Issue 701

K-STATE Research and Extension

Extension Agronomy

eUpdate

07/06/2018

These e-Updates are a regular weekly item from K-State Extension Agronomy and Kathy Gehl, Agronomy e-Update Editor. All of the Research and Extension faculty in Agronomy will be involved as sources from time to time. If you have any questions or suggestions for topics you'd like to have us address in this weekly update, contact Kathy Gehl, 785-532-3354 kgehl@ksu.edu, or Curtis Thompson, Extension Agronomy State Leader and Weed Management Specialist 785-532-3444 cthompso@ksu.edu.

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1. Factors to consider before baling or burning wheat residue

Following wheat harvest there are some producers that might be thinking about baling or burning their wheat stubble. Producers may consider burning for several reasons: as a management practice to control plant diseases or weeds, to improve the seedbed for the subsequent crop, and possibly other reasons. While burning is inexpensive and baling provides additional income, producers should understand the true value of leaving crop residue in the field. Some of the information below comes from K-State Extension publication MF-2604, *The Value of Crop Residue*.

There are four main factors to consider:

Loss of nutrients

The products of burned wheat stubble are gases and ash. Nutrients such as nitrogen (N) and sulfur (S) are largely combustion products, while phosphorus (P) and potassium (K) remain in the ash. When residue is burned, about one-third to one-half of the N and S will combust. The nutrients in the ash may remain for use by the plants, if it doesn't blow or wash away first (more on that below). Therefore, instead of cycling these important plant nutrients back into the soil, they can essentially become air pollutants when the residue is burned.

Table 1. Amounts of nutrients remaining in wheat stubble when assuming 50 bu/acre yield.

Nutrient	Pounds present in 5,000 lbs of wheat straw
N	27.0
P_2O_5	7.5
K_2O	37.5
S	5.0

Protection from soil erosion

Bare soil is subject to wind and water erosion. Without residue, the soil will receive the full impact of raindrops, thus increasing the amount of soil particles that may become detached during a rainfall event. Bare, tilled soils can lose up to 30 tons per acre topsoil annually. In no-till or CRP systems where residue is left, annual soil losses are often less than 1 ton per acre. The detachment of soil particles can lead to crusting of the soil surface, which then contributes to greater amounts of sediment-laden runoff, and thus, reduced water infiltration and drier soils.

Leaving residue on the field also increases surface roughness, which decreases the risk of both wind and water erosion. Most agricultural soils in Kansas have a "T" value, or tolerable amount of soil loss, of between 4 and 5 tons per acre per year, which is about equal to the thickness of a dime. To prevent water erosion, 30% ground cover or greater may be needed to reduce water erosion to "T" or less, especially in fields without erosion-control structures such as terraces.

Standing stubble is more effective at preventing wind erosion than flat stubble. On occasion, accidental residue burns have resulted in devastating wind erosion events that happen over and over again until a new ground cover is established. Once a field begins to erode from wind, it is extremely difficult to stop. During extended droughts the soil profile gets dried out and not even emergency tillage is effective at stopping the wind erosion. Losing topsoil degrades soil productivity, and the long-term effect of this loss is not easy to quantify.

Research results from six locations in western Kansas are shown in Figure 1. In this experiment, crop residue was removed at different levels by cutting the crop residue at different heights. For example, if the residue was 10" after it was combined, the residue would be cut to 5" and removed from the plot, and that would equal 50% removal. The wind erodible fraction is the part of the soil less than 0.84 mm in size.

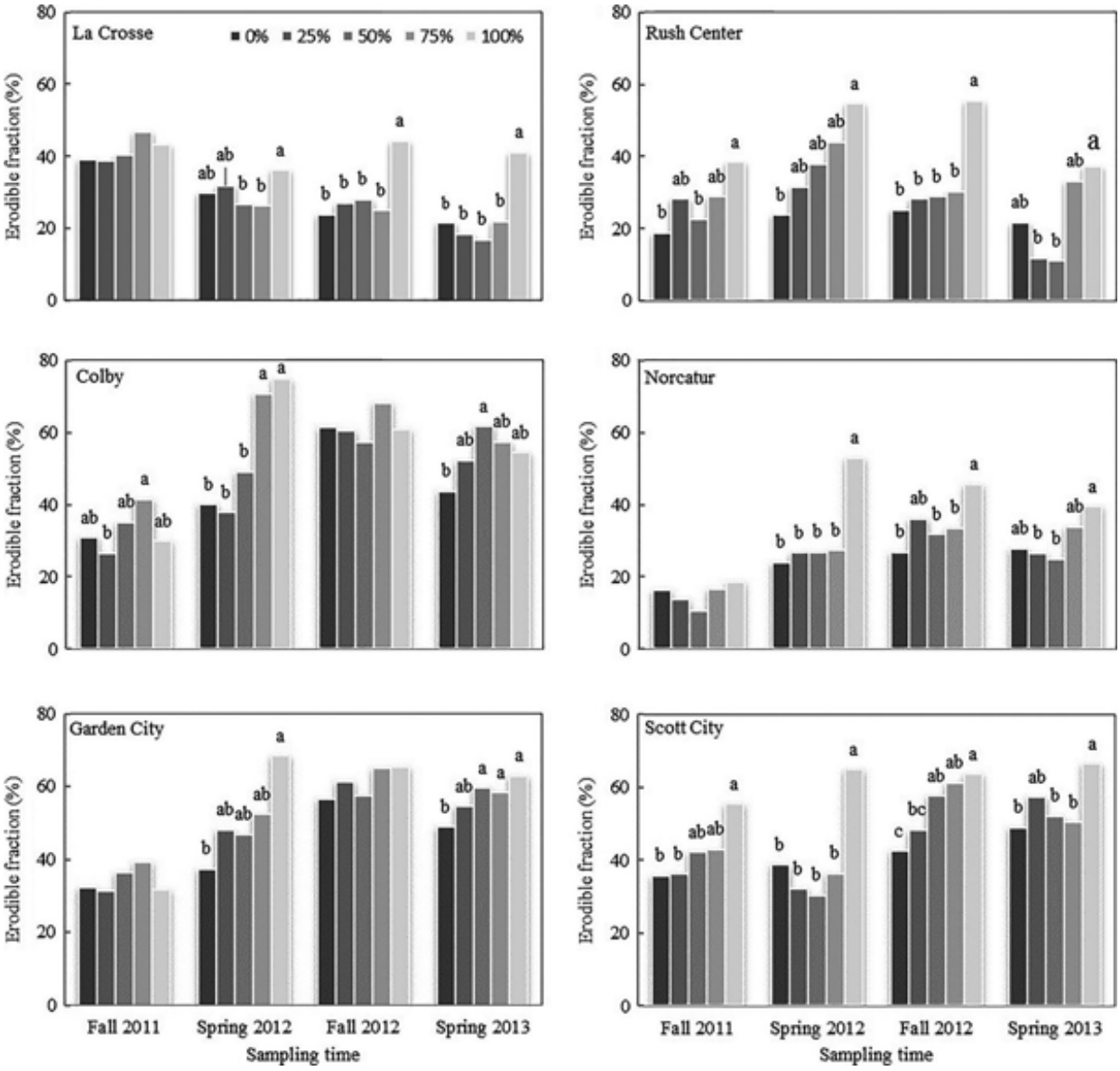

Figure 1. Effects of crop residue removal on the wind erodible fraction of soil, defined as <0.84 mm. Values on the x-axis (different shadings of the bars) refer to the percent residue removed. For example 0% means no residue was removed, while 100% means that all residue was

removed. Lowercase letters indicate treatment differences at p<0.05. From: He et al., 2017, available at: https://doi.org/10.1111/gcbb.12483

Moisture infiltration rates and conservation

Wheat residue enhances soil moisture by increasing rainfall infiltration into the soil and by reducing evaporation. Residues physically protect the soil surface and keep it receptive to water movement into and through the soil surface. Without physical protection, water and soil will run off the surface more quickly.

Ponded infiltration rates were measured at Hesston in September 2007. Very low infiltration rates (1.9 mm/hour) were observed for continuous winter wheat in which the residue was burned each year prior to disking and planting the following crop. In contrast, high infiltration rates (13.3 mm/hour) were observed for a no-till wheat/grain sorghum rotation (Presley, unpublished data).

Another way residue increases soil moisture is by reducing evaporation rates. Residue blocks solar radiation from the sun and keeps the soil surface cooler by several degrees in the summer. Evaporation rates can decline dramatically when the soil is protected with residue. Research from dryland experiments has shown that crop residues are worth 2 to 4 inches of water annually in the central Great Plains states (*Efficient crop water use in Kansas*, MF3066).

Soil quality concerns

Over time, the continued burning of cropland could significantly degrade soil organic matter levels. By continually burning residue, soil organic matter is not allowed to rebuild. Soil organic matter is beneficial for plant growth as it contributes to water holding capacity and cation exchange capacity. Soil organic matter binds soil particles into aggregates, which increases porosity and soil structure and thus, increases water infiltration and decreases the potential for soil erosion. One burn, however, will not significantly reduce the organic matter content of a soil (unless the field erodes, as discussed above).

If producers do choose to burn or harvest their wheat stubble, timing is important, and should minimize the time that the field will be without residue cover and vulnerable to erosion. Before choosing to burn residue, producers should check with the USDA Natural Resources Conservation Service and/or the Farm Service Agency to find out if this will affect their compliance in any conservation programs.

