Issue 1062

K-STATE Research and Extension

Extension Agronomy

eUpdate

07/17/2025

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. Wheat streak mosaic management: The role of other hosts in the landscape

This article is the second in a multi-week Agronomy eUpdate series on wheat streak mosaic complex management to address the 2025 outbreak. Last week, we revisited herbicide recommendations for volunteer wheat, and this week, we address the role of other crops in the landscape.

- Week 1: *Wheat-free windows and herbicide recommendations* https://bit.ly/4eSVKgP
- This week: *The role of alternative host crops in the complex*

Overview

Wheat streak mosaic complex devastated many wheat fields across central and western Kansas in 2025. The conditions that favored this outbreak were covered in this previous eUpdate article: (https://bit.ly/3SwJ7gU). As a reminder, wheat streak mosaic is a complex of three viruses: *wheat streak mosaic virus*, *Triticum mosaic virus*, and *High Plains wheat mosaic virus*. The wheat streak mosaic complex of viruses is vectored by the tiny wheat curl mite (*Aceira tosichella*). The highest risk place for curl mites to survive the summer is volunteer wheat. Conditions that favor grain shattering, such as preharvest hail or harvest delays due to windy storms (such as much of the 2025 Kansas wheat harvest), can increase the presence of pre-harvest volunteer wheat. **If mites are allowed to survive on this volunteer wheat or alternative hosts until the fall-established wheat crop is planted, there is a high likelihood of another outbreak in 2026.**

While keeping volunteer wheat controlled all summer is ideal to reduce wheat curl mite populations, it is not always practical, depending on the dynamics of rainfall and consequent wheat emergence. If it is not possible to control volunteers all summer long, there are two critical periods for volunteer control: **immediately after harvest** and **prior to fall planting**. Volunteer wheat that is **present at harvest** is the perfect place for populations of curl mites to migrate as the crop dries down. Controlling this volunteer wheat as soon as possible will help dilute the mite populations heading into the remaining summer months. The second critical window is **pre-planting**, as mites present at this time will migrate directly to the 2026 crop.

In last week's article, we shared the recommendation for wheat-free windows (Figure 1). These windows include periods 30 days prior to the start of the optimal winter wheat planting window by zone in Kansas. As the wheat curl mite is a community pest, coordinated breaks in volunteer wheat and other cereals will have the highest likelihood of lowering local and statewide mite levels moving into our 2025 optimal winter wheat planting date periods. Volunteer wheat that emerges after the fall crop is already established poses a lower risk as a green bridge and can be thought of in a similar way as the fall crop. Fall wheat planted early, during wheat-free windows**,** risks bridging wheat curl mite to the fall-established crop.

