



Extension Agronomy

eUpdate

02/28/2020

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. Marestalk in soybeans: Strategies for the best control

Controlling marestalk in soybeans continues to be a big challenge for Kansas no-till producers. Application timing and weed size are critical factors for successful control of this weed that germinates in the fall or early spring. Research has shown that up to 80% of marestalk can die over the winter as a result of cold temperatures and/or lack of adequate moisture. In addition, a well-established cover crop in the fall can further reduce marestalk establishment and survival and often is quite effective for marestalk control. However, the marestalk that do survive are often robust and can be difficult to control with herbicides, especially later in the spring. Herbicide options are also limited by widespread resistance to glyphosate and/or ALS-inhibiting (group 2) herbicides in marestalk.



Figure 1. Glyphosate-resistant marestalk in soybeans. Photo by Dallas Peterson, K-State Research and Extension.

Early spring options

In the early spring, using a growth regulator herbicide such as 2,4-D and/or dicamba is an inexpensive and effective option to control rosette marestalk (Figure 2, left). Dicamba has provided better marestalk control than 2,4-D and will also provide some residual control, especially at higher use rates. Recent observations suggest marestalk in Kansas will bolt (Figure 2, right) in April throughout most of the state, so timing control before the end of March is recommended. Application of dicamba and 2,4-D in March also generally allows adequate time ahead of planting soybeans to meet required pre-plant intervals.

Using herbicides with longer residual helps control weeds that germinate between treatment and soybean planting. Products that include Canopy EX, Autumn Super, Classic, FirstRate, Sharpen, metribuzin, or Valor can help provide residual control against several broadleaf species, including marestail. However, it is very important to consult and follow the herbicide label guidelines for the required pre-plant intervals prior to planting soybeans.



Figure 2. Marestail in the rosette growth stage (left photo) versus bolted (right photo). Photos by Dallas Peterson, K-State Research and Extension.

Pre-plant options

As soybean planting nears, existing marestail plants can become difficult to control because plants will have bolted and be considerably larger. Herbicides to apply as a burndown prior to planting include tank mixes of glyphosate with FirstRate, Classic, Sharpen, Optill, or 2,4-D. Be very careful to follow label directions when using 2,4-D prior to soybean planting. The plant-back restriction ahead of soybean can range from 7-30 days depending on rate and formulation. Sharpen generally provides good marestail control and can be applied any time before soybean emergence. However, it is still most effective if applied before marestail starts to bolt, in a tank-mix with other herbicides, when used with methylated seed oil, and at spray volumes of 15 gallons per acre or more. Elevore is a newer herbicide that has provided similar marestail control to dicamba, but needs to be applied at least 14 days prior to planting.

Pre-plant restrictions for dicamba products such as Clarity, Banvel, and others range from 14 to 30 days depending on product, application rate, rainfall amounts, and geography. However, with the introduction of Roundup Ready 2 Xtend soybeans, the new dicamba products Xtendimax, FeXapan, and Engenia have no pre-plant interval restrictions applied ahead of Xtend soybeans and should be some of the more effective treatments for marestail control in that scenario. Xtendimax, FeXapan, and Engenia are still most effective on marestail prior to bolting.

One additional herbicide to consider as a rescue burndown application to control bolting marestail prior to soybean planting is glufosinate (Liberty and others). Although, it would be better to control marestail at an earlier stage of growth, glufosinate has been one of the most effective herbicides to control bolting marestail. Glufosinate also has broad spectrum non-selective activity on other broadleaf and grass species if treated at a young growth stage. Glufosinate is primarily a contact

herbicide, so a spray volume of 15 gallons per acre or greater generally provides the most consistent weed control. Glufosinate tends to work best under higher humidity and warm, sunny conditions at application.

Post-emergence options

Controlling marestail in the growing soybean crop can be the biggest challenge for producers, especially in soybeans without herbicide resistant traits or in Roundup Ready soybeans (if marestail is glyphosate resistant). The most successful treatments for large marestail in Roundup Ready soybeans have been tank-mixes of glyphosate + FirstRate, glyphosate + Classic, or glyphosate +Synchrony. However, some marestail may also be ALS-resistant, and thus not controlled by those herbicides either.

If Roundup Ready 2 Xtend soybeans are planted, Xtendimax, FeXapan, and Engenia should be some of the most effective herbicides for post-emergence control of marestail in soybeans. Remember that Xtendimax, FeXapan, and Engenia can only be applied to Xtend soybeans.

Another post-emergence option to control marestail in soybeans is to plant Liberty Link soybeans and use glufosinate herbicide. It is important to remember that glufosinate can only be applied post-emergence on Liberty Link soybeans.

For more detailed information, see the “2020 Chemical Weed Control for Field Crops, Pastures, and Noncropland” guide available online at <https://www.bookstore.ksre.ksu.edu/pubs/SRP1155.pdf> or check with your local K-State Research and Extension office for a paper copy.

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2. Optimal time to remove cattle from wheat pastures: First hollow stem

The unique climate characteristics of the southern Great Plains allow producers to use wheat as a forage and grain crop (dual-purpose), potentially increasing overall profitability compared to grain-only or forage-only systems. Grazing termination is an important factor in determining wheat's recovery potential and ability to produce grain following grazing. First hollow stem (FHS) is the optimal time to remove cattle from wheat pastures to protect grain yield potential.

What is the first hollow stem (FHS) stage of wheat development?

Before the wheat leaf sheaths become erect after spring green-up, the developing growing point, which is below the soil surface, will soon begin to form a tiny head. Although the head is quite small at this point, it has already established some important yield components. At this stage, the maximum potential number of spikelets is determined. Sufficient nitrogen (N) should already be available in the root zone at this growth stage to maximize the potential number of seeds per head.

Once the embryo head has developed, the first internode will begin to elongate, pushing the head up through the leaf sheaths. This first internode will be hollow. This will be visible before you can actually feel the first node (joint, located just above the first internode).

FHS is the point at which a 1.5 cm (about half-inch) length of hollow stem can first be identified below the developing head (Figure 1). This length is roughly equivalent to the diameter of a dime, which makes its identification in the field easier. FHS occurs when the developing head is still below the soil surface. This means that producers have to dig plants out of the ground to measure it.

