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Southeast Kansas Weather Summary - 2020

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Southeast Kansas Weather Summary - 2020

Abstract

This is a summary of the weather conditions in southeast Kansas during the 2019/2020 growing season. The wet weather pattern that began in 2019 continued into the spring of 2020, creating adverse conditions for spring crop establishment. Dry conditions during the summer and fall limited crop and pasture production. Temperatures were very near the 10-year averages at each location.

Keywords

weather, rainfall, temperature, growing degree days, cumulative rainfall, southeast Kansas

Cover Page Footnote

This work is supported by the U.S. Department of Agriculture National Institute of Food and Agriculture, Hatch project 1018005.

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Introduction

The southeast Kansas extension area covers 25 counties. The area ranges from the north near Ottawa, KS, to the west in Harper and Kingman counties. The region has a unique environment as it includes the highest rainfall area of Kansas. A significant rainfall gradient occurs in the region from east to west. A temperature gradient is observed from north to south. The varying climate impacts crop production in the region.

Crop production is sensitive to environmental conditions. This report summarizes the environmental conditions during the 2019/2020 growing season in comparison to previous years and the historical averages. Weather conditions are reported on a water year basis. A water year (WY) begins on October 1 of the preceding year, and continues through September 30 of the following year. WY20 refers to the period from October 1, 2019–September 30, 2020. This coincides with the wheat growing season.

Temperature plays a critical role in crop production. Early season soil temperatures are critical for seed germination. Air temperatures regulate crop development and progress through crop stages of development (vegetative, reproductive, and maturation). Temperatures that are too high or too low can negatively impact crop production and development. Calculation of the cumulative growing degree days (GDD) is a method of tracking crop progress through the growing season. Cumulative GDD are calculated by summing the daily "heat units" received each day above a given low temperature. Growing degree day information is available on the Kansas Mesonet website (*http://mesonet.k-state.edu/agriculture/degreedays/*). 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.

Experimental Procedures

The Kansas State University Climatology Laboratory maintains weather stations throughout Kansas (*http://mesonet.k-state.edu*). These meteorological stations record

weather parameters throughout the growing season. Information is available to be downloaded on a daily basis. All information presented here was downloaded from the stations at Harper, Ottawa, and Parsons, KS. 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 during WY20 was on track to exceed that received during the record-setting previous year at all three locations (Figure 1). By the end of April, however, rainfall totals decreased to normal levels except in Parsons. Total rainfall in Harper for WY20 (28.8 inches) was near the average of 26.9 in. Rainfall totals in Ottawa decreased substantially after April, reducing total WY rainfall to 25.9 in., well below the average of 34.4 in. High rain events in Parsons continued throughout April in Parsons, creating problems for spring crop establishment (Sassenrath et al., 2021a). During April, the cumulative rainfall exceeded that received during the previous WY19. On May 15, 2020, Parsons received 4.7 in. of rain in one 24-hr period. However, after that, conditions at Parsons dried rapidly, creating challenges for double-cropped systems (Sassenrath et al., 2021b). The overall WY20 rainfall (49.9 in.) at Parsons was still well above the average of 38.7 in.

The decrease in rainfall during the summer growing season was more apparent in all locations (Figure 2). Harper received near-average rain of 18.3 in., compared to an average of 20.5 in. Ottawa received slightly more rain during the growing season (18.6 in.), which was substantially below the average for that area (26.2 in.) and more similar to the dry years of 2011 and 2012. Parsons received 16 in. of rain after the April deluge, which was less than the 20 in. average rainfall received from May–October. However, the total for the growing season was still above the 33.7 in. normally received, and well above the dry years of 2011 and 2012. The dry conditions created challenges for pasture establishment (Helwig et al., 2021), but contributed to higher wheat quality (Sassenrath et al., 2021c).

Temperatures in 2020 were reduced at Harper and Ottawa, but near normal for Parsons (Figure 3). Reduced heat unit accumulation caused slow crop development. This was observed as later harvest dates for corn (Sassenrath et al., 2021a). The 2020 growing season was nearly normal for the number of days with high temperatures (Figure 4). Excessive high temperatures reduce crop production. Note that Harper received on average more seasonal temperatures in excess of 90°F than Ottawa. Interestingly, Parsons on average has cooler summers, with fewer days of temperatures above 90°F. This may be due in part to higher rainfall, with more cloudy days.

