Issue 1006

K-STATE
Research and Extension

Extension Agronomy

eUpdate

05/30/2024

These e-Updates are a regular weekly item from K-State Extension Agronomy and Kathy Gehl, Agronomy eUpdate 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 Dalas Peterson, Extension Agronomy State Leader and Weed Management Specialist 785-532-0405 dpeterso@ksu.edu.

Subscribe to the eUpdate mailing list: https://listserv.ksu.edu/cgi-bin?SUBED1=EUPDATE&A=1

eUpdate Table of Contents | 05/30/2024 | Issue 1006

1. Be aware of herbicide spray drift in wheat

A recent eUpdate article addressed the appearance of white heads in wheat fields in Kansas. One cause of white heads not included in that article was injury from glyphosate spray drift. This article will explore glyphosate injury and discuss other types of wheat injury that could be caused by off-target movement of some of the herbicides that may be used during the early summer months.

Glyphosate. Injury resulting from glyphosate drift may appear a few days after application. One common symptom on grasses is a chlorotic band across the leaves that were in the plant's whorl when the drift occurred. If the wheat is heading, just the portion of the plant above the flag leaf may turn white while the rest of the plant stays green. This may not occur on all tillers, as minor differences in the growth stage can influence the symptoms (Figure 1).

Figure 1. White heads caused by glyphosate drift. Photo by Dallas Peterson, K-State Research and Extension.

Atrazine. Atrazine drift on wheat will appear as necrosis where the spray contacts the leaf and may progress to chlorosis/necrosis that starts at the leaf tip and expands down the outer edge of the leaf (Figure 2).

Figure 2. Chlorosis at leaf tips and margins about 2 weeks after a low rate of atrazine was applied. Photo by Sarah Lancaster, K-State Research and Extension.

Group 1 (ACCase-inhibiting) herbicides. These are products such as clethodim (Select Max, others) or quizalofop (Assure II, others). Injury from one of these herbicides will take a week or more to appear. You may see a chlorotic band across the leaves that were in the whorl of the plant. It's also important to remember that a Group 1 herbicide will have plant-back restrictions for corn or grain sorghum that will vary depending on the product and rate that is used, as well as the hybrids that will be planted. If Co-Axium wheat was planted, quizalofop may cause a limited response (Figure 3).

Figure 3. Wheat head trapped in the boot about two weeks following application of a low rate of Assure II. Also, note the chlorosis on the leaves. Photo by Sarah Lancaster, K-State Research and Extension.

Group 14 herbicides. These are products like saflufenacil (Sharpen, Verdict) or flumioxazin (Valor, others). Injury symptoms associated with saflufenacil or flumioxazin will develop within hours of application. They will include water-soaked speckles that become necrotic (Figure 4).

Figure 4. Wheat plants with necrotic speckles caused by simulated Sharpen drift (left) and = Valor drift (right). Photos by Sarah Lancaster, K-State Research and Extension.

When terminating failed wheat near a wheat field that will be harvested, there are a few things that can reduce the likelihood of spray drift.

1. **Monitor wind speed and direction**. Choose a time when the wind blows within the labeled speed and away from the sensitive crop.
2. **Lower the spray boom**. Reducing the distance droplets are suspended in the air will reduce the interaction with wind and the chance for movement.
3. **Reduce application pressure and drive slower**. The portion of the spray droplets susceptible to off-target movement increases as pressure increases.
4. **Change nozzles.** Choose a drift-reduction nozzle with the largest practical nozzle orifice size to create larger droplets.
5. **Consider a high-quality, label-approved drift reductant**. These adjuvants generally increase the spray solution's viscosity, preventing the formation of smaller droplets.

For more detailed information, see the "2024 Chemical Weed Control for Field Crops, Pastures, and Noncropland" guide available online at https://bookstore.ksre.ksu.edu/pubs/CHEMWEEDGUIDE.pdf or check with your local K-State Research and Extension office for a paper copy.

Additional information about herbicide injury can be found in the KSRE publication C715 "Herbicide Mode of Action" at https://bookstore.ksre.ksu.edu/pubs/C715.pdf.

The use of trade names is for clarity to readers and does not imply endorsement of a particular product, nor does exclusion imply non-approval. Always consult the herbicide label for the most current use requirements. Users should read and follow all label directions.

Sarah Lancaster, Weed Management Specialist
slancaster@ksu.edu

Jeremie Kouame, Weed Scientist, Agricultural Research Center-Hays
jkouame@ksu.edu

2. Kansas Mesonet Animal Comfort Tool monitors current and forecasted livestock conditions

Summer brings heat, often amplified by humidity. Recent rains across the state and more in the short-term forecast (Figure 1), much of it in drought-stricken regions, have increased atmospheric and surface moisture. When we factor in warmer-than-normal temperatures, especially at night, heat stress can rapidly develop in humans and animals alike. It's been nearly two years since a major cattle loss event occurred in southwest Kansas. This marked a time when producers were caught off guard by a sudden transition from cool/wet to hot conditions.