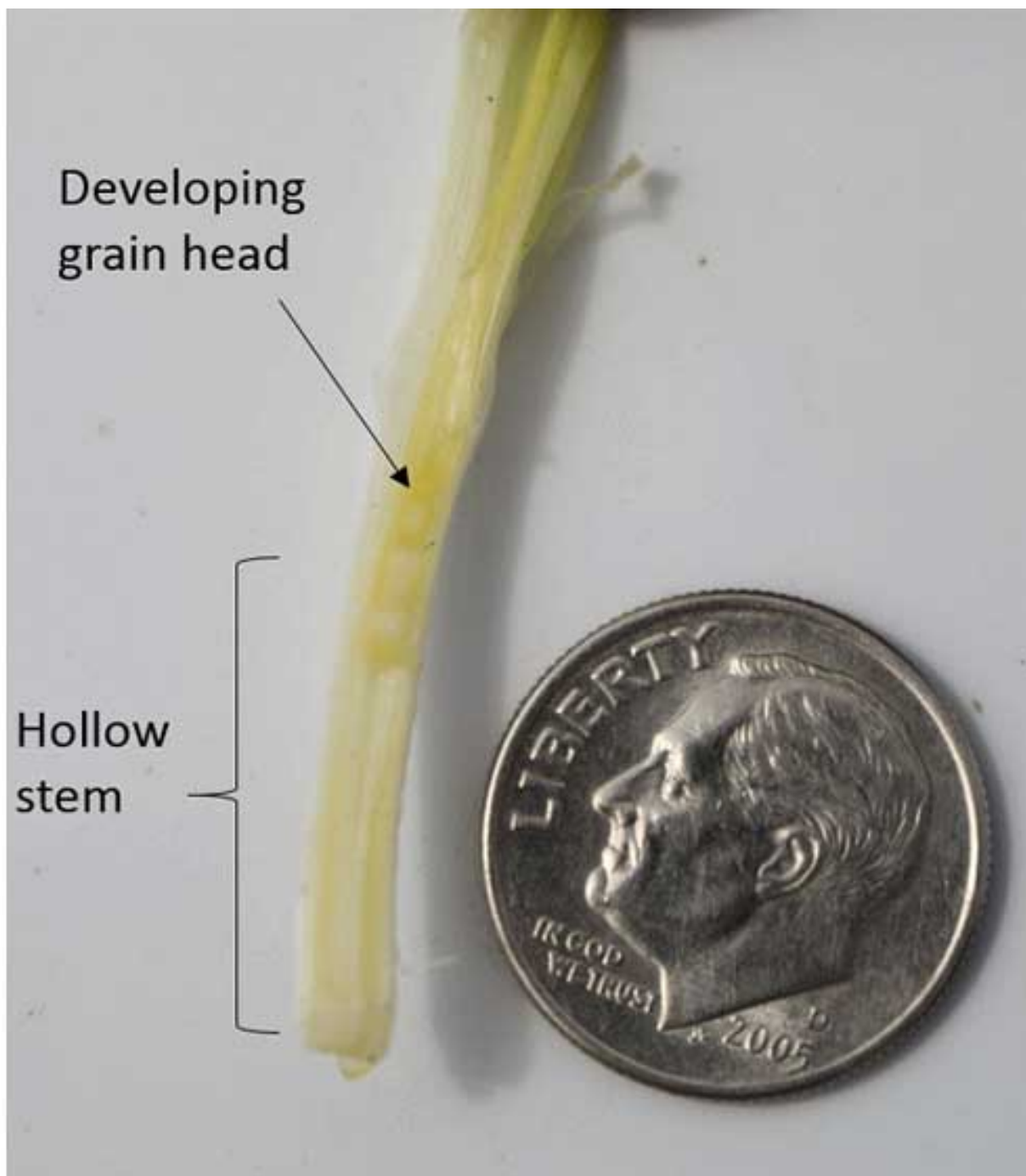


Figure 1. Wheat plant reaching the first hollow stem stage of growth, characterized by approximately 1.5 cm (or roughly the diameter of a dime) of hollow stem underneath the developing grain head. Photo by Romulo Lollato, K-State Research and Extension.

Assessing for first hollow stem

To look for FHS, start by digging up some plants from fields or areas that have not been grazed, such as field corners or just outside the fence. Date of FHS is variety- and field-specific, so it is important to sample each individual field. Select the largest tillers to examine, and slice the stem open from the crown area up. Look for the developing head, which will be very small. Next, see if you can find any

hollow stem between the developing head and the crown area. If there is any separation between the growing point and crown, the hollow stem is elongating. If that separation is 1.5 cm, the wheat plant is at FHS. FHS occurs between a few days to a week or more prior to jointing, depending on temperatures.

Yield losses from grazing past first hollow stem

If the wheat has reached FHS, cattle should be removed to prevent grain yield loss. Yield losses from grazing after FHS can range from 1 to 5% per day, depending on grazing intensity and the weather following cattle removal (Figure 2). If cattle removal is followed by cool, moist weather, yield losses will often average about 1% per day grazed after FHS; if weather is hot, dry, and harsh, yield losses of 5% per day or more can be expected. In fact, as much as 1.25 bushels per day yield decrease can occur according to data from Oklahoma State University. It is easy for producers to be late by a few days in removing livestock as they wait for obvious nodes and hollow stems to appear, and even the first few days can be significant.