Conclusions

The year 2020 was challenging for crop production due to excessive rainfall in the spring, limiting crop planting and crop establishment. Drier late spring/early summer conditions improved wheat quality, but impeded summer crop production and grass establishment.

Acknowledgment

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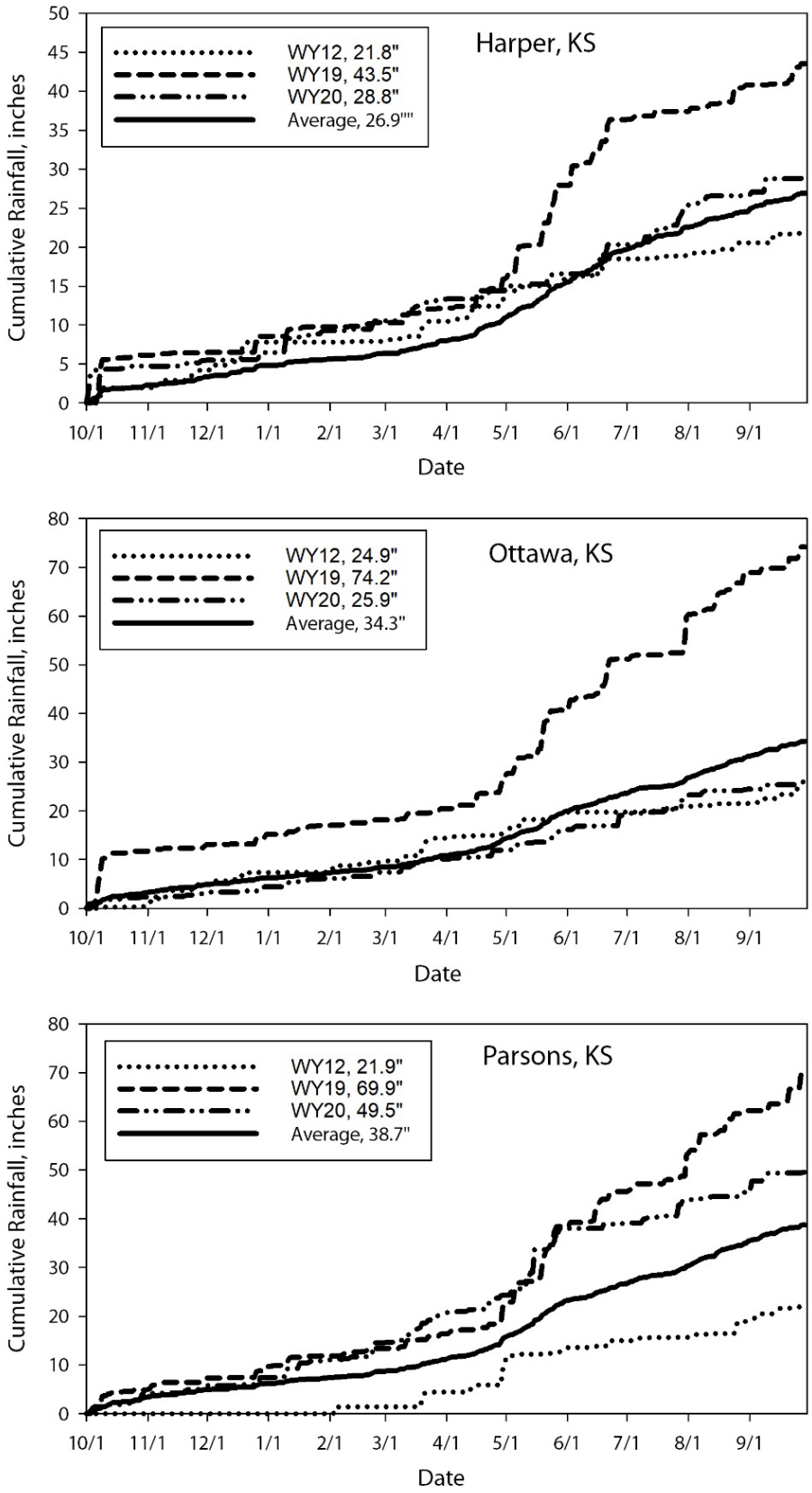

Figure 1. Cumulative rainfall during the water year from October 1 through September 30 at Harper, KS (upper), Ottawa (middle), and Parsons (lower). Ten-year average (solid black line) included for comparison. Rainfall total in inches given after each year in legend. Note difference in y-axis between locations.