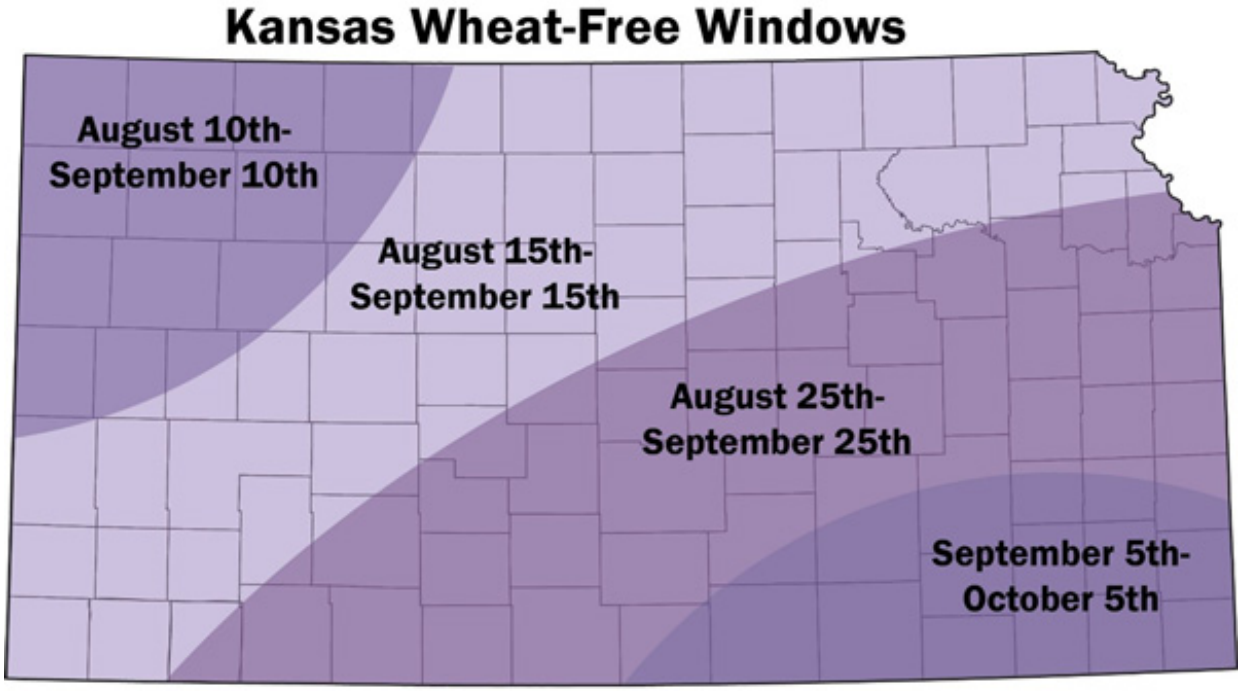

Figure 1. Proposed wheat-free windows **in different regions of Kansas to reduce the likelihood of a wheat streak mosaic complex outbreak during the subsequent season. Wheat-free windows are defined as the 30-day period prior to the start of the optimal winter wheat planting date for the region.**

Here are some important considerations for achieving success with wheat-free windows:

- All volunteer wheat should be terminated and completely dead prior to the start of your regional wheat-free window.
- Where possible, the fall wheat crop should not be planted until the end of the wheat-free window.
- Other winter cereals (such as rye and triticale) should not be planted during this period as they can serve as a "bridge" for the curl mites to move to fall-established wheat.
- A regional "break" in the volunteer wheat green bridge will allow for wheat curl mites to die off prior to the start of the optimal wheat planting window.
- Volunteer wheat that emerges after this period is of less concern, as it will emerge at a similar time as the fall-established winter wheat crop.
- Success is dependent on coordinated efforts in communities.

Revisiting the role of other crops and weeds in the landscape

The question about the role of alternative crops and grasses in the landscape is frequently raised. The general risk of species as reservoirs for the mite and virus complex depends on several factors, including:

1. How well the curl mite reproduces on a given host,
2. How susceptible the host is to the virus,

3. The presence of the host during critical periods over the summer,
4. How those periods overlap with the wheat crop, and
5. How much of the host is present in the landscape during those critical summer months (host density)?

That information was taken together to develop the relative risk of host species to harbor wheat curl mites over the summer (Figure 2). You'll notice that the list includes cereal crops, weeds, and pasture grasses. In all, over 90 species have been shown to harbor the mites or virus to some level. Legumes are not known hosts for the curl mite or viruses.

Volunteer wheat left over the summer is the highest risk host because it checks all the boxes for risk. The curl mites will reproduce rapidly on volunteer wheat, it is usually present right after harvest, may be left through fall planting, it is susceptible to the viruses, and it can build to high levels in the landscape. This is why the first line of defense against wheat streak will always be volunteer wheat management **(**ideally during **wheat-free windows** – Figure 1).

Volunteer wheat can also "hide" in summer crops planted after wheat harvest as well as cover crops, complicating the ability to determine the risk of other crops in the landscape. For example, if wheat that is harvested in June and grain sorghum (or corn and soybean) is planted into that same field after wheat harvest, secondary flushes of volunteer wheat will be difficult to control.

