Issue 1031

K-STATE Research and Extension

Extension Agronomy

eUpdate

12/05/2024

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 | 12/05/2024 | Issue 1031

1. Nutrient availability in poultry manure 3
2. Five years of the World of Weeds article series 7
3. Private wells in Kansas: Safe location and maintenance guidelines 9
4. Kansas Drought Update and Climate Report: Nov. 27 to Dec. 3, 2024 11
5. Save the Date for the 2025 Corn and Soybean Schools 20

1. Nutrient availability in poultry manure

Poultry litter can provide a significant supply of nutrients for crop production in areas of Kansas where a supply of litter is available (Figure 1). Although Kansas is not a major producer of poultry, there is an abundant supply of litter from the nearby states of Arkansas, Missouri, and Oklahoma, which rank among the largest producers of poultry in the U.S. The acreage available to receive poultry litter has been declining in Arkansas, Missouri, and Oklahoma in recent years because of environmental concerns and nutrient management regulations. Thus, litter availability in areas such as southeast Kansas has been on the rise.

Figure 1. Poultry litter. Photo by Dan Donnert, K-State Research and Extension.

Poultry litter should serve as an excellent complement to commercial nitrogen (N) fertilizers. Its phosphorus (P) content is usually high, and application rates should be based on P levels to avoid potential surface water contamination.

Moisture content and nutrient concentration in poultry litter can be highly variable and depend mainly upon production conditions, storage, and handling methods. Therefore, laboratory analysis is the best way to determine the level of N and P in the material to be applied. Average values for the different types of poultry manure collected over a period of time are shown in Table 1. Actual laboratory analysis of 213 poultry manure samples from southeast Kansas is shown in Figure 2. There is a large range in nutrient values, likely due to the source of the litter. However, a good sample average to expect would be 56-53-46 (N-P-K).

Table 1. Types and nutrient content of poultry litter

Litter Source	Typical moisture content	Typical nutrient content (lbs/ton)		
		N	P_2O_5	K_2O
Layer	High	35	40	20
Pullet	Low	40	45	40
Breeder	High	40	60	40
Turkey	Low	60	60	55
Broiler	Low	60	60	55

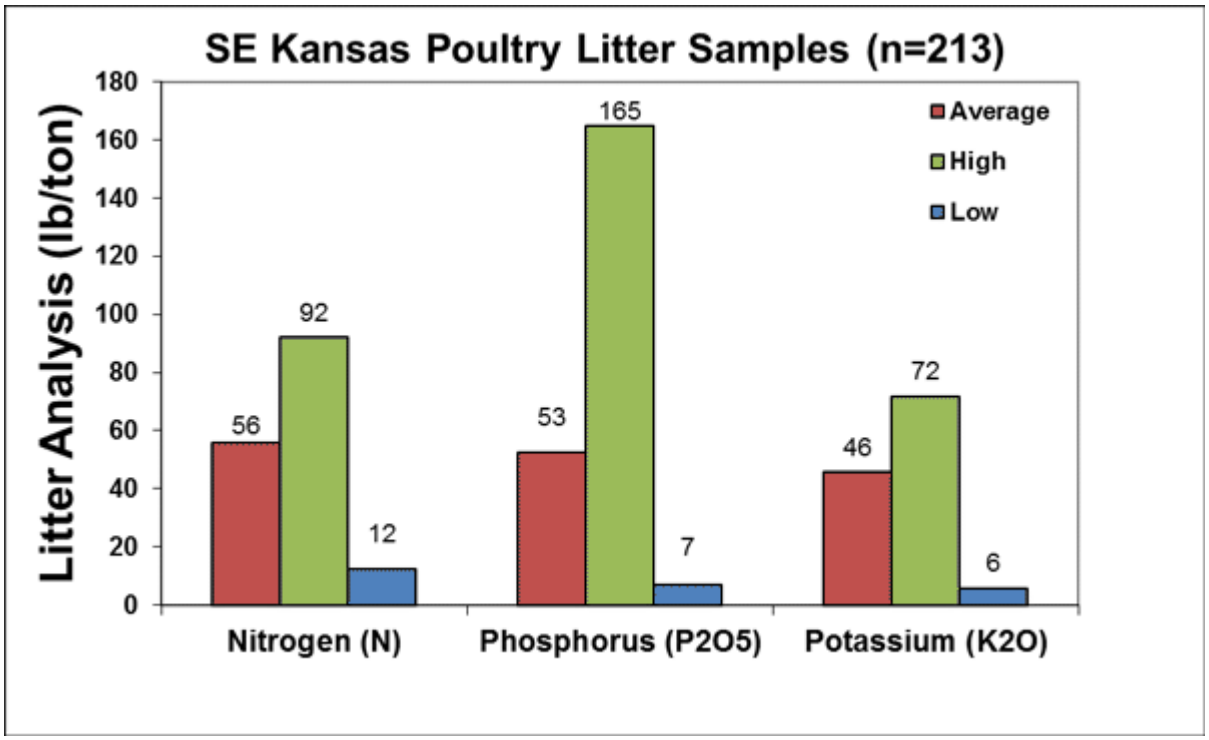


Figure 2. Results of analysis of 213 samples of poultry manure from southeast Kansas. Sources: K-State Research and Extension.

Knowing the nutrient content of the manure is essential for maximum efficiency of manure use. Before applying poultry litter to land, a laboratory analysis should be done on the poultry litter. This provides information regarding nutrient levels and the chemical forms of these nutrients, which is necessary to adequately estimate nutrient availability and application rates.

For more information, see K State Extension publication MF-2562, "Estimating Manure Nutrient Availability," at: http://www.ksre.ksu.edu/bookstore/pubs/MF2562.pdf

Nitrogen availability

What is the crop availability of N shortly following poultry litter application?

In the case of N, it is important to consider that this nutrient is primarily in the organic form in poultry litter (up to 75-80% organic N). Organic N needs to be mineralized before becoming available to crops. A fraction of this organic N may become part of the soil organic matter pool and unavailable to crops in the short term.

Field and laboratory studies suggest that the fraction of total nitrogen that becomes plant-available in the first year of application is approximately 45-55%, which includes both the inorganic N in the manure and a percentage of the organic N. This value varies depending on the components in the litter and the method of handling and application. For example, poultry litter that contains a large fraction of bedding material will tend to have lower N availability in the year of application. Reduction in N availability may also occur when litter is aged and has undergone some composting. Nitrogen lost from the volatile ammonium fraction at the time of application on the soil surface can also reduce plant available N. Ammonium volatilization is typically higher during windy and warm days. Incorporation of litter immediately after application will reduce volatilization and potential nutrient loss by water runoff in case of a rainfall event, in addition to reducing the odor of the litter.

