



K-STATE
Research and Extension

Extension Agronomy

eUpdate

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These e-Updates are a regular weekly item from K-State Extension Agronomy and Steve Watson, Agronomy e-Update 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 Steve Watson, 785-532-7105 swatson@ksu.edu, Jim Shroyer, Crop Production Specialist 785-532-0397 jshroyer@ksu.edu, or Curtis Thompson, Extension Agronomy State Leader and Weed Management Specialist 785-532-3444 cthompso@ksu.edu.

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1. Special Edition: Could the latest rounds of cold temperatures harm the Kansas wheat crop?

Two rounds of cold temperatures have hit the Kansas wheat crop in the last few days. The mornings of April 9 and April 12 had minimum air temperatures below freezing in parts of the state. Minimum air temperatures ranged from about 27 degrees F in northwest Kansas to about 48 degrees F in southwest Kansas during the April 8-9 period (Figure 1); and from 23 degrees F in northeast Kansas to 44.5 degrees F in south central Kansas during the April 11-12 period (Figure 2).

Duration of potentially damaging temperatures

The coldest temperatures on April 9 were measured mostly in northern Kansas, which had air temperatures below 32 degrees F for as much as 6 consecutive hours (Figure 3). On April 9, minimum air temperatures were generally above 38 degrees F and did not reach 32 degrees F in the southern portion of the state. On April 12, the coldest temperatures were measured in the central, west central, and northeast portions of the state, where temperatures were sustained below 32 degrees F for as much as 4-7 hours (Figure 4). From this preliminary assessment, the April 12 freeze has greater potential for injury to the wheat crop than does the April 9 freeze.