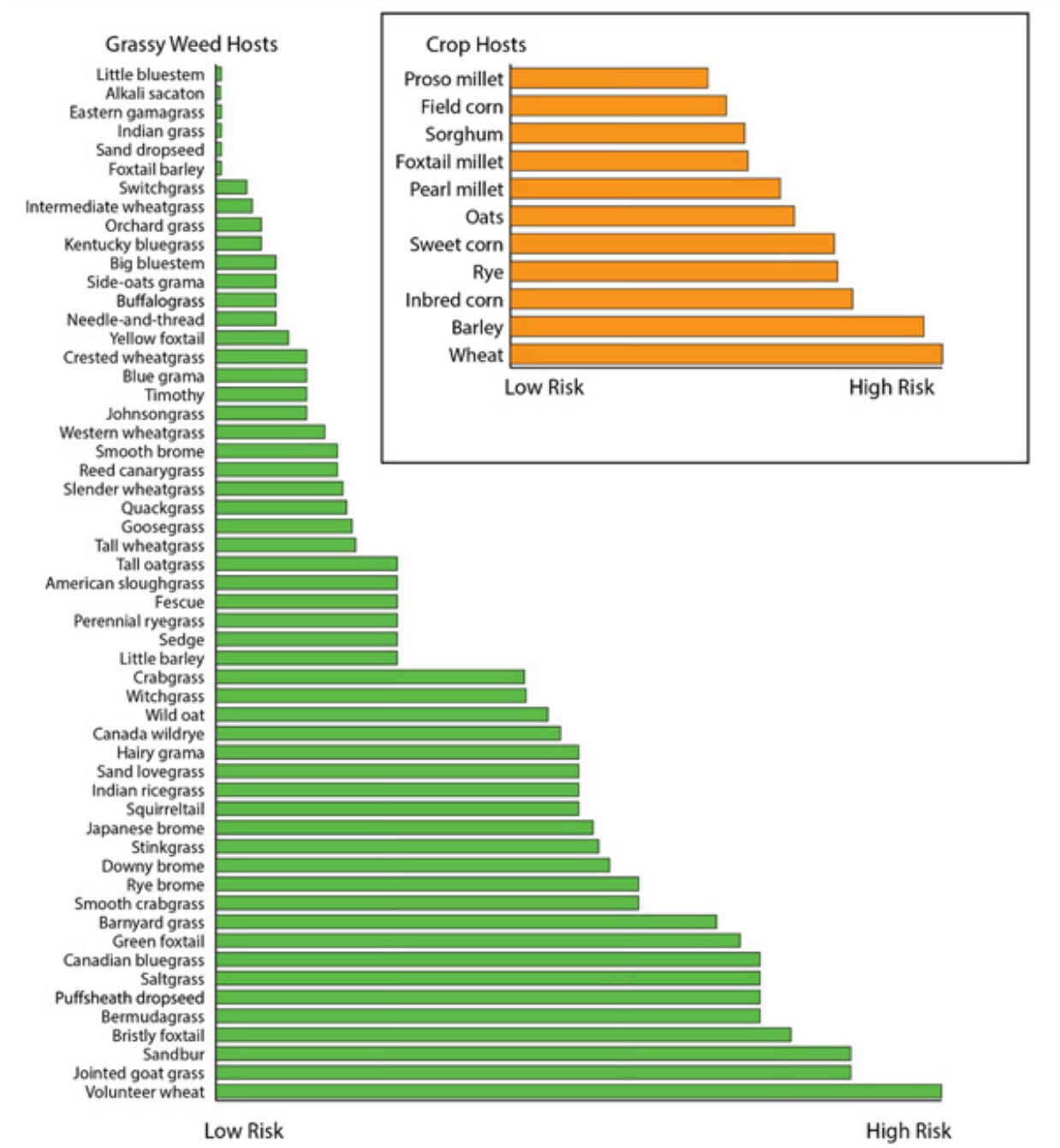

Figure 2. From K-State Research and Extension Publication MF3383: Wheat Streak Mosaic. These graphs show the relative risk of various crops, grassy weeds, and pasture grasses to serve as hosts for the wheat streak mosaic virus and the wheat curl mite.

Winter cereals planted early (during the **wheat-free windows**) for grazing or cover cropping may pose a risk for harboring curl mites. Species like **barley**, **oats**, **rye**, and **triticale** have all been shown to host both the mites and the virus at fairly high levels. When at all possible, early planting of these crops near fields that will be established with a fall wheat crop should be avoided. Including these crops in a summer cover crop mix can also be risky for bridging the curl mites and viruses to the fall

wheat crop.

To a lesser extent, **corn** and **sorghum** can also host the mite and virus complex. These crops are generally considered of low concern for epidemics in Kansas. Most of the research that we've reviewed has demonstrated that these crops are most conducive to curl mite survival during early growth stages. So, for example, corn/sorghum at a young stage when wheat is drying down would be at higher risk for curl mites than late-planted corn. It appears that curl mites are limited to corn husks later in the season and can result in symptoms of kernel red streak through feeding damage. Kernel red streak is generally considered a cosmetic issue in corn, but can serve as a sign that curl mites were present. Most commercial corn hybrids are resistant to *wheat streak mosaic virus* and *High Plains wheat mosaic virus* and will not experience yield losses to those viruses. Importantly, it appears that curl mite populations rapidly decline in the corn crop after the crop reaches black layer.

Weedy grass hosts (detailed in Figure 2) are generally a lower concern, unless they are allowed to build to high levels and remain established through the summer months. Their role in epidemics is dictated by their abundance and the time they are allowed to persist in the landscape.

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2. Corn production: Pollination issues and tightly wrapped tassels

Farmers and agricultural professionals from multiple states, including Kansas, are reporting pollination issues in corn linked to tightly wrapped tassels. This issue appears to be related to rapid growth syndrome that some corn fields exhibited earlier in the growing season. It also seems to be connected to a certain planting window (mid-April), so there could be instances where a hybrid with tassel wrap and reduced pollination shows normal tassel emergence and ear development in fields planted outside of that window.

What is happening?

In affected fields, tassels remain tightly wrapped in the upper leaves (Figure 1) and fail to shed pollen properly, potentially causing pollination issues leading to poor kernel set (Figure 2). Unpollinated silks continue to grow and may reach several inches in length and still be receptive to pollen for several days (Figure 3).

However, these long silks can block pollen from reaching later-emerging silks and will eventually cease to be receptive to pollen, especially when temperatures reach the upper 90s and above. The impact of delayed pollination is difficult to predict because so much depends on weather conditions during the first several days after pollination when potential kernel size gets set. That said, any delay in kernel set and fill usually does not bode well for corn yield formation, particularly considering the high temperatures predicted for the coming days (Figure 4).

Figure 1. Corn plants exhibiting tightly wrapped tassels.

Figure 2. Corn ear exhibiting pollination issues.

Figure 3. Corn ear depicting a longer pollination window where kernels developed at different times (note the younger, whiter, more translucent kernels).