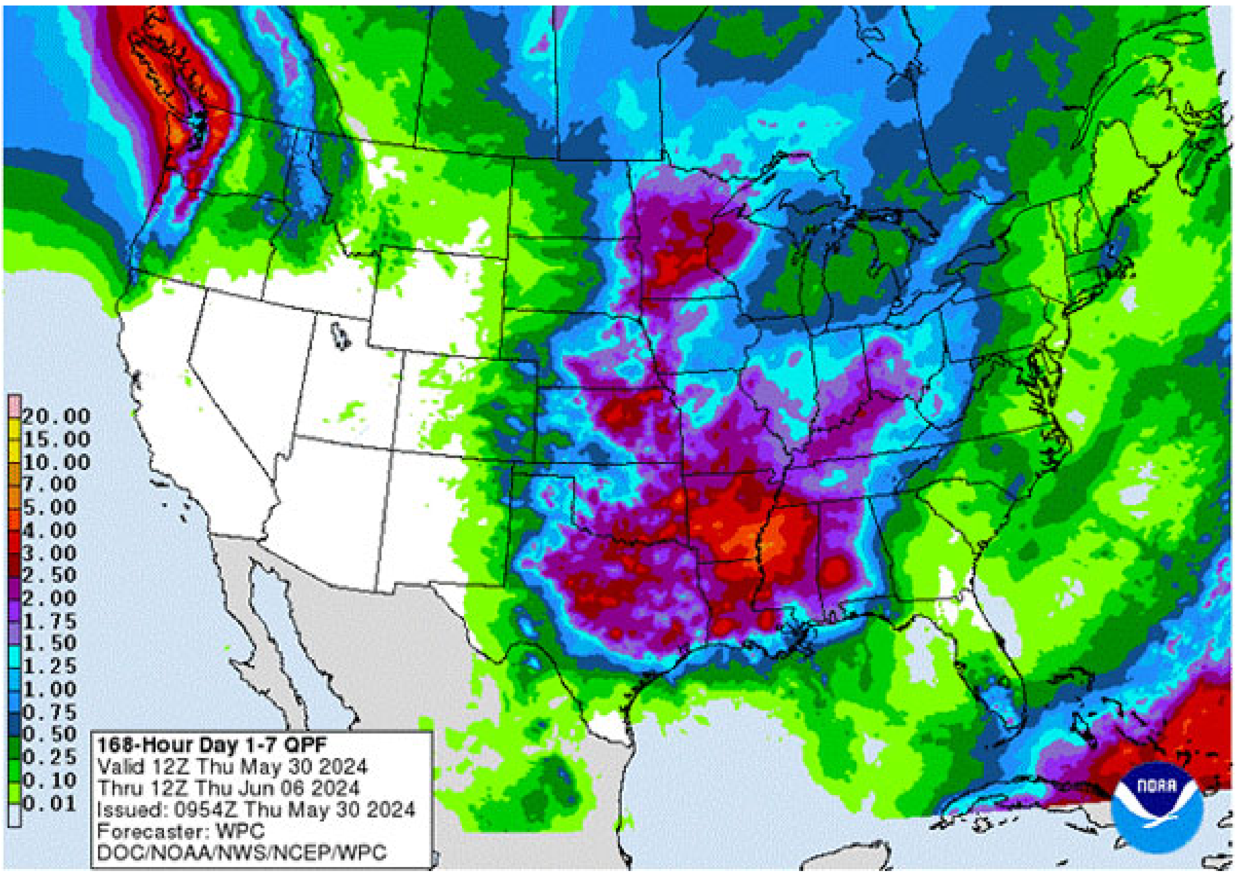


Figure 1. Seven day estimated precipitation from the Weather Prediction Center (https://www.wpc.ncep.noaa.gov).

When heat stress develops with hot, sunny, and humid conditions, increased proactive steps are required to avoid potential illness. This is compounded when heat stress values remain elevated for long periods of time. Of special importance is the animal's ability to recover at night. High temperatures overnight prevent the body from recovering from the previous day's heat and can compound the next day's stress if not mitigated.

The Kansas Mesonet has an Animal Comfort Tool that tracks current heat stress values with real-time data and looks ahead at the 7-day forecast, helping farmers stay one step ahead of potential issues.

Users can access this tool from the main Mesonet page (https://mesonet.k-state.edu/) by selecting "Agriculture" from the drop-down menu on the top left of every page and then "Comfort Index" (Figure 2). Also, users can access the tool directly from this link: http://mesonet.k-state.edu/agriculture/animal/

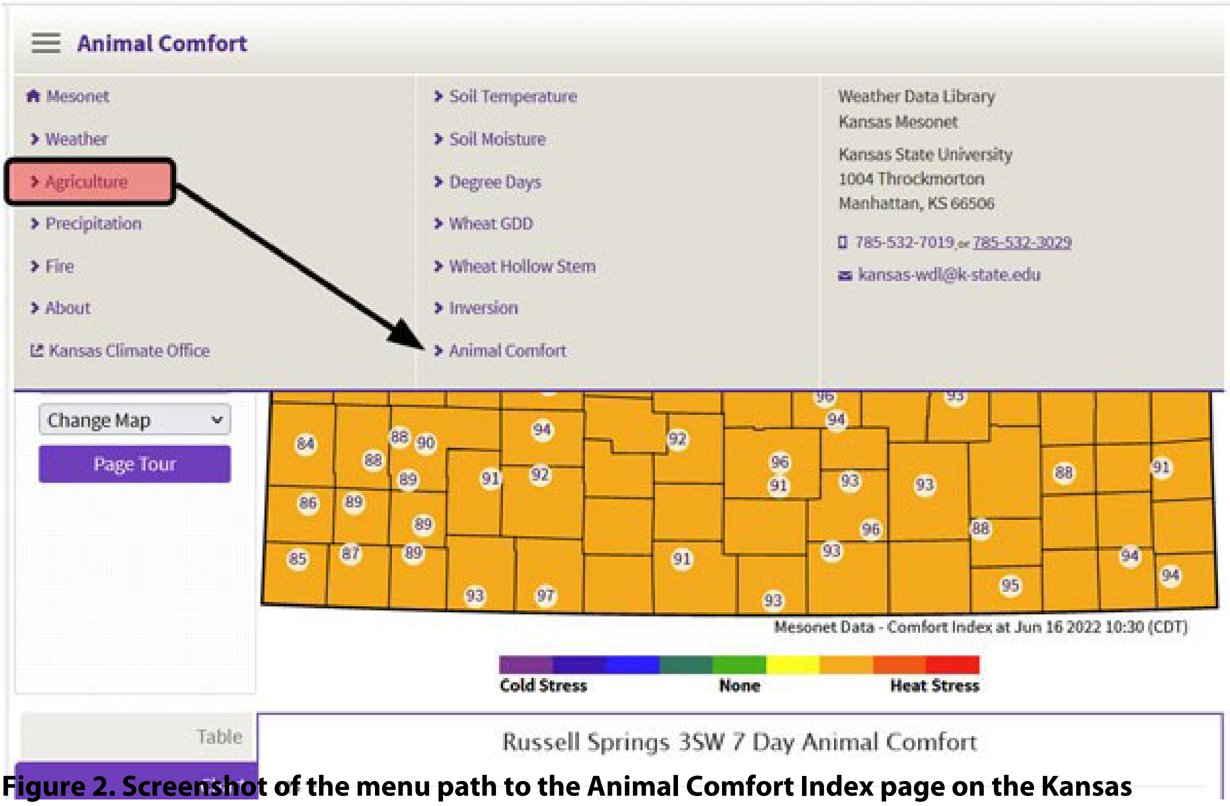


Figure 2. Screenshot of the menu path to the Animal Comfort Index page on the Kansas Mesonet.

Utilizing the Forecast Animal Comfort Index

This product utilizes the National Weather Service hourly forecast (averaged over the hour, meaning extremes could be slightly more) for the next seven days. This data consisting of solar, wind, temperature, and humidity is utilized in the Comprehensive Comfort Index equation from the University of Nebraska. The ability to handle both hot and cold extremes provides a year-round product to increase producer awareness in advance of critical weather. Data is displayed on a graph and a summarized table (Figure 3), allowing quick analysis of conditions on desktop and mobile browsers in an easy-to-read format.