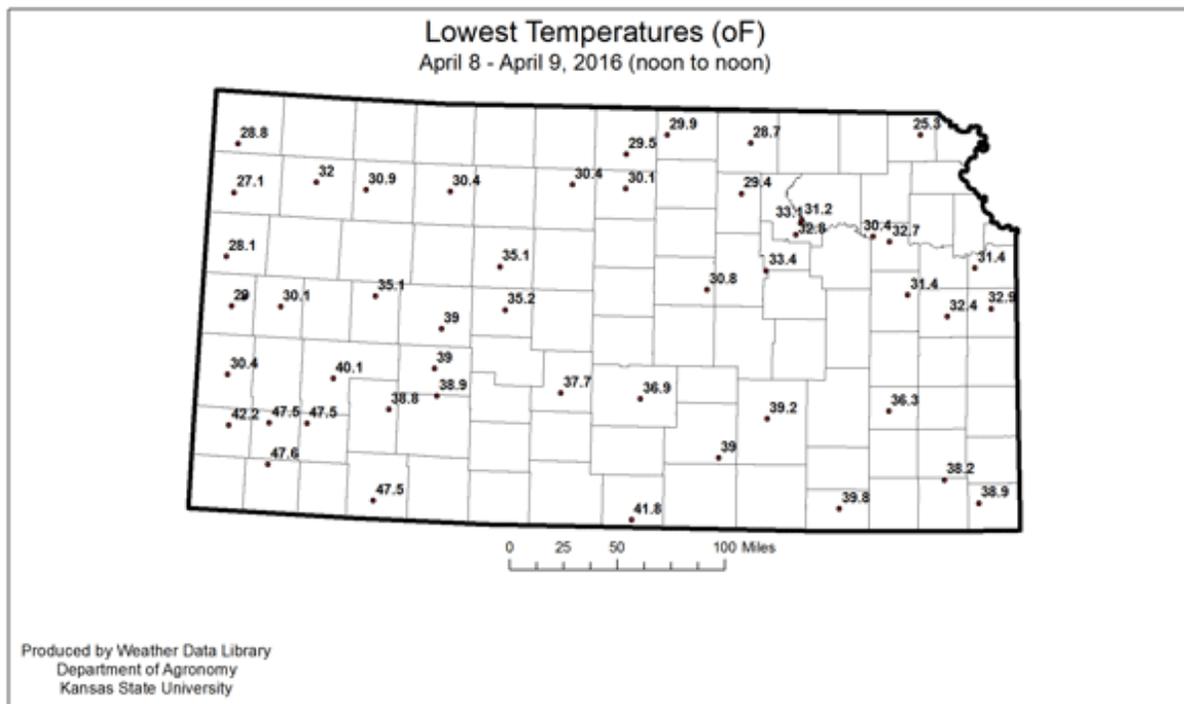


Figure 1. Coldest minimum air temperatures measured on April 8-9.

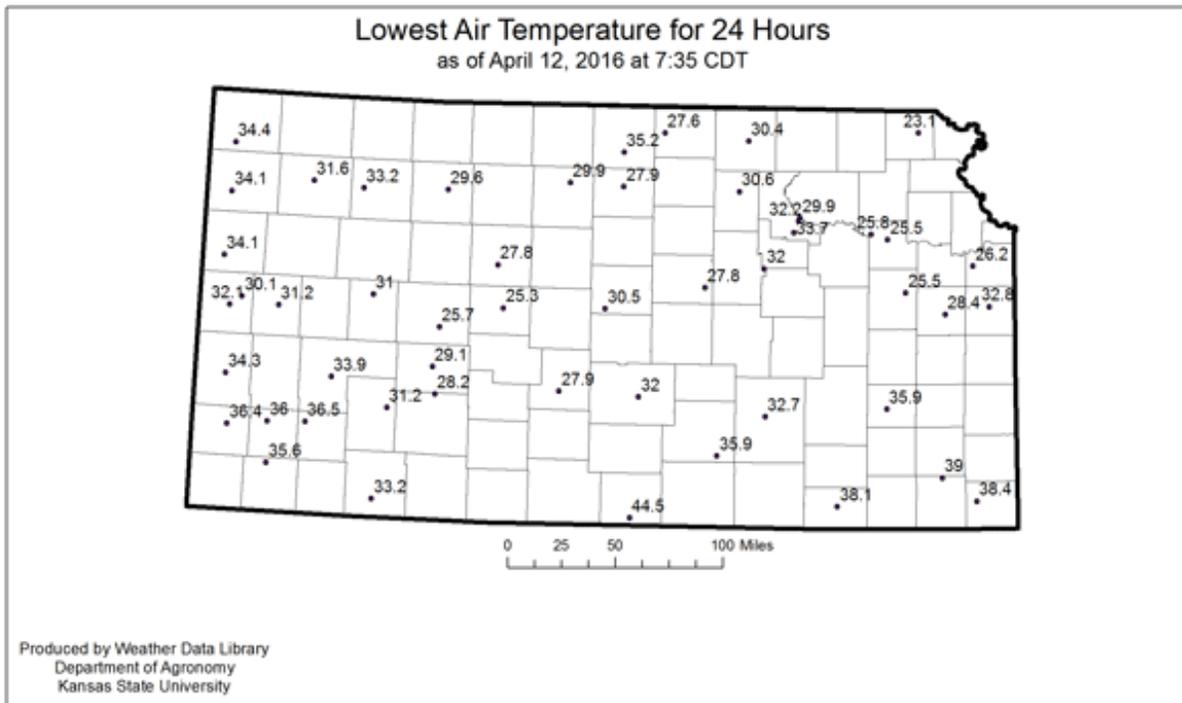


Figure 2. Coldest minimum air temperatures measured on April 11-12.