If the manure is applied to pastures, the percentage of N utilized by the forage in the first year will depend on whether the pasture consists of cool-season or warm-season grasses. For cool-season grasses, such as fescue pasture, N utilization will likely be less than 50% in the first year. Most of the growth in cool-season pasture occurs early in the year. The microbial community will not mineralize as much N early in the spring as later in the summer. Fall applications may result in better N utilization for fescue than winter or spring applications. For warm-season grasses, such as bermudagrass pasture, nitrogen utilization from manure will likely be close to 50%. In both cases, producers should base application rates on the P and K needs of the grass and supplement additional N fertilizer to meet the N needs of the grass.

Phosphorus and potassium availability

When manure is applied to the soil, what percentage of the phosphorus and potassium is available to the crop during the first year?

A large fraction of the P in manure is considered plant-available immediately after application. The fraction that is not plant-available shortly after application will become available over time.

Estimated P availability values range from 50 to 100%. This range accounts for variation in sampling and analysis and for P requirements with different soil test levels. Use the lower end of the range of P availability values (50%) for soils testing "Very Low" and "Low" (below 20 ppm). In these situations, large yield loss could occur if insufficient P is applied, and soil P buildup is desirable.

On the other hand, use 100% availability when manure is applied to maintain soil test P in the "Optimum" soil test category and when the probability of a yield response is small.

Several studies have shown that manure P is a valuable resource that is comparable to inorganic fertilizer P for crop production. These two P sources are similarly effective when the manure P concentration is known and the manure is applied properly. Nevertheless, excessive application of manure P (e.g., at rates sufficient to meet the crop's N needs) often results in excessive soil P buildup, resulting in a higher risk of surface water contamination.

This problem of excessive P buildup in the long term can be minimized by:

- Applying manure to meet the P needs of the crop and using inorganic sources of fertilizer to complement nitrogen needs,
- Constantly monitoring soil test P levels and
- Using the P-index to assess the potential impact of P buildup on water quality.

Producers should consider actual P application rates and not just tons per acre of manure being applied. Uniformly applying manure at precise rates can also be difficult. Careful calibration of manure applicators is needed. If these aspects are not considered, the efficiency of manure P compared with inorganic fertilizer P may be reduced. Careful management pays off.

Availability of potassium is usually near 100% with proper application. Poultry litter can also provide significant amounts of secondary and micronutrients.

Peter Tomlinson, Environmental Quality Specialist
ptomlin@ksu.edu

Dorivar Ruiz Diaz, Nutrient Management Specialist
ruizdiaz@ksu.edu

2. Five years of the World of Weeds article series

In December 2019, Extension Weed Science specialist Sarah Lancaster launched a new article series all about weeds. The series "World of Weeds" features a different weed species that typically has agronomic implications for farmers and ranchers in Kansas. Each article contains information on the species' ecology, identification features, and management options.

If you missed some of the earlier articles or would like a refresher, all the articles are still available to view as part of the eUpdate online archives. Below is a list of the weeds grouped into categories, with the articles as clickable hyperlinks.

Annual grasses	Annual or bi-annual broadleaves
Warm-season	
Foxtails Stinkgrass Prairie cupgrass Fall panicum Longspine sandbur Shattercane	Kochia Stinging nettle Common sunflower Palmer amaranth Morningglory Hornbeam copperleaf Giant ragweed Prickly sida (teaweed) Toothed spurge Snow-on-the-mountain
Cool-season	
Downy brome Jointed goatgrass	Marestail (horseweed) Henbit Mustards Corn gromwell Poison hemlock and wild carrot Prickly lettuce

Perennial grasses	Perennial broadleaves
Tumble windmillgrass Johnsongrass Tumblegrass Purple threeawn	Bur ragweed/woollyleaf bursage Hemp dogbane
Grass-like weeds	**Shrubs/trees/vines**
Yellow nutsedge Dayflower (Asiatic and erect) Horsetails	Field bindweed Smooth sumac Eastern redcedar Bush honeysuckle

If there is a weed you would like featured in a World of Weeds article, please contact Sarah Lancaster at slancaster@ksu.edu or Kathy Gehl at kgehl@ksu.edu.

3. Private wells in Kansas: Safe location and maintenance guidelines

Water supply to rural residences and agricultural operations without rural or public water systems is usually obtained from a private well or surface water supply. In Kansas, more than 73,000 individuals rely on private wells for a water supply. When public and rural water systems that use well water are added to the private well numbers, 34.6% of the Kansas population relies on groundwater for their water supply.

Municipal and rural water systems must maintain water quality standards specified by local, state, or federal requirements; however, owners of private wells are responsible for the water quality of their wells. Permanent contamination of groundwater can decrease property values, affect human and animal health, and involve legal liability.

Testing water from private wells has shown that some wells do not meet the safe drinking water standards used for public water systems. The primary reasons for this reduction in water quality from private wells include:

- contamination sources upslope or near the well;
- failure to construct the well in accordance with current standards;
- inadequate well maintenance and service; and
- lack of protection from activities that risk contamination.

Following the guidelines for recommended separation distance and direction from potential contamination sources when locating a well can help protect private well water quality. When private wells are appropriately sited and constructed, routine maintenance is required to ensure wells continue to be safe. Wells that do not receive regular maintenance are more likely to produce unsafe water.

Detailed information about properly constructing a well in a safe location and maintenance guidelines for existing wells can be found in two recently updated publications from K-State Research and Extension.

Private Wells – Safe Location
MF3667 https://bookstore.ksre.ksu.edu/download/private-wells-safe-location_MF3667

Private Well Maintenance and Protection MF3666 https://bookstore.ksre.ksu.edu/item/private-well-maintenance-and-protection_MF3666

This project has received funding and support from K-State 105, Kansas State University's economic growth and advancement initiative for all 105 counties in Kansas. Learn more at *k-state.edu/105*.

