelve cultivars of oilseed sunflowers were grown in 2018, with an average yield of 1129 lb/a and a range from 569 to 1646 lb/a (Figure 7). This is greater than the 5-year variety test average of 798 lb/a, but fewer than the 10-year state average yield of 1425 lb/a.

Conclusions

2018 was an average year for climate conditions, with some early spring low temperatures, and a period of high temperatures in early summer. Rainfall was also average, with dry periods in fall-winter and mid-summer followed by rain to bring total precipitation to near-normal levels. Crop production was also average, with the exceptions being short-season corn and sorghum, which had lower than average yields.

Acknowledgment

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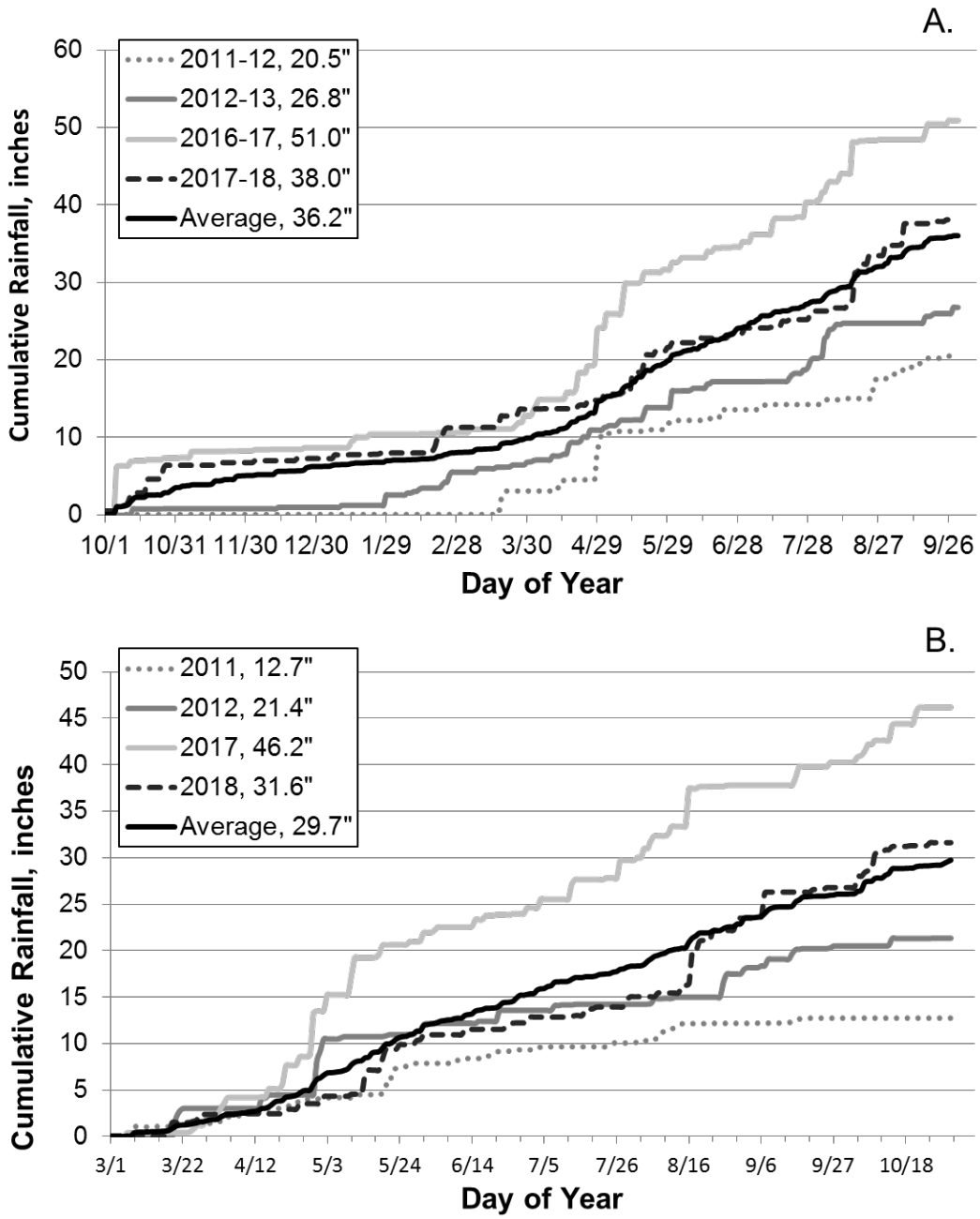

Figure 1. Cumulative rainfall (A) during the water year from October 1 through September 30 and (B) during the summer crop production season. Eight-year average included for comparison. Rainfall total in inches given after each year in legend.