For more information, see:

- *Efficient crop water use in Kansas*, MF3066, available at: http://www.ksre.ksu.edu/bookstore/pubs/mf3066.pdf
- *Emergency wind erosion control*, MF2206, available at: http://www.ksre.ksu.edu/bookstore/pubs/MF2206.pdf
- *Crop residue harvest impacts wind erodibility and simulated soil loss in the Central Great Plains*. 2017. Global Change Biology Bioenergy, https://doi.org/10.1111/gcbb.12483

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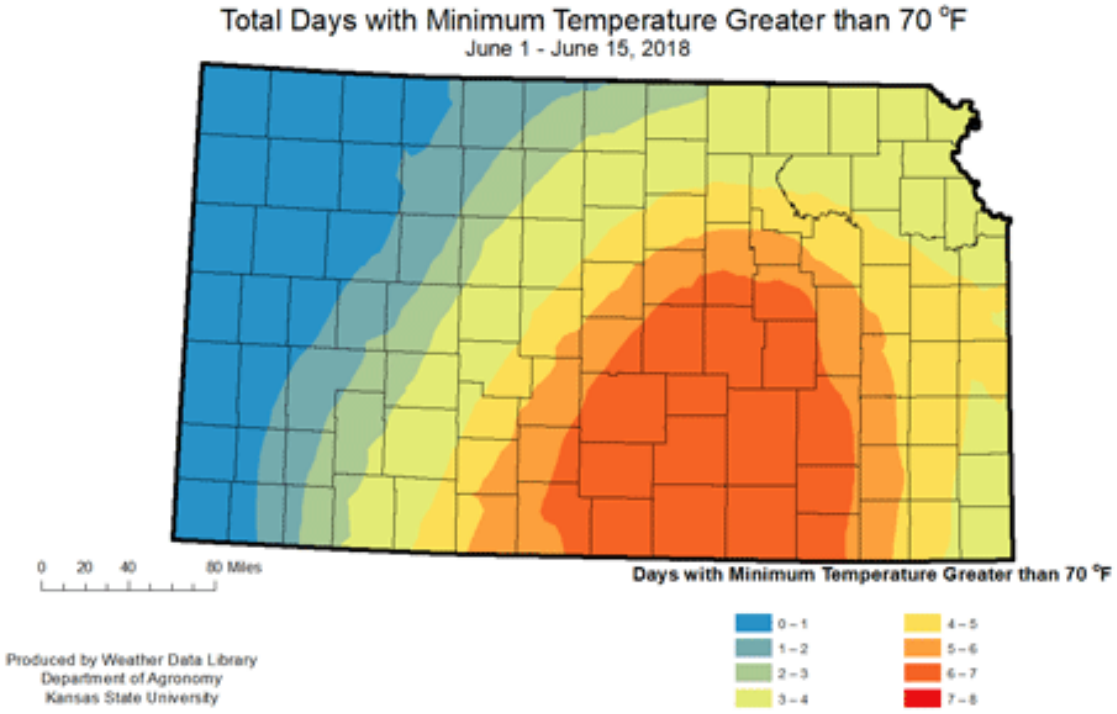
2. Effect of high night temperatures on corn yield

Corn is already in reproductive stages in many parts of the state, particularly in eastern Kansas. One of the main challenges presented in the last month, besides the lack of precipitation, was the high night temperatures.

Nighttime temperatures started increasing as June progressed. During the first half of the month, for even the warmest locations, lows were greater than 70 degrees F only half of the time. However, during the last part of June and the beginning of July (June 16- July 5), the total number of days with temperatures above 70 degrees F increased in the eastern part of the state to almost three-quarters of the time in the warmest regions (Figure 1).



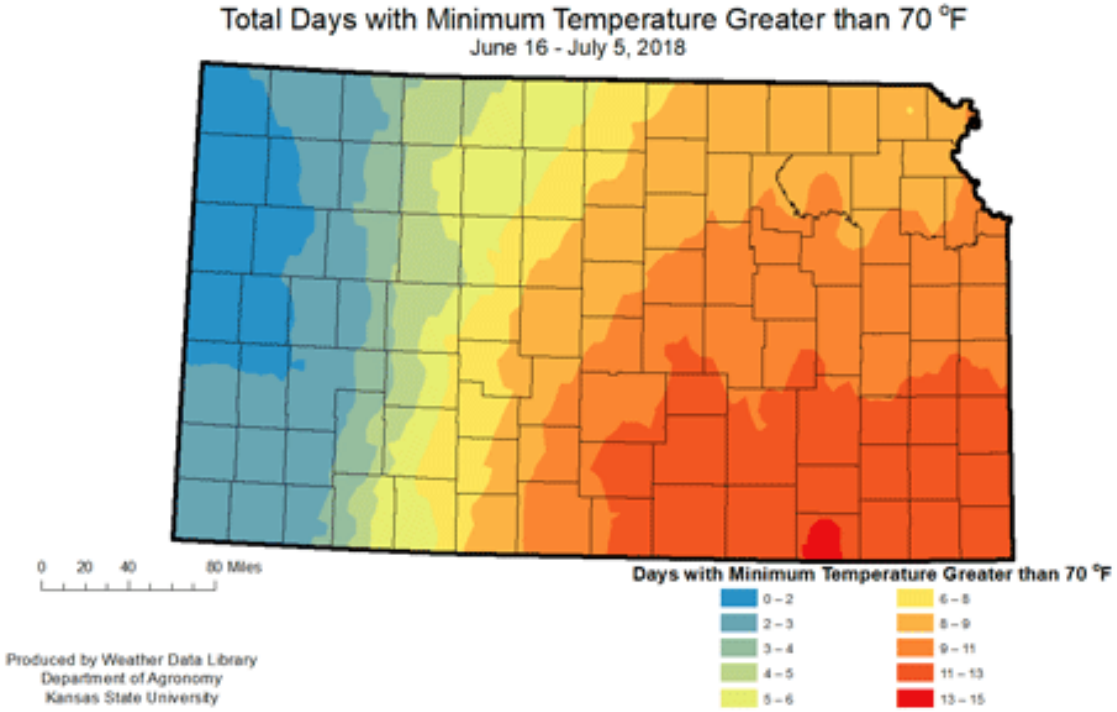


Figure 1. Total days with minimum temperatures greater than 70 degrees F for the period June 1 – June 15 (upper panel) and June 16 - July 5 (lower panel). Map by the K-State Weather Data Library.

High nighttime temperatures during the reproductive growth (at or after flowering) can reduce kernel number, and if later in the season, kernel weight. This effect can be explained as an increase in the rate of respiration, increasing the demand for sugar for energy and diminishing its availability for supplying the growing kernels.

In addition, as experienced in many parts of our state, high night temperatures tend to accelerate plant phenology, running more quickly but with overall lower plant efficiency in using available resources. This situation has been documented in many parts of the state as an earlier-than-usual (close to 2 weeks) flowering time. For example, a corn planted during the first week of May was flowering around the first or second week of July in 2017 (depending on the maturity) and a similar corn hybrid this year was reaching the same stage around the last week of June.

The effect of high night temperatures will be exacerbated as corn is entering into the most critical growth period (a few days before flowering to grain filling). The consequence of high night temperatures will be reflected in reductions in kernel number (if timing of the stress was around flowering) and/or kernel weight (if timing of stress was coincided with the grain filling period).

In summary, high night temperatures will be impacting corn yields primarily in the eastern part of the state, but the final yield reduction is yet to be determined, clearly depending on the timing of the stress (duration) and the area of the state affected.

Scout your corn fields and stay tuned for more information in upcoming eUpdate issues!

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3. Drought update for Kansas - July 6, 2018

Precipitation summary

Spotty rainfall fell across Kansas again this week. The Northwest Division had the highest percent of normal with an average of 1.01 inches or 150 percent of normal. The Southwest Division came in with the lowest precipitation, with an average of 0.02 inches, or 2 percent of normal. Statewide average precipitation was 0.73 inches, which was 71 percent of normal and resulted in a deficit of 0.17 inches for the week. The highest precipitation total for a National Weather Service Coop station was 5.53 inches at Hill City 1E in Graham County. The highest total for a Community Collaborative Rain Hail and Snow (CoCoRaHS) station was 3.15 inches at Garnett 0.4 NNE in Anderson County. The greatest total for a Kansas Mesonet station was 5.59 inches, at the Hill City station in Graham County.

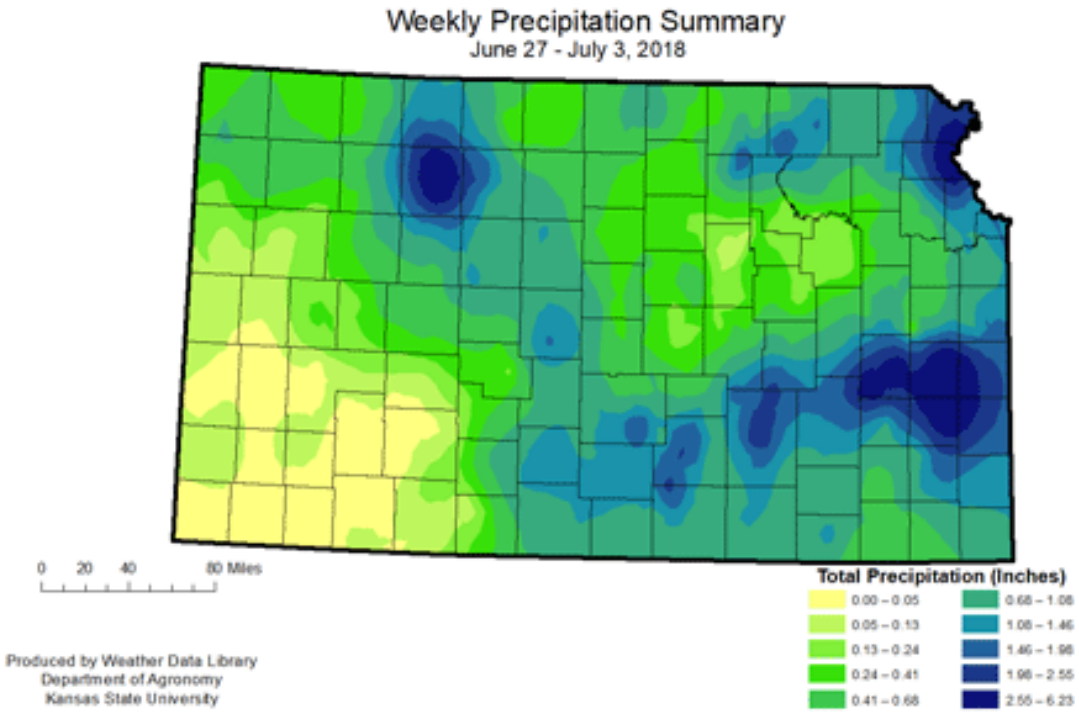

Figure 1. Weekly total precipitation for Kansas during the week of June 27- July 3, 2018 via Cooperative Observer (COOP), Community Collaborative Rain Hail Snow Network (CoCoRaHS), and Kansas Mesonet.