Stacie Minson, Extension Watershed Specialist, KCARE
sedgett@ksu.edu

Other contributors:

Pat Murphy, Extension Engineer, retired
Joe Harner, Extension Engineer, retired
Herschel George, Watershed Specialist, retired
Dan Wells, Environmental Administrator, KDHE
Melissa Harvey, KCARE

Kansas State University Department of Agronomy
2004 Throckmorton Plant Sciences Center | Manhattan, KS 66506
www.agronomy.ksu.edu | www.facebook.com/KState.Agron | www.twitter.com/KStateAgron

Temperature summary

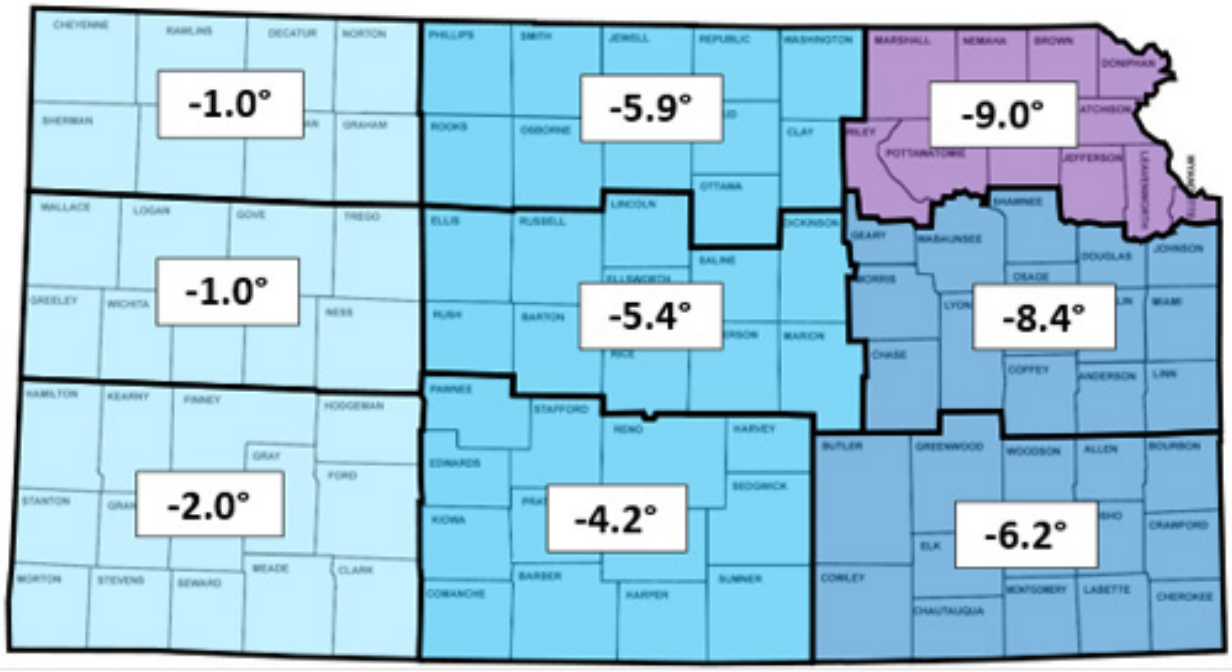
Meteorological fall ended on November 30, and the season closed on a chilly note thanks to an extended period of below-normal temperatures that arrived Thanksgiving week and lingered through the start of meteorological winter. Daily average temperatures across the Kansas Mesonet were below normal on all 7 days of the period. This puts the number of consecutive days below normal at 9 (as of December 3), which is the longest run since a 9-day stretch back in early July. For comparative purposes, this year's longest run of below-normal days is 13 during the bitterly cold spell in mid-January. One day during the period with an above-normal average high was December 3rd when a prevailing south wind boosted readings in western Kansas to well above seasonal normals. After a cold morning low of 25°, Goodland's high of 70° on the 3rd was 24 degrees above the normal high for the date of 46°. One county south, the cooperative observer at Wallace bested Goodland by a degree, topping out at 71°, the week's warmest reading. Morning lows averaged below freezing on all 7 days and averaged in the teens on four mornings. The Silver Lake Mesonet site in Shawnee County recorded the coldest temperature of the week on the 1st at 9°. The nearby Rossville tower recorded a low of 10°. Both lows resulted from fresh snow cover that blanketed northeast Kansas the preceding day. The 7-day average temperature was 32.4°, or 4.9° below normal (Figure 1). All nine divisions were above normal for the week; departures ranged from -9.0° in northeast to -1.0° in northwest and west central Kansas.

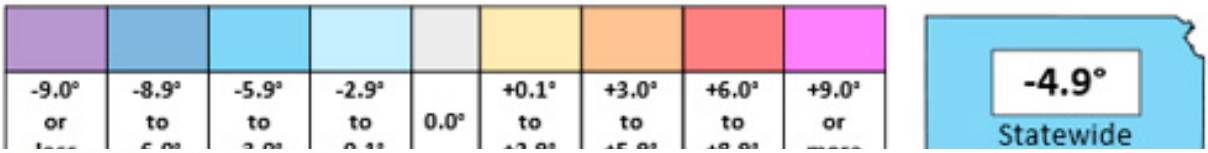
Precipitation summary

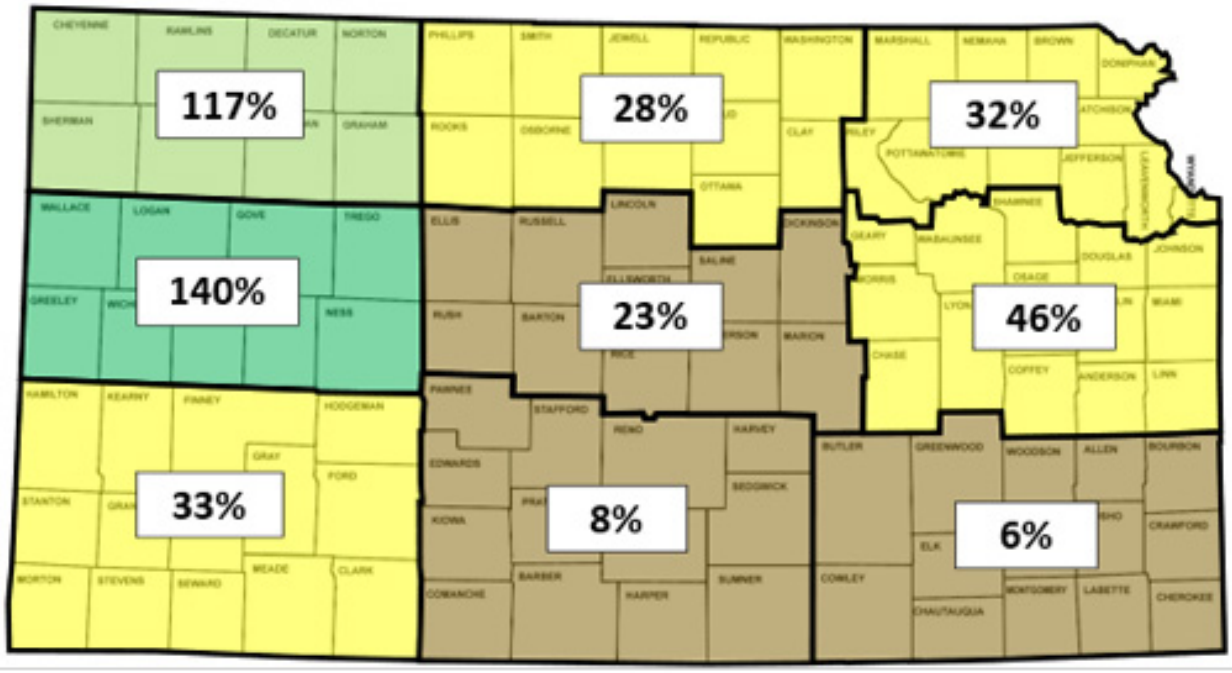
There were two precipitation events of note during the period. The first event began late on the 26th in northwest Kansas and spread across much of the state on the 27th. Temperatures were warm enough for a cold rain in most areas, but there were reports of freezing rain in far northern Kansas and snow in parts of the northwest. Hoxie in Sheridan County picked up half an inch of snow from the event. Liquid precipitation amounts around the state were generally under two-tenths of an inch, with isolated higher totals. The CoCoRaHS observer west of Oberlin in Decatur County measured 0.44" for the event. The second event was on the 30th, and with colder air in place, the precipitation fell as snow, mainly impacting northeast and east central Kansas. A narrow but intense band of snow brought accumulating snowfall to these areas, with rates over 1 inch per hour observed in many locations. Totals exceeded forecasted amounts, and a Winter Weather Advisory was issued for the morning hours as roads became snow-covered, leading to hazardous driving conditions. Hoyt in Jackson County had the highest snow total of 5.5". Leavenworth received 4.5" of snow, and the official total for Topeka was 3.3". Amounts from 1 to 4 inches were observed in the western Kansas City suburbs and the Lawrence area, while totals in Manhattan were around one inch.

