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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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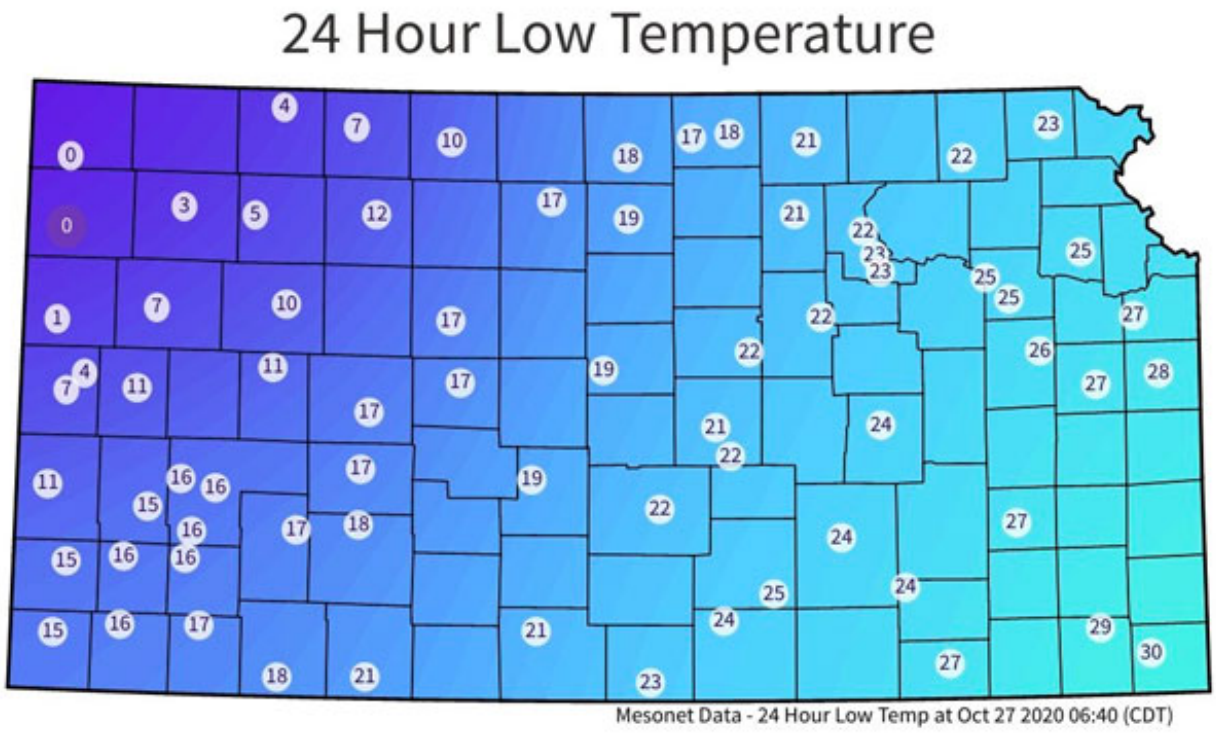
1. Possible impacts of the recent cold temperatures to the Kansas wheat crop

The sharp drop in temperatures across Kansas observed in late October 2020 could have different consequences to the wheat crop, varying from no impact to the crop, to some injury in particular fields. Average temperatures dropped to as low as 0 degrees F on October 27 in northwest Kansas (Figure 1). In regions where temperatures were lowest, there was also some snow accumulation that ranged from 0 to 5 inches across the state (Figure 1).