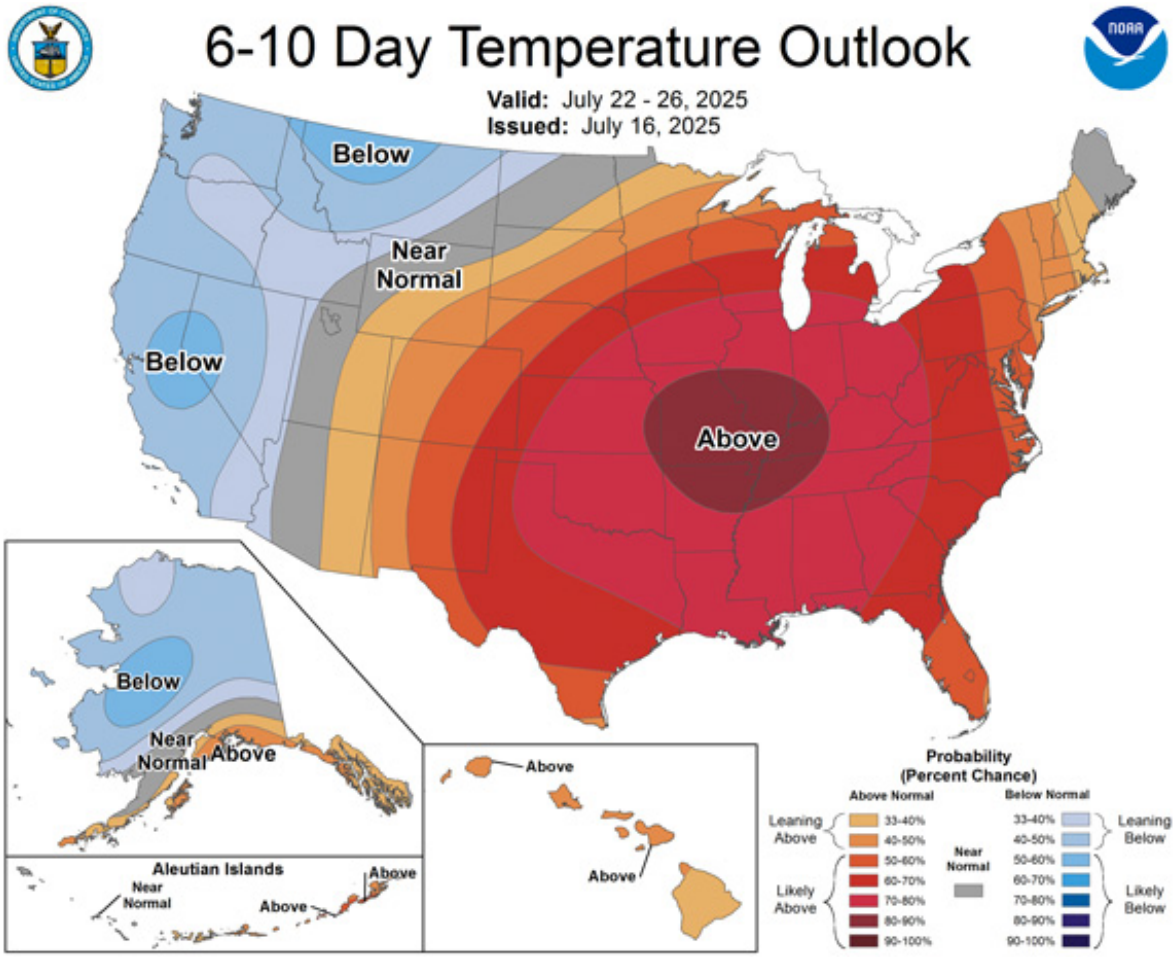

Figure 4. Temperature outlook for July 22-July 26, 2025. Source: Climate Prediction Center.

What can farmers do now?

Unfortunately, there is nothing that can correct poor pollination. However, scouting fields and evaluating the kernel set can provide a clearer picture of the potential yield impact. This is especially important in fields that experienced rapid growth earlier this growing season. Performing yield estimates can help inform decisions about subsequent inputs, like fungicides, if the yield estimate is well below the target.

More information about how to estimate corn yield potential can be found in a companion article in this eUpdate.

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3. Corn production: Estimating yield potential

With most corn fields in Kansas already in reproductive stages (or close to flowering for late-planted fields), it is time to start assessing grain yield potential. Successful pollination is a critical aspect that farmers can evaluate by examining ear silks. Having conditions that favor the synchrony between the pollen shed by the tassels and the silks, the exposed silks should turn brown and easily separate from the ear when the husks are removed.

Corn flowering

The cool, wet early season, followed by a rapid onset of very warm temperatures, triggered a period of rapid growth for some corn fields in eastern and central Kansas. This unique set of environmental conditions sets the stage for potential pollination issues. In some fields, tassels remain tightly wrapped in the upper leaves and fail to shed pollen properly, causing pollination issues leading to poor or reduced kernel set. More about this phenomenon, with photos, can be found in a separate companion article in the eUpdate edition.