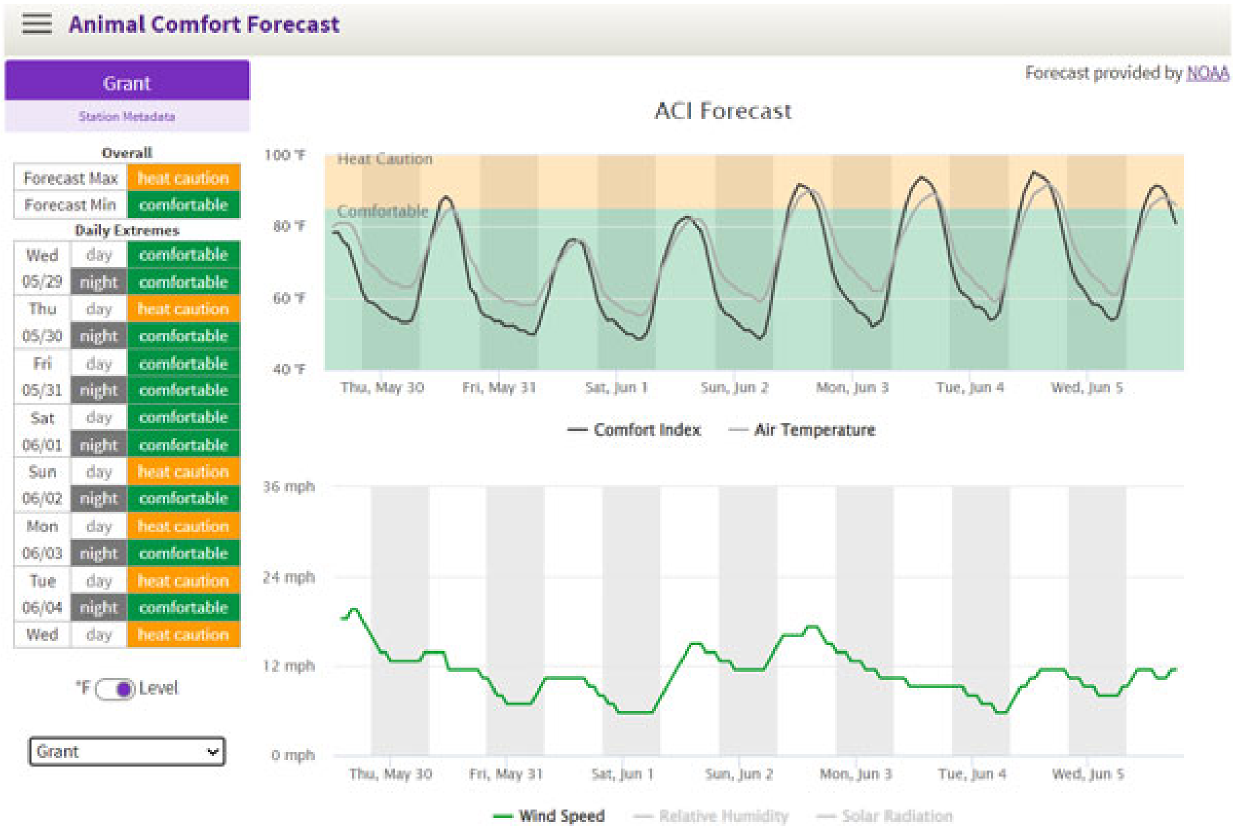


Figure 3. The Animal Comfort Forecast in advance of increased warm and humidity late this coming weekend and into early next week.

It is important to note that the forecast is only a guidance product. Forecasts are subject to change, and conditions could vary significantly based on numerous external factors. Actual animal response to temperature stress will depend on several factors not accounted for in the index. Those include but are not limited to age, hair coat (winter vs. summer; wet vs. dry), health, body condition, micro-environment, and acclimatization. Additionally, recent moisture can result in mud, increasing livestock stress levels.

Important note: The National Weather Service forecasts hourly average values rather than extremes. In addition, fluctuations in cloud cover (which affects solar radiation) and wind speed have a large effect on comfort levels. Producers should recognize that localized conditions may be significantly warmer/cooler than the predicted comfort index.

Tracking conditions with current data

One of the most basic ways to verify a forecast is to look at current conditions. The original Animal Comfort product remains to allow producers to see the real-time weather stress at the nearest Mesonet location. This displays both the current data up to (fifteen-minute intervals).

Users can scroll down the page and view the previous seven days' hourly data on the "Chart" (Figure 4). This is particularly useful for producers that suffered loss and want to capture the conditions that took place in the previous week. You can also download the data in a comma-delimited form for use in Excel or similar software. This can be found under the "Download" tab.

No historical data download is available beyond the last seven days, so this information must be captured quickly.

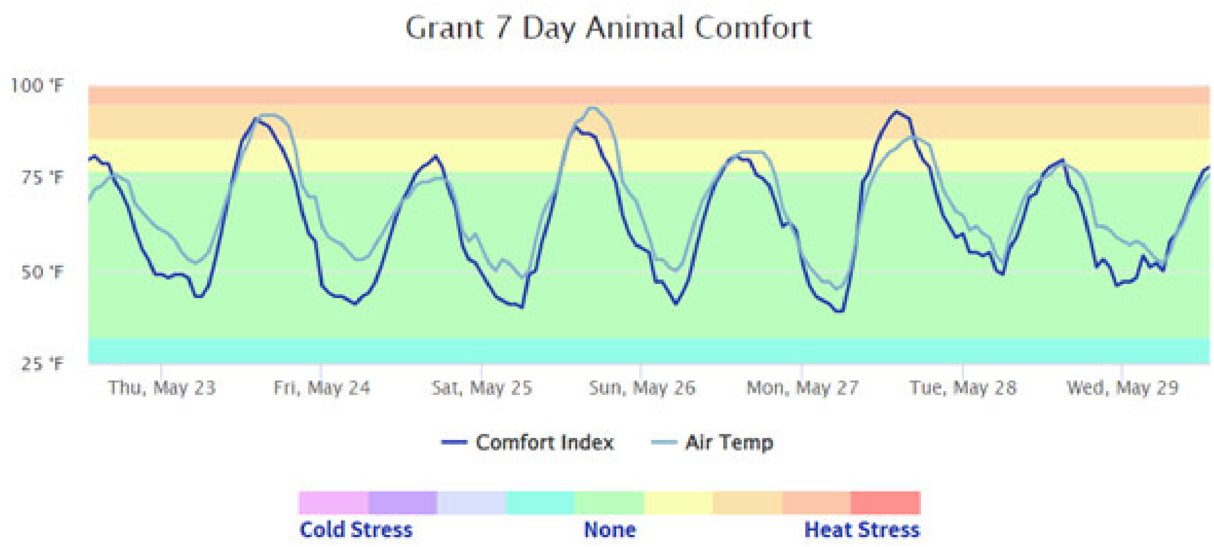


Figure 4. Animal Comfort Index history at the Mesonet station in Grant. Graphic from Kansas Mesonet.

The displayed data does not consider conditions compared to "normal." Solar radiation, wind, and humidity data are hard to put into a climatological (or long-term) perspective since recorded data is relatively new (only about 15 years of data at most stations). Thus, climatological data is limited for the animal comfort index. If you need historical data, please contact our staff at Kansas-wdl@ksu.edu, and we'd be glad to pull older data that may exist.

If you want to read more about the Forecast or Current Conditions pages, please visit https://mesonet.ksu.edu/agriculture/animal and scroll down to the "Resources" tab.