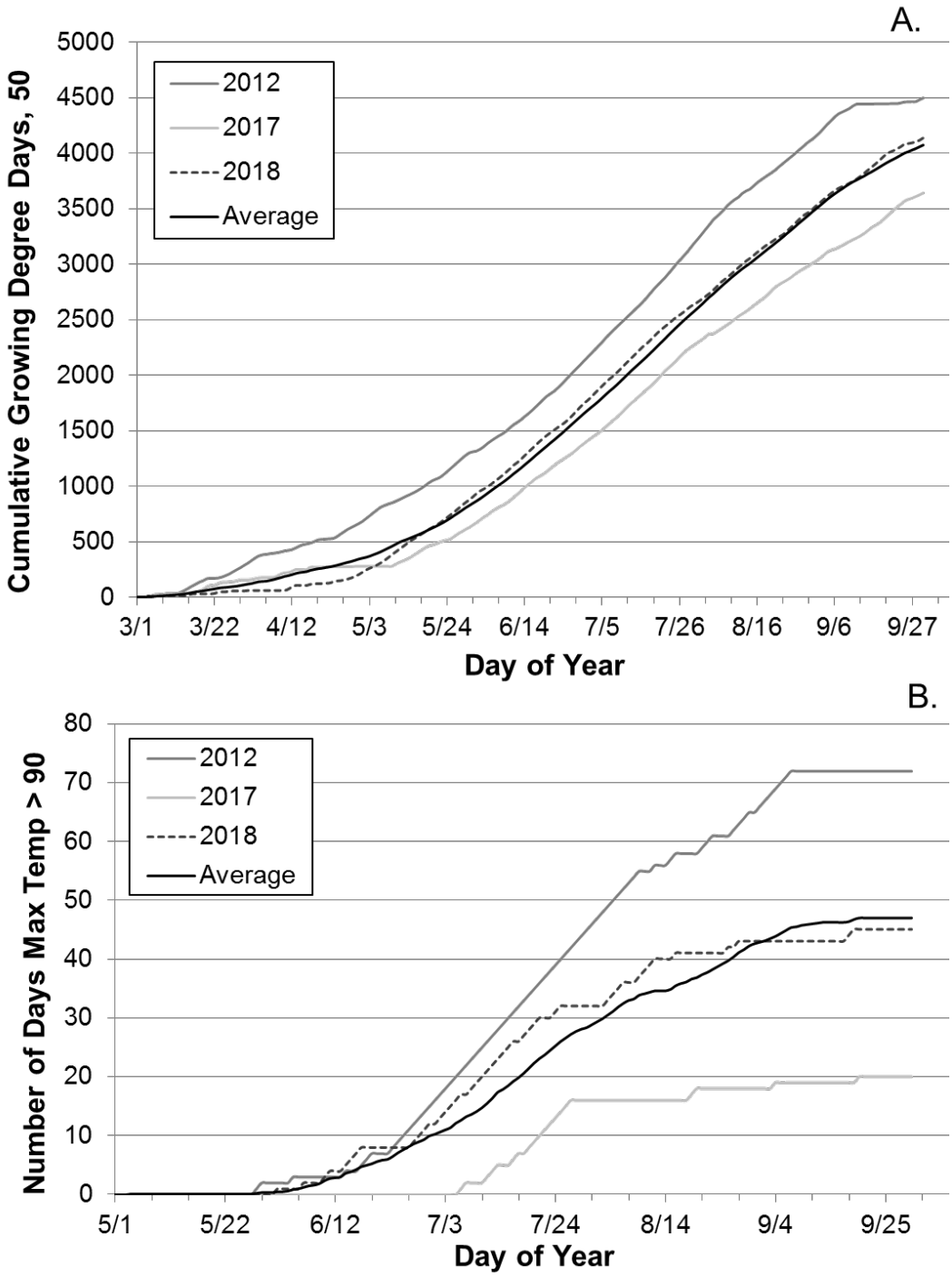

Figure 2. Temperature patterns and extremes during 2018 and preceding years. (A) Cumulative growing degree days (GDD) calculated with a base temperature of 50°F during the summer growing season. (B) Number of days the maximum temperature was greater than 90°F. Eight-year average included for comparison.