Another important point relates to the timing of heat and water stress. Water stress around flowering time (R1, http://www.bookstore.ksre.ksu.edu/pubs/MF3305.pdf) will negatively impact pollination due to a lack of synchrony between the pollen release and the emergence of the silks, which is a process that requires a lot of water. Heat stress around flowering will mainly impact the viability of the pollen. Usually, under dryland conditions in Kansas, water and heat stress happen together. Silks that have not been successfully pollinated will stay green, possibly growing several inches long (Figure 1). Unpollinated silks will also be connected securely to the ovaries (the undeveloped kernels) when the husks are removed.

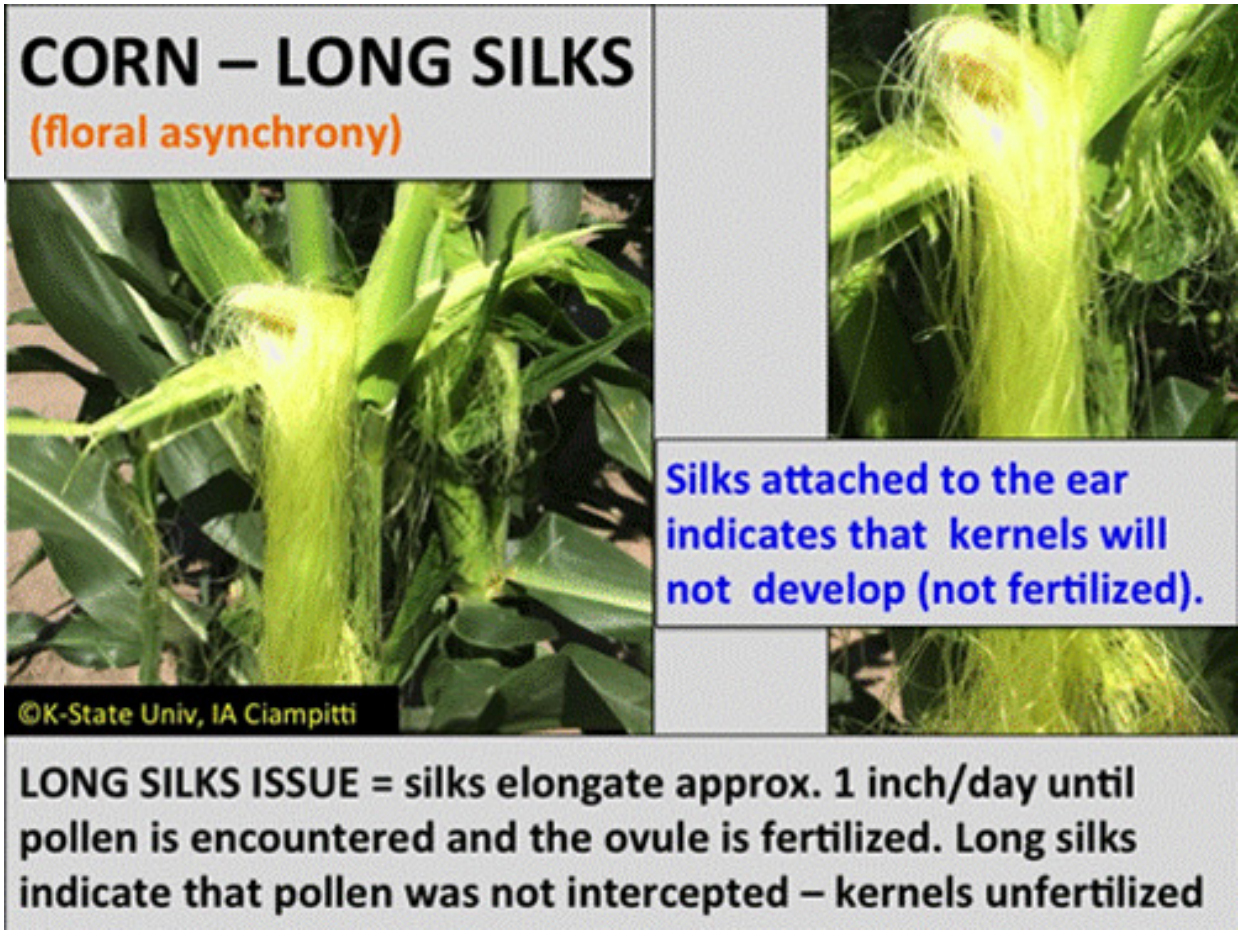

Figure 1. Long silks primarily reflecting floral asynchrony. Silks that have not been successfully pollinated will stay green. Infographic by I. Ciampitti, K-State Research and Extension.

