Issue 942

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Extension Agronomy

eUpdate

02/09/2023

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.

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1. Pre-plant herbicide applications for kochia control

Now is the time to finalize plans for kochia control. Recent research suggests that kochia can begin emerging in early February with most kochia emerging by early April. Kochia seedlings emerge in dense populations that make adequate herbicide coverage difficult (Figure 1). In addition, glyphosate-resistant kochia is prevalent across western Kansas, making kochia control even more challenging. For these reasons, it is important to apply pre-emergence herbicides in late winter or early spring to control this weed before it emerges. This article will be the first in a series discussing specific options for various cropping scenarios.

Figure 1. Emerged kochia seedlings in a fallow field. Photo by Sarah Lancaster, K-State Research and Extension.

Herbicide program components to effectively manage kochia at germination

To successfully manage kochia, a herbicide program needs two components:

1. a very soluble and effective herbicide that can be incorporated with very little precipitation,

such as dicamba; and

2. a herbicide that has longer residual activity, which will require perhaps 0.75 inches or more precipitation for adequate incorporation, such as atrazine.

Precipitation events during late winter are often too small to activate longer residual herbicides, but dicamba may control kochia for 4 to 6 weeks until the longer residual herbicide is incorporated.

The best timing to apply herbicides for kochia control is generally January through the first week of March but **prior to kochia emergence**, which can vary depending on weather conditions. Later applications, for example, at the time of burndown, are more likely to occur after kochia emergence, which increases the risk of control failure (Figure 2). Fall-applied treatments can help ensure timely application, however, they are not likely to effectively control later flushes of kochia (Figure 3).

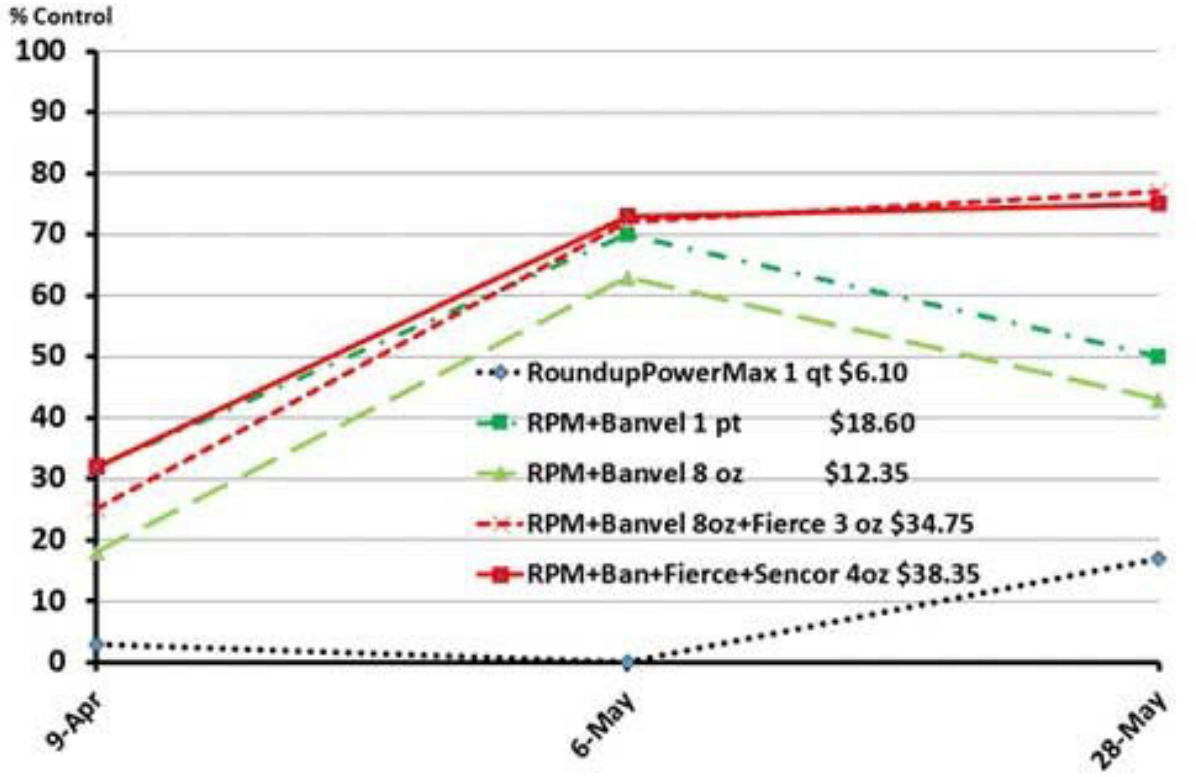

Figure 2. EPP/POST herbicides applied March 10, 2015 for kochia control at Tribune, KS. Kochia at cotyledon stage. Graph by C. Thompson, K-State Research and Extension.