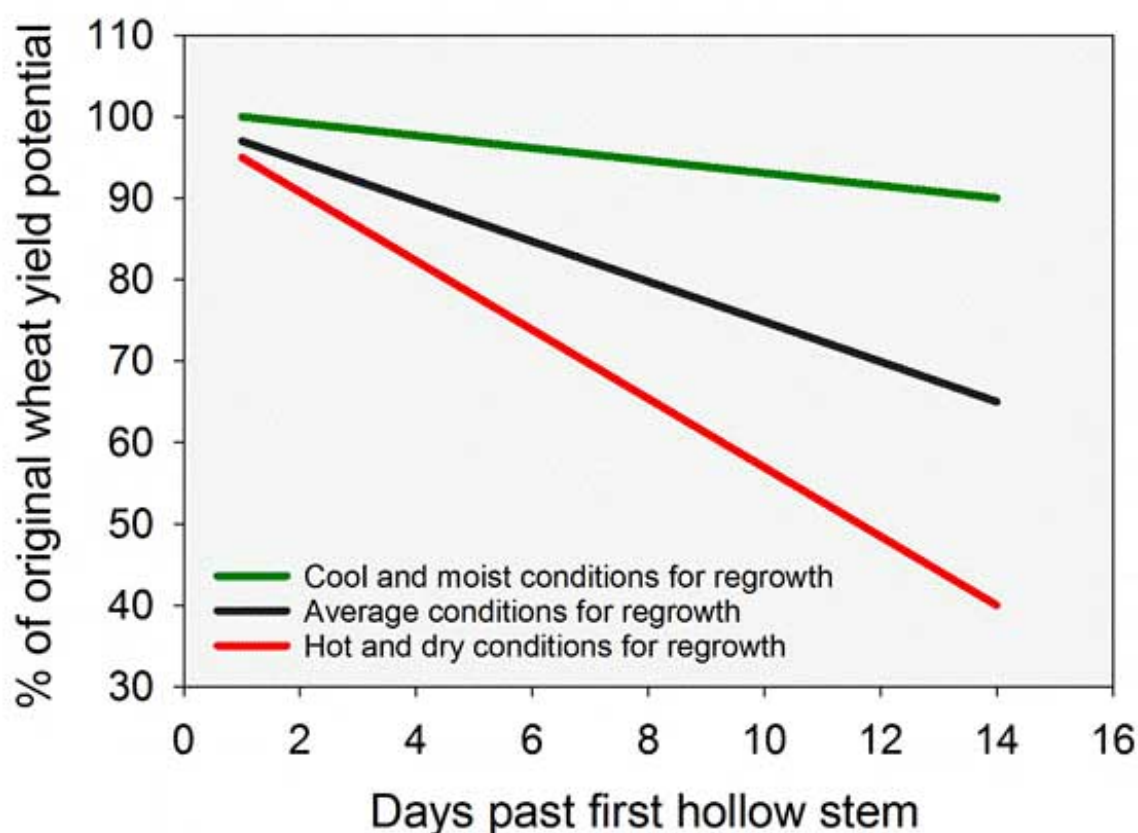


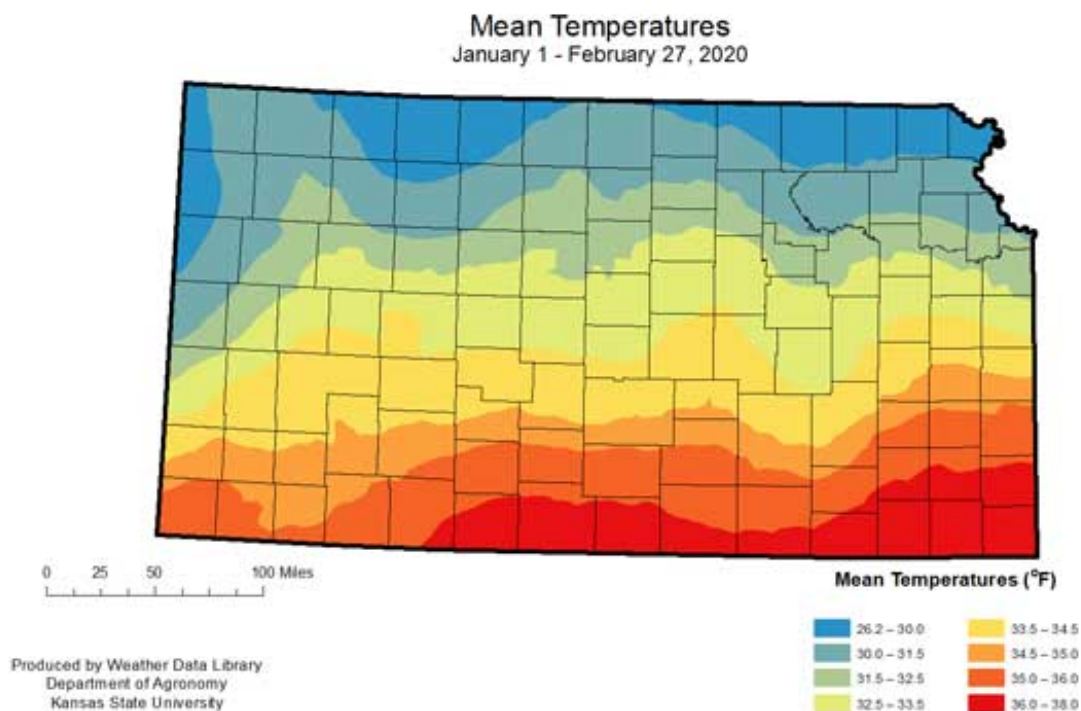
Figure 2. Percent of original wheat yield potential as affected by days of grazing past first hollow stem and weather conditions following grazing termination. Average yield losses by grazing for 14 days past first hollow stem ranged from 10% under favorable conditions to 60% under non-favorable conditions. Research conducted by Oklahoma State University (OSU) and published as K-State publication MF3375 and OSU publication PSS-2178.

Two things are observed when wheat is grazed too long: 1) fewer heads per acre because the primary tiller has been removed, and 2) smaller and lighter heads than expected because leaf area

has been removed. As cattle continue grazing, the wheat plant is stressed and begins to lose some of the tillers that would produce grain. A little later, if there is not enough photosynthates, the plant begins aborting the lower spikelets in the head or some of the florets on each head. Finally, if there is not enough photosynthates during grain filling, the seed size will be reduced and if the stress is severe enough, some seed will abort.

Air and soil temperatures during 2020

Crop development is mostly a function of available water, nutrients, and temperature. While nutrient availability is field specific and water has been abundant since the fall for the majority of the wheat growing region of the state, temperatures will be the focus of this discussion. Average temperatures across most of Kansas were warmer-than-normal for the period between January 1 and February 27 (Figure 3), which will likely speed the progression toward first hollow stem compared to most years. As temperatures increase and wheat begins growing more rapidly in the spring, producers should start thinking about when to pull cattle off pasture to protect grain yields.



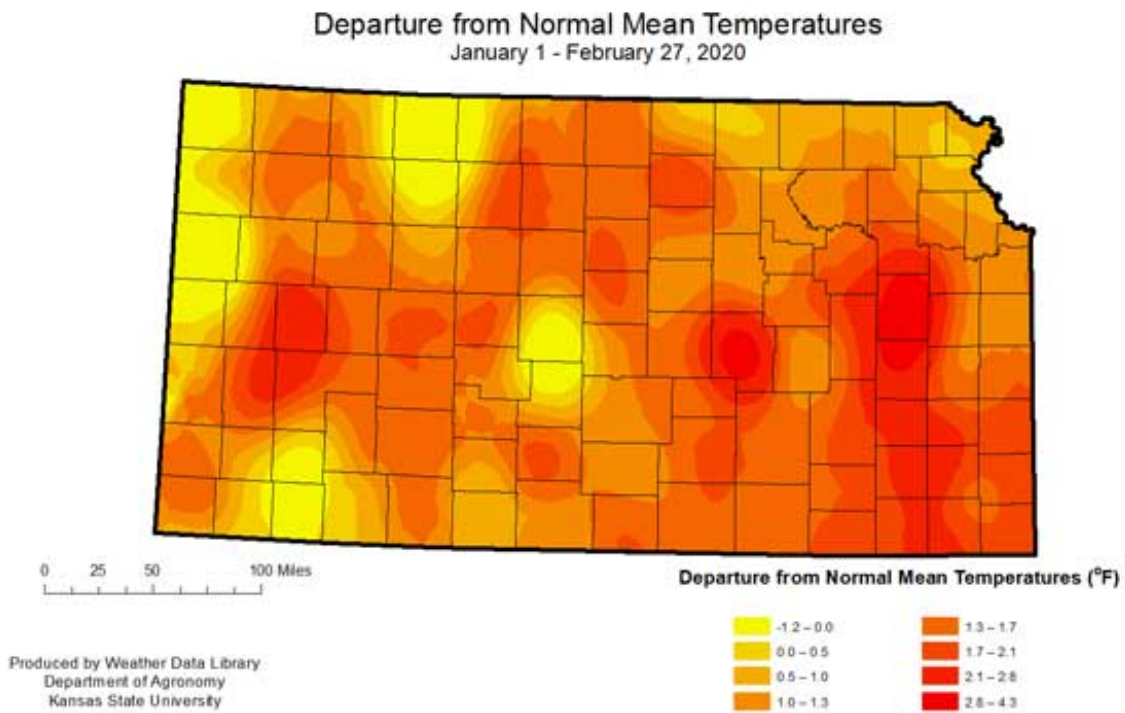


Figure 3. Mean temperatures during the January 1 to February 27 period (upper map) and departure from long-term average temperatures the same period (lower map). For the lower map, darker orange and red colors indicate temperatures were above average, while yellow indicates below average temperatures. Graph generated by the K-State Weather Library.