Corn yield potential estimation

Once pollination is complete or near completion, farmers could begin to estimate corn yield potential. To obtain a reasonable estimate, corn should be at least in the milk stage (R3). Corn can move quickly from silking to milk stage while only a limited portion of the state is in dough (R4), based on the USDA-NASS crop progress estimate of 11% in dough as of July 13. Before the milk stage, since grain abortion is still possible under stress conditions (mainly due to drought and/or heat stresses), it is difficult to tell which kernels will develop and which ones will abort.

To estimate yields, we can use the yield component method (Figure 2). This approach uses a combination of known and projected yield components. It is considered "potential" yield because one of the critical yield components, kernel size, remains unknown until physiological maturity or black layer (R6). Therefore, we can only make an estimate of predicted yield based on expected conditions during the grain filling period (e.g., favorable, average, or poor).

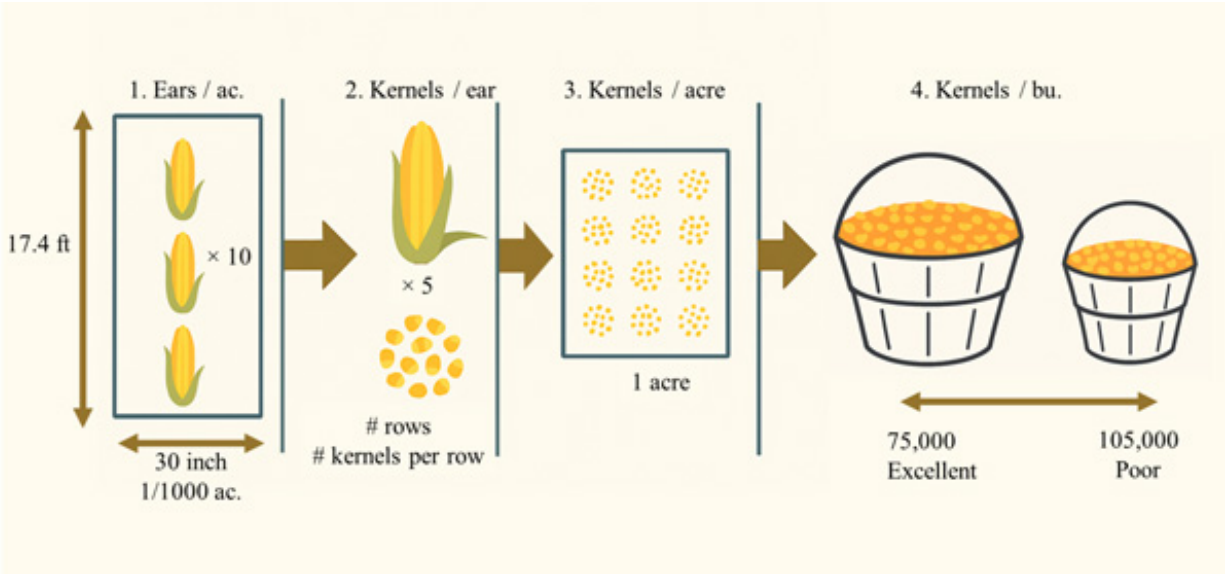

Figure 2. Example of corn yield estimation under the "yield components method". Graphic by Tina Sullivan, K-State Research and Extension.

Steps to estimating corn yield using yield components:

Step 1. Ears per acre via ear count in a known area, **[Figure 2, step 1]**

- With 30-inch rows, 17.4 feet of row = 1,000th of an acre. The number of ears in 17.4 feet of row x 1,000 = the number of ears per acre. Counting a longer row length is fine, just be sure to convert it to the correct portion of an acre when determining the number of ears per acre.

- Make ear counts in 10 to 15 representative parts of the field or management zones to get a good average estimate. The more ear counts you make (assuming they accurately represent the field or zone of interest), the more confidence you have in the yield estimate.
- Example: (25 + 24 + 25 + 21 + 24 + 26 + 23 + 21 + 25 + 23)/10 = 23.6 ears. Scaling up to an acre: 23.6 x 1,000 = **23,600 ears per acre.**

Step 2. Kernels per ear, [Figure 2, step 2]

- There are two sub-components of kernels per ear: (i) the number of rows per ear and (ii) the number of kernels within each row. Most likely, the number of rows will be around 16, and ears always keep an even number of rows.
- The number of kernels per row depends on multiple factors, starting from the hybrid, but mainly on the growing conditions around flowering.
- To arrive at kernels per ear, multiply the two sub-components (number of rows x kernels per row).
    - *Note: Do not count aborted kernels or the kernels on the butt of the ear; count only kernels that are in complete rings around the ear. Do this for every 5th or 6th plant in each of your ear count areas. Avoid odd, non-representative ears.*

- Counting 5 ears from each 17.4-foot area had an average of 16 rows and 27 kernels per row: 16 x 27 = **432 kernels per ear**

Step 3. Kernels per acre = Ears per acre x kernels per ear, **[Figure 2, step 3]**

- 23,600 ears per acre x 432 kernels per ear = **10,195,000 kernels per acre**

Step 4. Kernels per bushel, [Figure 2, step 4].