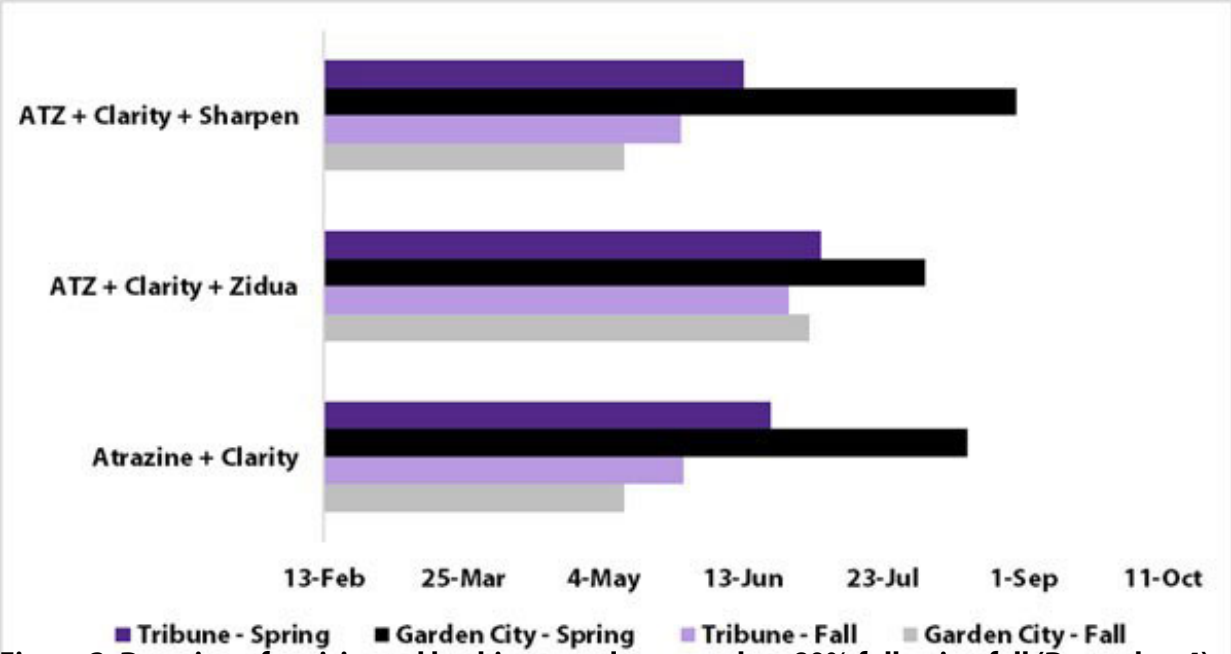

Figure 3. Duration of anticipated kochia control greater than 80% following fall (December 4) and spring (February 23) herbicide applications at two locations during 2015. Data from Vipan Kumar, K-State Research and Extension.

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2. Native grasses: Factors for successful stand establishment

Establishment is the most important phase to ensure system longevity when planning the long-term use of a seeded native grass stand. Native species are slow to establish and do not compete well with other plants (weeds). For this reason, native grass pastures can take up to four years to become fully established. Because they have been selected for better establishment and forage production characteristics, use known cultivars. Species and cultivar selection, site preparation, seed quality, seed source, and seeding date must be considered to ensure the successful establishment of a native grass pasture. Planning is the key to achieving a successful stand (Figure 1).

Figure 1. Well-established native prairie. Photo by Bruno Pedreira, K-State Research and Extension.

Before seeding

Before seeding, it is important to assess resources, including soil type, fertility, and current and past cropping uses, and how these resources affect the establishment of new native pasture. Producers must understand the potential challenges (existing weed problems, seed bank, and potential cropland herbicide carry-over), necessary changes in the farming operation, available equipment, seed sources, the intended use of the seeded area, costs and returns anticipated, and suitability for

wildlife habitat. This information contributes to the preparation for seeding.