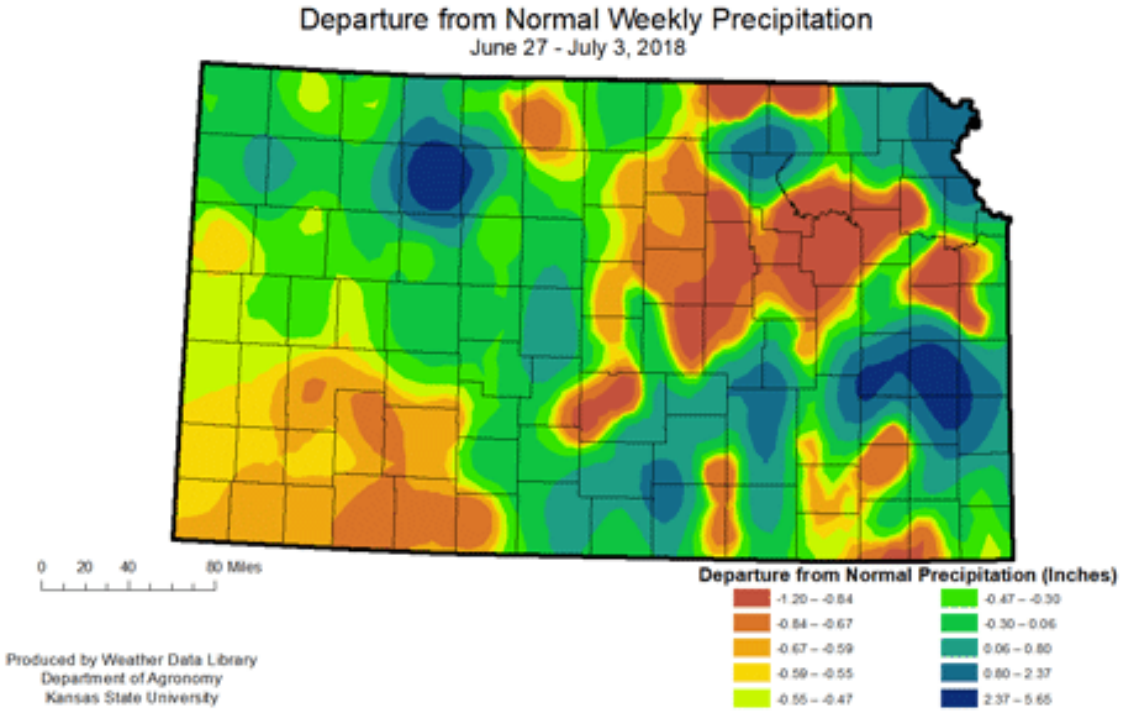

Figure 2. Departures of weekly precipitation from normal for Kansas during the week of June 27- July 3, 2018 via Cooperative Observer (COOP), Community Collaborative Rain Hail Snow Network (CoCoRaHS), and Kansas Mesonet.

Temperature summary

Temperatures continued to be warmer-than-normal across the state. The statewide average temperature was 80.8 degrees F, or 3.6 degrees warmer-than-normal. The East Central Division had the greatest departure from normal with an average of 81.9 degrees F, or 5.0 degrees warmer-than-normal. The Northwest Division came closest to normal, with an average of 77.3 degrees F or 2.0 degrees warmer-than-normal. The highest maximum temperature was 107 degrees F at Abilene 1W in Dickinson County on the June 28th. The lowest minimum temperature was 41 degrees F at Plainville 4WNW, also on June 28th.

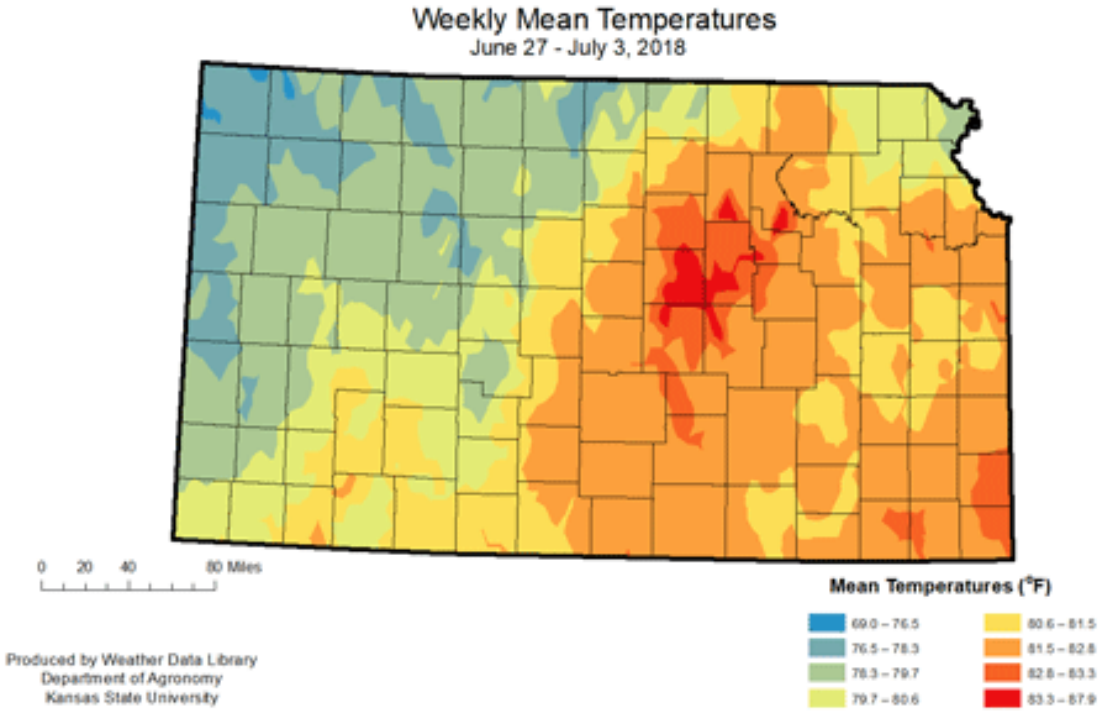

Figure 3. Weekly mean temperatures for Kansas during the week of June 27- July 3, 2018 via Cooperative Observer (COOP) and Kansas Mesonet.

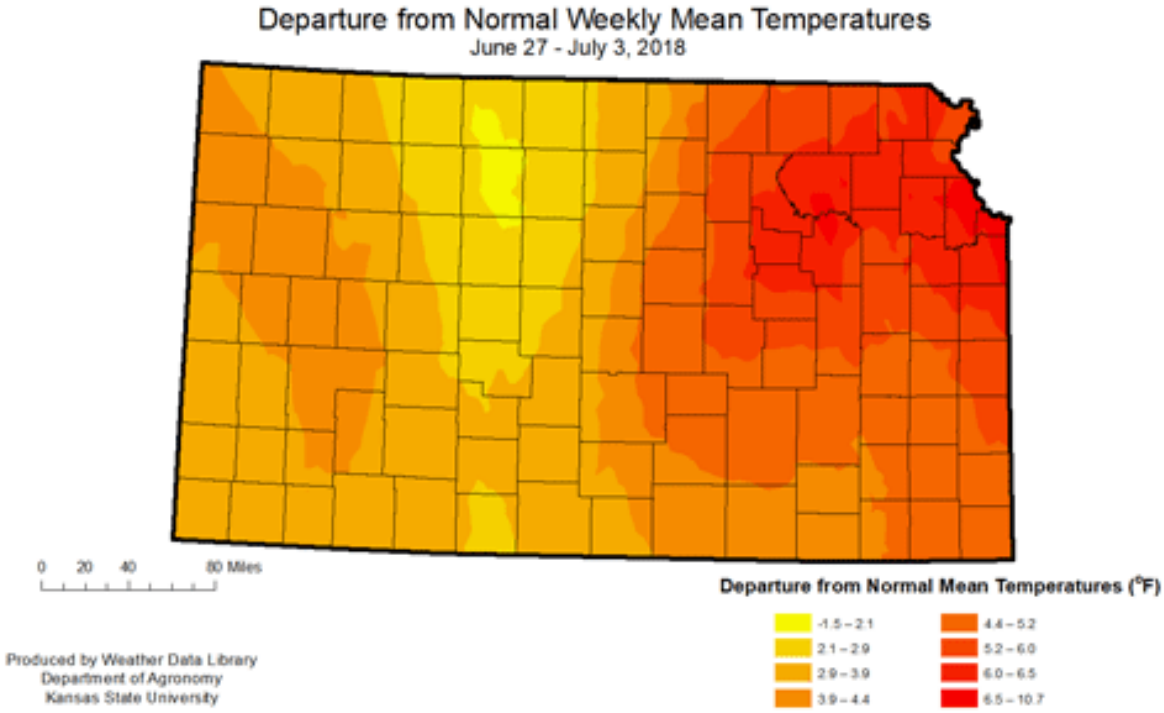

Figure 4. Departures of weekly mean temperatures for Kansas during the week June 27- July 3, 2018 via Cooperative Observer (COOP) and Kansas Mesonet.