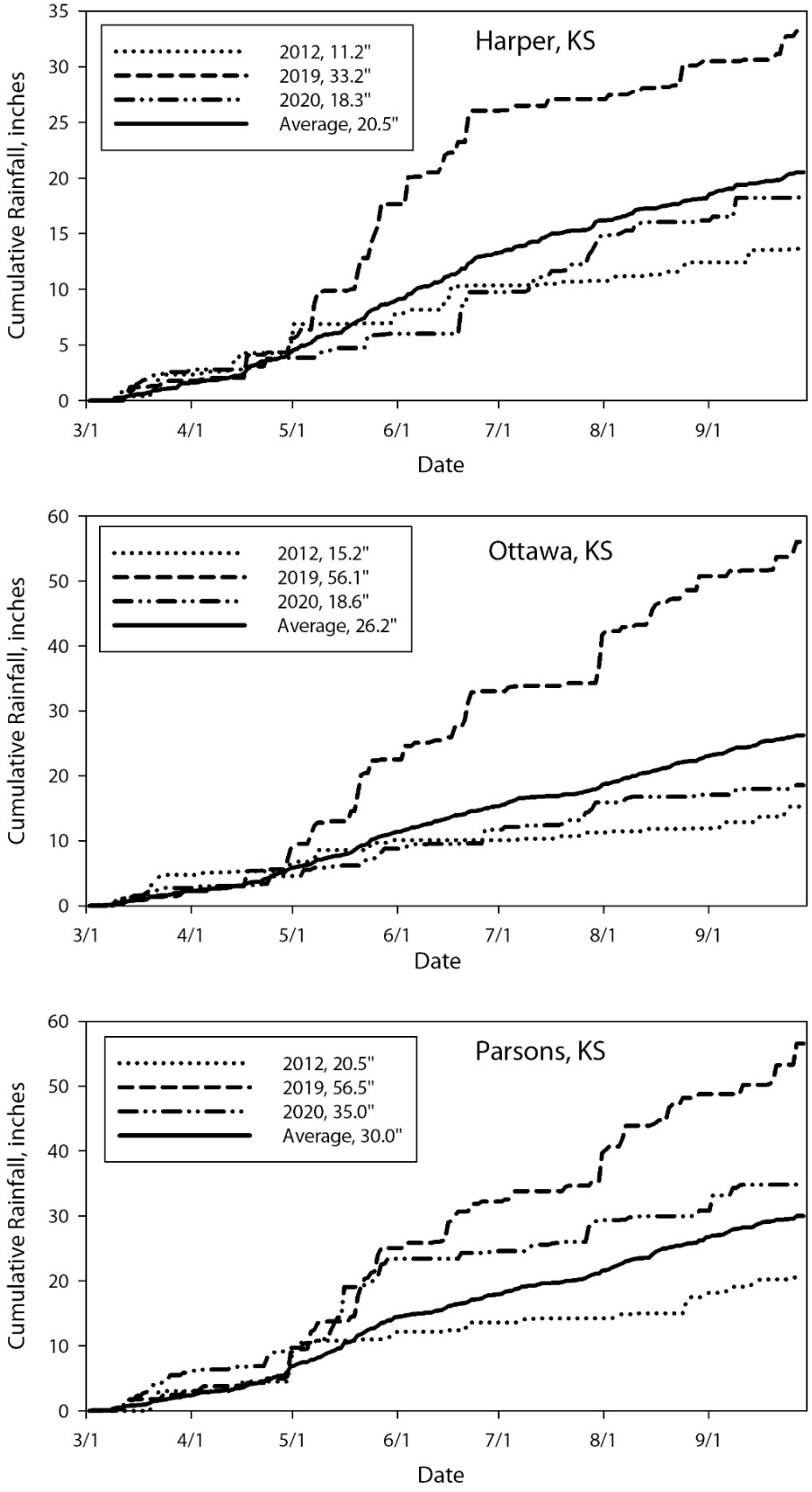

Figure 2. Rainfall during the summer crop production season during 2020 and preceding years at Harper (upper), Ottawa (middle), and Parsons (lower). Ten-year average (solid black line) included for comparison. Rainfall total in inches given after each year in legend. Note difference in y-axis scale between locations.

