



Climate Variability:

The Main Driving Force Behind *Crop Yields* and *Local Economies* in Kansas

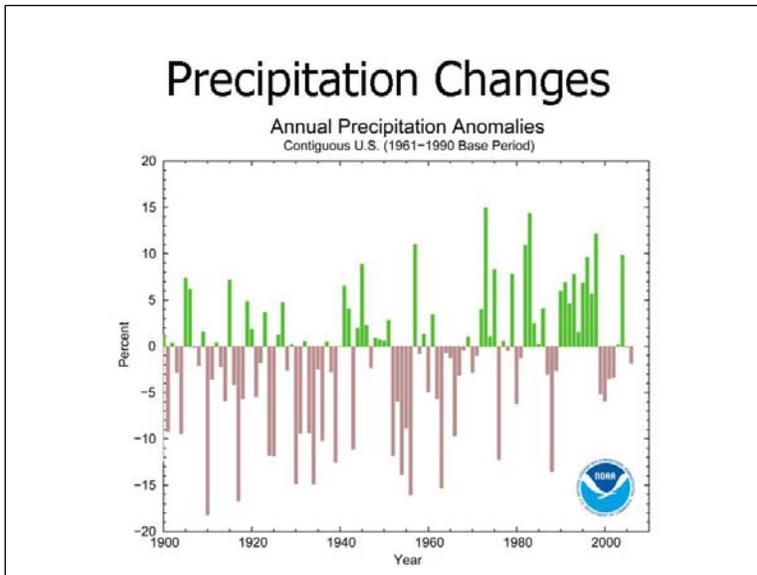
Local economies in Kansas depend largely on agriculture in any given year – how good the crops turn out, pasture and grazing conditions, and commodity prices. Pick any year, and the main driving force controlling all of these factors can be boiled down to one word: Climate.

This year, 2011, has driven home the reality of this in a way that few will ever forget. A severe and ongoing drought has hurt the wheat crop in much of western and southern Kansas. Regardless of how good the variety is, how much fertilizer was applied, or how good the equipment, the force of the drought has evened everything out.

Two other climate-related factors have also impacted wheat yields in 2011:

- The period of extreme, 100-degree heat on May 8-10
- The unusually late freezes on May 15-16

Precipitation and Temperature: As so often happens, this year these two climatic forces are affecting income potential for producers, grain handlers, and others – and ultimately economic activity at the local level.



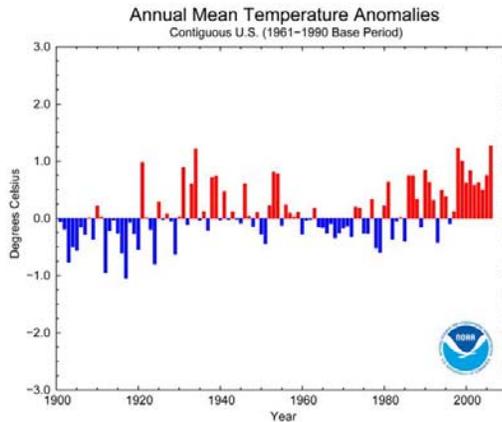
Precipitation is often the most obvious driving force in crop yields in Kansas, as it has been for the 2011 wheat crop. The graph at left shows the large variability in precipitation averaged over the entire continental U.S. since 1900. Precipitation has varied from nearly 20 percent below normal to 15 percent above normal.

In Kansas, it is not uncommon to have even greater variability in precipitation from year to year, causing large variations in crop yields, grazingland conditions, and local economic activity. Projections for future changes in precipitation vary, but one thing is certain: There will continue to be large variations in precipitation and Kansas producers should consider how to adapt their management strategies so they

can prosper for any possible future extremes in precipitation – from drought to unusually wet conditions.

Temperature is the other main climatic variable that affects agriculture and economic activity. The graph on the next page shows how average mean temperatures have varied in the continental U.S. since 1900. This graph is in degrees Celsius, but 1 degree C is about 1.8 degrees F.

Temperature Changes

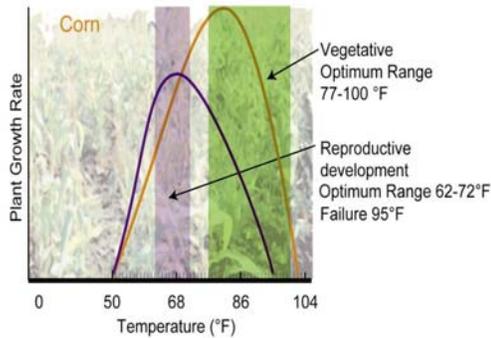


It is the extremes in temperatures that cause the most serious disruptions in crop yields, especially when these extremes occur during a crop's reproductive phases. Consider the following situations, all of which have occurred in various parts of Kansas over the last several years, and all of which have affected crop yields:

- In early May, high temperatures reach 100 degrees. This sterilizes wheat pollen and reduced kernel set.
- A late freeze occurs in early May while the wheat is flowering, damaging the flowers and reducing yields.
- Temperatures are unusually hot in June, disrupting corn pollination. The graph below shows how temperature ranges and extremes affect the reproductive development of corn.

- An early freeze in late September stops grain sorghum before it has matured, or stops the development of soybean.

Climate Change and Mitigation



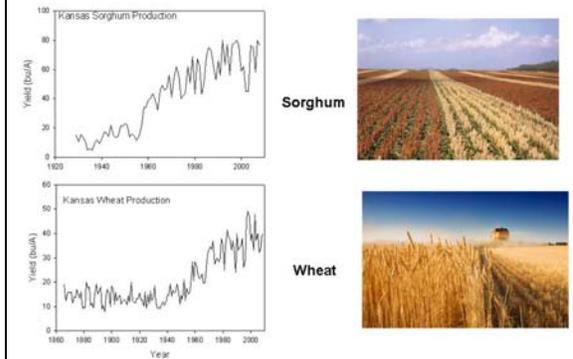
The bottom line is that precipitation and temperature are the most powerful factors in agriculture in any given year. In many years, when extremes of precipitation or temperature occur, these factors have an even bigger impact on agriculture than genetic or technology improvements.

It is important, then, that all Kansans – especially those most closely tied to production agriculture – do all they can to prepare for changes in precipitation and temperature extremes during the coming decades.

The first step is to recognize that changes in climate one way or another are inevitable, without necessarily trying to predict what those changes will be. The next step is for producers and others in Kansas to position their business

operations and personal activities to be able to thrive in any type of future climate. Certainly crop insurance and good marketing strategies play an important in this preparedness for agricultural producers, but ultimately adapting to future climate variability may require changes in management planning at many levels. Local businesses and municipal economies in Kansas must be strong and adaptable, and aware of the challenges of the future.

Variation in Crop Yields



Variation in Crop Yields in Kansas

The graphic at left shows how yields of grain sorghum and wheat have increased in Kansas during the past 80 to 100 years. The increases are generally due to improvements in genetics and technology. The graph also shows the considerable variability in crop yields from year to year. This is largely due to the effects of changes in precipitation and temperature, and the extremes in those two factors. If it were not for changes in precipitation and temperature, there would be a smooth line upward in yields.