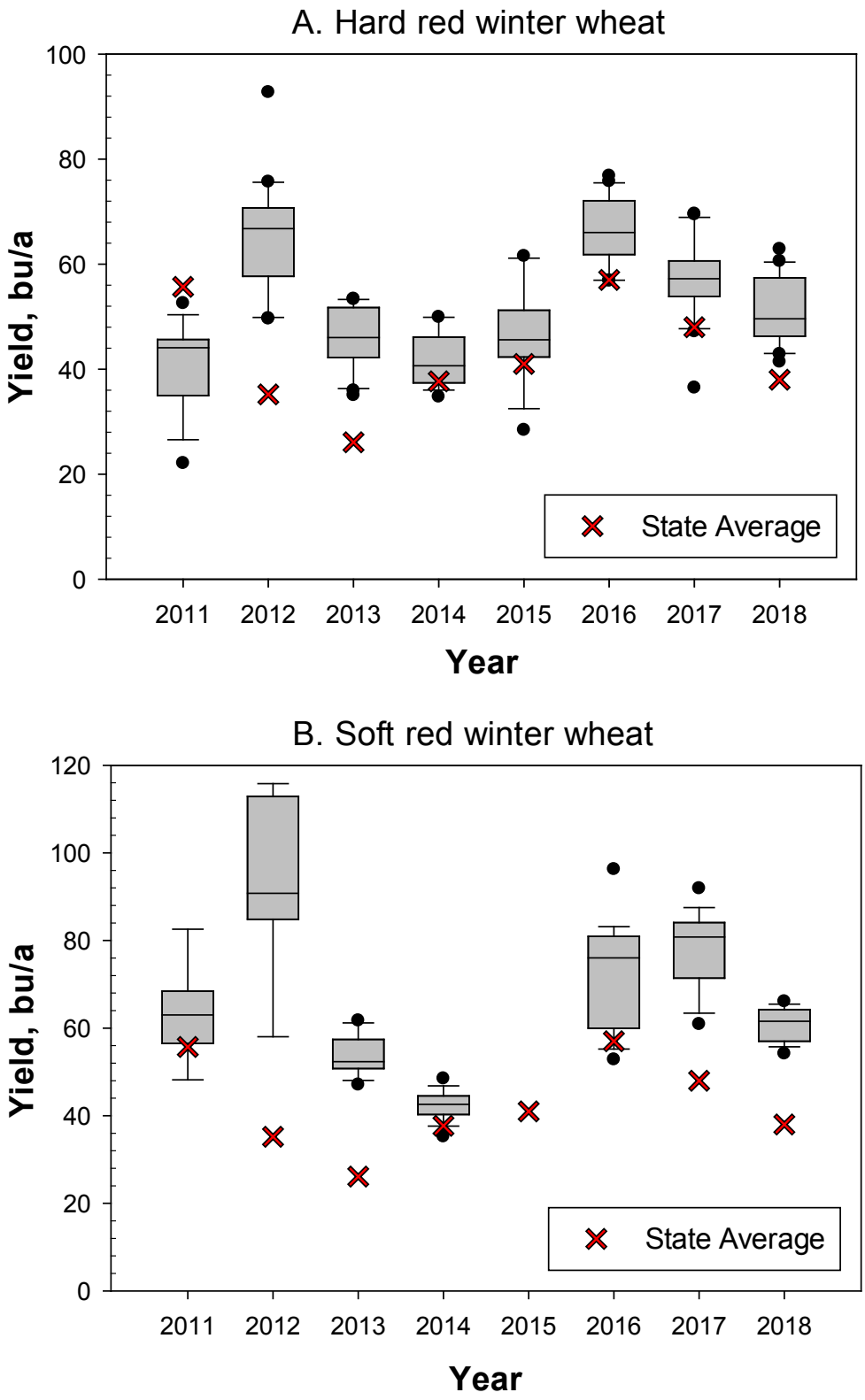

Figure 3. Winter wheat yield for (A) hard red wheat and (B) soft red wheat from variety trials in southeast and eastern Kansas from 2011 through 2018. The line in the middle of the box plots is the median yield of all varieties. The upper and lower quartiles are given by the upper and lower edges of 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 southeast Kansas are highlighted as a red X.