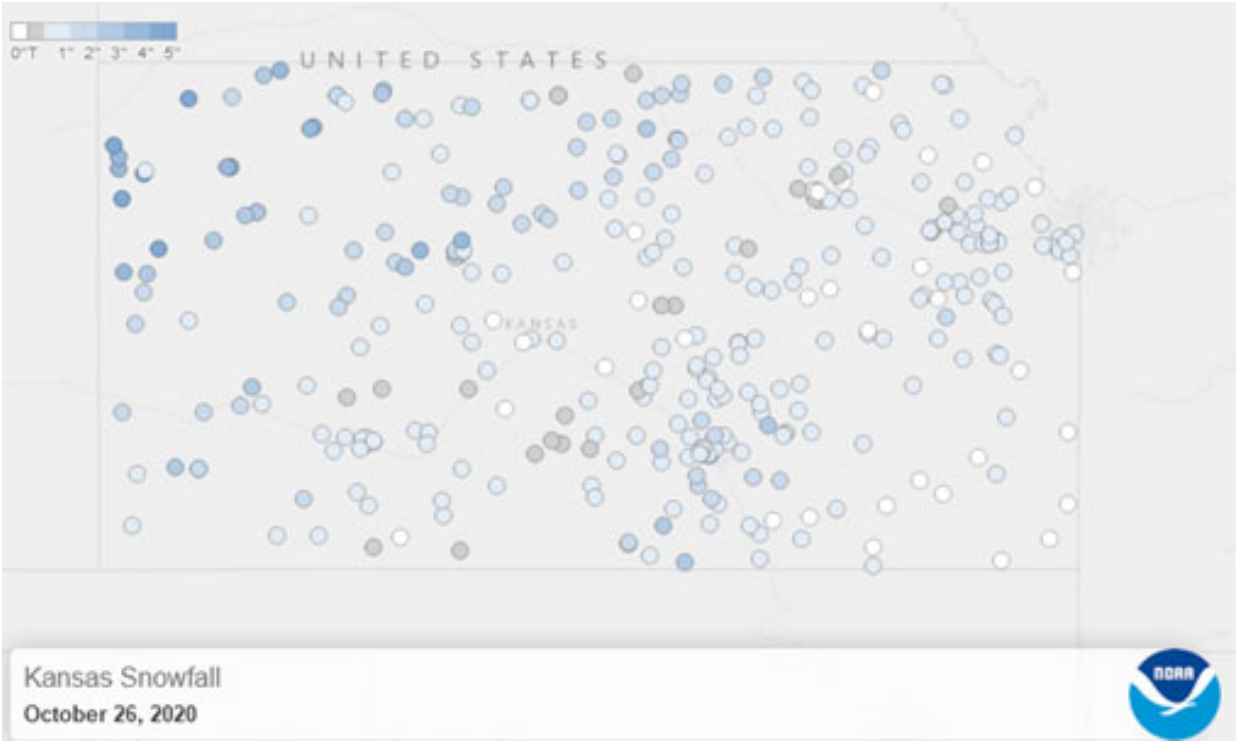


Figure 1. Minimum air temperatures observed on October 27 (upper panel, courtesy of Kansas Mesonet), and cumulative snowfall during October 26 (lower panel, courtesy of NOAA).

The actual consequences of this temperature drop should be field specific, depending on the region within the state and several other factors. The snowfall will be important to help buffer possible injuries resulting from cold temperatures. When more than 2-3 inches of snow is accumulated on the soil surface, it helps buffer temperature changes in the soil surface by avoiding large changes in soil temperature and thus protecting the wheat crop. While the drop in air temperature also led to a drop in soil temperature, the minimum soil temperatures never reached levels below 35 degrees F in northwest Kansas (where air temperatures reached 0 degrees F) or ~40 degrees F in south central Kansas (Figure 2). Another factor impacting the degree of damage from cold air temperatures to the wheat crop is topsoil moisture, which also affects the extent of change in soil temperature. The moisture level in the topsoil was very low across the entire state, with topsoil (2" depth) percent of saturation ranging from 24-44% prior to the drop in temperatures. Dry soils have a lower thermal buffer capacity compared to moist soils, and winter injury might be more pronounced. While the average soil temperatures followed a similar trend to that observed for air temperatures (Fig. 2), the minimum 2-inch soil temperatures measured across the state was about 35 degrees F in parts of southwest Kansas.