Soils

The first step in knowing the potential yield for haying or grazing is to understand more about the soil. Soil texture can be identified by a lab test or by searching NRCS soil survey maps, available through the NRCS Web Soil Survey (websoilsurvey.nrcs.usda.gov).

Additionally, soil chemical properties needs to be determined. Previous cropping history, particularly herbicide use, is necessary to prevent seedling damage from herbicide carryover. Seedling damage can result from long-residual herbicides, particularly those used for grass control. Short-residual herbicides are less likely to injure seedlings. Herbicides with rotation restrictions for corn or grain sorghum are an indication of potential seedling damage. Check labels for plant-back intervals and expected suppression.

The species and cultivar selected should be adapted to the field's soil. If several different soils occur in a field, splitting the field should be considered, and changes in seedbed preparation may be required.

Seedbed preparation

A firm, weed-free seedbed is recommended. Seedbed preparation depends on climate, soils, and intended use. In most cases, clean-tilled seedbeds are preferred to establish pastures, especially where precipitation is greater than 32 inches per year. The seedbed is tilled as needed to destroy all weeds and leave a firm, friable seedbed. Weed control is a major requirement for a successful stand. The use of a cultipacker or similar equipment before and/or after seeding can greatly improve the stand of grass, especially during seasons of low rainfall. This approach stores soil moisture but requires precipitation after seeding to ensure a successful stand.

More information on no-till seedbeds can be found at bookstore.ksre.ksu.edu/pubs/MF2291.pdf .

Seeding method

Proper seeding depth is important to obtain adequate establishment of native grasses. Most seeds cannot emerge from deeper than 1/2 to 1 inch. Grass drills will handle the fluffy seed of most native grass species and ensure accurate placement, delivering the seed at a uniform rate.

Origin and quality of seed

Companies selling certified seed are required by law to inform buyers of seed quality. This allows buyers to determine the amount of seed to plant. Native grass seed quality is measured on a pure-live-seed (PLS) basis, which is calculated based on germination and purity. See details and examples at bookstore.ksre.ksu.edu/pubs/MF2291.pdf

Seeding rates

Seeding rates vary by soil, precipitation, and intended use of the seeding. For help on seeding rates and mixtures, consult the county Natural Resource Conservation Service Office, local K-State Research and Extension office, wildlife agencies, or seed dealers. An example mixture is given at

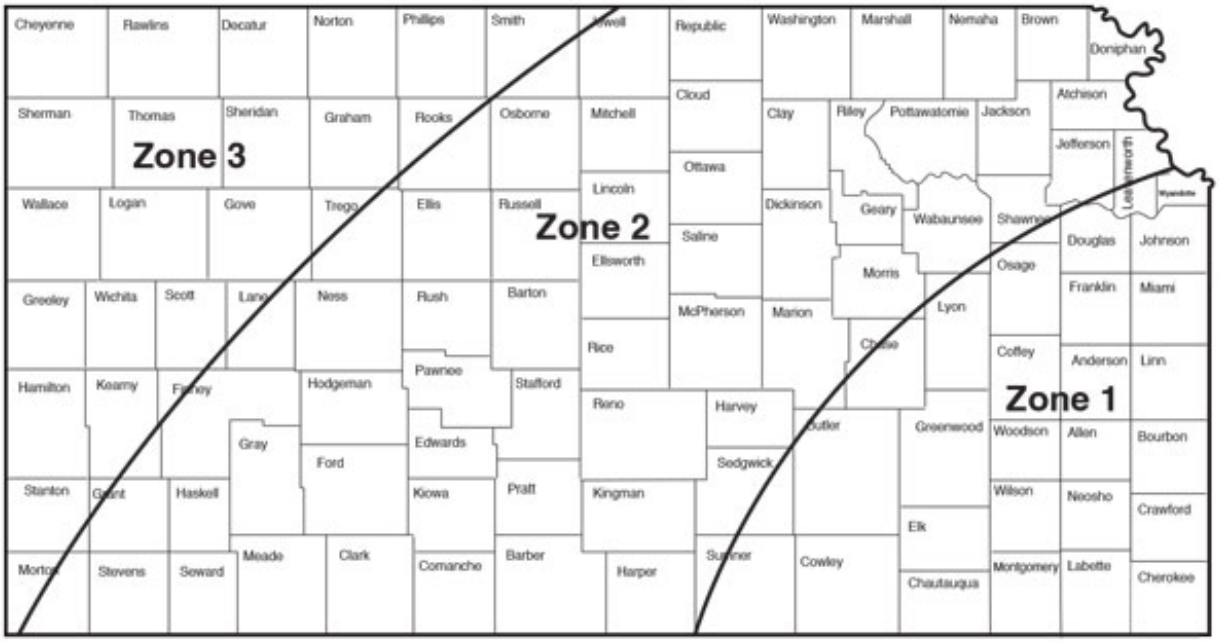
bookstore.ksre.ksu.edu/pubs/MF2291.pdf.