- This must be estimated until the plants reach physiological maturity.
- Common values range:
    - Excellent: 75,000 to 80,000 for excellent
    - Average:85,000 to 90,000
    - Poor: 95,000 to 105,000
- At this point, the best you can do is estimate a range of potential yields depending on expectations for the rest of the season.
- Example: Under a scenario of temperatures above 100°F for the next 7-14 days and lack of rains (and if these conditions persist), it might be more than reasonable to assume below-average grain-filling conditions producing overall medium to small kernels. Based on the projected weather, a reasonable value might be **100,000 kernels per bushel**. Note - this is just an example value for this scenario.

Step 5. Bushels per acre:

- 10,195,000 kernels per acre ÷ 100,000 kernels per bushel ~ **102 bushels per acre**

Final considerations

If these estimates are close to correct, the example field used here is probably worth taking to grain harvest. Past experience indicates that this method of estimating yield usually provides somewhat optimistic estimates. Please consider these points when doing these field estimations.

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4. Southern rust is now active in central and eastern Kansas

Southern corn rust continues to spread in the southern part of the US and is now detected in four counties across central and eastern Kansas (Figure 1). In cooperation with K-State Plant Pathology Department, the Kansas Corn Commission has launched an online Corn Disease Resource Center (https://kscorn.com/corndisease/) to help corn growers identify what diseases to watch for in their geographic area. Unlike some other corn diseases, such as tar spot and gray leaf spot, southern rust does not survive in Kansas during winter months and blows in annually from more tropical regions. The severity is dependent on the weather, and southern rust likes 90-degree days, warm nights, and high humidity.

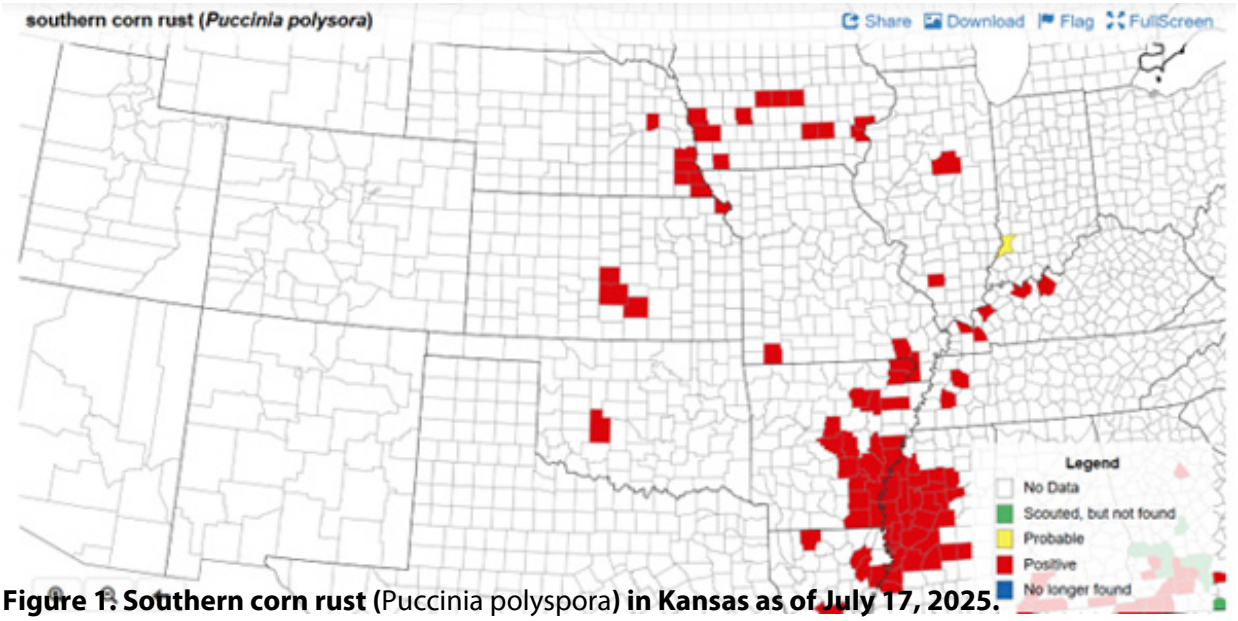

Figure 1. Southern corn rust (Puccinia polyspora**) in Kansas as of July 17, 2025.**
Source: https://kscorn.com/corndisease/

Here are some frequently asked questions related to managing southern rust in Kansas.

Should I apply a fungicide prior to observing southern rust?

Applying a fungicide to control southern rust is not recommended unless the disease has been observed in the canopy. Now that southern rust has been reported in Kansas, it is time to scout corn fields. Once pustules are observed, the pathogen can reproduce rapidly if temperatures and humidity are high.

What factors should I consider when making the decision to spray for southern rust?

It is important to consider hybrid susceptibility, disease incidence (how many plants are affected), and the crop's growth stage. Infection early in the season on a susceptible hybrid, coupled with conducive weather conditions, poses the highest risk for yield loss.