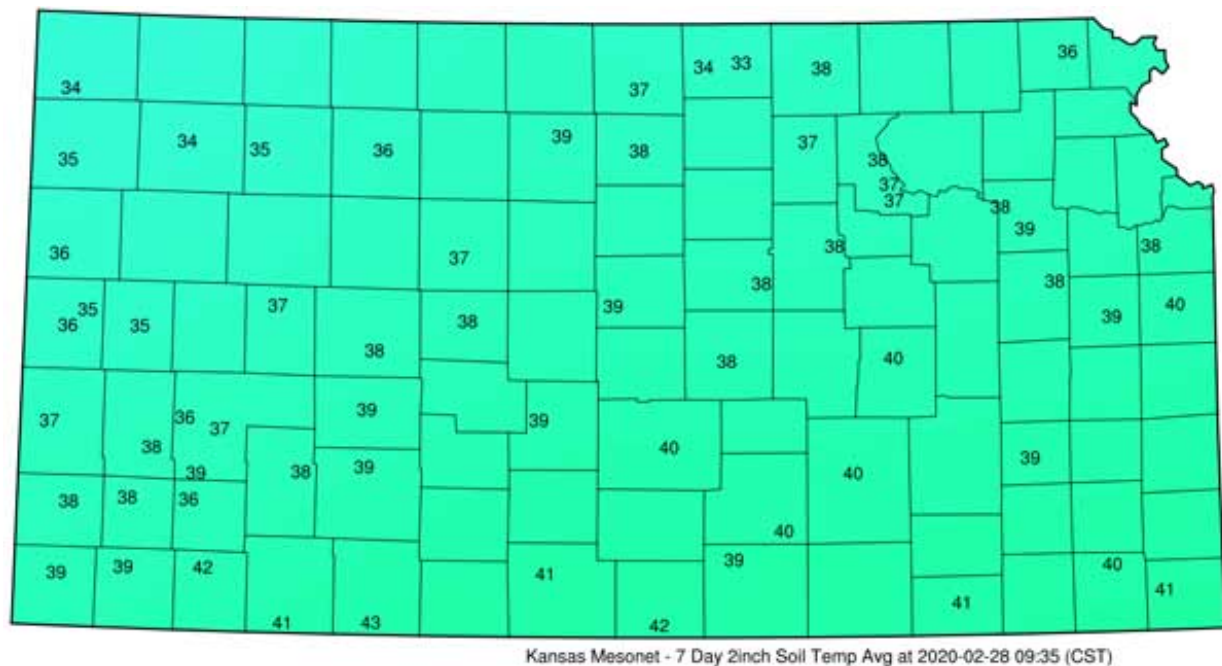


Figure 4. Weekly average soil temperatures at the 2-inch depth during the February 21-27, 2020, period. Graph generated by the K-State Weather Library.

Soil temperatures will be slow to warm as much of the state has very saturated soils. As the soils thaw, muddy conditions may also influence the decision to remove cattle.

For more information on managing wheat in dual-purpose systems, check the K-State Research and Extension publication MF3375 [PSS-2178 from Oklahoma State Extension], "Dual-purpose wheat: Management for forage and grain production" at <https://www.bookstore.ksre.k-state.edu/pubs/MF3375.pdf>.

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3. First hollow stem update: February 28, 2020

Cattle should be removed from wheat pastures when the crop reaches first hollow stem (FHS). Grazing past this stage can severely affect wheat yields (for a full explanation, please refer to accompanying eUpdate article “Optimal time to remove cattle from wheat pastures: First hollow stem”).

First hollow stem update

In order to screen for FHS during this important time in the growing season, the K-State Extension Wheat and Forages crew measures FHS on a weekly basis in 36 different commonly grown wheat varieties in Kansas. The varieties are in a September-sown replicated trial at the South Central Experiment Field near Hutchinson.

Ten stems are split open per variety per replication (Figure 1), for a total of 40 stems monitored per variety. The average length of hollow stem is reported for each variety in Table 1. As of February 25, 2020, none of the varieties had yet reached first hollow stem but all varieties had started to show minor stem elongation.



Figure 1. Ten main wheat stems were split open per replication per variety to estimate first hollow stem for this report, for a total of 40 stems split per variety. Photo by Romulo Lollato, K-State Research and Extension.

Table 1. Length of hollow stem measured February 25, 2020 for 28 wheat varieties sown mid-September 2019 at the South Central Experiment Field near Hutchinson. The critical FHS length is 1.5 cm (about a half-inch or the diameter of a dime).

Variety	Hollow stem length (cm)
	2/25/2020
09BC308-14-16	0.07
AM Cartwright	0.23
AM Eastwood	0.11
Bentley	0.11
Bob Dole	0.06
Doublestop CL Plus	0.06
Gallagher	0.14
Green Hammer	0.05
Guardian	0.04
KS Dallas	0.11
KS Silverado	0.12
KS Western Star	0.11
LCS Valiant	0.07
Long Branch	0.28
Paradise	0.08
Rock Star	0.08
Showdown	0.12
Smith's Gold	0.11
SY Achieve CL2	0.12
SY Wolverine	0.14
TAM205	0.08
WB4269	0.10
WB4303	0.09
WB4595	0.21
WB4699	0.01
WB4792	0.11
Whistler	0.06
Zenda	0.08

While none of the varieties had yet reached first hollow stem as of February 25, there were statistical differences among the varieties evaluated and these differences tend to increase over time. Thus, we will report first hollow stem during the next few weeks again until all varieties are past this stage. Additionally, first hollow stem is generally achieved within a few days from when the stem starts to elongate, so we advise producers to closely monitor their wheat pastures at this time.

The intention of this report is to provide producers an update on the progress of first hollow stem development in different wheat varieties. Producers should use this information as a guide, but it is extremely important to monitor FHS from an ungrazed portion of each individual wheat pasture to take the decision of removing cattle from wheat pastures.

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4. Is spring-planted wheat a viable option for northwest Kansas?

Spring wheat is a cool-season grain crop that in adapted areas of production (typically the Northern Great Plains) usually produces a higher protein and higher quality grain for milling and baking purposes. Spring wheat can be produced in northwest Kansas and adjoining areas. Yields will be lower than summer fallow winter wheat. Grain quality will be an important component of marketability. The long-term ability to produce quality spring wheat in northwest Kansas, and its economic viability, has yet to be demonstrated.

Management

Traditionally, spring wheat has not been a recommended crop in northwest Kansas. However, if spring wheat is planted, the K-State recommendation is to plant from February 25 through March 15. Particular emphasis should be given to the ending date relative to the starting date for minimizing heat stress, which will be the yield limiting factor in most years. In research plots at Colby, dormant seeded spring wheat in December has shown to be viable in stand establishment. Seeding rates significantly higher than those typically used in winter wheat will be necessary due to the reduced window for initiating productive tillers. In addition, heat stress will be exceptionally detrimental to tillers of spring wheat as compared to winter wheat, making the density of main stems even more important to achieving yield potential.

K-State does not have any current data regarding appropriate seeding rates for spring wheat but limited experience would suggest 1.3 to 1.8 million seeds per acre to be an appropriate range. With respect to nitrogen management, growers should consult the recommendations offered by North Dakota State University in the publication SF712, [“Fertilizing Hard Red Spring Wheat and Durum”](#). Spring wheat will reach physiological maturity and be harvested slightly later than winter wheat in our region.

Experimental data on spring wheat yields

Spring wheat has been evaluated at several points in time in northwest Kansas. From a historical context, during a 35-year study at Colby (1915-1950), spring wheat grown on fallow averaged slightly less than ½ of winter wheat grown (also on fallow). Additional research in the 1970's demonstrated a similar relationship. More modern research was conducted in 2001 through 2005 in which spring wheat averaged 49% of winter wheat (Table 1).

Table 1. Summary of grain yields for spring wheat vs. winter wheat from 2001-2005 at Colby, KS.