Update on drought conditions

With near-normal precipitation in some areas, the changes in drought conditions were limited. The high temperatures and low precipitation have concentrated the "Extreme Drought" in the Central Division, with some extent into the East Central and South Central Divisions (Figure 5). Based on the frequency of these conditions, we no longer have any "Exceptional Drought" in Kansas. It is important to note, however, that the difference between "Exceptional" and "Extreme" can be slight. Extreme and severe drought still indicate many negative impacts remain. The change in drought categories map (Figure 6) shows that there where changes that occurred during the week.

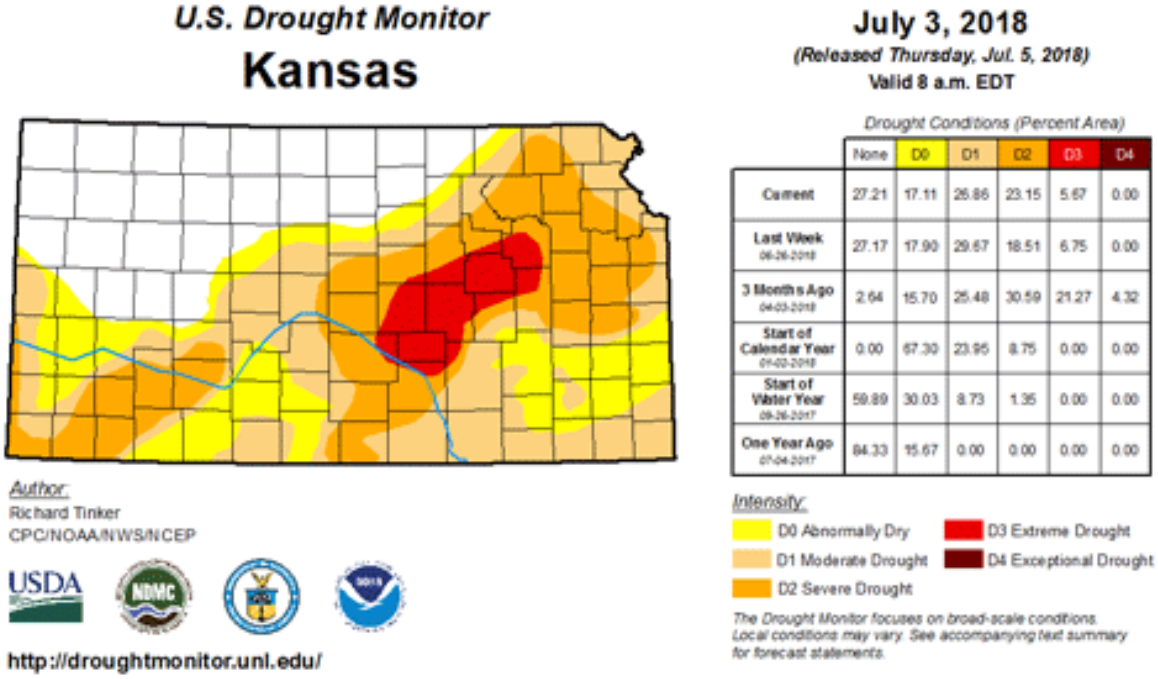

Figure 5. Current drought from the Drought Monitor (http://droughtmonitor.unl.edu/).

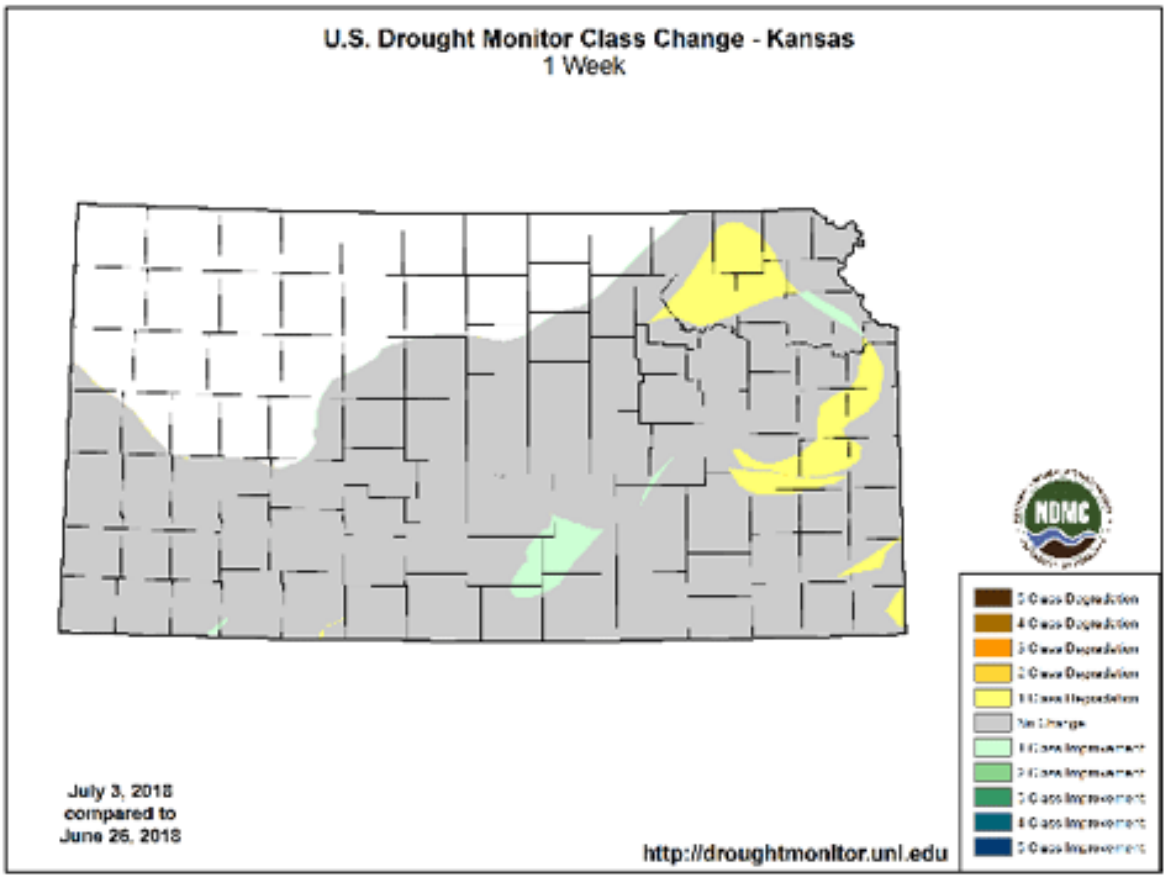

Figure 6. Difference in drought categories from June 26 to July 3, 2018. (U.S. Drought Monitor).

Precipitation and Temperature Outlooks for Kansas

The Quantitative Precipitation Forecast for the 7-day period, ending on July 12 shows the heaviest rainfall will be in the northwest corner of the state (Figure 7). The areas with heaviest amounts may see over an inch of precipitation. However, the rest of the state may see as little as half an inch, less than half of normal for the period. The 8 to 14-day precipitation outlook (Figure 8) indicates normal precipitation across much of the state. The temperature outlook is for an increased chance of warmer-than-normal temperatures for most of the state.