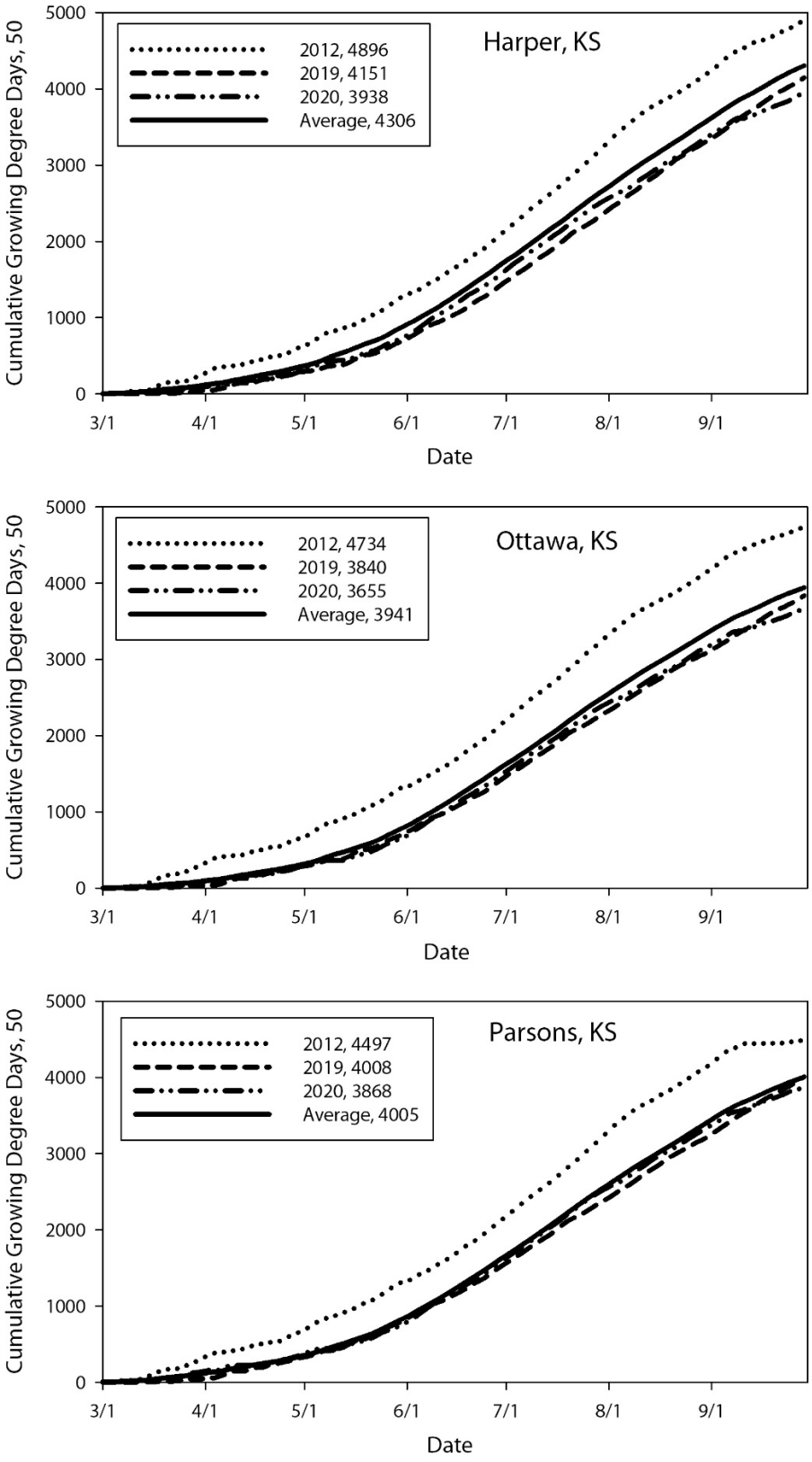

Figure 3. Cumulative growing degree days during 2020 and preceding years at Harper (upper), Ottawa (middle), and Parsons (lower). Ten-year average (solid black line) included for comparison. Cumulative growing degree days (GDD) calculated with a base temperature of 50°F during the summer growing season. Total GDD50 during growing season given in legend for each year.