Christopher "Chip" Redmond, Kansas Mesonet Manager
christopherredmond@ksu.edu

Matthew Sittel, Assistant State Climatologist
msittel@ksu.edu

3. Average Precipitation Distribution: A Kansas Climate Primer

The state of Kansas has a reputation as being a uniformly flat state, but anyone who has spent time here knows there are a few exceptions. There are multiple areas of hills in the state, such as the Flint, Smoky, and Gypsum, and valleys carved out by rivers that can be easily seen on a topographic map (Figure 1) of the state. In general, much of Kansas is indeed flat. However, the apparent evenness of the topography is misleading, as there is a gentle increase in elevation from east to west across the state. The lowest elevation in the state is 679 feet in Montgomery County, south of Coffeyville, along the Verdigris River. The highest point is 4,039 feet in Wallace County, in west central Kansas, near the Colorado border. This high point has an appropriate but amusing name: Mount Sunflower. As it turns out, Mount Sunflower isn't a towering peak but just a high spot on the plains.

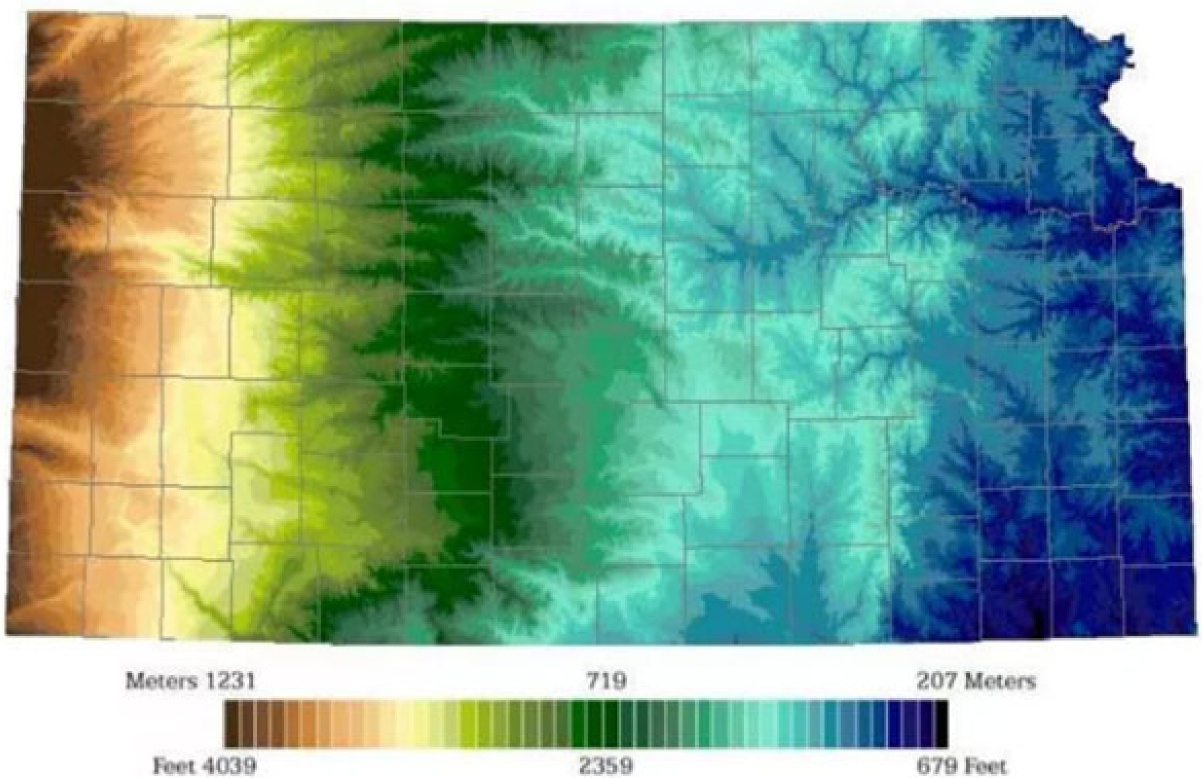


Figure 1. Elevation map of Kansas.

Topography affects precipitation distribution

Topography influences the distribution of precipitation across Kansas. Western Kansas lies in a "precipitation shadow," as descending airflow on the lee side of the Rockies results in drier air that eventually spreads east into Kansas. Further east, the Gulf of Mexico provides an ample source of moisture that gets transported north, first arriving in far southeastern Kansas and then spreading north and west on southerly winds that commonly blow across much of the state. The westward increase in elevation in Kansas is a hindrance to effectively spreading the Gulf moisture into the western half of the state. Thus, the topography of Kansas plays a part in the uneven distribution of precipitation. Average annual precipitation amounts are lowest in the west and highest in the east (Figure 2). The counties along the Colorado border average from 17 to 19 inches of precipitation annually. The lowest average is 17.36" in both Stanton and Morton Counties in far southwestern Kansas. Along the Missouri border, annual averages range from a low of 36.31" in Doniphan County in the far northeast to a maximum of 45.30" in Cherokee County, our southeasternmost county. Cherokee is one of twelve counties that average 40 or more inches of precipitation annually. Lines of equal precipitation, known as isohyets, change from vertical to diagonal as you move from west to east across the state, the direct influence of the Gulf moisture source, which lies to the southeast of Kansas.