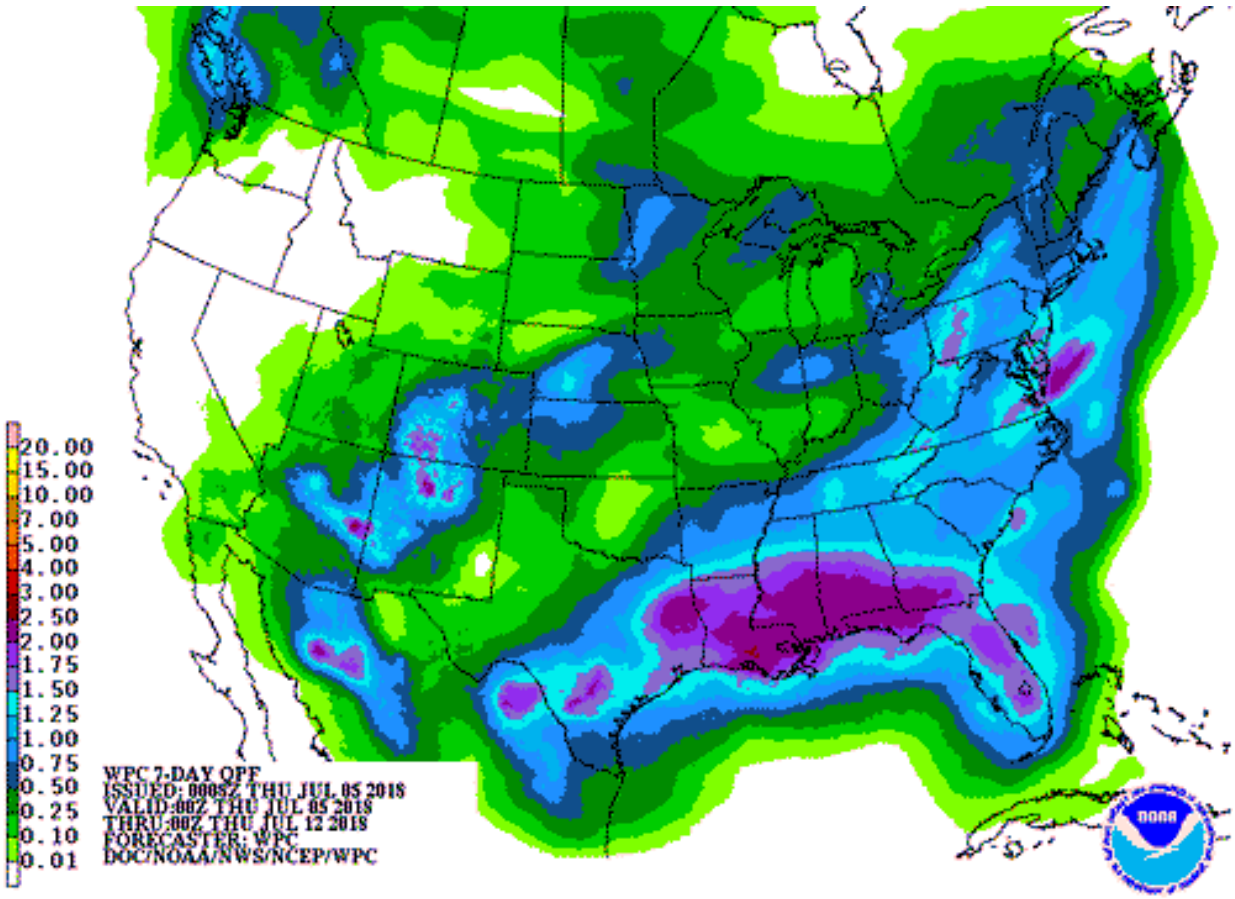

Figure 7. Quantitative Precipitation Forecast the 7-day period ending July 12, 2018 (NCEP).

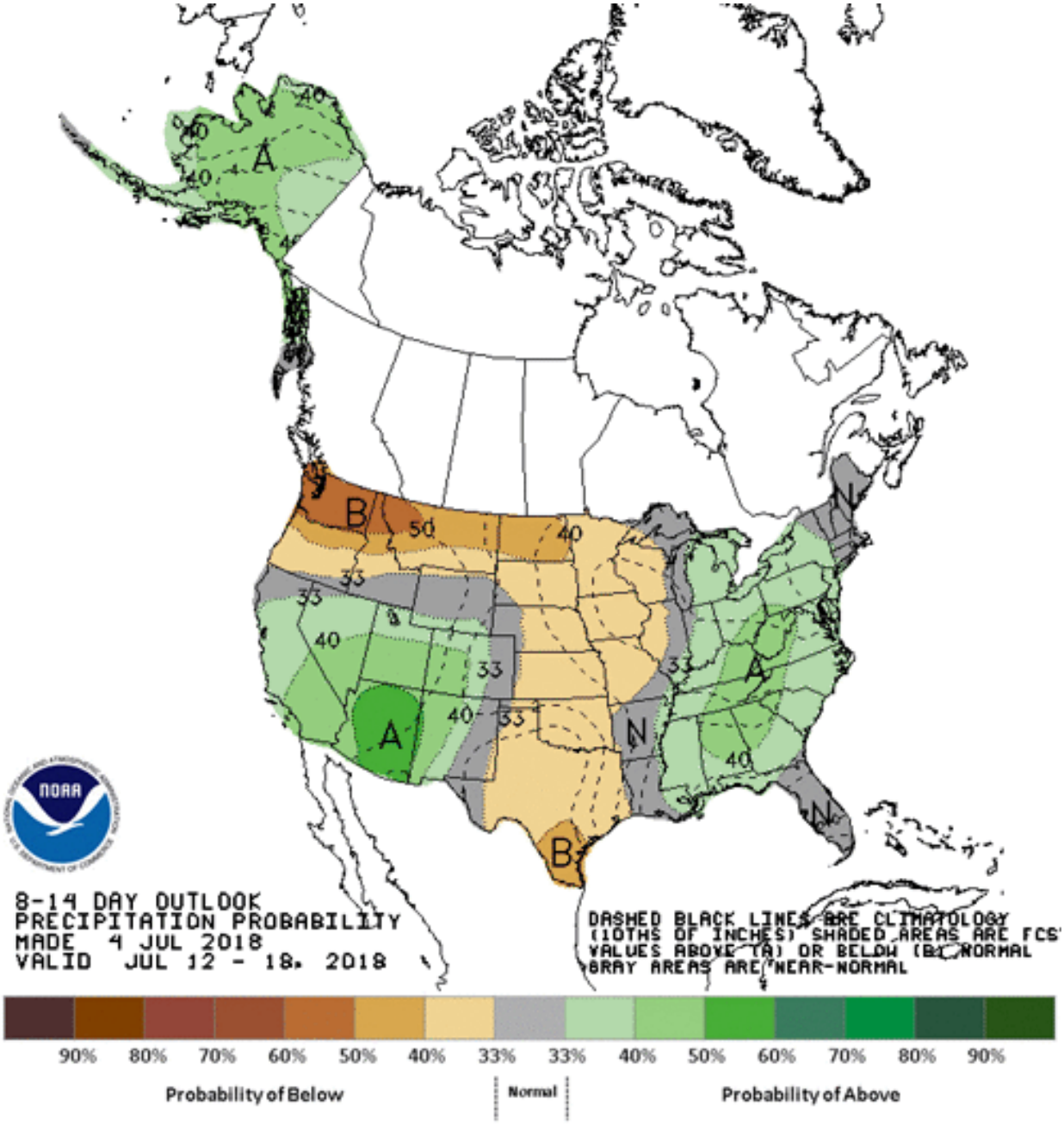

Figure 8. 8-14 day Precipitation Outlook for period ending July 19, 2018 (CPC).

Additional information can be found in the latest Agronomy eUpdate at https://webapp.agron.ksu.edu/agr_social/eu.throck or on the Kansas Climate website under weekly maps or drought reports:

http://climate.k-state.edu/maps/weekly

http://climate.k-state.edu/reports/weekly/2018/

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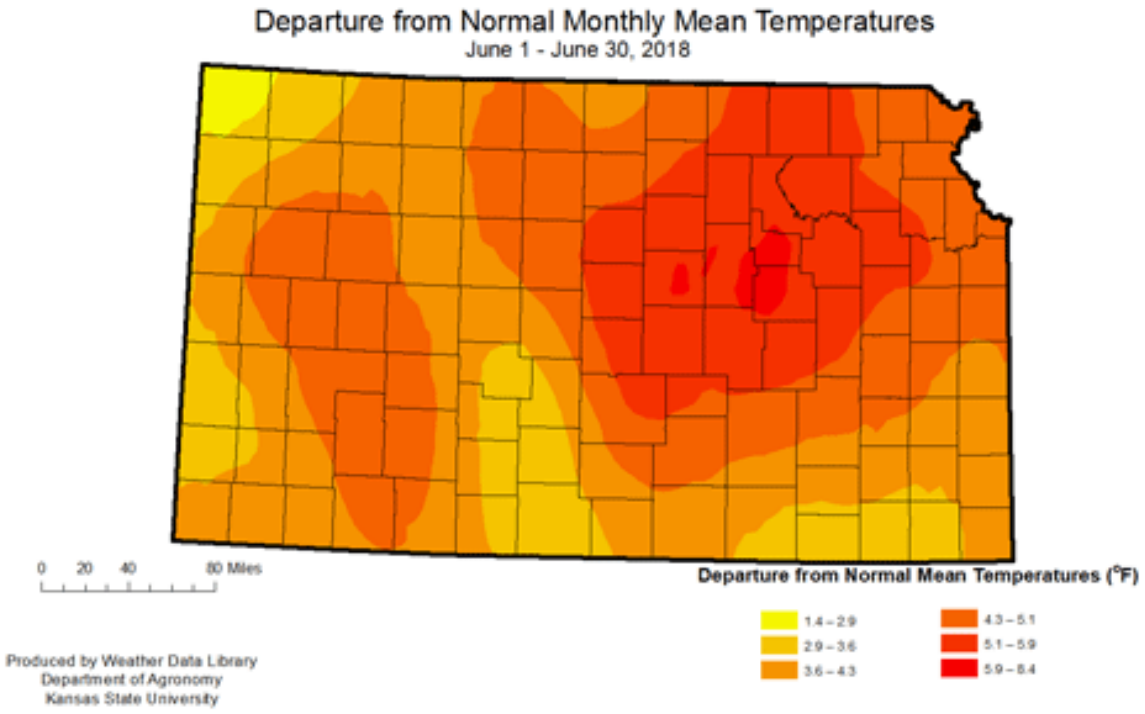
4. June weather summary for Kansas - It's still hot...

June temperature summary

While the heat wasn't as dramatic as in May, June was the 7th warmest since 1895. The state-wide average for the month was 77.9 degrees F. This was 4.2 degrees warmer-than-normal for Kansas. The Central Division had the greatest departure with an average of 79.8 degrees F which was 5.5 degrees above the average. The Northwest and Southeast divisions came closest to the average at 3.9 degrees above normal. For the Northwest Division that was with an average temperature of 74.7 degrees F, while the Southeast had an average of 78.1 degrees F.