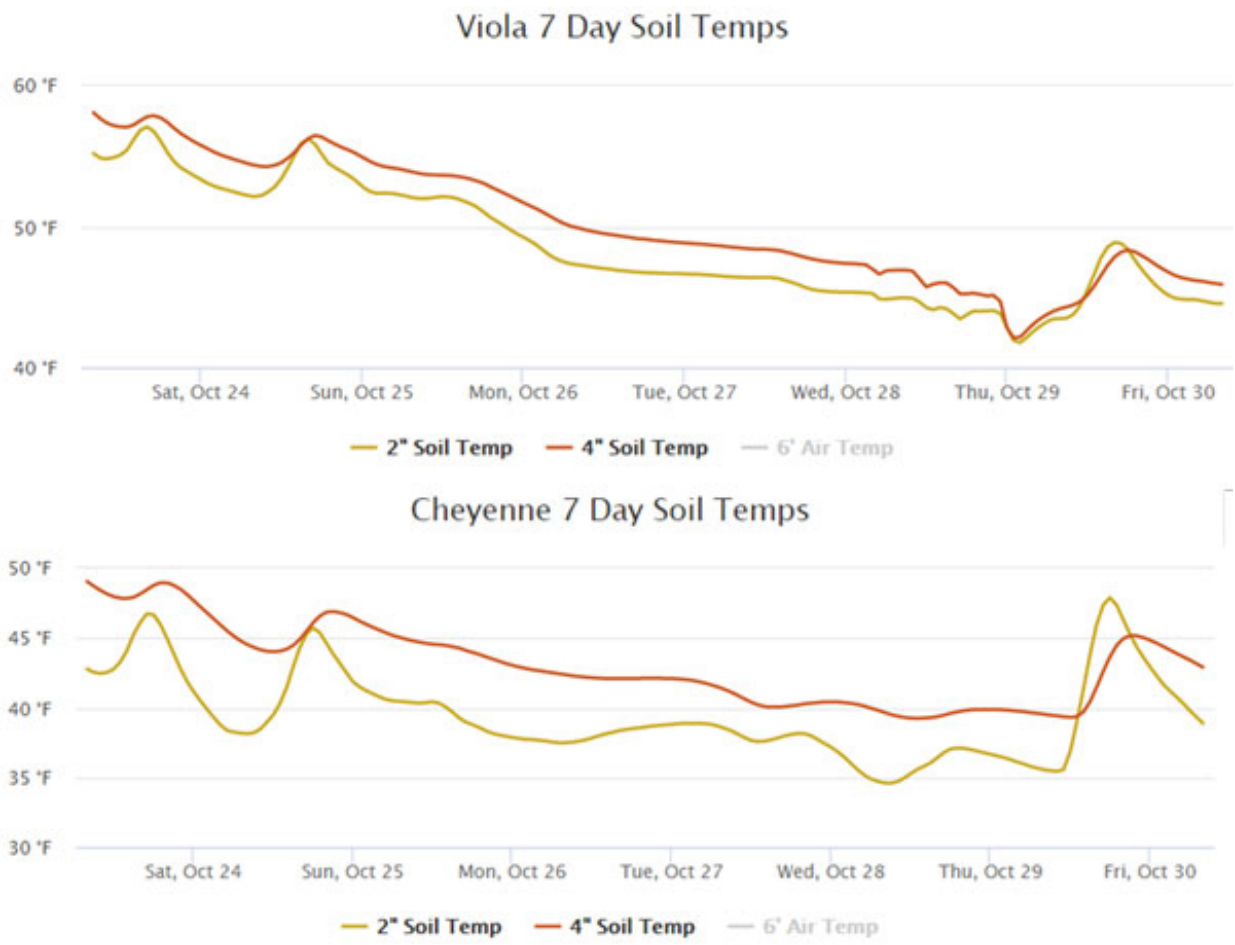


Figure 2. Average soil temperature at the 2-inch and 4-inch depth from 24 Oct to 30 Oct for Viola (south central KS, upper panel) and Cheyenne (northwest KS, middle panel). Minimum soil temperatures did not reach values lower than 28°F across the state. Data courtesy of Kansas Mesonet.