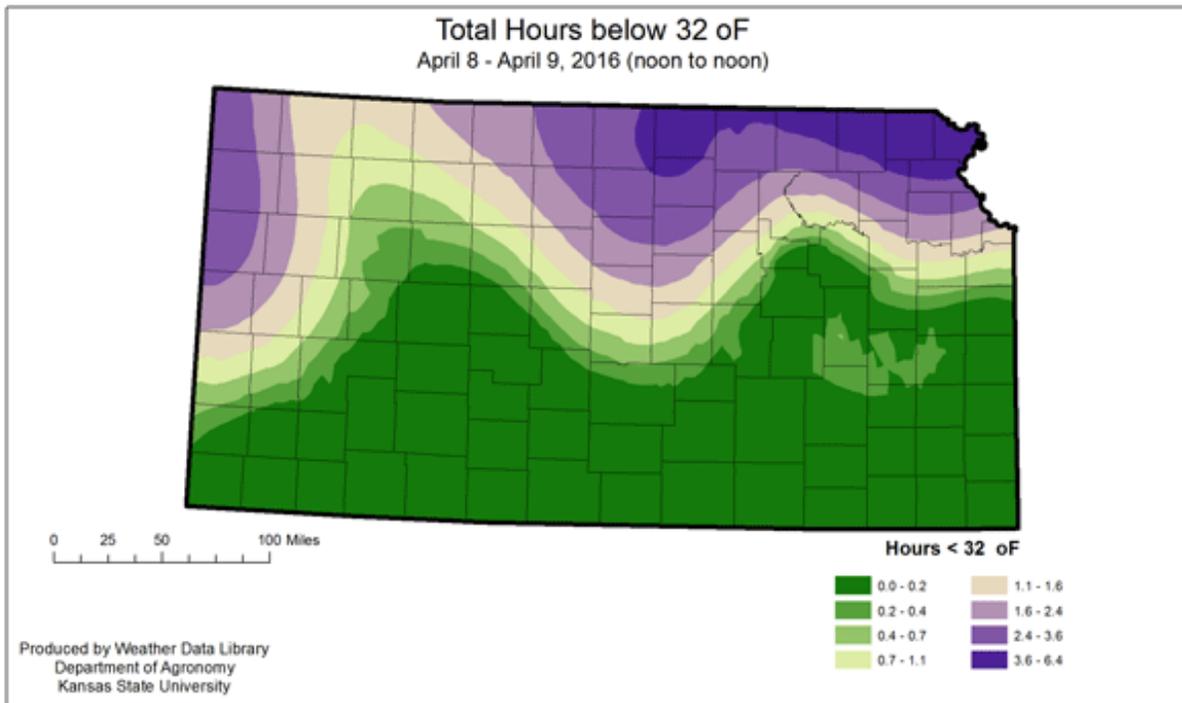


Figure 3. Total hours of air temperatures below 32 degrees F measured in April 8-9.