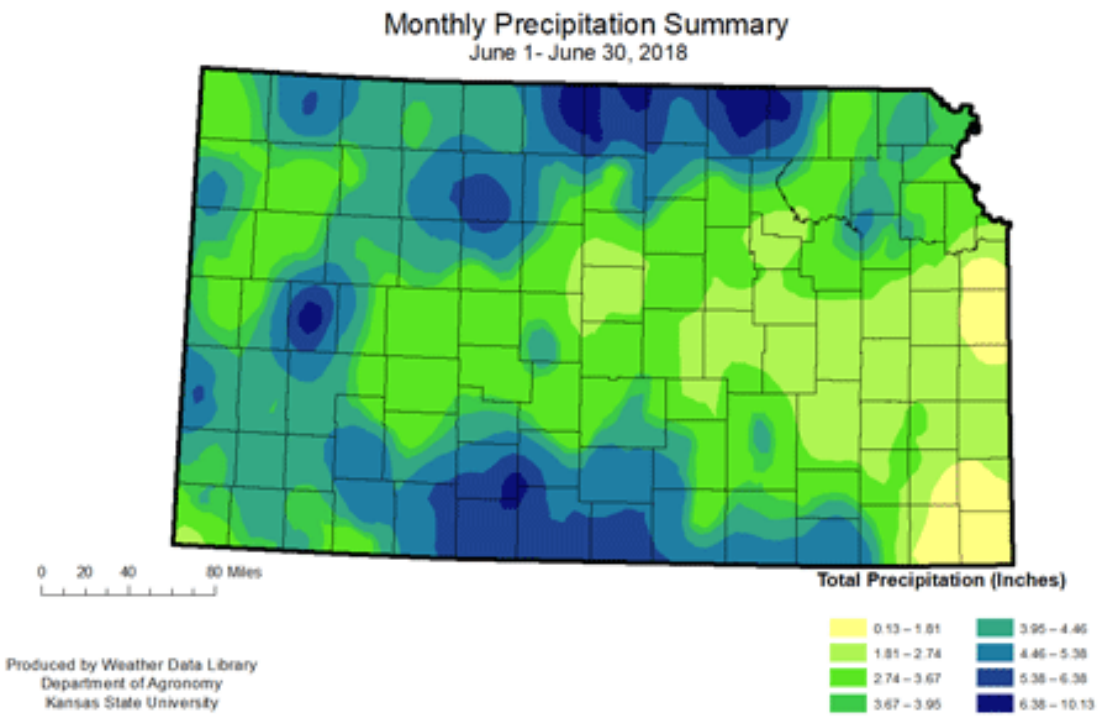
There were 50 new record daily warm maximum temperatures. The real warmth came in the low temperatures where there were 116 new daily record warm minimum temperatures. Two of those set records for the warmest minimum temperatures for June at those locations. Despite the heat, there were 19 new record coldest maximums and 2 record coldest minimum temperatures. This nighttime warmth is one reason that the monthly average was so much warmer-than-normal with relatively few record highs. The warmest temperature reported during the month was 107 degrees F at Abilene, Dickinson County on the 28th. The coldest temperature reported during June was 41 degrees F, reported at Plainville 4WNW, Rooks County, on the 28th.



June precipitation summary

June precipitation came very close to normal, although the distribution was uneven. The state-wide average precipitation was 4.24 inches which was 99 percent of normal. Given that the June was much warmer-than-normal, the benefit from that precipitation was less than it might have been. The division with the largest surplus was the Northwest Division, with an average of 4.03, or 143 percent of normal. The Southeast Division had the greatest departure, with an average of 3.61 inches for a

deficit of 2.31 inches which is 61 percent of normal. The greatest monthly total for a National Weather Service Cooperative station was at Scott City, Scott County, with 7.29 inches on the 20th. The Community Collaborative Rain, Hail and Snow network station with the greatest monthly precipitation was Courtland 6.1 N, Republic County, with 6.81 inches, also on the 20th. Among the Kansas Mesonet stations, the Viola station in Sumner County had the greatest total at 6.81 inches.



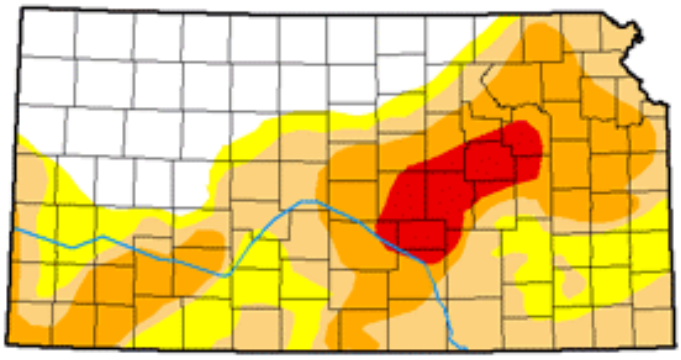
Severe weather summary

With the resurgence of moisture, severe weather reports during the month also increased. Tornado numbers were lower than in May with only 4 tornadoes reported. Unfortunately one hit the town of Eureka. Eight people were injured and damage was widespread. In addition to the tornado damage, there were significant damages from hail and wind storms. Total storm reports: 4 tornadoes, 105 hail events, and 268 reports of damaging wind.

Drought summary

With the above-normal rains in the west and near-normal amounts across the rest of Kansas, the drought picture has changed significantly. Extreme drought has shifted into central Kansas, while the “drought free” area of the state has expanded. Currently, 27 percent of the state is “drought free", while only 6 percent remains in “Extreme Drought”. The July outlook has a slight chance for drier-than-normal conditions across the state. The temperature outlook is for warmer-than-normal temperatures statewide. That combination is unlikely to result in significant improvement of the drought conditions.

U.S. Drought Monitor
Kansas



Author:
Richard Tinker
CPC/NOAA/NWS/NCEP

http://droughtmonitor.unl.edu/

July 3, 2018
(Released Thursday, Jul. 5, 2018)
Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0	D1	D2	D3	D4
Current	27.21	17.11	26.86	23.15	5.67	0.00
Last Week 06-26-2018	27.17	17.90	29.67	18.51	6.75	0.00
3 Months Ago 04-03-2018	2.64	15.70	25.48	30.59	21.27	4.32
Start of Calendar Year 01-02-2018	0.00	67.30	23.95	8.75	0.00	0.00
Start of Water Year 09-26-2017	59.89	30.03	8.73	1.35	0.00	0.00
One Year Ago 07-04-2017	84.33	15.67	0.00	0.00	0.00	0.00

Intensity:
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

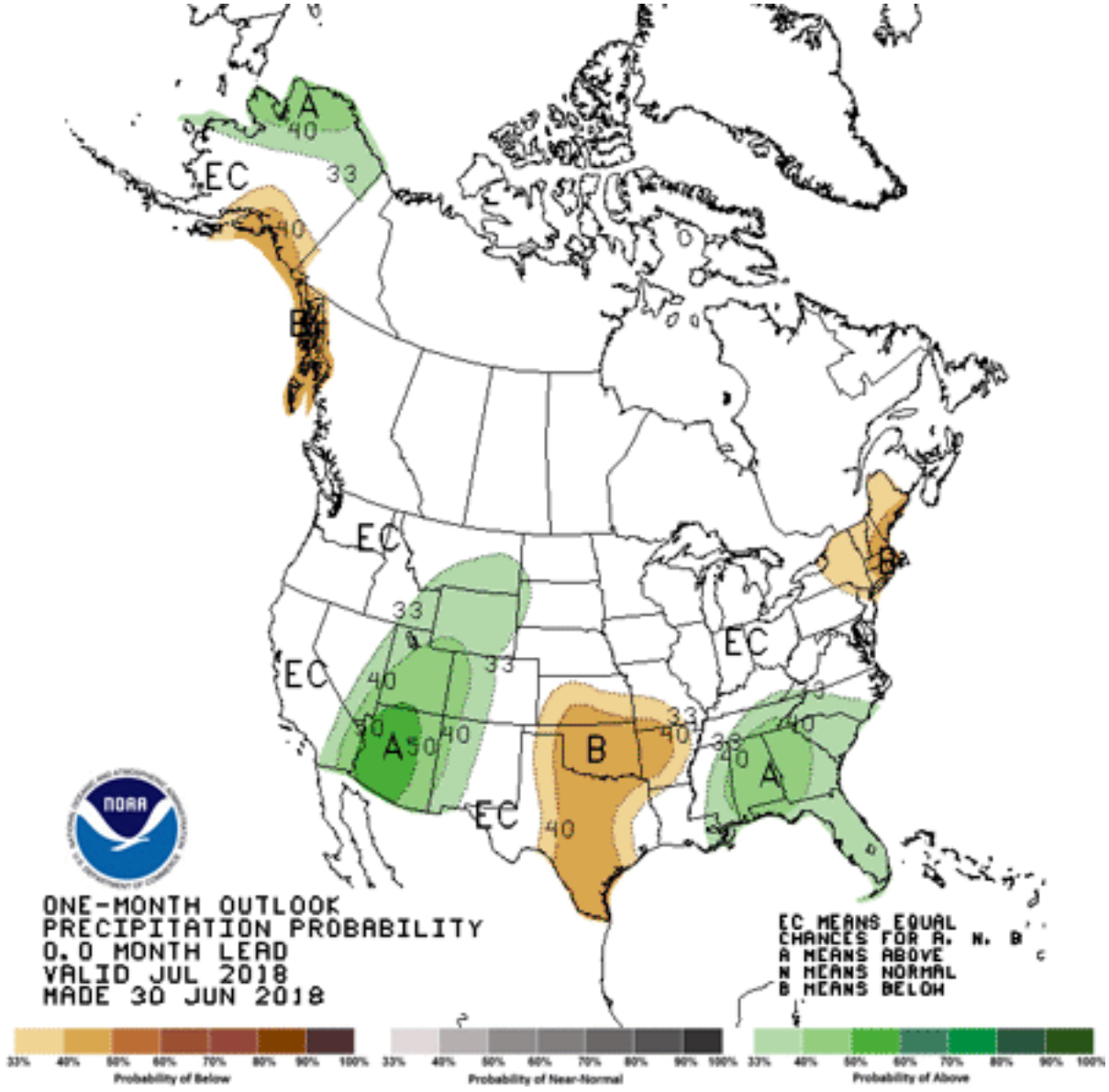

ONE-MONTH OUTLOOK
PRECIPITATION PROBABILITY
0.0 MONTH LEAD
VALID JUL 2018
MADE 30 JUN 2018
EC MEANS EQUAL
CHANCES FOR A, N, B
A MEANS ABOVE
N MEANS NORMAL
B MEANS BELOW
Probability of Below
Probability of Near-Normal
Probability of Above