While the soil temperatures show in Figure 2 are relatively low, the snow fall helped avoid steeper drops in soil temperature and will certainly help buffer any negative effects of the sharp temperature drop. For parts of the state receiving less than ~2 inches of snow where air temperatures dropped below 15 degrees F and the wheat crop has just emerged, however, some damage might have occurred. This might be especially the case for fields planted in heavy no-till residue where the furrow might not have been closed properly at sowing, or where there was not good seed-soil contact. Under these circumstances, the lack of furrow closure results in a less protected seedling (and in some fields, crown) which might be more exposed to cold temperatures (Figure 3).

Producers are encouraged to start checking for possible injury on lower portions of the fields and especially in no-till fields with heavy residue in the near future, but no immediate damage will be apparent. The cold temperatures also will be more likely to cause injury to wheat if the plants were showing drought stress symptoms and soil temperature might have fallen below those shown on Figure 2, as dry soils will get colder more easily than wet soils. Additionally, the drier and looser the seed bed soil is, the greater the potential for the planting to be exposed to cold temperatures

resulting in injury. Meanwhile, firmer and moister soils should help to minimize rapid fluctuations in soil temperatures allowing the wheat to better withstand cold temperatures.

Figure 3. Effect of soybean residue on wheat cold damage. Yellow portions of the field correspond to greater residue left by the combine at soybean harvest, and resulted in poorer seed-soil contact at wheat planting. As a consequence, the plants are more exposed to colder temperatures and potential injury. Photo provided by Romulo Lollato, K-State Research and Extension.

Another factor affecting wheat's response to the cold is whether the wheat had time to become properly cold-hardened, which is likely not the case for the majority of the state due to the dry conditions at sowing delaying wheat emergence. In fact, many fields have not even emerged at this point or are just now starting to emerge.

In fields that have not yet emerged but in which seeds are already sprouted, no significant injury should be expected for two main reasons:

1. Recently sprouted wheat generally handles temperatures above 5-10 degrees F well, and soil temperatures never reached those levels.
2. Recently sprouted wheat is still below the soil surface and the warm soil temperatures will likely help buffer the seedling from being damaged by the cold.

In fields where the crop has already emerged, temperatures of around 15 degrees F or less can injure the newly emerged wheat, and these limits decrease as the crop progresses to tillering later in the fall and become more cold-hardy. Thus, some fields in western Kansas where the crop has recently emerged, especially the northwest part of the state, could sustain some level of damage. We likely

won't know for sure until temperatures warm up and give us an opportunity to scout.

If fields were affected, the first symptom will be burndown of the wheat from these cold temperatures as shown in Figure 3. For fields that were planted early to take advantage of the mid-September precipitation and were able to start tillering prior to the cold snap, the wheat might already be "bigger-than-normal" and the plants may look "rough" with a lot of brown, dead-looking foliage on the soil surface. That doesn't mean the plants are dead. The important factor will be whether the crown below the soil surface remains alive. Having a well-developed secondary root system will help the plants survive.

In summary, the extent of the damage resulting from the late-October 2020 cold snap can be a concern in certain scenarios described above. The most concerning scenarios would be those in which less than ~2 inches of snowfall were received, coupled with a just recently emerged crop and air temperatures less than 15 degrees F.

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2. EPA approves labels for over-the-top dicamba application

Labels for XtendiMax, Engenia, and Tavium were granted unconditional Section 3 labels on October 27, 2020. The labels will be effective until 2025. Some details are still being confirmed, but information in Table 1 below has been confirmed by labels and/or company representatives. The registration notice and labels can be accessed by clicking the name of each product in the table.

Table 1. Summary of labels for over-the-top dicamba applications. Table created by Sarah Lancaster, K-State Research and Extension.