Seeding dates

Recommended planting dates are based on research, but they may be adjusted for your region based on local knowledge. For warm-season grasses, the optimum seeding date is about 2 weeks before the average last frost date and at least 6 weeks before hot, dry summer weather (Figure 2). If it is not possible, 1 month before to 3 weeks after the average last frost date may be an acceptable period for seeding. This allows the seedling 6 to 8 weeks to establish the permanent root system before hot, dry summer weather.

Fertilization

In drier climates of Kansas, fertilizer and lime are not normally required for native species at seeding. Lime is suggested if the pH is below 6.0. Taking soil samples contributes to successful seeding. Consult NRCS or local K-State Research and Extension personnel for local needs. Fertilizing may stimulate weed competition during the establishment phase.



Zone	Optimum	Acceptable
1	March 25–April 10	Feb. 15–May 1
2	April 1–April 20	March 1–May 15
3	April 10–April 30	March 1–May 15

Figure 2. Optimum and acceptable seeding dates for native grass species.

This article originated from the recently released KSRE publication *Establishing Native Grasses (MF2291)* and can be viewed online at bookstore.ksre.ksu.edu/pubs/MF2291.pdf.

More information on factors to consider during and after stand establishment can be found in the aforementioned publication and in a companion article to be published in the next eUpdate.

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3. A comparison of three historical mid-February cold outbreaks in Kansas

On average, January is the coldest month of the year in Kansas, and December is the second coldest. Temperatures begin to warm in February; normal temperatures rise by about 7 degrees F from the first to the last day of the month. Given this, it might be surprising to learn that some of the all-time coldest temperatures at Kansas observing sites were not set in December or January, but in mid-February. It was just two years ago, on February 15 and 16, 2021, when a cold air outbreak brought the coldest temperatures in over three decades to parts of Kansas. But more than a century before, there were two days in particular that still stand out as being amongst the coldest days in Kansas weather history.

Record-setting cold in February 1899, 1905, and 2021

The year was 1899. William McKinley was in the Oval Office as the 25th president. There were only 45 US states; our southern neighbor, Oklahoma, was still 8 years away from admission to the Union. The winter of 1898-99 was the 5th coldest on record in Kansas. January was the mildest of the three winter months, but an extended cold spell arrived in late January, accompanied by multiple rounds of wintry precipitation that brought a few inches of snow to the state. An Arctic high pressure slid down the east side of the Rockies on February 11, and by the morning of the 12th was centered on the central US. This was referred to as a "violent norther" by Alfred Henry, the US Weather Bureau's Chief of Division and Records and Meteorological Data, in the February 1899 issue of the Monthly Weather Review. Barometric pressures rose to over 31" (1050 mb) across Kansas (Figure. 1), levels rarely observed in the United States. When a very strong high parks itself over snow cover, temperatures plummet, and that's exactly what happened (Table 1). Temperatures tumbled to -20°F or colder across the entire state, as cold as -34°F in Frankfort, in Marshall County. Manhattan fell to -32°F, which to this day is still the all-time record low. Other all-time record lows still standing from that day include -32°F at Garden City, -26°F at Dodge City and -22°F at Wichita. Kansas was not the only state in the deepest of deep freezes in 1899. The coldest temperature ever recorded in the state of Florida was recorded the next morning, on February 13, 1899: -2°F in Tallahassee. It snowed as far south as New Orleans, LA and Tampa, FL, as a blizzard swept up the east coast. February 1899 was the coldest February on record in Kansas, with an average monthly temperature of 19.0°F. The normal average temperature for the month of February (based on the 1991-2020 normals) in Kansas is 35.0°F.