Colby Kanas Spring Wheat and Winter Wheat, 2001-2005

Year	Winter Wheat	Spring Wheat
	Mean of Top LSD Group	Mean
-- Grain Yield, bu ac ⁻¹ --		
2001	82.1	46.0
2002	43.2	12.1
2003	78.7	42.4
2004	60.1	30.3
2005	78.2	37.5
Average	68.5	33.7

R. Aiken, 2008. unpublished data.

In response to producers' questions regarding spring wheat, a spring wheat variety trial was conducted in northwest KS in 2019. Sixteen spring wheat varieties from four companies were evaluated and yields ranged from 56 to 37 bu/ac (Figure 1). These yields were 36 to 55% of winter wheat grown adjacent to the study. Grain samples from this trial are currently being evaluated for milling and baking quality. This trial is set to continue in 2020.

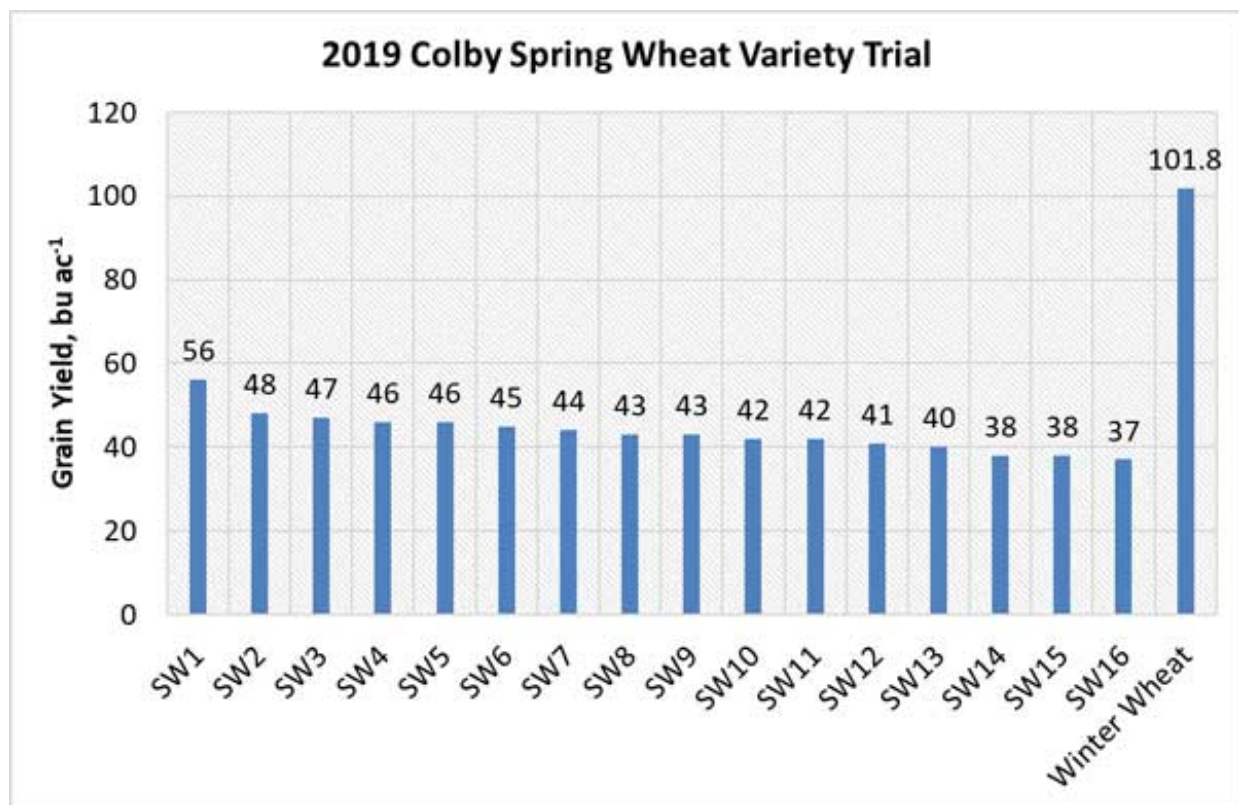


Figure 1. 2019 spring wheat variety trial at Colby, KS. Grain yield is reported in bushels per acre.

This data would show a significant reduction in yield potential for spring wheat relative to winter wheat when both are grown on fallow. It is important to note however, yield alone is not the determining factor for the viability of the practice. Differences in cost structure and revenue could very well make spring wheat an economically feasible alternative, provided that quality grain can be raised and marketed at a premium to winter wheat.

Marketing

Producers should be aware that hard red and hard white spring wheats are different market classes than hard red or hard white winter wheats. While small quantities are likely being blended off without notice, any concentration greater than 2% would be considered a mixing of classes that could result in the rejection of shipments. No local delivery points have been established at this time. A producer's greatest chance of successfully marketing spring wheat will involve the use of on-farm storage to allow proper segregation, time to perform necessary testing of grain quality, and then direct marketing to a mill. If it is shown that spring wheat of sufficient quality can be grown in the region, it is possible that delivery points would be established. However, it is more likely that this niche market will function mostly on the use of identity preservation practices, on-farm storage, and direct marketing.

Take home message

Spring wheat can be produced in this region. Producers should have marketing plans in place prior to production and manage the crop to ensure quality. However, there are still many unknowns

regarding the production of spring wheat and its long term viability in northwest Kansas and adjacent areas.

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5. Update on drought conditions in Kansas - February 28, 2020

For the week ending on February 25, 2020, wetter-than-normal conditions dominated all but northwestern Kansas. Over that seven-day period, Kansas received 350% of normal moisture (Figure 1). Greatest measured daily precipitation in the state occurred in Chautauqua County with 2.72 inches recorded (Sedan, Feb. 24). This moisture includes the liquid equivalent of snowfall that stretched across the state (Figure 2). The largest departures from normal were seen across the central parts of the state. This snow/mixed precipitation significantly impacted the drought conditions in the Central and South Central region, with lesser impacts in the Southwest part of the state (Figure 3). Severe and moderate drought persists across the southwest with abnormally dry in portions of northwest Kansas (Figure 4). The moisture seen during the middle of this week will be included in next week's update.