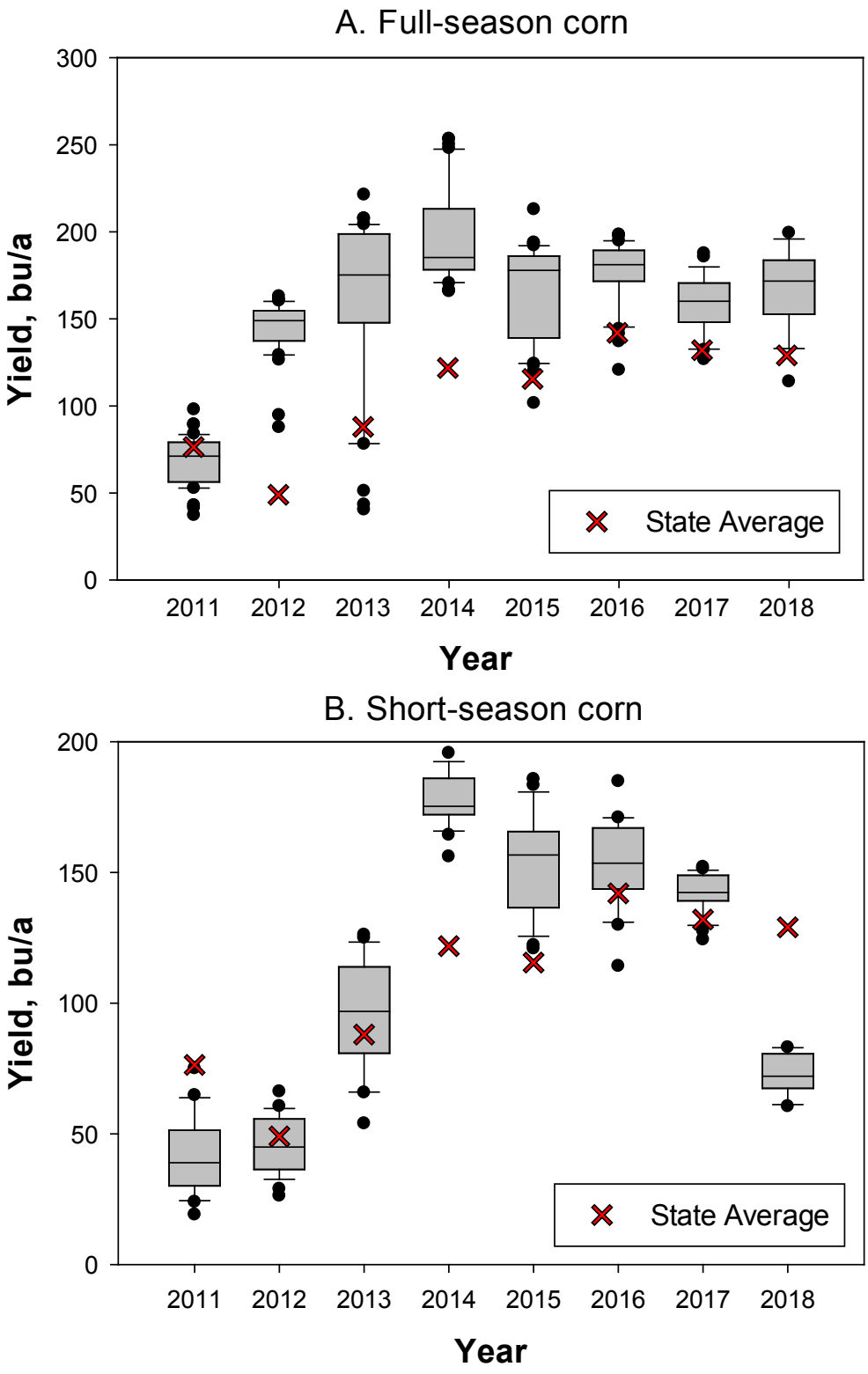

Figure 4. (A) Full-season corn at Erie and (B) and short-season corn at Parsons from variety trials grown from 2011 through 2018. Yield was not available for the variety trials from 2016. For comparison, reported state average yields are highlighted as a red X.