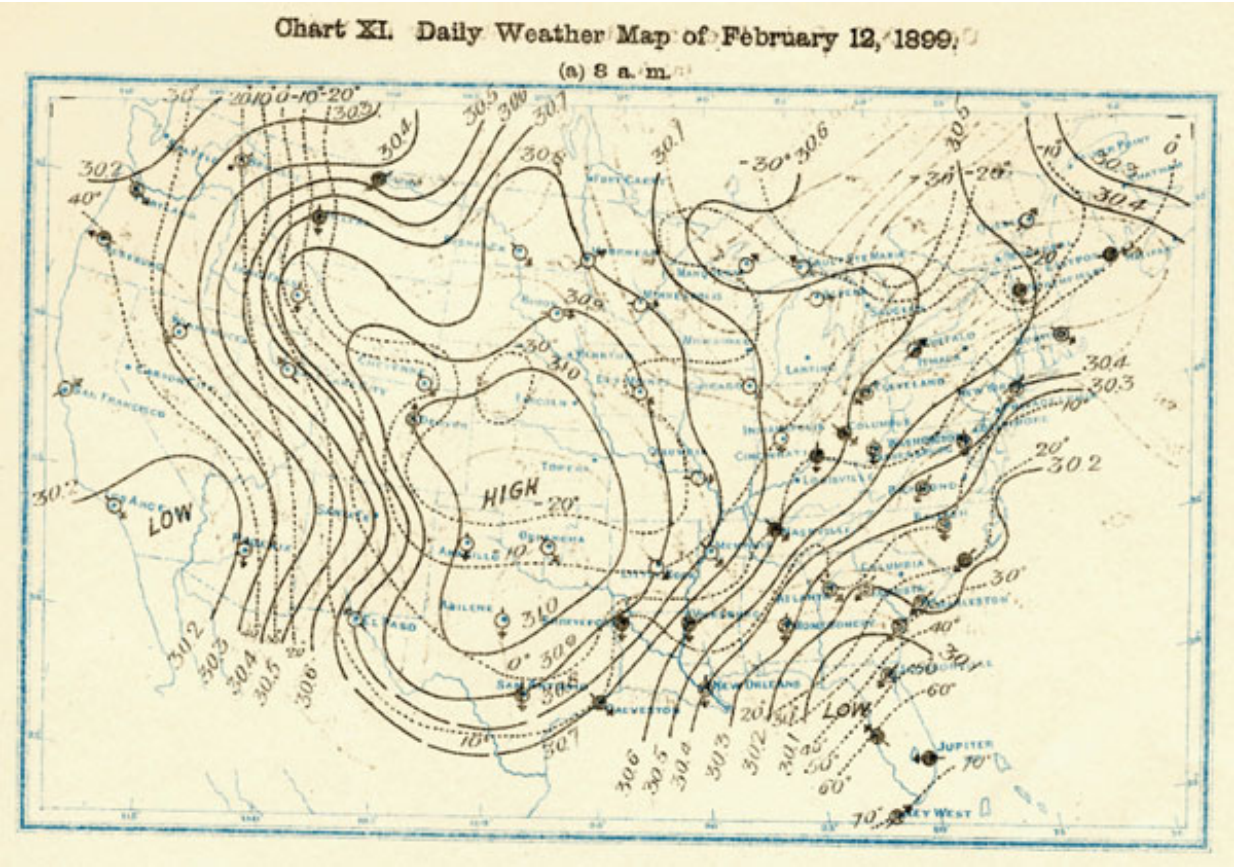

Figure 1. Daily weather map from 8 AM on February 12, 1899. Source: Monthly Weather Review, American Meteorological Society.

Six years and one day later, Kansas was once again in the grips of an Arctic air mass on the morning of February 13, 1905. An area of high pressure took a similar path to the 1899 event, but was not nearly as strong, with highest pressures around 30.50" (1033 mb). There was deeper snow cover in place than in 1899, with many areas receiving between 6 to 18 inches of snow during the first part of February. Kansas' coldest temperature on record was observed on this date: -40°F in Lebanon, in Smith County. All-time records set that morning that are still standing include -28°F at Newton, -24°F at Fort Scott, and -23°F at Independence. February 1905 was the second coldest February on record in Kansas; the average monthly temperature was 20.5°F. For comparison, February 2021 was only the 7th coldest February on record (averaging 24.0°F). There are a few sites that set their coldest all-time records during the 2021 event, but all of those locations have much shorter periods of records that don't include 1899 and 1905.