The statewide average precipitation for the 7-day period was 0.09", or 31% of the normal amount of 0.29" (Figure 1). Only two divisions were above normal: west central (140%) and northwest (117%) Kansas. The highest total was east central Kansas with 0.19". South central had the lowest total with just 0.02". Precipitation remains above normal for the water year, which began on October 1. The average statewide total for the water year is 6.05", or 2.03" above the normal amount of 4.02". All nine divisions are above normal, with percents of normal ranging from 126% in the northeast to 211% in southwest Kansas. Departures from normal range from +1.17" in north central to +3.59" in southeast Kansas. For the year, the statewide average precipitation is 27.72", or 2.13" below normal. Three divisions are above normal for the year: southwest (113%), west central (106%), and east central (100%). North central has the lowest percent of normal (87%) as well as the largest departure

from normal (-3.70").







Kansas State University Department of Agronomy
2004 Throckmorton Plant Sciences Center | Manhattan, KS 66506
www.agronomy.ksu.edu | www.facebook.com/KState.Agron | www.twitter.com/KStateAgron

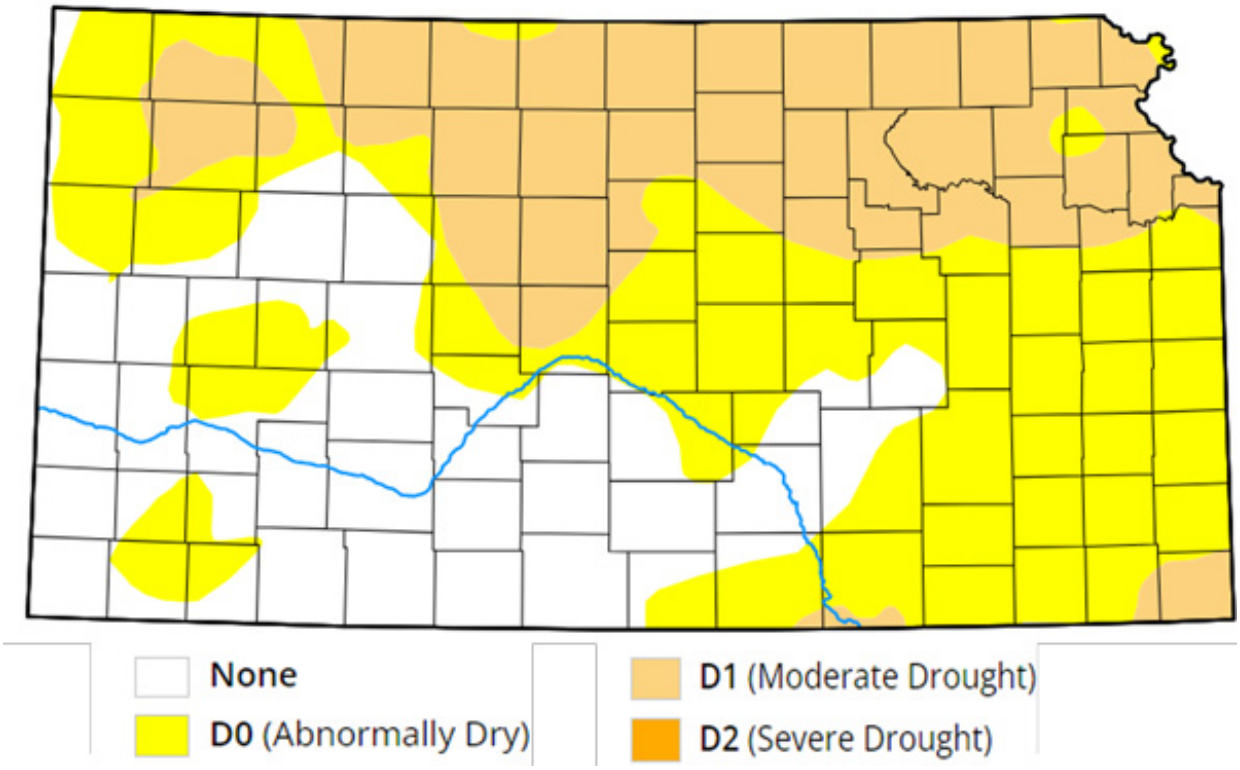
Figure 1. This week's departure from normal temperature (°F, top) and percent of normal precipitation (bottom) by Kansas climate division. Source: MRCC.

Evapotranspiration and soil temperatures

The average evapotranspiration for grass across the state for the week was 0.23". This is well below the normal amount of 0.36" for the 7-day period. Divisional averages ranged from 0.18" in east central to 0.27" in west central Kansas. The statewide average 2" soil temperature across the Kansas Mesonet fell another 5.2° this week to 39.5°. This average is 1.5° below the normal of 41.0° for the 7-day period. Divisional averages ranged from 36° in northwest to 44° in southeast Kansas.