Table 1. Kansas Climate Division Summary for June 2018

	Precipitation (inches)						Temperature (°F)			
	June 2018			2018 through Jun					Monthly Extremes	
Division	Total	Dep.[1]	% Normal	Total	Dep.[1]	% Normal	Ave	Dep.[1]	Max	Min
Northwest	4.03	1.20	143	9.60	-1.07	89	74.7	3.9	104	41
West Central	3.89	1.08	139	9.70	-0.55	93	76.8	5.1	107	46
Southwest	4.34	1.13	136	8.42	-1.54	84	77.8	4.4	105	42
North Central	5.09	1.26	132	11.93	-1.99	86	78.5	5.2	105	41
Central	3.24	-0.84	81	9.88	-5.09	67	79.8	5.5	107	48
South Central	5.40	0.61	115	13.46	-3.04	82	79.2	4.2	101	50
Northeast	4.76	-0.38	99	11.87	-5.52	71	78.1	5.2	106	53
East Central	3.65	-1.93	64	11.93	-7.28	61	78.4	5.2	104	52
Southeast	3.61	-2.33	61	15.95	-5.65	74	78.1	3.9	100	54
STATE	4.24	-0.02	99	11.47	-3.47	78	77.9	4.7	107	41

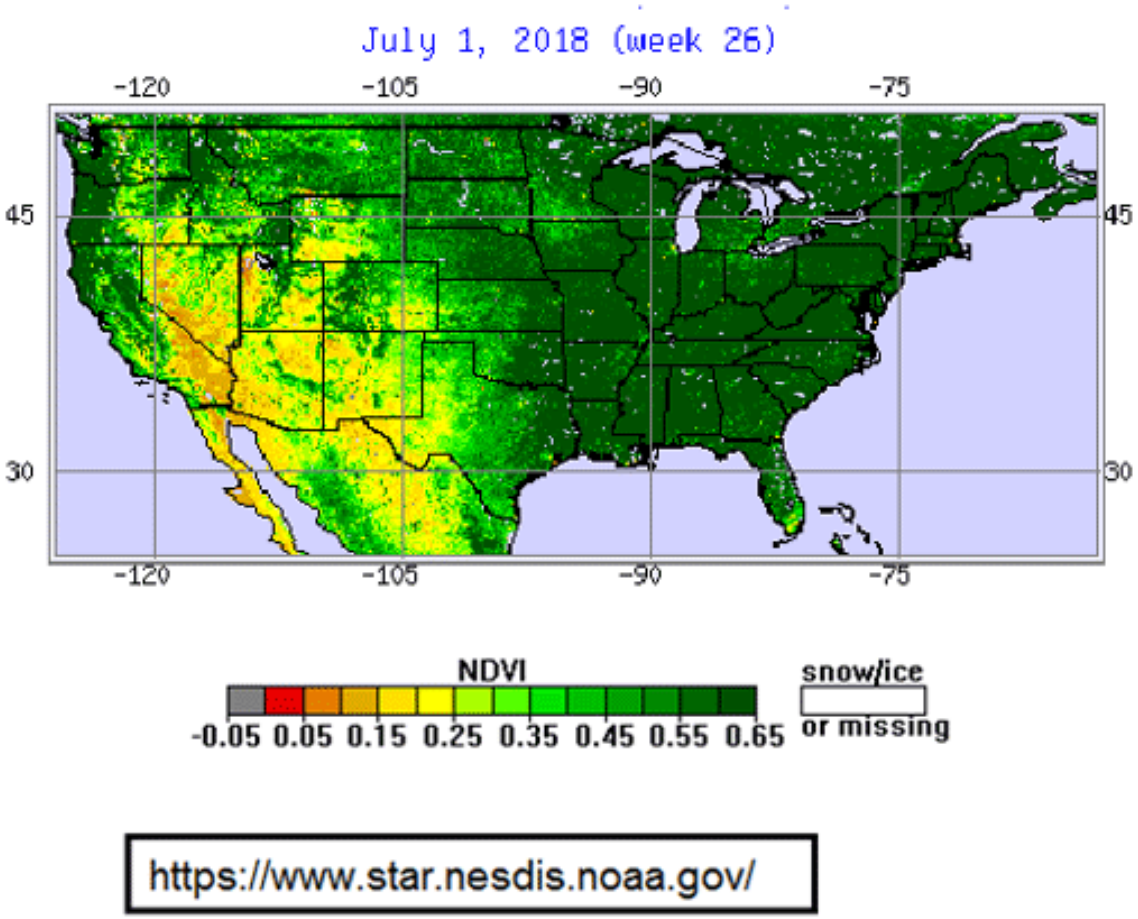
1. Departure from 1981-2010 normal value

2. State Highest temperature: 107 oF at Abilene 1W, Dickinson County, on the 28th.

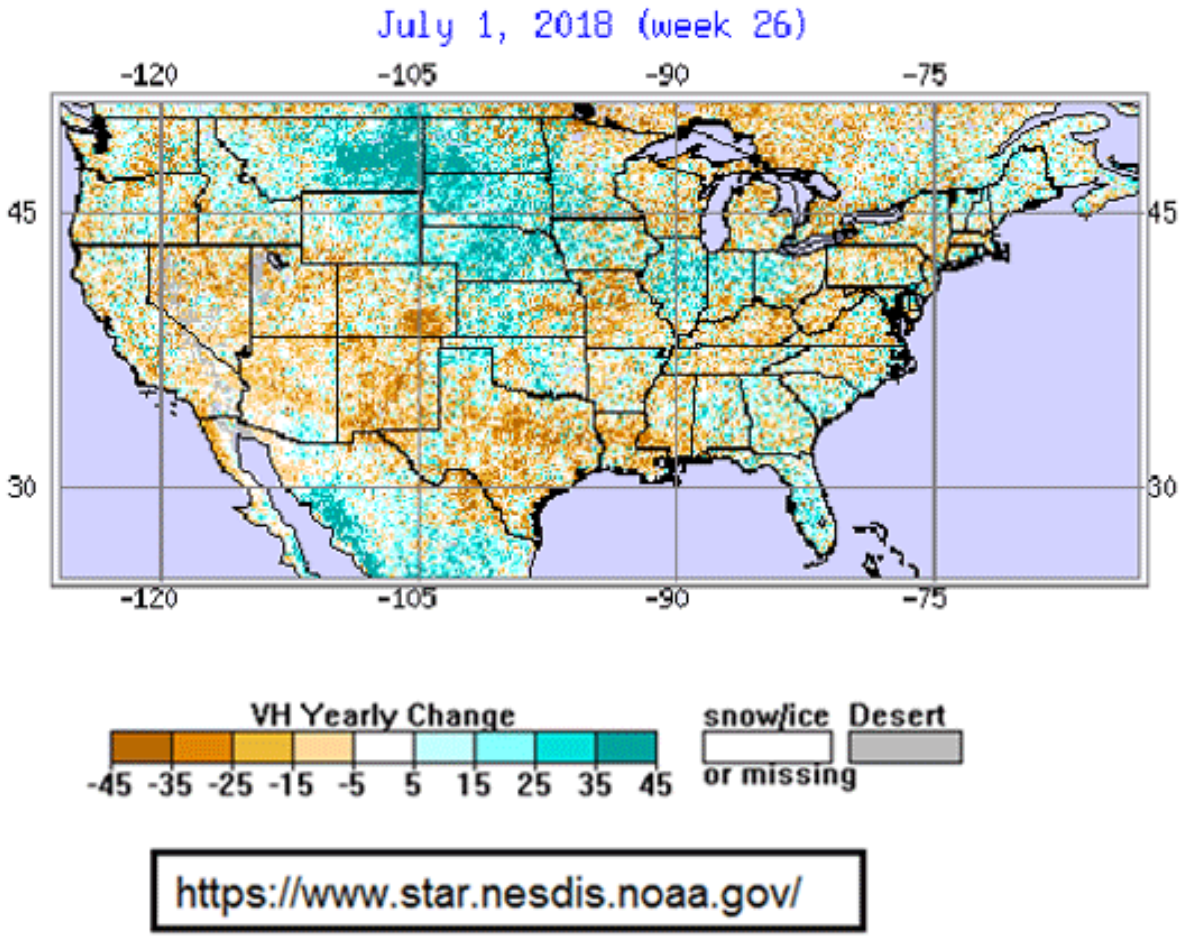
3. State Lowest temperature: 41 oF Plainville 4WNW, Rooks County, on the 28th.

4. Greatest 24hr: 7.29 inches at Scott City, Scott County, on the 20th (NWS); 6.81 inches at Courtland 6.1 N, Republic County, on the 20th. (CoCoRaHS).

Source: KSU Weather Data Library



Current greenness map (NOAA)



Change in vegetative health from 2017 (NOAA)

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5. Exciting news for 2018 - Kansas Corn Yield Contest

Corn harvest in Kansas will be here before you know it. Corn producers in the state are encouraged to keep in mind the Kansas Corn Yield Contest before they fire up the combines this year.

Kansas Corn, in conjunction with K-State Research and Extension, will conduct a 2018 Kansas Corn Yield Contest. All Kansas corn producers are eligible to enter the contest, but they must be active members of the Kansas Corn Growers Association.

The contest is a fun way for producers to showcase their high yielding and high quality corn with other growers in the state, and provide motivation to producers to increase yields. The contest also serves as a vehicle to improve farming operations and increase awareness of best management practices (BMPs) to improve and sustain corn yields.