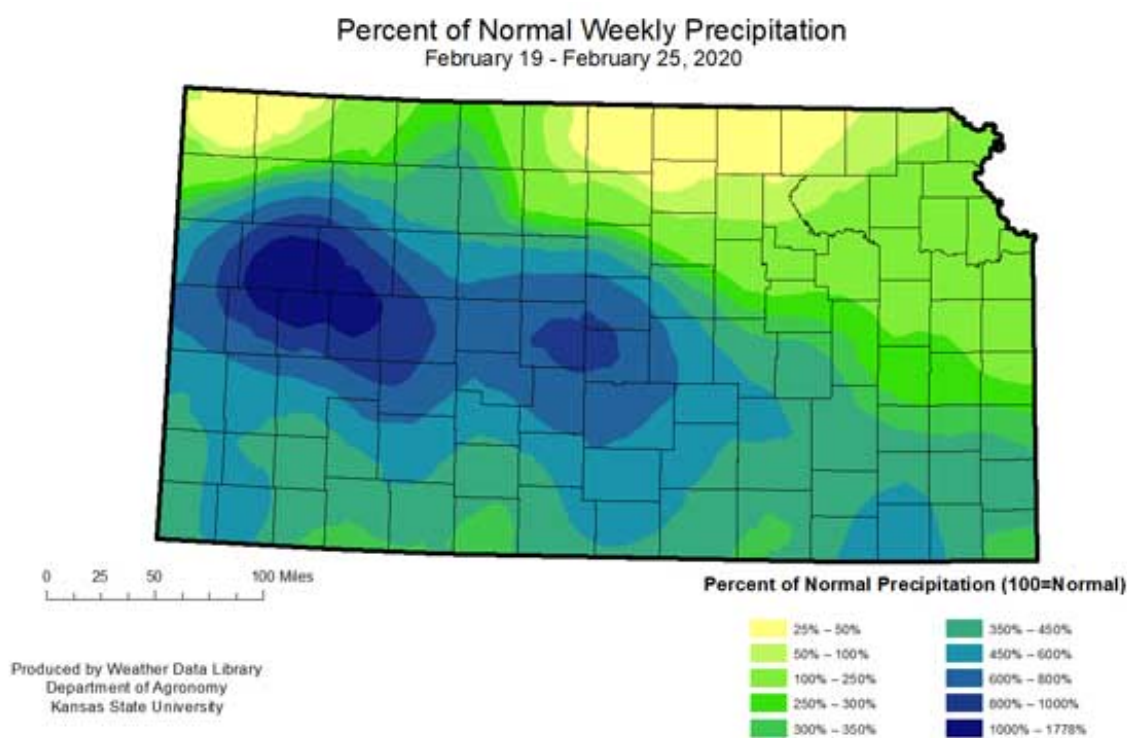


Figure 1. Percent of normal precipitation for the week of February 19 - 25, 2020. Normal precipitation is noted as 100%. Map by the Kansas Weather Data Library.

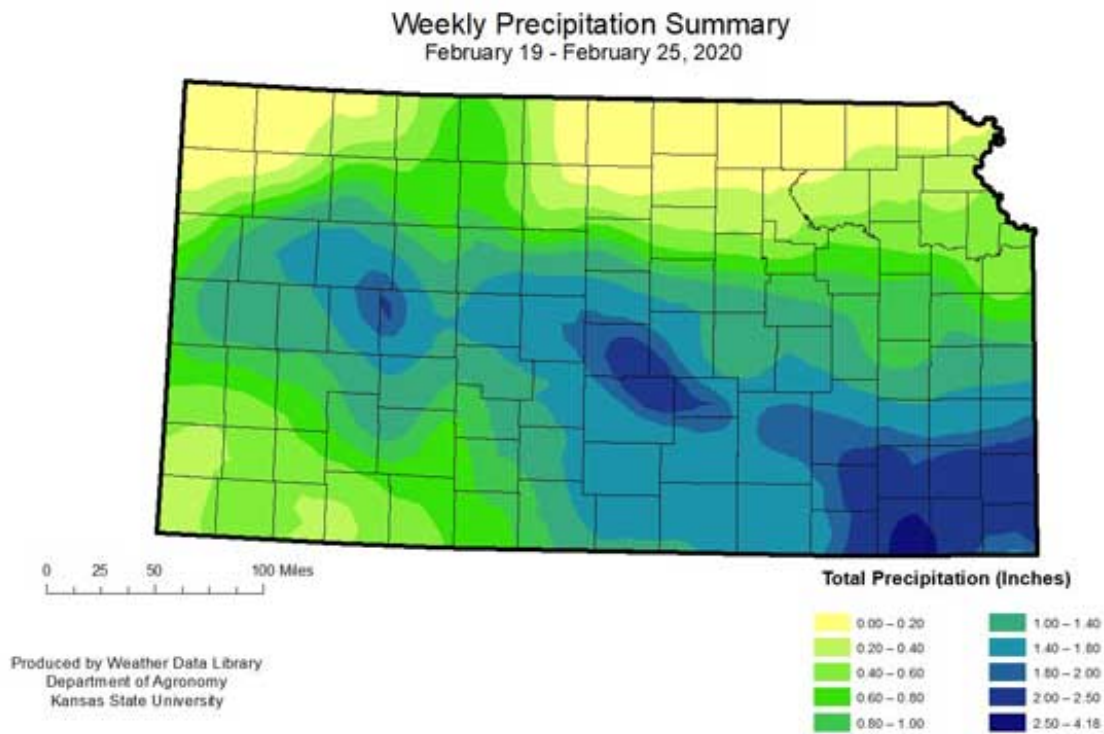


Figure 2. Summary of precipitation recorded during the week of February 19 - 25, 2020. Map by the Kansas Weather Data Library.

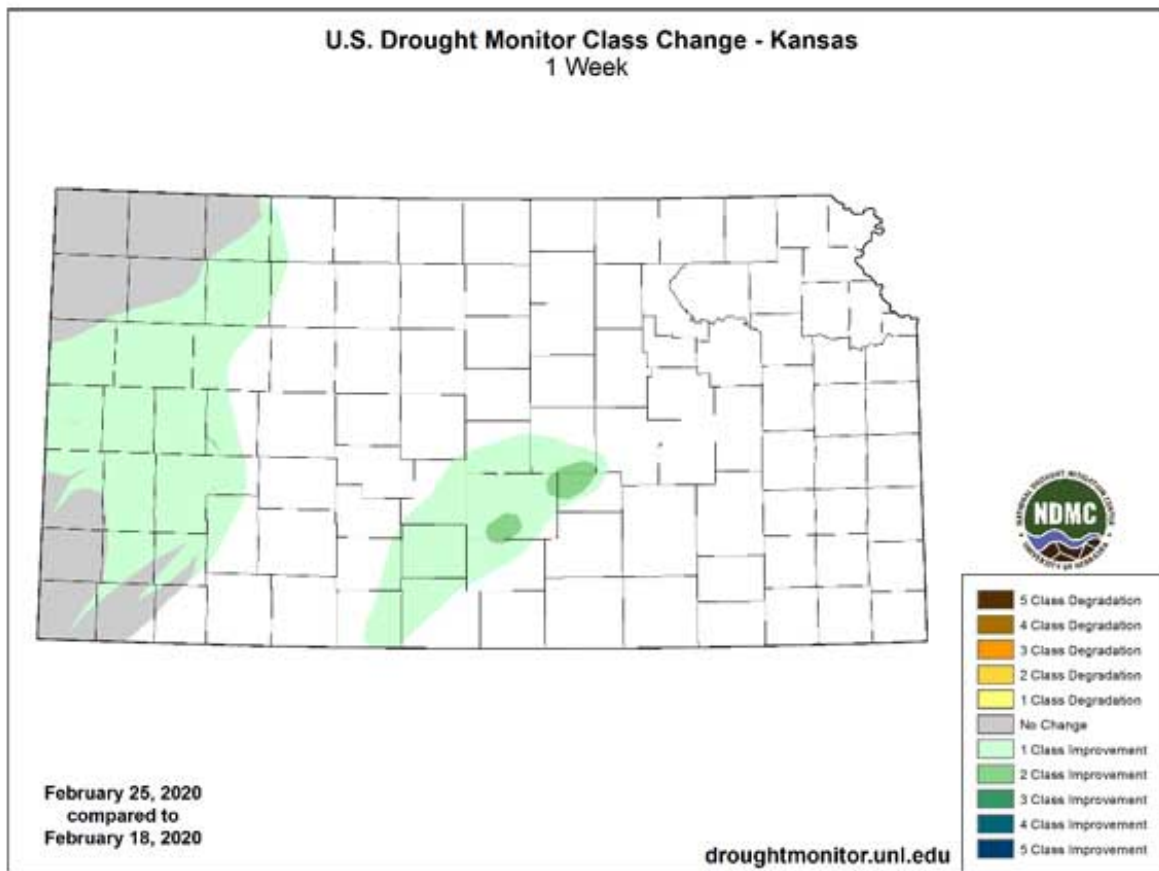


Figure 3. One week change in drought status for Kansas. Green colors indicate an improvement and gray indicates no change. (U.S. Drought Monitor)