Drought update

In this week's US Drought Monitor map, there were a few changes, all for the better (Figure 2). Parts of 14 counties were improved by one category. These changes include new drought-free areas in parts of four counties along the Colorado border: Sherman, Wallace, Greeley, and Hamilton. The percentage of drought-free areas in the state increased to 31.3%, up 0.9% from last week. The remaining changes in this week's map were improvements from D1 to D0 in west central and east central Kansas. The statewide Drought Severity and Coverage Index (DSCI) fell 3 points and now stands at 98. The DSCI is under 100 for the first time since July 23.



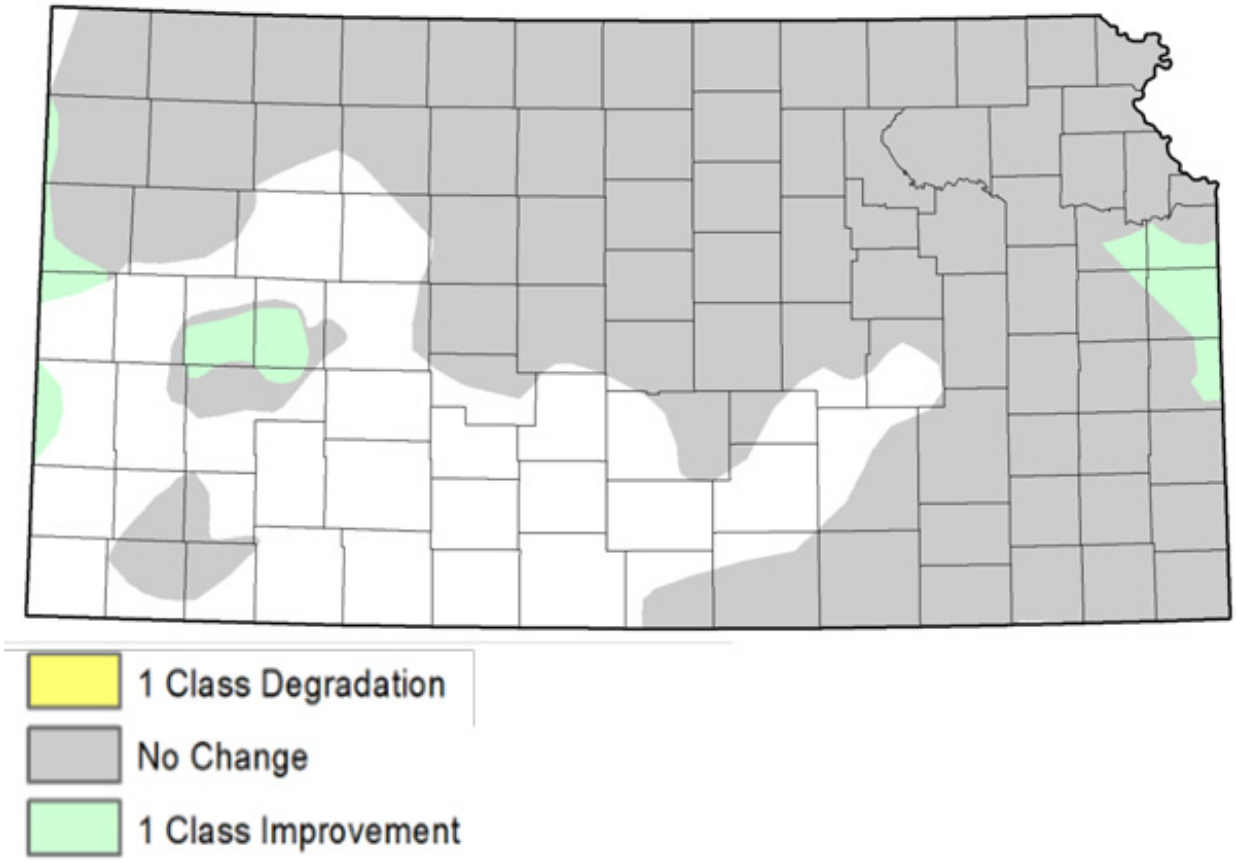


Figure 2. Current weekly drought status (top) and change in drought category over the past week (bottom). Source: UNL Drought Monitor.

Weather outlooks

The Weather Prediction Center's 7-day precipitation forecast, valid for December 4-10, calls for a dry week, with no precipitation expected anywhere in the state (Figure 3). A return to milder conditions is expected, and temperatures should average from 3 to 9 degrees above normal. The warmest day is likely to be Sunday, when highs may reach into the 60s, especially in western Kansas. The average daily high and low across Kansas for this period are 46° and 23°. Average 7-day precipitation is 0.14" in western, 0.26" in central, and 0.40" in eastern Kansas.