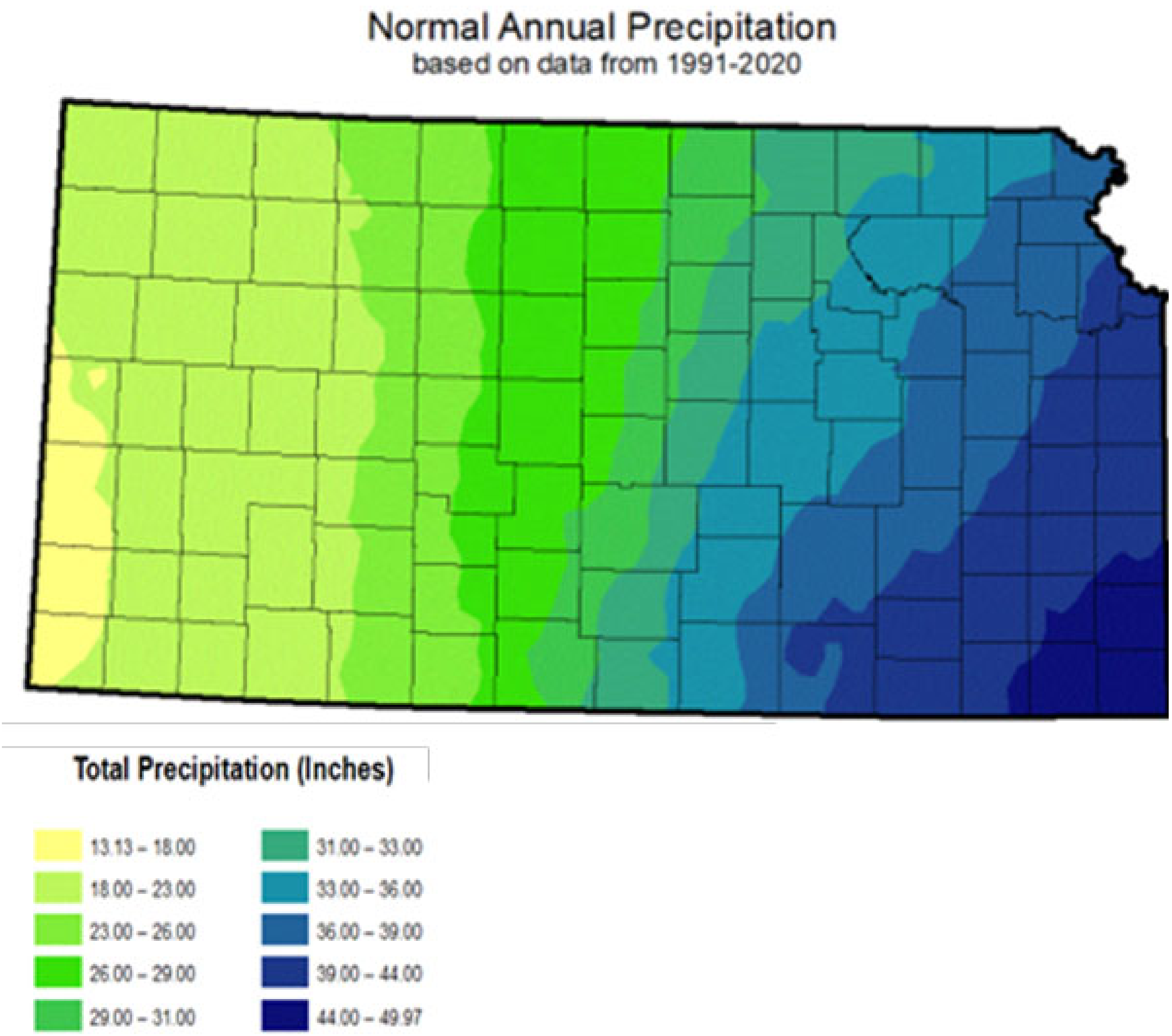


Figure 2. Average annual precipitation across Kansas. Source: climate.k-state.edu.

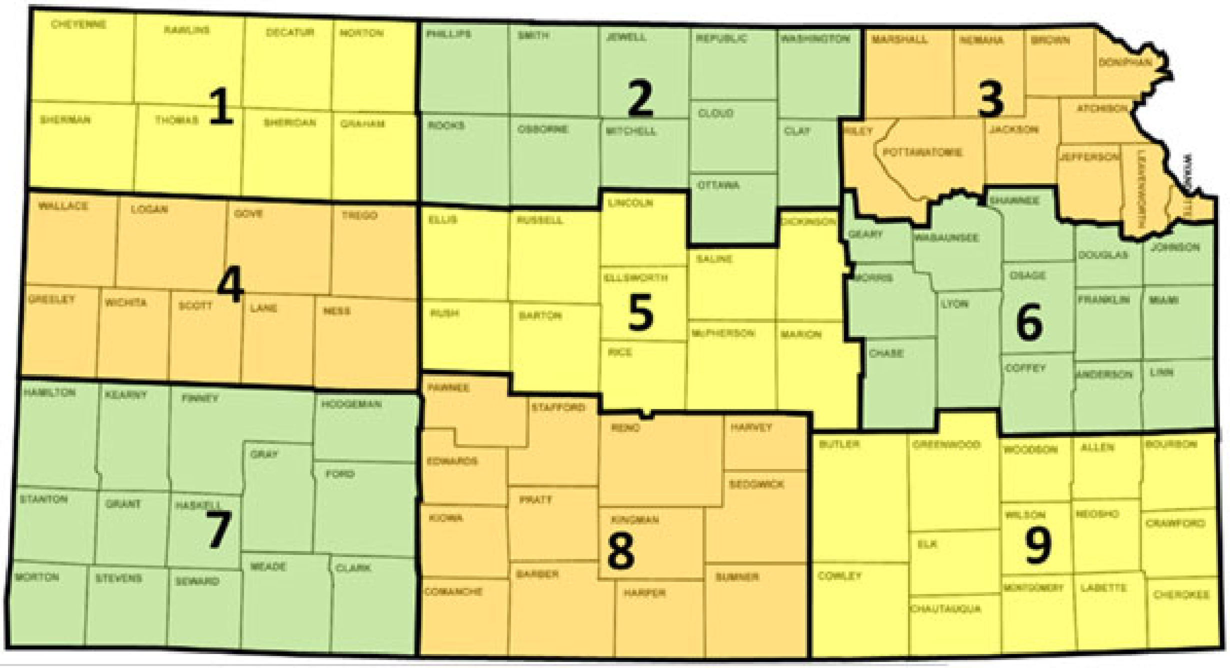
Precipitation varies based on time of year

In addition to the spatial differences in precipitation distribution, there is a temporal variation in precipitation as well (Table 1). January is the driest month on average in all divisions except southwest Kansas, where the driest average is in February. On average, May is the wettest month in the eastern two-thirds of Kansas. June is typically the wettest month in the southwest, while July averages the most in both northwest and west central Kansas. The annual increase of precipitation in spring is followed by a general decrease through summer into autumn, but the rise and fall in each of Kansas' nine climate divisions is far from the smooth ride one might experience on, say, Interstate 70. Buckle up; let's take a road trip across the state and see how Kansas' average precipitation varies by location and date.

In the following graphics, weekly average precipitation is displayed for three climate divisions at a time for eastern, central, and western Kansas. These were constructed using daily precipitation averages for 165 different locations around the state, calculated by the National Centers for Environmental Information for the 30-year period 1991 to 2020. The individual locations were grouped based on climate division, and the daily averages were summed to generate 7-day averages.

Table 1. Average monthly and annual precipitation in each of Kansas' nine climate divisions.