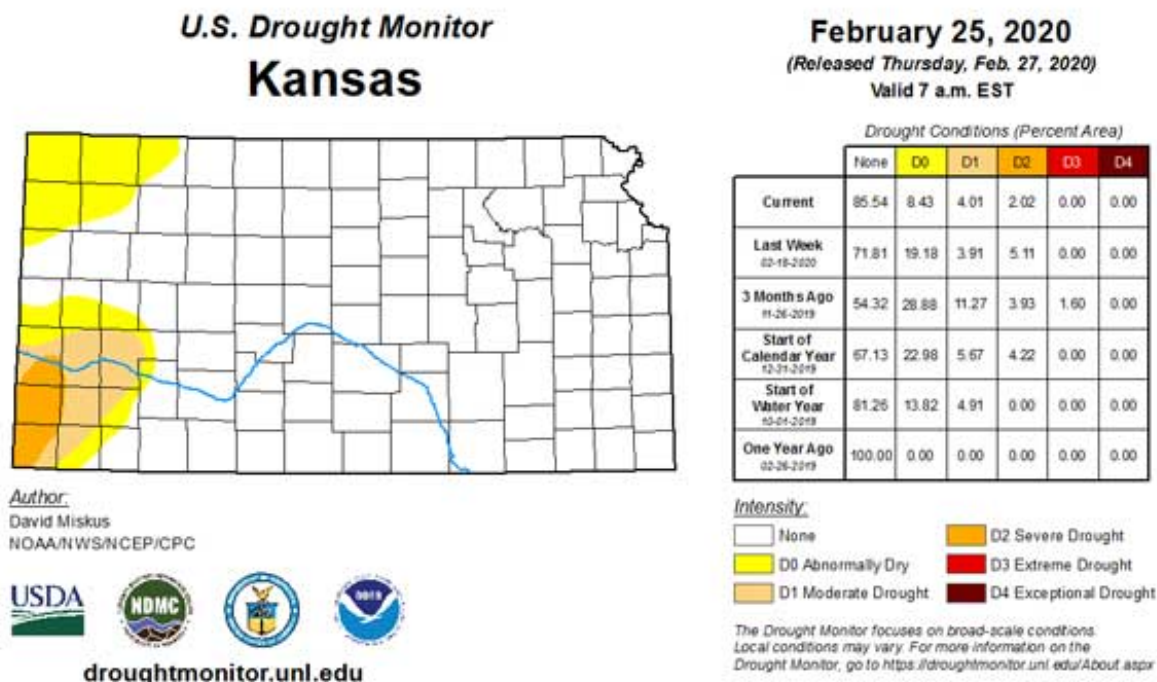


Figure 4. Drought status for Kansas as of February 25, 2020. (U.S. Drought Monitor)

Temperatures across the state averaged 1.6 °F cooler than normal for the same seven-day period (Figure 5). In late February, temperatures typically average warmest in southern Kansas (Figure 6) and that was the case this week. The largest anomaly was in the Northwest Division, which has recorded both the coldest minimum temperatures and the warmest maximum temperatures. The week's highest temperature, 68 °F, was recorded at Atwood, Rawlins County and Colby 1S, Thomas County, on February 23. However, despite these warm temperatures, the coldest reading still dropped below zero in Kansas with -2 °F recorded at Brewster 4W, Sherman County, on the 21st. Normal temperatures will continue to increase as we approach the latter days of winter.

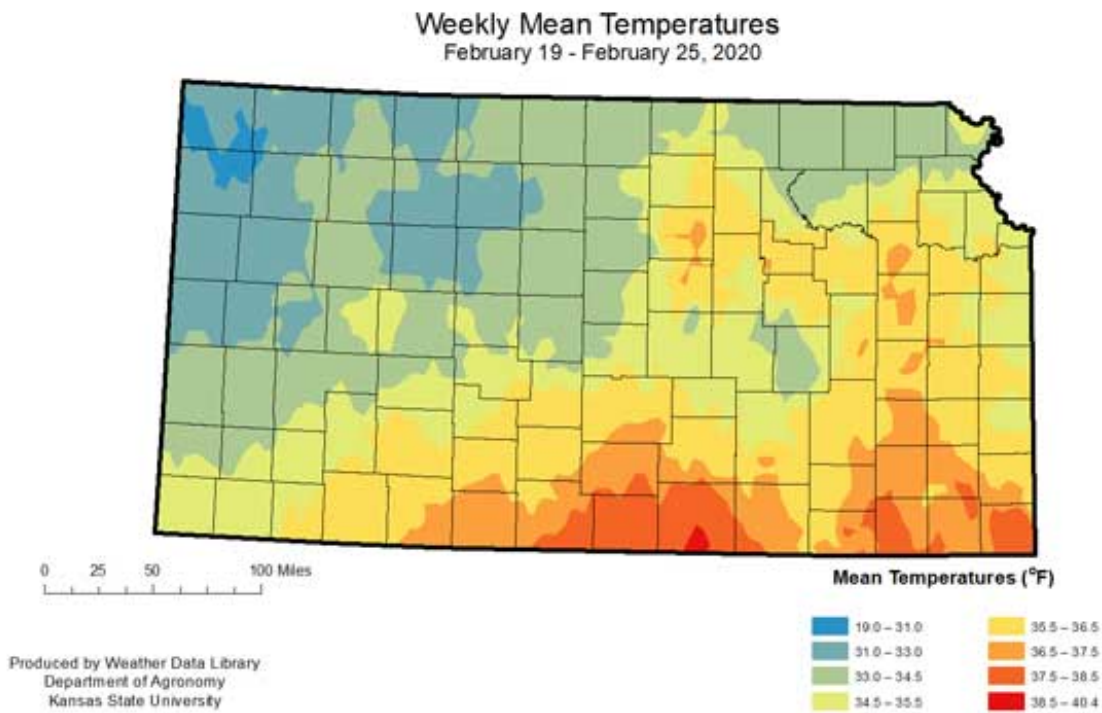


Figure 5. Mean air temperatures recorded during the week of February 19 - 25, 2020. Map by the Kansas Weather Data Library.