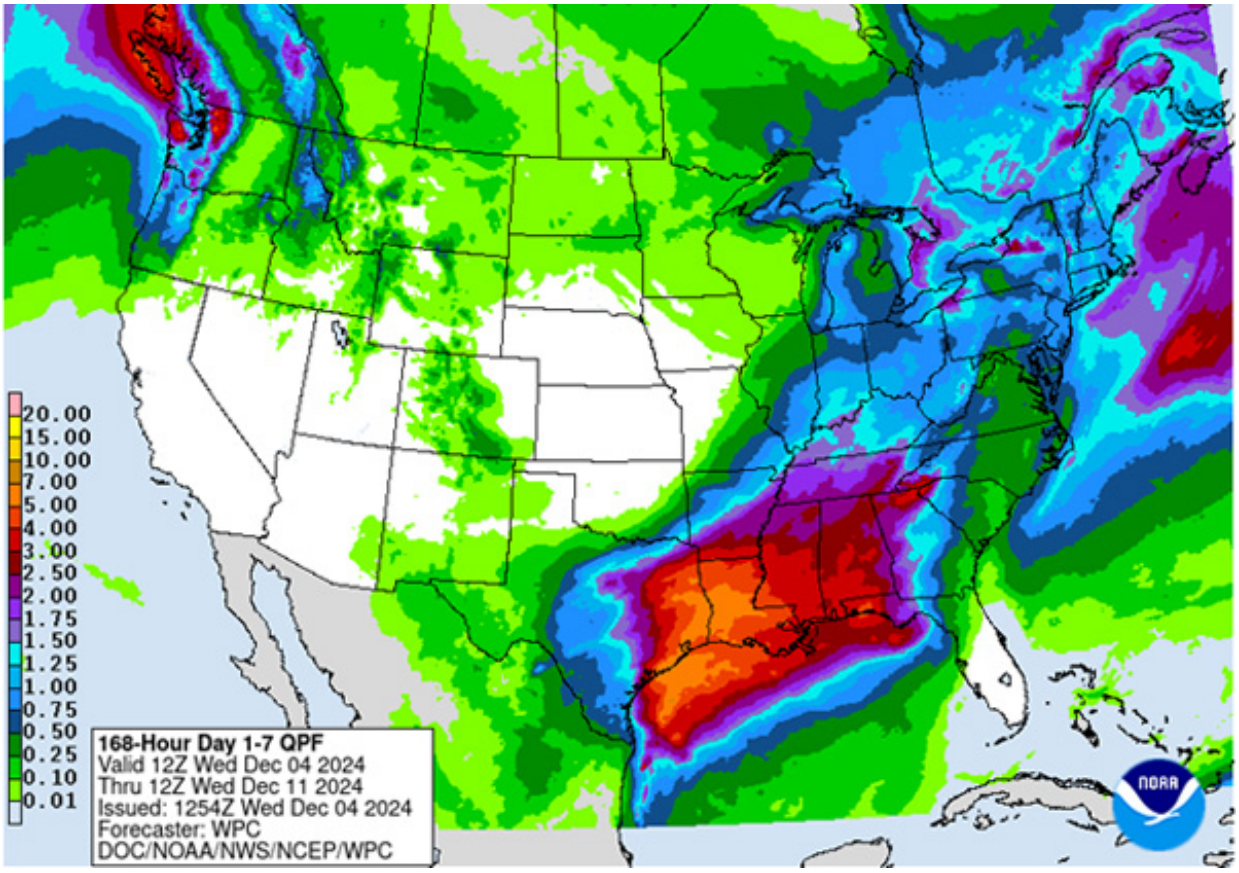
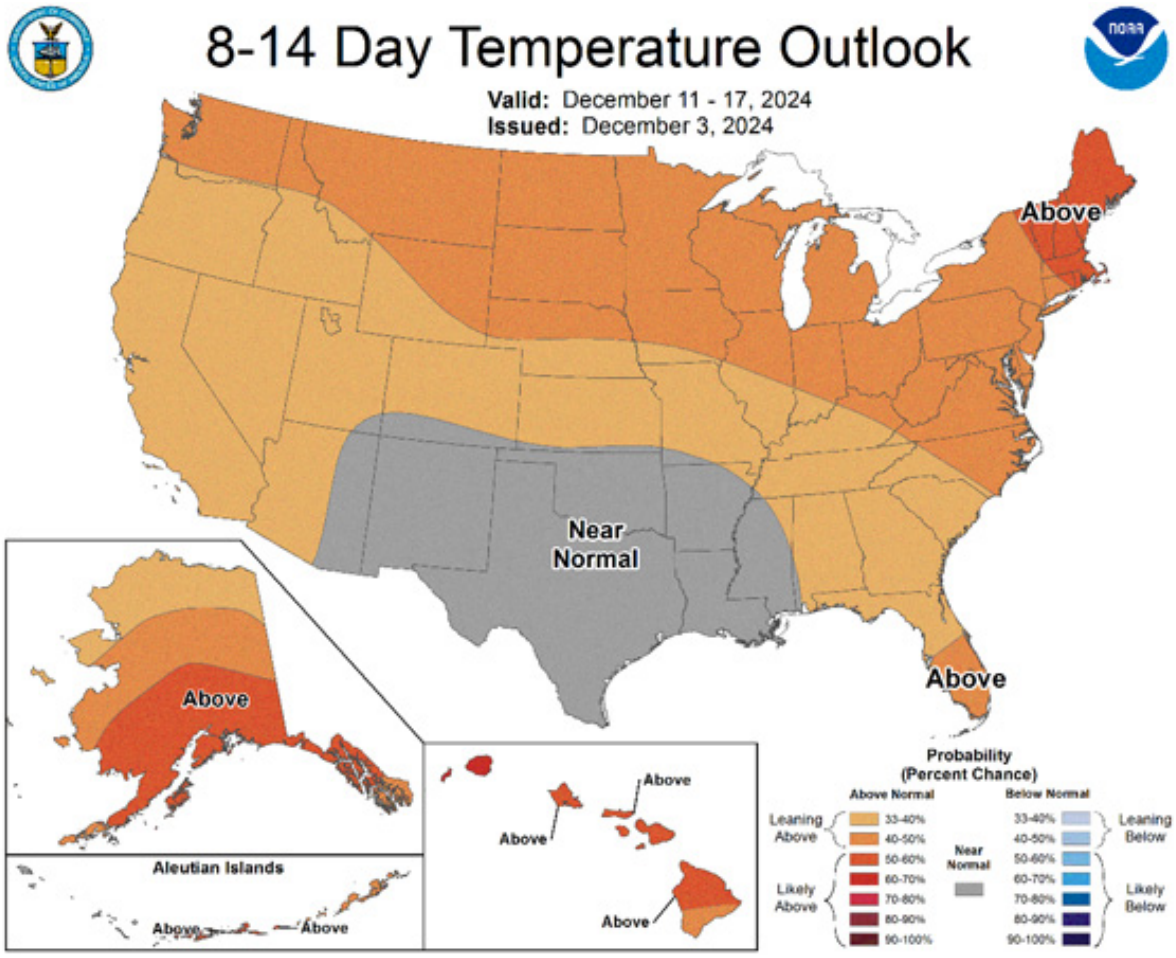


Figure 3. The National Weather Service Weather Prediction Center's (NWS-WPC) 7-day precipitation forecast (Dec. 4 to Dec. 10, 2024).

In the longer term, the 8 to 14-day outlook, valid for December 11-17, slightly favors above-normal temperatures for all but far southern Kansas (Figure 4). The probability of above-normal temperatures ranges from 32% in the far south to 38% in the northwest. Above-normal precipitation is very slightly favored in the southwest, with a maximum probability of just 34%. Near-normal precipitation is favored elsewhere, with a maximum probability of 36%. Given that the maximum probabilities are close to the 33% equal chances threshold, this forecast should be considered a low-confidence forecast.