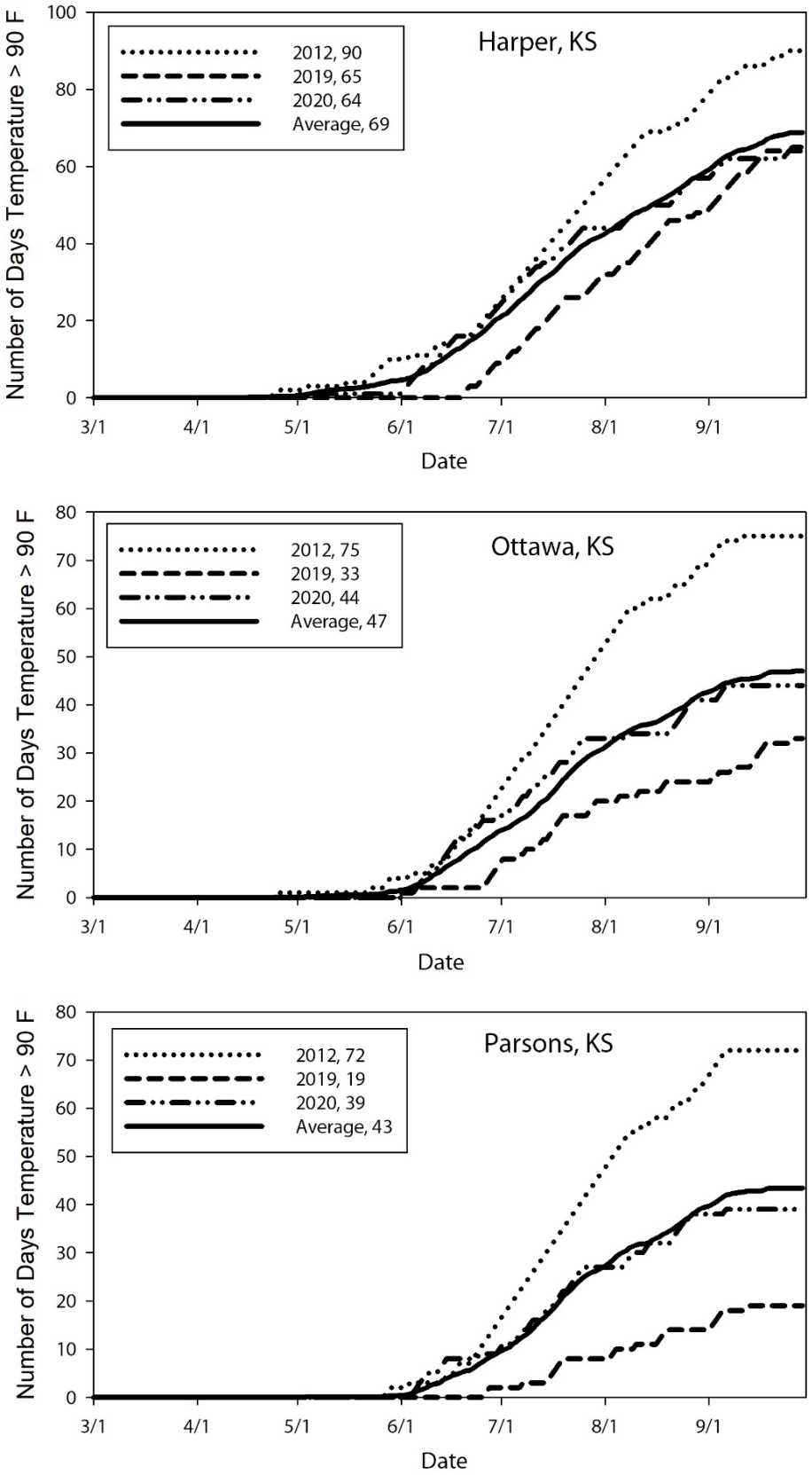

Figure 4. Number of days the maximum temperature was greater than 90°F days during 2020 and preceding years at Harper (upper), Ottawa (middle), and Parsons (lower). Ten-year average (solid black line) included for comparison. Total number of days of temperatures greater than 90°F are given after each year in legend.