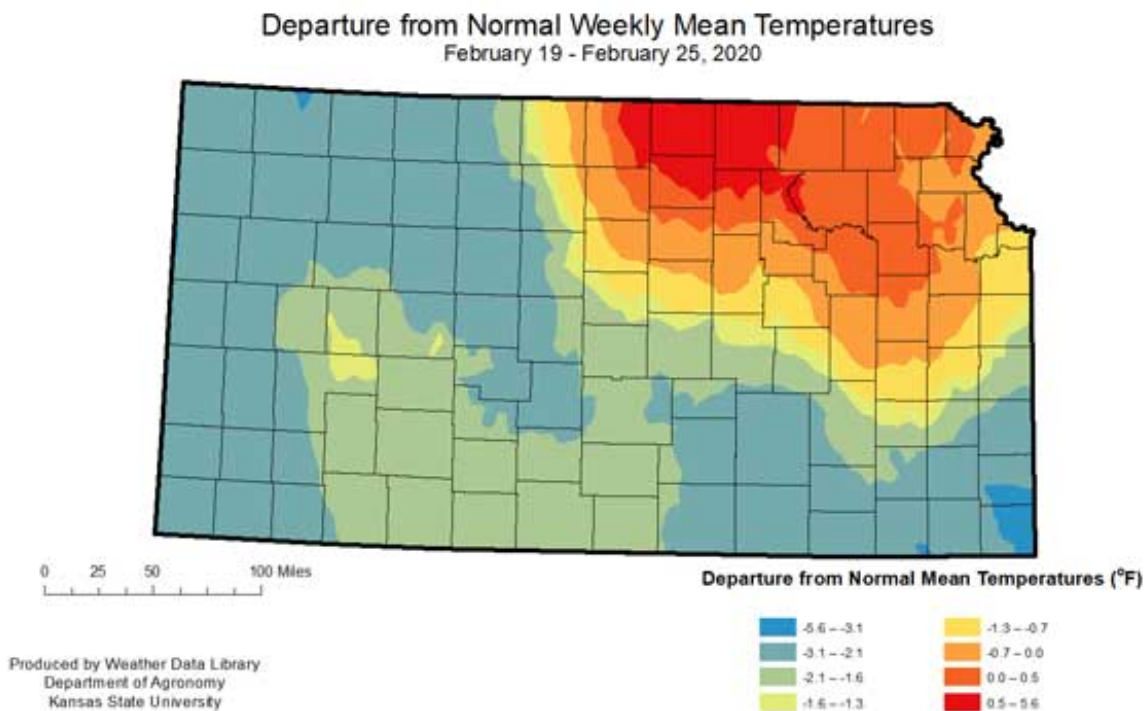


Figure 6. Departure of normal mean air temperatures for the week of February 19 - 25, 2020. Positive values (dark orange and red colors) indicate warmer than normal temperatures. Map

Looking ahead

In the upcoming week, precipitation chances are minimal. Most of the state is expected to see less than one hundredth of an inch with only southeast Kansas likely to see significant moisture (Figure 7).

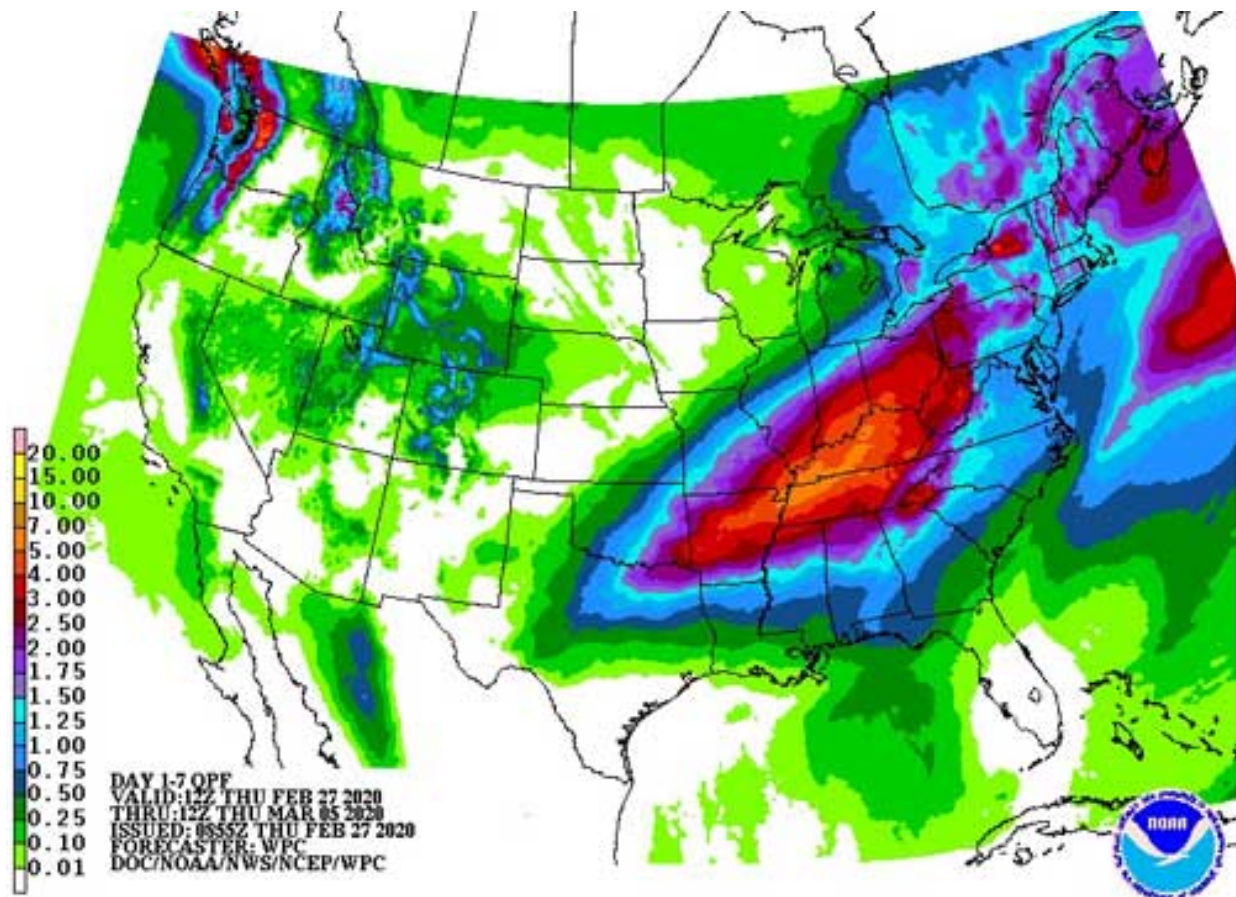


Figure 7. Quantitative Precipitation Forecast for the week ending March 5, 2020 (Weather Prediction Center).

Summary

- Heavy rain fell on February 23-24 from I-70 southward, with over 2 inches reported in many places.
- Major reduction in drought conditions in central and west-central Kansas.
- Below-normal temperatures for most of the state, coldest in the northwest.

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6. 2019 Kansas Summer Annual Forage Hay and Silage Variety Trial results now available

The results of the 2019 Kansas Performance Tests with summer annual forage varieties are available online at

<https://www.agronomy.k-state.edu/services/crop-performance-tests/forages/2019-summer-annual-forages-performance%20-tests.html>. The results are summarized by location (Garden City, Hays, and Scandia) and are split into hay and silage categories. The results can be viewed by clicking the “Data Tables” link at the website listed above and downloading the document.

At this time, only the yield results are available. Forage quality results will be posted in the next few weeks.

Summer annual forage performance tests are conducted each year by the Kansas Agricultural Experiment Station (Figure 1). The objectives of the Kansas Summer Annual Forage Variety Trial are to evaluate the performance of released and experimental varieties, determine where these varieties are best adapted, and increase the visibility of summer annual forages in Kansas. Breeders, marketers, and producers use data collected from the trials to make informed variety selections. The Summer Annual Forage Trial is planted at locations across Kansas based on the interest of those entering varieties into the test.

This work was funded in part by the Kansas Agricultural Experiment Station and seed suppliers. Sincere appreciation is expressed to all participating researchers and seed suppliers who have a vested interest in expanding and promoting annual forage production in the U.S.



Figure 1. Harvesting a forage variety trial at the Southwest Research and Extension Center in Garden City, KS. Photo from John Holman, K-State Research and Extension.

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