8-14 Day Temperature Outlook
Valid: December 11 - 17, 2024
Issued: December 3, 2024
Above
Near Normal
Above
Above
Aleutian Islands
Above
Above
Above
Above
Probability (Percent Chance)
Above Normal
Below Normal
Leaning Above
Likely Above
Near Normal
Leaning Below
Likely Below
33-40%
40-50%
50-60%
60-70%
70-80%
80-90%
90-100%

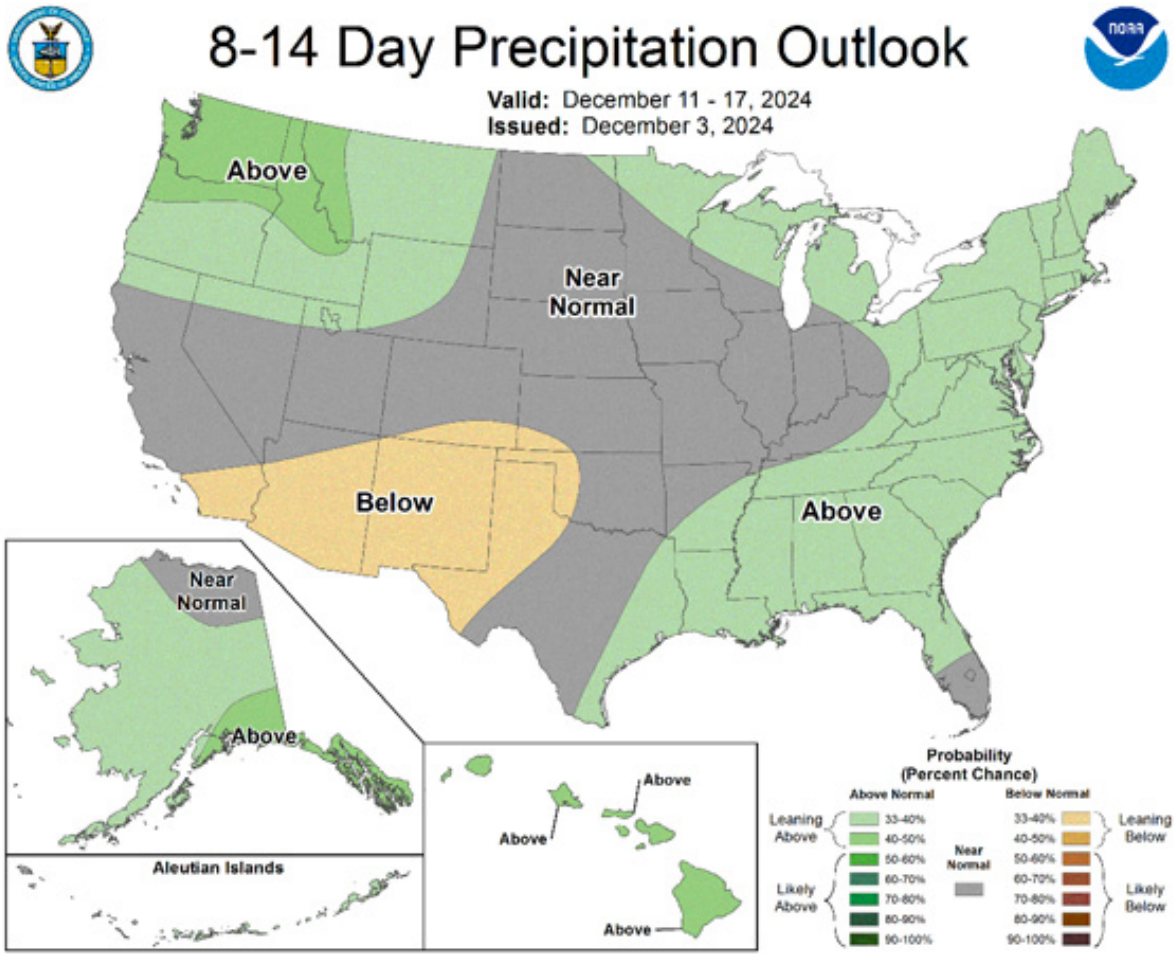
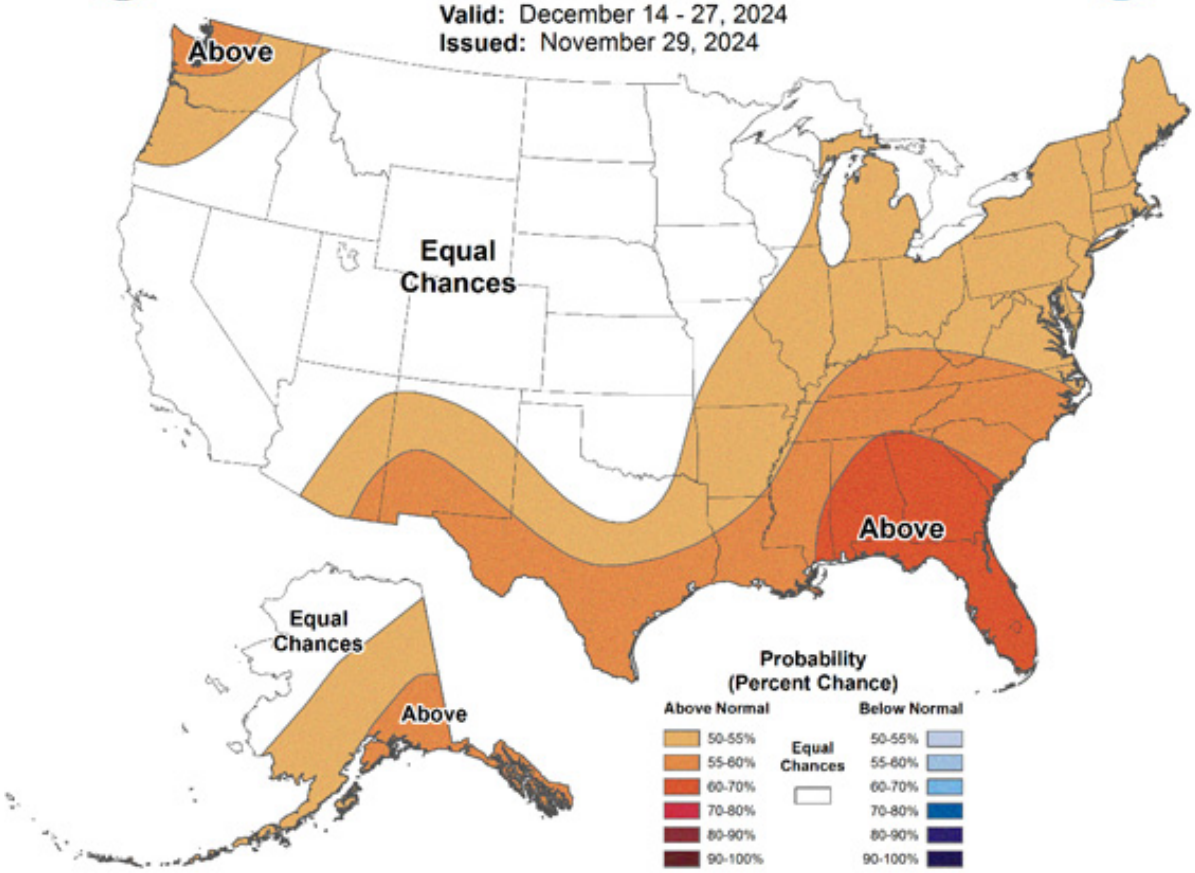


Figure 4.The National Weather Service Climate Prediction Center's (NWS-CPC) 8 to 14-day temperature (top) and precipitation (bottom) outlooks.