	XtendiMax	Engenia	Tavium
Application cutoff	Through June 30 or R1 soybean Through July 30 in cotton	Through June 30	Through June 30 or V4 soybean Through July 30 or 6-leaf cotton
Drift reduction adjuvant	Required	Not required	Required
Volatility reduction agent	Required	Required	Required
Downwind buffer	240 ft (110 ft with approved hooded sprayer)	240 ft (110 ft with approved hooded sprayer)	240 ft (110 ft with approved hooded sprayer)
Forecast	48 hours no runoff producing event	48 hours no runoff producing event	48 hours no runoff producing event
Training	Updated every other year	Updated every year	Updated every other year

As before, each company will maintain a website that lists approved hooded/shielded sprayers, spray nozzles, and tank-mix partners. Those websites are:

XtendiMax: www.xtendimaxapplicationrequirements.com

Engenia: www.engeniatankmix.com

Tavium: www.taviumtankmix.com

The EPA also issued a clarification limiting the use of Special Local Needs (Section 24(c)) labels to add additional state-specific restrictions. At this time, it is unclear if the Kansas Department of Agriculture will seek any modifications to the federal label.

In a recent survey, 56% of producers indicated they will plant dicamba-resistant soybeans in 2021, down from 78% who reported planting dicamba-resistant soybeans in 2020. A potential increase in non-dicamba-tolerant soybeans for 2021 highlights the need for extra care when making in-crop dicamba applications.

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3. Fall soil testing of hay fields and pastures

Soil testing can be done in either spring or fall on hay fields and pasture. Given a choice, fall would be the preferred time because it allows more time for any needed lime applications to have an effect before the main growing season begins, and it gives the producer some flexibility for planning nutrient applications.

Figure 1. Grazing pasture in the fall. Photo by Doo-Hong Min, K-State Research and Extension.

Soil sampling on a regular basis (every 3 – 4 years) can keep you from applying excessive and unnecessary amounts of fertilizer or manure, and can increase yields by revealing exactly which soil nutrients are too low for optimum productivity. By doing this practice properly, producers can save money and reduce environmental impacts.

Tips for collecting a representative soil sample

To take accurate soil samples, it is best to use a soil probe. You can borrow a probe from many county extension or NRCS offices. A shovel or spade can be used, but make sure to dig a hole first and then take a nice even slice to the correct depth. A shovel or spade that angles to a point at the bottom can easily result in misleading soil test results because the sample is biased by having more

soil from the surface and less from lower depths.

When taking soil samples, it is important to have a representative composite soil sample from the field by combining several soil cores and mixing thoroughly. Ideally, one composite soil sample should represent a uniform and treatable area and should not exceed 40 acres, and for more variable fields, no more than 10 acres. On these areas, take 15 to 20 cores or subsamples to make up your representative composite sample. If the field has areas where different forages or crops have been grown, or has different soil types, then soil sampling from these areas should be done separately.

Sampling depth for pastures and hayfields should be 3 to 4 inches for pH evaluation. For phosphorus and potassium, a 6-inch depth is preferred when submitting samples to the K-State Soil Testing Laboratory since that is the depth we have used to calibrate recommendations.

Soil pH is important

One key soil property for forage production, especially with legumes, is soil pH. The optimal pH level is 6 to 7, depending on the forage species. Grasses such as brome or fescue do well at a lower pH. But legumes, especially alfalfa, require a near-neutral pH (~pH 7). If the soil pH is too low or too high, nutrient uptake of macro- and micronutrients can be reduced. Especially important for legumes such as alfalfa and clover is the impact of pH on nodulation and nitrogen fixation. At low soil pH, aluminum toxicity can also be an issue.

When you lime a new pasture, it is important to apply the lime 6 to 12 months before planting legumes. If you want to get a more rapid response from liming, use fine-ground liming materials with a high effective calcium carbonate (ECC). Fields that will be planted to alfalfa next spring should also be evaluated for phosphorus and potassium levels and make corrections before planting.