Long-term weather records serve many purposes

If we compare the three February Arctic outbreaks from 1899, 1905 and 2021, which one was the coldest? The challenge with undertaking such a comparison is finding sites with continuous weather observations that span all three of those years. Fortunately, there are 18 sites in Kansas that have over 120 continuous years of weather records (Table 2). Averaging the minimum temperatures across all locations for each of the three events, 1899 has the coldest average (-26°F), compared to -22°F in 1905 and -18°F in 2021.

Another benefit to having long-term climate records is it helps us understand the rarity of such events. Temperatures of -20°F or colder in February have happened only a few other times outside of the three years spotlighted here. In Colby, there are seven other years (1933, 1936, 1951, 1960, 1981, 1982, and 1996) that featured at least one low of -20°F or colder in February. In Topeka, there are only three other occurrences (1971, 1979, and 1982). But in Manhattan, it hasn't been -20°F in February since 1905.

The latest in the year that -20°F has been observed in Kansas is March 11, 1948. Eleven locations had lows of -20°F or colder that day, the coldest of which was -25°F in Healy, in Lane County. The last time it was -20°F in March was almost 45 years ago, when the mercury fell to -21°F in Holton on March 4, 1978.

Table 1. Minimum temperatures recorded at select Kansas locations on Feb. 12, 1899 and Feb. 13, 1905.

February 12, 1899 **Minimum Temperatures (°F)**				**February 13, 1905** **Minimum Temperatures (°F)**		
Location	County	Low		Location	County	Low
Frankfort	Marshall	-34°		Lebanon	Smith	-40°
Campbell	Washington	-33°		Clay Center	Clay	-35°
Manhattan	Riley	-32°		Frankfort	Marshall	-35°
Garden City	Finney	-32°		Salina	Saline	-31°
Lebanon	Smith	-32°		Cottonwood Falls	Chase	-30°
Colby	Thomas	-31°		El Dorado	Butler	-28°
Hoxie	Sheridan	-30°		Newton	Harvey	-28°
Fanning	Doniphan	-30°		Burlington	Coffey	-27°
Olathe	Johnson	-29°		Manhattan	Riley	-26°
Yates Center	Woodson	-28°		Hays	Ellis	-26°

Table 2. Minimum temperatures at selected Kansas stations during cold air outbreaks in 1899, 1905, and 2021. The all-time record lows are also listed for each site.

Location	**County**	**All-Time Record Low (°F)**	**All-Time Record Low Date**	**Feb 12, 1899 Low**	**Feb 13, 1905 Low**	**Feb 15-16, 2021 Low**
Colby	Thomas	-31°	Dec 22 1989	-31°	-20°	-26°
Concordia	Cloud	-33°	Jan 08 1886	-25°	-21°	-22°
Dodge City	Ford	-26°	Feb 12 1899	-26°	-20°	-14°
Emporia	Lyon	-24°	Jan 04 1947	-22°	-23°	-17°
Fort Scott	Bourbon	-24°	Feb 13 1905	-23°	-24°	-15°
Garden City	Finney	-32°	Feb 12 1899	-32°	-19°	-20°
Horton	Brown	-33°	Jan 19 1892	-25°	-25°	-19°
Independence	Montgomery	-23°	Feb 13 1905	-21°	-23°	-13°

Lawrence	Douglas	-25°	Feb 12 1899	-25°	-20°	-22°
Manhattan	Riley	-32°	Feb 12 1899	-32°	-26°	-18°
Minneapolis	Ottawa	-29°	Feb 12 1899	-29°	-28°	-16°
Newton	Harvey	-28°	Feb 13 1905	-25°	-28°	-16°
Ottawa	Franklin	-28°	Feb 13 1905	-26°	-28°	-18°
Pratt	Pratt	-25°	Feb 12 1899	-25°	-20°	-17°
Sedan	Chautauqua	-27°	Jan 30 1949	-24°	-19°	-18°
Topeka	Shawnee	-25°	Feb 12 1899	-25°	-22°	-21°
Wichita	Sedgwick	-22°	Feb 12 1899	-22°	-18°	-17°
Yates Center	Woodson	-28°	Feb 12 1899	-28°	-11°	-13°
Average minimum across all sites				-26°	-22°	-18°