Looking even further ahead, the Climate Prediction Center's weeks 3 and 4 outlook, valid for the 14-day period from December 14-27, calls for equal chances of above and below temperatures statewide (Figure 5). The entire state also has equal chances of above and below precipitation.

Weeks 3-4 Temperature Outlook

Valid: December 14 - 27, 2024
Issued: November 29, 2024



Kansas State University Department of Agronomy
2004 Throckmorton Plant Sciences Center | Manhattan, KS 66506
www.agronomy.ksu.edu | www.facebook.com/KState.Agron | www.twitter.com/KStateAgron

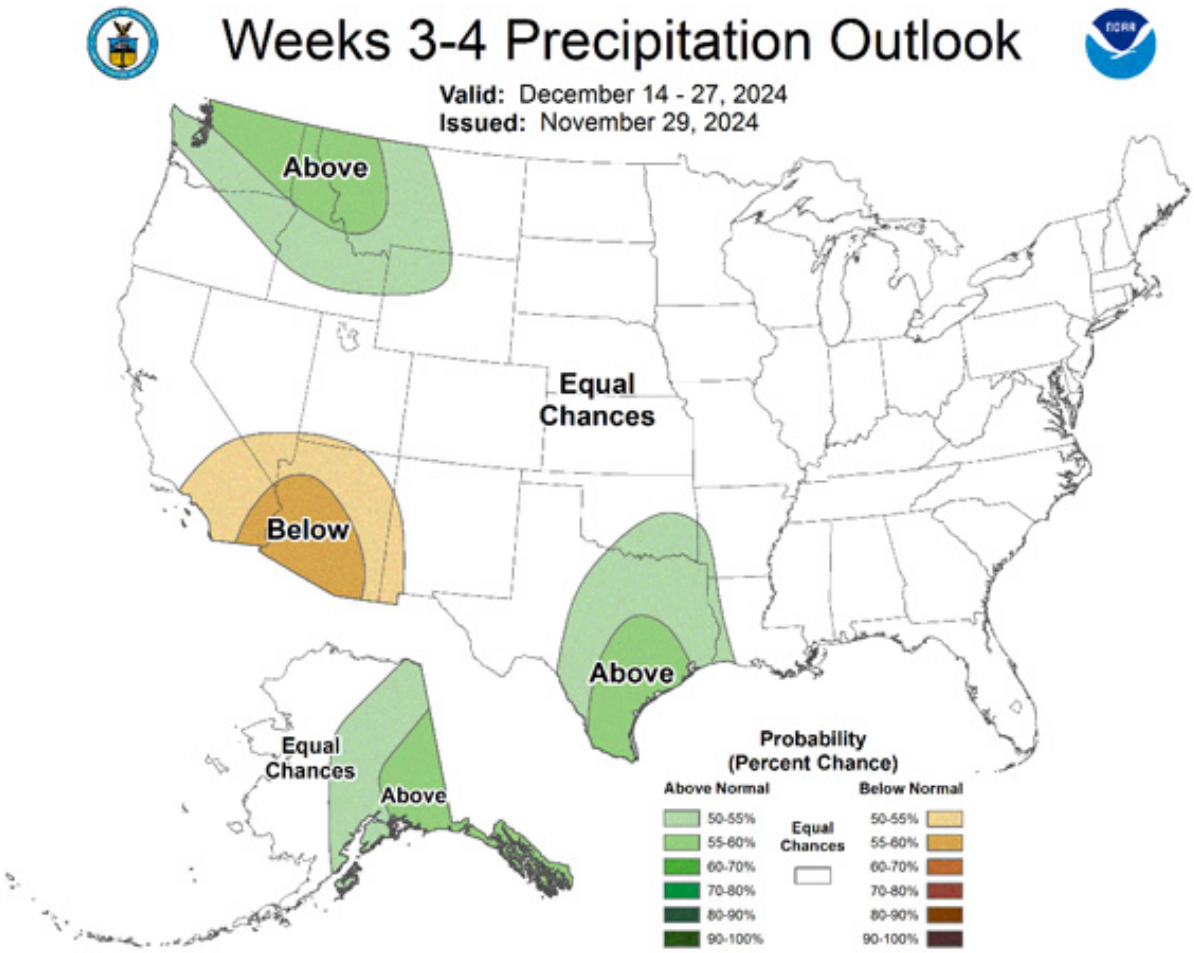


Figure 5.The Climate Prediction Center's weeks 3 and 4 outlooks for temperature (left) and precipitation (right).

This article is a shortened version of the weekly Kansas Drought Update and Climate Report**.** If you would like to receive the full report delivered to your email each week, please send a request to Matt at msittel@ksu.edu. He will add you to his distribution list.

Matthew Sittel, Assistant State Climatologist
msittel@ksu.edu

5. Save the Date for the 2025 Corn and Soybean Schools

For the second year, Kansas Corn and Kansas Soybean are partnering with K-State Research and Extension to offer the Kansas Corn and Soybean Crop Schools. These full-day winter learning sessions will feature informative presentations for both crops.

The Kansas Corn and Soybean Schools will cover several issues and opportunities for growers and are tailored to each region. Topics include weed control, insect resistance, fertility management, disease management, late-planting seasons, economics, and farm policy. Morning refreshments and a hot lunch are provided at these in-person schools. CCA and Commercial Pesticide Applicator credits have been applied for.

2025 Kansas Corn and Soybean Crop Schools

Each program will start at 9:00 AM (check-in at 8:30 AM) and conclude at 3:00 PM.

- **January 14 (Tuesday) – Highland**
  Geiger Ag
- **January 15 (Wednesday) – Parsons**
  K-State Southeast Extension and Research Center
- **January 16 (Thursday) – Hesston**
  AGCO
- **January 17 (Friday) – Oakley**
  Buffalo Bill Cultural Center

Stay tuned to the Agronomy eUpdate for the complete agendas to be released soon. Registration for all locations is open at https://kscorn.com/Schools/.

Luiz Felipe Almeida, Cropping Systems Graduate Student
luizfelipeaa@ksu.edu

Kathy Gehl, Extension Program Coordinator
kgehl@ksu.edu

Emily Koop, Kansas Corn
ekoop@ksgrains.com

Jancey Hall, Kansas Soybean
hall@kansassoybeans.org