In addition to grower recognition, cash awards will be presented to the 1st ($300), 2nd ($200), and 3rd ($100) place winners for the 10 districts across Kansas. The districts align with crop reporting districts, plus a NNE district was created to include Doniphan and parts of Brown and Atchison. The overall highest yields in the dryland and irrigated categories each will receive an additional $500. All farmers entering the contest and completing the harvest form will receive a shirt from Kansas Corn. Contest winners will be recognized at the Kansas Corn Symposium in late January 2019.

The contest is free of charge to members of the Kansas Corn Growers Association. Pre-registration must be complete by **August 30, 2018 or prior to harvest.** All entries must be postmarked by December 1, 2018. The contest is divided into "dryland" and "irrigated" categories in all 9 Kansas crop reporting districts plus a 10th district in NNE Kansas (Figure 1).

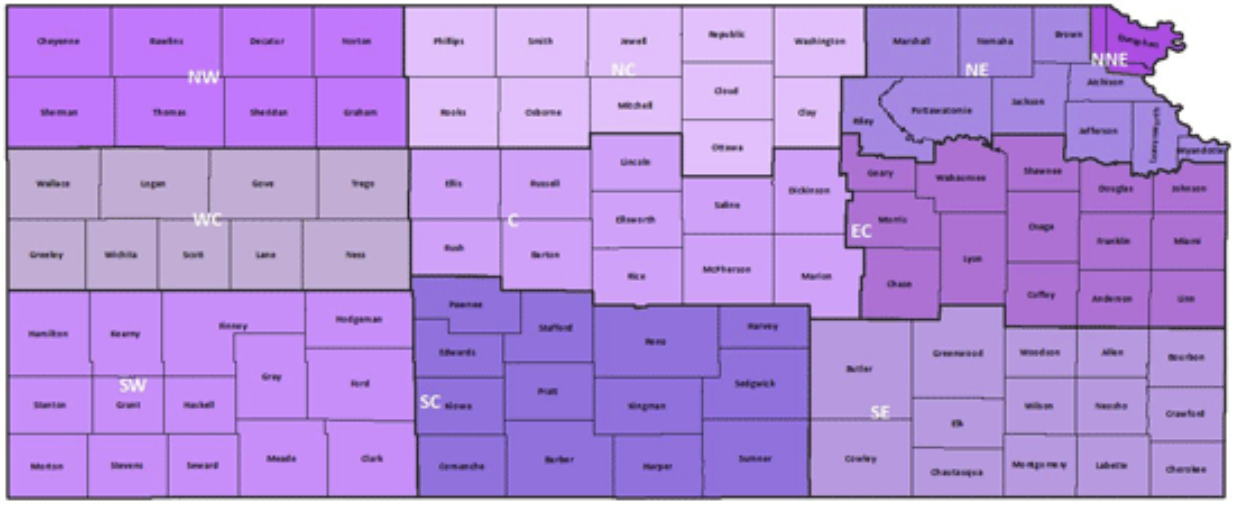

Figure 1. Dryland and irrigated contest districts. Note: NNE includes only those fields north and/or east of KS Hwy 73 in Brown, Doniphan, and Atchison counties.

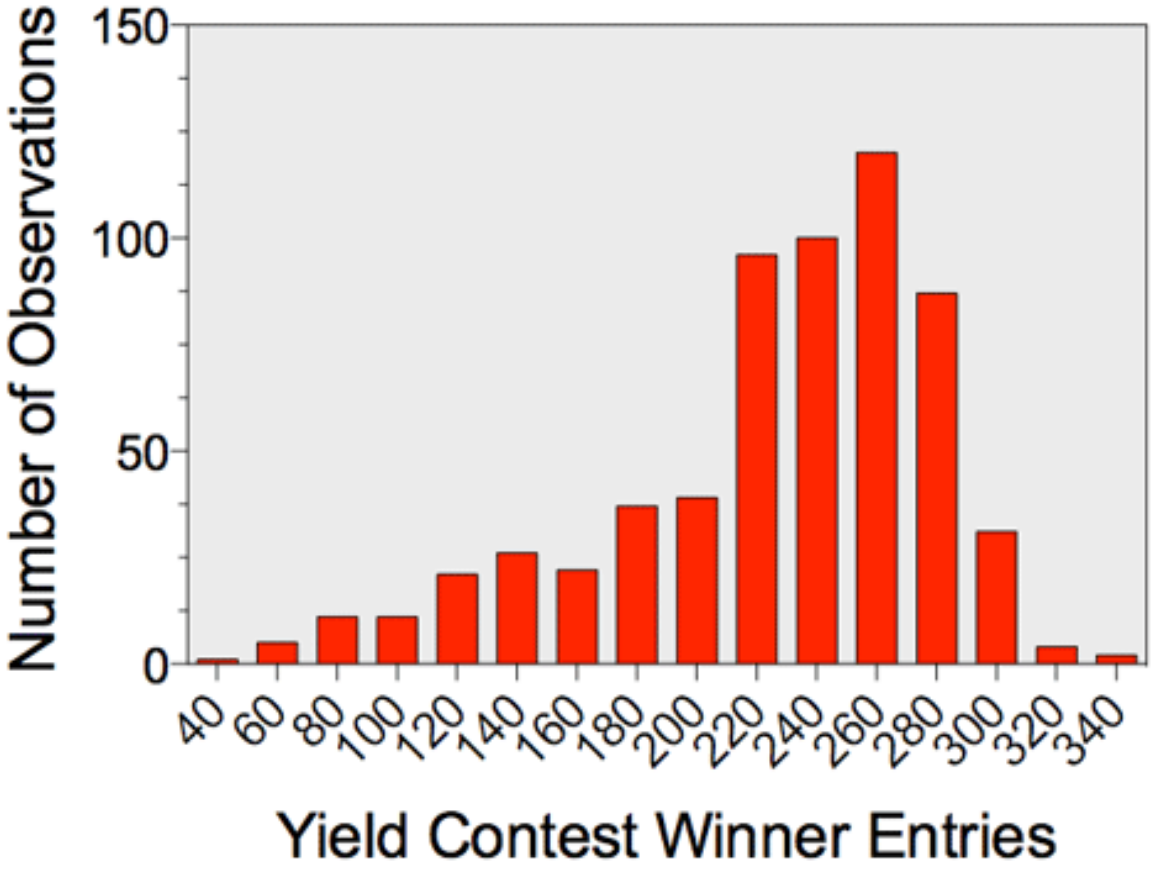

Figure 2. Kansas contest winner entries to the National Corn Contest from 2011-2106. Yield values along the x-axis are in bushels per acre. Graph produced by Ignacio Ciampitti, K-State

Research and Extension.

All contest rules and required entry forms can be found online at **https://kscorn.com/yield/**

If a producer has interest in submitting an entry in the Kansas Corn Yield Contest, they need:

1. A minimum of field size of 10 acres with only 1 entry per field allowed
2. A KSRE Extension Agent, FFA Advisor, lender, farm manager, or other impartial person to witness the harvest
3. The entry/harvest form postmarked by December 1, 2018

The entry forms should be sent to:

Kansas Corn Yield Contest
Kansas Corn Growers Association
1310A Westloop Pl #285
Manhattan, KS 66502

Download here the entry form:

https://kscorn.com/wp-content/uploads/2018/06/Kansas-Corn-Yield-Contest-Harvest-Entry-Form.pdf

For any questions concerning the contest, please contact the individuals listed below.

Dale Fjell, Director of Research and Stewardship, Kansas Corn
dfjell@ksgrains.com, 785-410-5285

Ignacio A. Ciampitti, Crop Production and Cropping Systems Specialist, K-State Department of Agronomy
ciampitti@ksu.edu, 785-532-6940

6. Soil health summer tour - July 27, 2018

K-State Research and Extension and the Department of Agronomy, in conjunction with the Kansas Corn Growers Association and the Soil Health Partnership, is hosting a Soil Health Summer Tour on Friday, July 27th.

The tour will consist of a field day at two locations on July 27:

- **Glen Elder – 10:00 a.m. to noon**
  - Palen Family Farms, 1031 180 Road, Glen Elder, KS 67446

- **Spring Hill – 5:00 p.m. to 7:00 p.m.**
  - Guetterman Brothers Family Farms, 14633 West 239th Street, Spring Hill, KS 66083

The program will include a discussion of management practices to improve overall productivity and soil health to benefit farmers. Presenters on the tour include:

- Dr. Charles Rice, Soil Microbiologist
- Dr. Ignacio Ciampitti, Crop Production and Cropping Systems Specialist
- Dr. Dorivar Ruiz Diaz, Soil Fertility Specialist

A meal will be provided at each location courtesy of the sponsors. Please RSVP by July 20 for the location you plan to attend. You can send the RSVP to Troy Lynn Eckart at sprite@ksu.edu or 785-532-0400, or the individuals listed below.

Glen Elder, KS – Sandra Wick, Crop Production Extension Agent, Post Rock District, swick@ksu.edu, 785-282-6823

Spring Hill, KS – Katelyn Barthol, Agriculture and Natural Resources Agent, Marais des Cygnes District, kbarth25@ksu.edu, 913-294-4306.

KANSAS STATE UNIVERSITY
Department of Agronomy

K-STATE Research and Extension

KANSAS CORN GROWERS ASSOCIATION

SOIL HEALTH PARTNERSHIP

SOIL HEALTH SUMMER TOUR – Field Day

Friday, July 27th

Glen Elder, KS – 10 am to 12pm

1031 180 Rd, KS 67446

Palen Family Farms

Spring Hill, KS – 5 pm to 7pm

14633 West 239th St, KS 66083

Guetterman Brothers Family Farms

We will be discussing management practices to improve overall productivity and soil health to benefit farmers.

PRESENTERS

Dr. Charles Rice
Soil Microbiology

Dr. Ignacio Ciampitti
Crop Production

Dr. Dorivar Ruiz Diaz
Soil Fertility

* Lunch and dinner provided by sponsors