Division	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Northwest	0.42	0.56	1.05	2.07	3.22	2.91	**3.53**	3.10	1.68	1.67	0.73	0.61	21.58
North Central	0.68	0.87	1.56	2.49	**4.37**	3.86	4.31	3.60	2.55	2.05	1.22	1.00	28.56
Northeast	0.84	1.24	2.18	3.56	**5.06**	4.99	4.57	4.31	3.44	2.82	1.78	1.41	36.20
West Central	0.41	0.59	1.09	1.83	2.91	2.86	**3.40**	3.03	1.60	1.56	0.67	0.63	20.58
Central	0.72	1.02	1.78	2.62	**4.67**	3.99	4.07	3.83	2.56	2.15	1.20	1.08	29.68
East Central	0.96	1.45	2.35	3.79	**5.33**	5.03	4.26	4.23	3.68	3.02	2.01	1.50	37.62
Southwest	0.50	0.47	1.18	1.68	2.54	**3.12**	3.07	2.87	1.41	1.75	0.60	0.78	19.99
South Central	0.80	1.10	2.11	2.70	**4.62**	4.49	3.68	3.65	2.43	2.57	1.30	1.15	30.60
Southeast	1.28	1.65	2.83	4.26	**6.20**	5.54	4.28	4.02	4.06	3.60	2.39	1.87	41.96
STATE	0.78	1.07	1.90	2.92	**4.51**	4.25	3.95	3.69	2.75	2.47	1.42	1.19	30.91
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR



Division	7-DAY MAX	DATE
Northwest	0.88	31-May
North Central	1.08	23-May
Northeast	1.22	9-Jun
West Central	0.85	2-Aug
Central	1.15	22-May
East Central	1.29	7-Jun
Southwest	0.78	6-Aug
South Central	1.14	6-Jun
Southeast	1.48	13-May

Figure 3 and Table 2. List of the highest 7-day average precipitation totals and their dates of occurrence in each of Kansas' nine climate divisions (Table 2), the boundaries of which are shown on the map (Figure 3).

Our first stop is eastern Kansas (Figure 4), the wettest part of the state, home to Topeka, Emporia, Pittsburg, Manhattan, and Lawrence, plus the western Kansas City metropolitan area. All three of the eastern divisions have their lowest weekly average precipitation in mid-January. This is also the time of year when average daily low temperatures are at their minimum in the state (the coldest average daily low temperature across Kansas is 18.5°F from January 13 through January 21). Cold air can't hold as much water vapor as warm air, so in winter there's less moisture available to generate precipitation, hence the lower amounts on average. There is a steady increase in average precipitation through February and March, with a rapid rise in 7-day totals in April into May. Southeast Kansas has not only the state's maximum 7-day average at 1.48" (Table 2), but it also reaches that maximum earlier than any other division, peaking on May 13 (Note: references to individual dates in this article refer to the last day of a weekly value; May 13 refers to the 7-day period from May 7 through May 13).

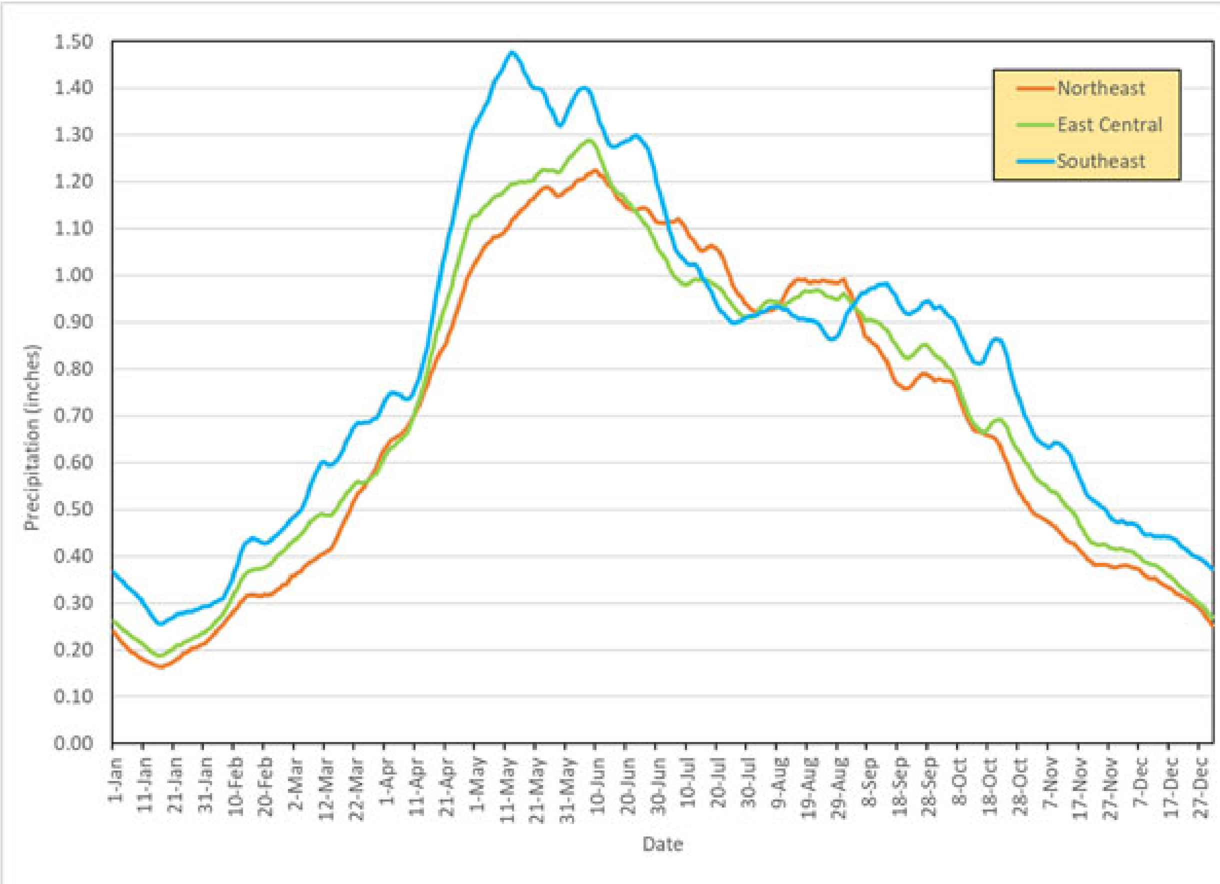


Figure 4. Average 7-day precipitation during the calendar year in Kansas' three eastern climate divisions. Data source: NCEI.

Further north, the peak average in northeast and east central Kansas doesn't occur for another three to four weeks; the maximum 7-day average is June 7 in east central and June 9 in northeast Kansas. The maximum averages are lower in these two divisions than in the southeast. In the second half of the year, averages are on the decrease in all three divisions, but this descent is not a smooth one. Rather, it's somewhat of a bumpy ride on the way down, with a few "rolling hills" along the way, not unlike the terrain in a few parts of Kansas. These undulations lead to some surprising results in the average precipitation data. Despite averaging the lowest annual precipitation of the three eastern divisions, the wettest average in the state in both July and August is in northeast Kansas. There are secondary peaks in weekly averages in all three divisions in late summer. While not dramatically higher, the increases are such that southeast Kansas averages slightly more precipitation in September (4.06") than it does in August (4.02").