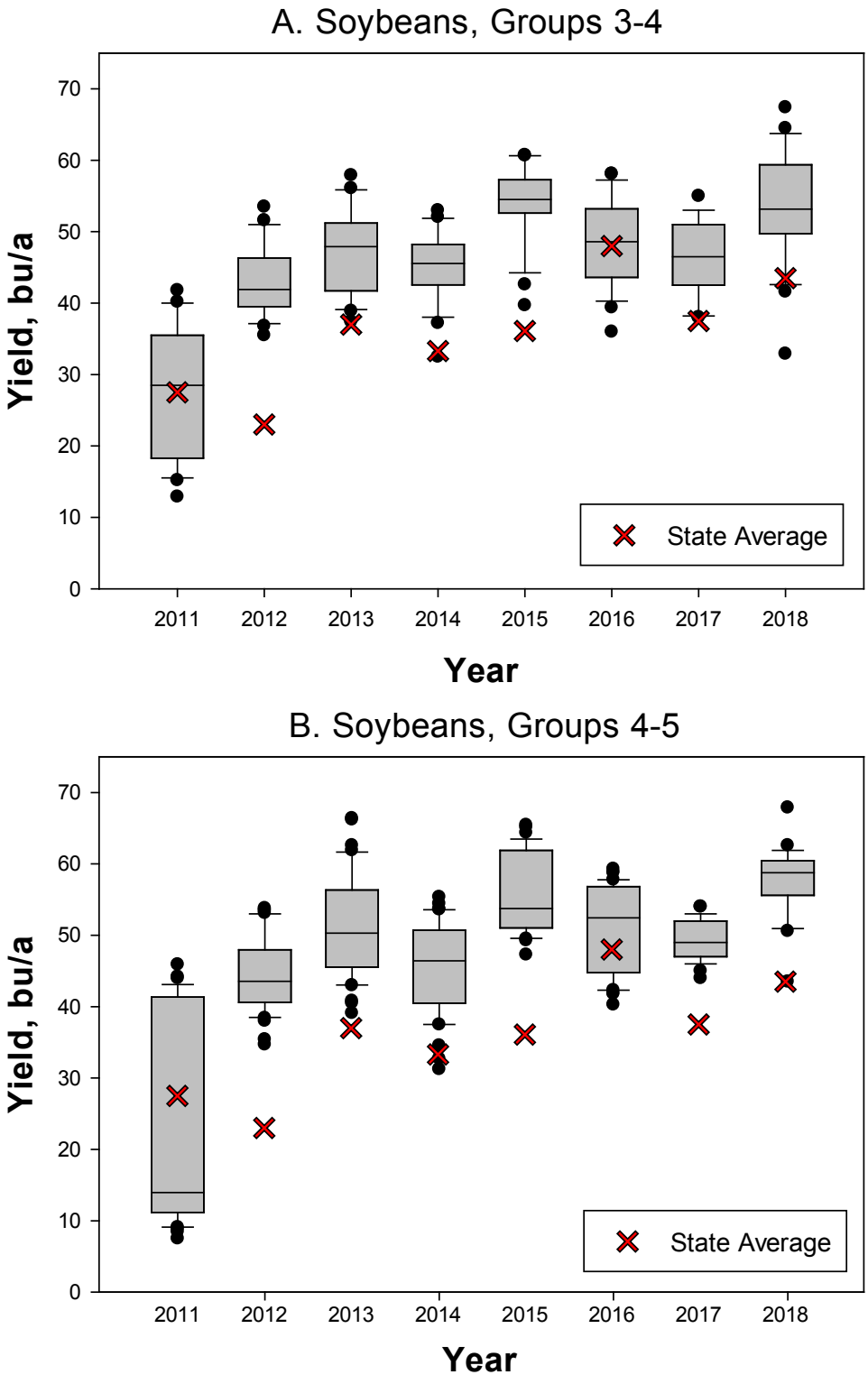

Figure 5. Soybeans from (A) MG3-4 and (B) MG4-5 from variety trials grown from 2011 through 2018. For comparison, average reported yields from Kansas are highlighted as a red X.