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4. Crop Talk webinar series will continue through the end of February

The popular K-State Crop Talk webinar series kicked off on February 7. This year, Crop Talk will be focused on agronomic topics for producers across the state of Kansas. Topics include spring annual forages, climate-smart agriculture, alternative weed control research, and the latest on corn tiller research . Continuing education credits have been applied for and 1 credit will be available for each session.

Each webinar will begin at 12:00 pm (CST) and last until 1:00 pm. Sessions are offered on each Tuesday in February.

Upon registration, participants will receive an email with instructions to attend via Zoom or YouTube. These webinars are open to all and there is no cost. Visit the K-State Northwest Research and Extension Center's website to register: https://www.northwest.k-state.edu/events/crop-talk-series/index.html.

Please contact your local KSRE extension office or the Northwest Research and Extension Center at 785-462-6281.

The remaining webinars, with dates, topics, and speakers, is detailed below.

February 14 - **Climate Smart Agriculture, What's all the Buzz**
Peter Tomlinson, K-State Environmental Quality Specialist

February 21 – **Alternative Weed Control Research from Kansas**
Sarah Lancaster, K-State Weed Science Specialist

February 28 – **Corn Tillers: The Good, the Bad, and the Ugly**
Rachel Veenstra, K-State Crop Science Agronomist

K-STATE Research and Extension

CropTalk Webinar Series

February 7 **Spring Annual Forages To Fill the Gap in Cattle Feed**
John Holman, K-State Agronomist at Garden City

February 14 **Climate Smart Agriculture, What's All the Buzz?**
Peter Tomlinson, K-State Environmental Quality Agronomist

February 21 **Alternative Weed Control Research from Kansas**
Sarah Lancaster, K-State Extension Weed Specialist

February 28 **Corn Tillers: The Good, the Bad, and the Ugly.**
Rachel Veenstra, K-State Crop Science Agronomist

Held from 12:00 – 1:00 pm CT

Register to attend at www.northwest.ksu.edu/events

Webinars will be broadcast via zoom and YouTube
Links for joining will be sent after registration

Certified Crop Advisor (CCA) Credits have been applied for 1 per session

If you have questions, please contact your local Extension agent or the K-State Northwest Research and Extension Center at 785-462-6281.

5. K-State Soybean School scheduled for February 22 in Salina

K-State Research and Extension will be offering a one-day Soybean School on February 22 at Great Plains Manufacturing, 1525 E. North Street in Salina, KS. The school will start at 8:30 am with registration and presentations will begin at 9:00 am. The presentations will conclude at 2:30 pm with an optional tour of Great Plains Manufacturing immediately following the last presenter. A noon lunch will be provided thanks to sponsorship by the Kansas Soybean Commission.

This event will provide in-depth training targeted for soybean producers and key-stakeholders. Some topics that will be covered include crop production practices, soybean breeding update, Kansas Mesonet tools, insect and disease management, and market outlook.

There is no cost to attend this school. In addition, CCA credits have been applied for. For those interested in the Great Plains Manufacturing tour, please dress for the weather and wear closed-toed shoes.

Please register online at https://bit.ly/soyschool. You can also register by calling one of these contacts: Kansas Soybean at 877-577-6923; Jay Wisbey at 785-309-5850; or K-State Extension Agronomy at 785-532-0400

K-State Research and Extension is committed to providing equal opportunity for participation in all programs, services and activities. Program information may be available in languages other than English. Reasonable accommodations for persons with disabilities, including alternative means for communication (e.g., Braille, large print, audiotape, and American Sign Language) may be requested by contacting the event contact Jay Wisbey two weeks prior to the start of the event or February 8, 2023, at (785)309-5850 or jwisbey@ksu.edu. Requests received after this date will be honored when it is feasible to do so. Language access services, such as interpretation or translation of vital information will be provided free of charge to limited English-proficient individuals upon request.

Kansas State University Agricultural Experiment Station and Cooperative Extension Service.

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