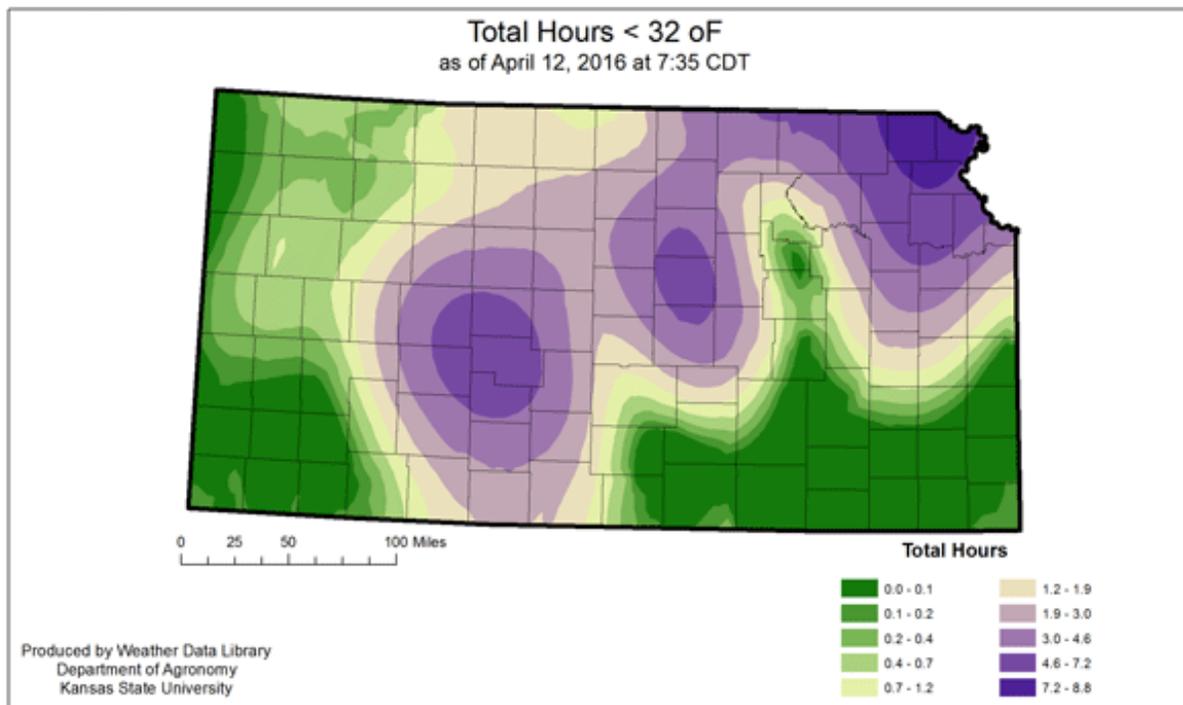


Figure 4. Total hours of air temperatures below 32 degrees F measured on April 11-12.

Risk of freeze injury to the wheat crop

The risk of damage to wheat is a function of the stage of crop development, the minimum temperature, and the duration of time spent at potentially damaging temperatures (Figure 5). The majority of the wheat in Kansas is at flag leaf emergence, but a few areas in the southeast are likely in the boot stages of growth (Figure 6). The wheat in northwest Kansas is jointing. Wheat at that stage is less vulnerable to freeze injury.

The region with higher risk of freeze injury from the April 12th freeze event is the central portion of the state, as well as the eastern portion of southwest Kansas (Figure 7). Minimum temperatures in the central region (Gypsum, Ellsworth, Reno, Rush, Ellis, Ness, and Stafford counties, and potentially surrounding regions), reached as low as 25 degrees F (Figure 2). Air temperatures were sustained below freezing for more than 4 hours in some regions (Figure 4). Temperatures in Clark, Comanche, and Barber counties (eastern southwest Kansas) also fell below 32 degrees F, but were sustained for a shorter period of time (less than 3 hours). Most of the wheat in this region is still not yet headed or in boot stages, but many fields in this region may already have the flag leaf emerging out of the whorl. Some of the more advanced fields already at these stages may have sustained injury from the sub-freezing temperatures.

Wheat in the south central and southeast portions of Kansas is well past the second node, with most

fields generally at flag leaf emergence -- and even some reports of wheat at the boot or heading stages. These stages are more susceptible to freeze damage. Generally temperatures below 28 degrees F can cause damage to boot stage wheat, and temperatures below 30 degrees F can cause damage to heading wheat (Figure 5). Temperatures in south central and southeast Kansas were sustained above 38 degrees F on both mornings of April 9th and 12th. These temperatures should not cause damage to the developing wheat head.

Most wheat fields in the northern portion of the state are at jointing or between jointing and second node stages of development -- stages that are more resilient to cold temperatures. Wheat in these stages of development generally do not sustain damage at temperatures above approximately 24 degrees F. Although the coldest temperatures on April 9 were measured in the northern portion of the state, temperatures did not reach values close to the 24 degrees F threshold that could lead to damage to the growing point for wheat at jointing or slightly past.