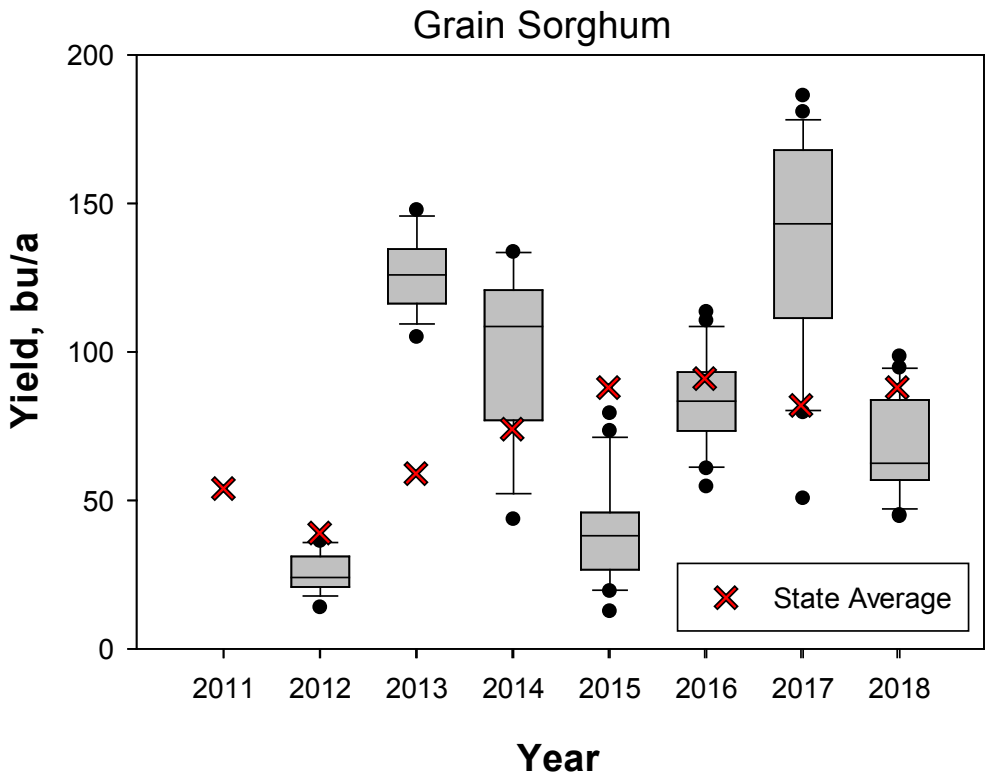

Figure 6. Grain sorghum from variety trials grown from 2011 through 2018. Yield was not available for the variety trials in 2011. For comparison, average reported yields from Kansas are highlighted as a red X.

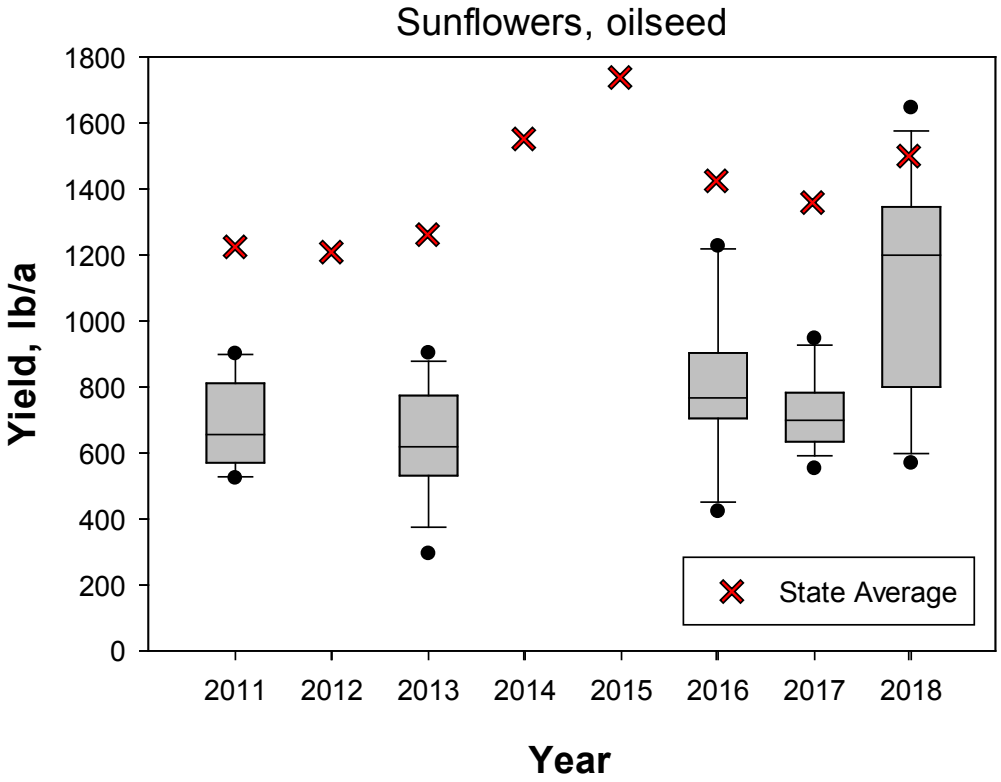

Figure 7. Oilseed sunflowers from variety trials grown from 2011 through 2018. Yield data were not available from the variety plots in 2012, 2014, or 2015. For comparison, average reported Kansas state yields are highlighted as a red X.