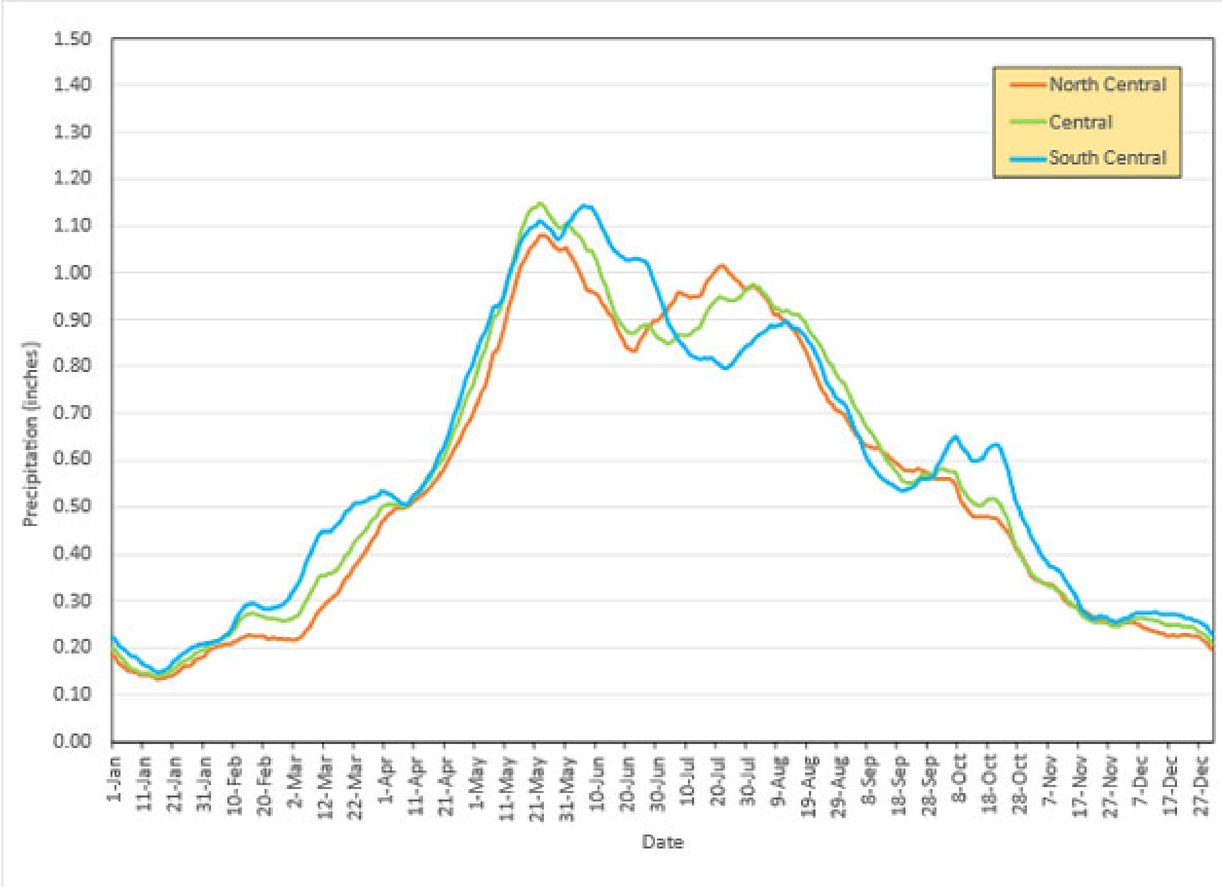


Figure 5. Average 7-day precipitation during the calendar year in Kansas' three central climate divisions. Data source: NCEI.

Now, let's roll west into central Kansas, home to Concordia, Salina, Hutchinson, Wichita, and Medicine Lodge. Elevations are slightly higher in this division than further east, particularly west of 98° west longitude. The influence of the Gulf of Mexico is less in this part of the state, plus the air is usually less humid in central than in eastern Kansas, thanks to drier air being advected eastward from the west. As a result, precipitation across Kansas' three central climate divisions (Figure 5) averages less than in the east. The maximum 7-day amount occurs in late May in both north central (May 22) and central (May 23) Kansas but around two weeks later in south central Kansas (June 6). This earlier peak results in central Kansas averaging the most precipitation of the three divisions in May, with south central wettest on average in June.

An interesting pattern is evident in the central divisions during mid-summer. In north central and central Kansas, average precipitation decreases from the late May peak until late June, then increases again for a few weeks. There is a similar increase in totals in south central Kansas that commences a few weeks later. As a result, north central is the wettest of the three divisions in July, while central Kansas is the wettest in both August and September. A short-lived average increase occurs in south central Kansas in October, which is the wettest division of the three from October through the winter months into April.

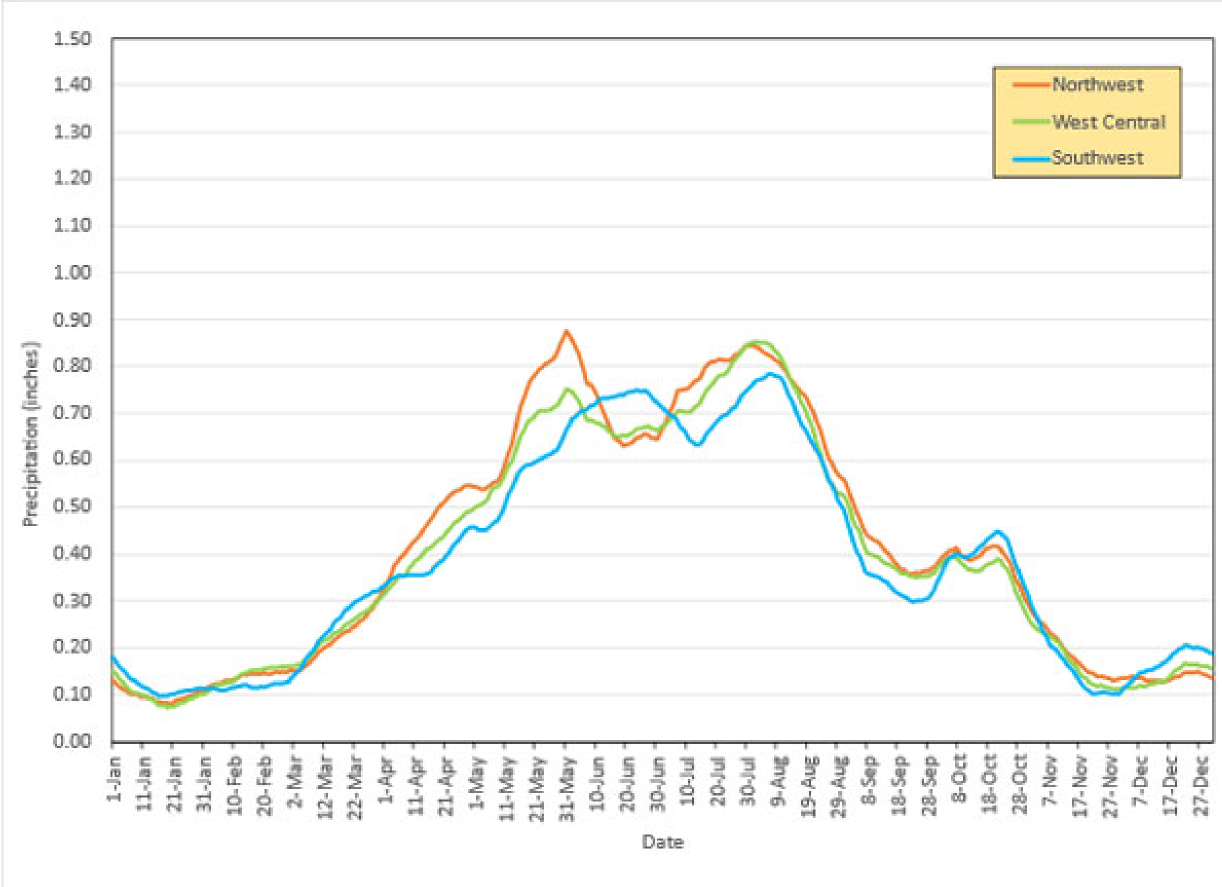


Figure 6. Average 7-day precipitation during the calendar year in Kansas' three western climate divisions. Data source: NCEI.