For more information on soil sampling and submitting samples to the K-State Soil Testing Laboratory, visit their website at http://www.agronomy.k-state.edu/services/soiltesting/. You can also access two previous eUpdate articles discussing fall soil sampling and collecting a representative soil sample in Issue 767, September 27, 2019.

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4. World of Weeds: Smooth sumac

The tannic acid produced by the smooth sumac was once used to tan leather to make shoes, hence the name 'sumac' (from shoe make). The red leaves of smooth sumac are very noticeable this time of year, making it a timely focus for the October World of Weeds article (Figure 1).

Figure 1. Smooth sumac thicket in Kansas rangeland. Photo by Walt Fick, K-State Research and Extension.

Ecology of smooth sumac

Smooth sumac (*Rhus glabra*) is a perennial shrub native to North America. It reproduces by both rhizomes and seeds to form dense thickets, especially in pastures and rangeland throughout Kansas

Identification

Smooth sumac seedlings have oblong cotyledons and smooth petioles. Mature plants can reach up to 20 feet tall. Its stems are red to purple when young and turn grey to brown when older. They can be up to 7 inches in diameter.

Smooth sumac has alternate leaves 12 to 20 inches long that are composed of 11 to 29 leaflets. Each leaflet is 1.5 to 3 inches long with serrated margins and fine hairs on the lower surface. Flowers are yellowish-green with 5 petals and found in pyramid-shaped inflorescences 4 to 10 inches long, somewhat resembling an open milo head. Each inflorescence contains both male and female

flowers. The fruit is a dark red, hairy flattened sphere with a single, straw-colored seed.

Management

Smooth sumac is not controlled by spring burning, however a number of herbicides can control it. Some of the recommended products include Grazon P+D alone or with Remedy Ultra, as well as 2,4-D and Chaparral + 2,4-D. Repeated mowing at the bud stage will provide control of smooth sumac.

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.

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5. Prussic acid in sorghum following a hard freeze

The following article was written by Brent Bean, Ph.D., Director of Agronomy at the United Sorghum Checkoff Program and is reprinted here with his permission. – Kathy Gehl, Agronomy eUpdate Editor

You will likely be getting some questions regarding prussic acid or hydrogen cyanide (HCN) in sorghum following a hard freeze in many regions of Kansas at the end of October.

Below are some key considerations:

1. Prussic acid (HCN) poisoning is more of a concern when grazing sorghum than when harvested for hay or silage because HCN will dissipate in harvested forages if properly ensiled/cured. For **grazing** it is best to wait approximately seven days after the hard freeze to graze.

2. **Sorghum silage** - Most of the HCN will dissipate within 72 hours following warm weather after a hard freeze. However, if HCN levels are high at the time of harvest, wait at least four weeks before feeding the forage. The HCN will volatilize during the fermentation and feed mixing process.

3. **Hay** - The curing process for hay will allow the HCN to dissipate as a gas, reducing the HCN content to safe levels.

Testing for Prussic Acid

1. If high prussic acid concentrations are suspected prior to grazing or at harvest, forage should be tested before grazing or feeding. There are quantitative and qualitative tests available to learn more about the potential for prussic acid poisoning in a particular forage.

2. If HCN levels exceed 200 ppm on an 'as-is' basis or 500 ppm on a dry basis, the forage should be considered potentially toxic and should not be fed as the only source of feed to animals.

3. Contact the forage lab that will conduct the HCN analysis prior to sending in samples so that proper handling procedures can be followed. There are commercial labs available to producers in Kansas to handle this type of testing.

For a more complete discussion, see the Sorghum Checkoff and other links below:

USCP - Avoiding Prussic Acid

University of Nebraska - Cyanide Poisoning

Texas AgriLife - Nitrate and Prussic Acid Poisoning

To monitor the freeze conditions in Kansas, go to the Kansas Mesonet Freeze Monitor tool: http://mesonet.k-state.edu/weather/freeze/

For more information on how to use the Freeze Monitor, please read the recent eUpdate article, "Cooler weather brings the return of the Mesonet Freeze Monitor", in Issue 824.