Preliminary risk injury forecast

A preliminary assessment of potential freeze injury to Kansas wheat indicates that more advanced fields in the central portion of the state, as well as in the eastern southwest Kansas, have the greatest potential to sustain freeze injury from the April 12 freeze event (Figure 7). Producers in these regions are encouraged to scout for the extent of a possible freeze damage in the upcoming days before taking additional management decisions in their fields, such as spraying a foliar fungicide to control diseases. Although stripe rust is present in most of the central corridor in Kansas, a fungicide application may not pay off in cases in which the yield potential of the crop has been decreased by these freeze events. Careful evaluation of disease risk and freeze injury is needed to make an informed decision.



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Figure 5. Temperatures that cause freeze injury to winter wheat at different growth stages.
Source: Spring Freeze Injury to Kansas Wheat, K-State Research and Extension publication C646.

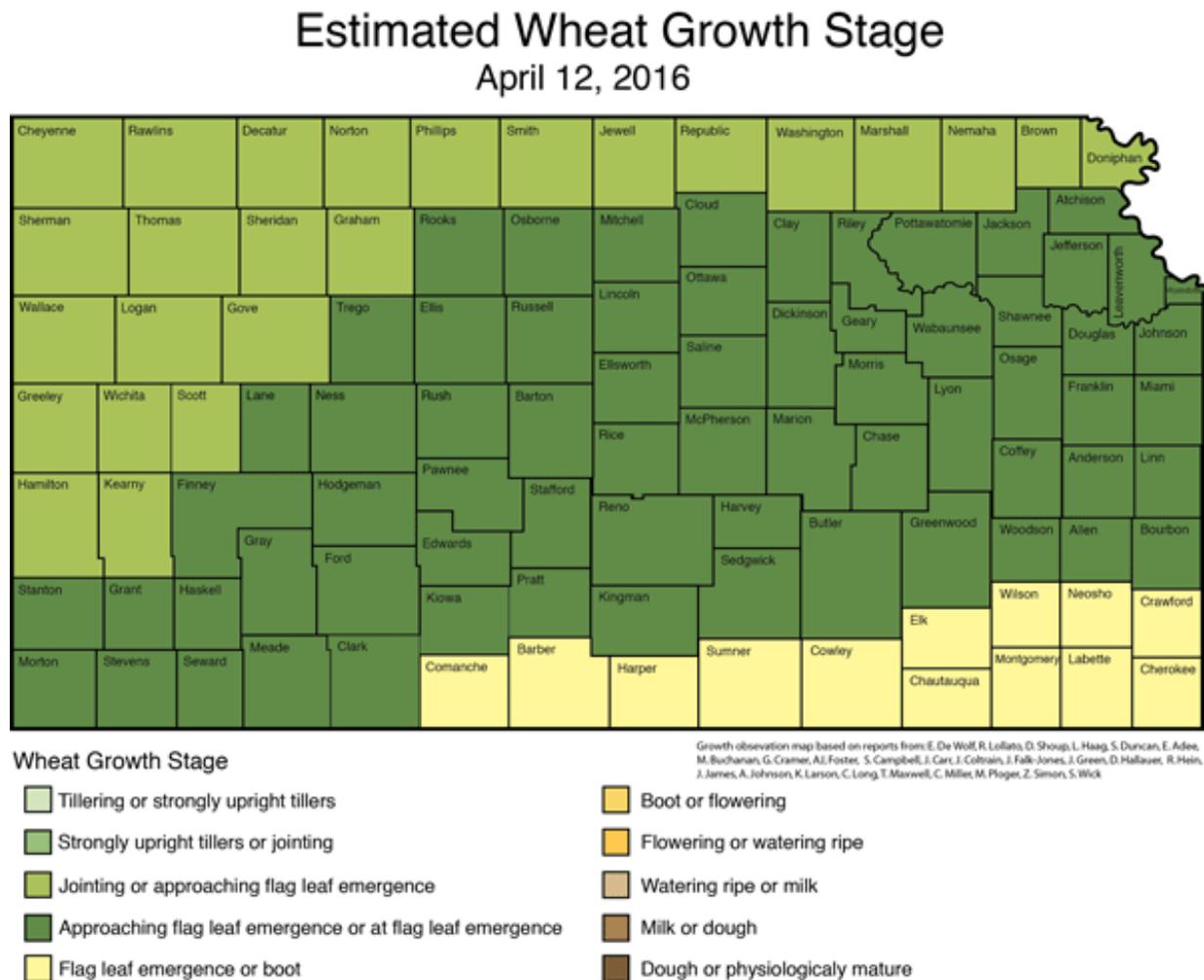
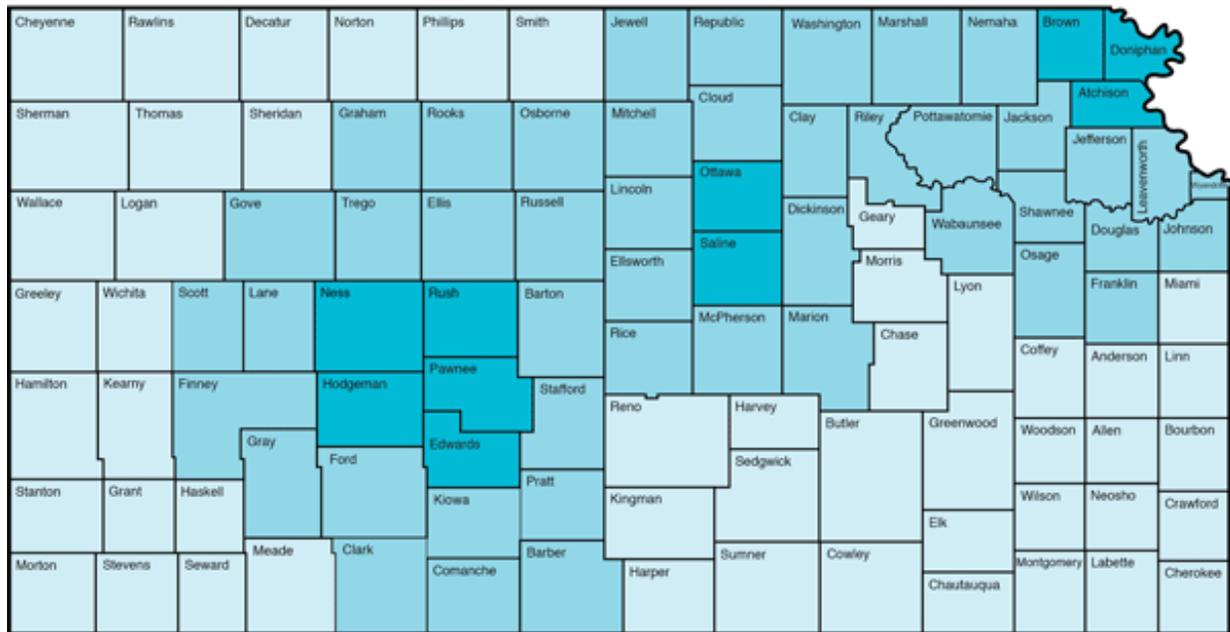


Figure 6. Estimated wheat growth stage based on observations and wheat growth models.
Actual growth stage may vary with variety and planting date.

Risk of Freeze Injury to Wheat

April 9-12, 2016



Risk map based on observations of wheat growth stage and duration of temperature below 32 degrees. Kansas State University; E. De Wolf, R. Lollato, M. Knapp, and C. Redman.

Risk of Freeze Injury

- Freeze injury unlikely
- Freeze injury possible
- Freeze injury likely

Figure 7. Risk of freeze injury to wheat based on observations of growth stage and the duration of cold temperatures that place the wheat at risk for injury.

For more information on symptoms of freeze to wheat, see *Spring Freeze Injury to Kansas Wheat*, K-State Research and Extension publication C646, available at: <http://www.ksre.ksu.edu/bookstore/pubs/C646.pdf>

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