Our last stop on this road trip is western Kansas (Figure 6), home to Goodland, Colby, Tribune, Dodge City, and Garden City. Weekly averages are lower than those in the eastern and central divisions. There are two distinct peaks in amounts during the year, but the secondary peak is much more pronounced in this division than it is in central Kansas. In northwest Kansas, the highest 7-day average of the year comes with the first peak, occurring on the last day of May. Further south, the second peak results in higher averages than the first, and as a result, the highest 7-day amounts are in early August in both west central (Aug. 2) and southwest Kansas (Aug. 6). All three of the western divisions see a notable increase in weekly averages from late September into late October, and also a slight increase during December. This results in a pair of oddities for southwest Kansas: October averages more precipitation than September, and December's average is more than November's!

As we know, precipitation totals aren't consistent from year to year, making for a never-ending challenge for those with agricultural interests in the state. May is the wettest month on average in Kansas, so we are in prime time as we speak for receiving moisture that is critical to those raising crops and livestock. Thanks for coming along with me on this virtual road trip!

Matthew Sittel, Assistant State Climatologist
msittel@ksu.edu

4. 2024 Kansas Wheat Plot Tours - Updated Schedule

The Department of Agronomy and K-State Research and Extension will host several winter wheat variety plot tours in different regions of the state. Make plans to attend a plot tour near you to see and learn about the newest available and upcoming wheat varieties, their agronomics, and their disease reactions. Below is a preliminary list of plot tour dates, times, and plot locations/directions. This list will be continuously added to and updated in the coming weeks. **Pay attention to the time zone for the last few plot tours. Times with (MT) indicate the Mountain Time Zone**. All other times will be in the Central Time Zone.

Romulo Lollato, Extension Wheat Specialist
lollato@ksu.edu

Date	Time	County	Location	Directions	Agent/ Contact
6/5	7:30 AM	Republic	Belleville	Plot to focus on wheat streak mosaic virus. 2 miles west of Belleville in the North Central Experiment Field	Luke Byers
6/5	10:00 AM	Republic	Polansky	1 mile east of Belleville on U.S. 36	Luke Byers
6/5	3:00 PM	Clay	Morganville	2 miles east of Morganville on KS-80, 0.5 miles south on Limestone Rd	Luke Byers
6/5	5:00 PM	Washington	Palmer	3 miles east of Palmer on 4th Rd	Luke Byers
6/11	8:15 AM (MT)		Tribune	At Tribune Station, 1 mile west of Tribune on Hwy 96	Lucas Haag
6/11	5:30 PM (MT)	Sherman		9 miles north of Goodland on Hwy 27 to Road 73, east of the Quonset. Supper to follow at 4-H building	Jeanne Falk Jones
6/12	7:30 AM (MT)	Wallace	Mai Farms	9 mi south of Sharon Springs on Hwy 25 to Field Road, 3 miles east. Breakfast at 7:00 AM (MT). Plot tour at 7:00 AM (MT)	Jeanne Falk Jones
6/12	10:30 AM	Wallace	E&H Farms	3 mi west of Weskan on Hwy 40 to Road 3, south	Jeanne Falk Jones

	(MT)			5.5 mi to Gooseberry Rd	

6/12	5:30 PM	Cheyenne	Hingst Farm	13 miles west of St. Francis on Hwy 36 to Road 1 and 3.5 miles north. Sandwiches in the field after tour.	Jeanne Falk Jones
6/13	9:00 AM	Thomas		Plot located 4.5 miles south of I-70 on Levant-Winona blacktop	Laurel Despain/ Lucas Haag

5. K-State TAPS Technology Field Day - June 20 in Colby

The K-State Testing Ag Performance Solutions (TAPS) program invites TAPS contestants, agricultural industry partners, and anyone interested in sustainable and efficient irrigation technology to attend the TAPS Technology Field Day on June 20, 2024, at the Northwest Research-Extension Center, 105 Experiment Farm Drive, Colby, KS 67701.

The technology program and a tour of the TAPS plots will begin at 10:00 a.m. Afterward, a meal will be provided at the NWREC. Attendees are also invited to join the TAPS program team and technology partners for a golf scramble at Meadow Lake Golf Course.

Attendees can engage with technology partners and demonstrations, view the TAPS Sprinkler Irrigated Corn competition plots planted in May, connect with K-State Research and Extension Specialists, and build their network.

Schedule for the 2024 TAPS Technology Field Day

- 10:00 a.m. to 12:30 p.m. Technology Program and Tour of the TAPS Plots
- 12:30-1:30 p.m. Lunch
- 2:00 p.m. Tee Time at the Meadow Lake Golf Course

"TAPS unites industry, farmers, research, and education, building a collaborative network to support sustainable and profitable irrigation management," said Daran Rudnick, K-State director of sustainable irrigation and TAPS. "This technology field day is an opportunity for anyone interested to see what TAPS is all about and join the conversation."

The public is encouraged to attend the TAPS Technology Field Day to witness this exciting real-world farming competition and learn about the technology used in sustainable agricultural water management. Attendees will meet the farmers, industry professionals, and researchers working to conserve the Ogallala Aquifer and sustain a strong agricultural economy in western Kansas.

You can still participate in the TAPS competition by following @KSUTAPS on Twitter, Facebook, and Instagram and engaging with the TAPS social media team. The public is invited to vote and help make decisions for the TAPS Social Media Team plots, experiencing the same competition challenges farmers face in western Kansas.

To RSVP for the 2024 TAPS Technology Field Day and catered meal, visit the TAPS website at www.K-State.edu/TAPS or contact Renee Tuttle, TAPS and irrigation extension associate, at rstuttle@ksu.edu.


KSU TAPS
TESTING AG PERFORMANCE SOLUTIONS
REGISTER TODAY
TAPS TECHNOLOGY FIELD DAY & GOLF SCRAMBLE
Thursday, June 20, 2024
Northwest Research-Extension Center
105 Experiment Farm Drive
Colby, KS 67701