If I apply a foliar fungicide at tasseling (VT) or silking (R1) to control tar spot and gray leaf spot, will this application have efficacy against southern rust?

Yes. Most fungicides labeled for tar spot and gray leaf spot are also effective for southern rust. Depending on the product, they will have residual activity for approximately three weeks after application. Fields should be carefully monitored for disease development.

What fungicides are best to control southern rust?

Efficacy ratings for corn fungicide management of southern rust have been compiled by a working group of corn researchers and can be found here: Crop Protection Network

How do I know if what I'm seeing is southern rust?

Southern rust produces characteristic orange pustules of spores, primarily on the upper side of the leaf (Figure 2). If you run your finger across the pustules, the orange spores will be visible on your hand.

Figure 2. Southern rust on corn. Photo courtesy of Rodrigo Borba Onofre, K-State Research and Extension.

Please help us track Southern Rust

If you suspect a field has Southern Rust, contact Rodrigo Onofre directly at 785-477-0171 and/or submit a sample to the K-State Plant Disease Diagnostic Lab at https://www.plantpath.k-state.edu/extension/diagnostic-lab/documents/2021_PP_DiseaseLabChecksheet.pdf.pdf. This will help us monitor the situation in the state.

For more information on identifying corn rusts, see K-State Research and Extension Bulletin MF3016, Corn Rust Identification and Management in Kansas.

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5. Save the date for the Wheat Rx Preplant Seminar - August 20 in Pratt

All are invited to attend the Wheat Rx Preplant Seminar on Wednesday, August 20, 2025, in Pratt, Kansas. This educational event is hosted by K-State Research and Extension and Kansas Wheat and will cover critical topics to support wheat management decisions ahead of the 2025-26 planting season.

The seminar will feature expert presentations on:

- Wheat variety selection
- Wheat streak mosaic virus
- Conservation practices in wheat-based cropping systems
- Wheat management for high yield and profit

This seminar is part of the Wheat Rx initiative, an ongoing partnership between Kansas Wheat and K-State Research and Extension to promote the adoption of proven, research-based management strategies for producing high-quality, high-yielding winter wheat in Kansas. In this event, we will also highlight a new initiative to promote the adoption of conservation practices in wheat-based cropping systems across Kansas, which is funded by the National Fish and Wildlife Foundation. In addition to in-person seminars, the Wheat Rx effort includes a collection of Extension publications and resources available at kswheat.com/wheatrx.

Event Details

Date: August 20, 2025
Location: Pratt County 4-H Events Center
Address: 81 Lake Road, Pratt, KS
Registration: https://kswheat.com/prattrx

Tentative Program Schedule

Time	Topic	Speaker
8:00 AM	Registration	
8:15 – 8:45	Kansas Wheat Overview	Aaron Harries
8:45 – 9:30	Wheat Variety Selection	Allan Fritz
9:30 – 10:15	Wheat Streak Mosaic Virus	Kelsey Andersen Onofre
10:15 – 10:30	Break	
10:30 – 11:15	Conservation Practices in Wheat-Based Systems	Logan Simon
11:15 – Noon	Wheat Management for High Yield and Profit	Romulo Lollato
Noon	Lunch	

Registration

Members of the Kansas Association of Wheat Growers (KAWG) receive one free registration to this event. Non-member registration is $110. To take advantage of the member benefit, join or renew at

kswheat.com/join. The registration link for the event is https://kswheat.com/prattrx. Lunch will be provided for all attendees.

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6. Sorghum Connection field day series returns in 2025

The Kansas Grain Sorghum Commission, K-State Department of Plant Pathology, and K-State Research and Extension will host the 2025 Sorghum Connection field day series in August. The series will showcase current research on fungicides and seed treatments, hybrid performance, cropping systems, fertility management, and hands-on precision ag techniques with drone technology for mapping and spraying applications through a statewide lineup of speakers and on-farm demonstrations. This year's field day series includes three events across Central and Western Kansas:

Bavaria Field Day, held in conjunction with producer Alex Bacon – **Aug. 27 at 10 a.m**.
Directions: 1½ miles west of Bavaria, then ¾ mile north on South Powers Road

Russell Field Day, held in conjunction with producer Michael Anschutz – **Aug. 28 at 10 a.m**.
Directions: 9 miles south of Russell on Winterset Road, then ½ mile east of Highway 281

Dighton Field Day, held in conjunction with producer Andy Hineman – **Aug. 29 at 10 a.m**.
Directions: 6 miles south of Dighton, then 1 mile east at the intersection of Longhorn Road and Road 90

Lunch will be provided following the program. The events are free, but to ensure your meal, registration is required at www.ksgrainsorghum.org/sorghum-connection.

Speakers include Adam York, administrator for the Kansas Grain Sorghum Commission; Sarah Sexton-Bowser, managing director for the Center for Sorghum Improvement; Deepak Joshi, K-State assistant professor of precision agriculture; and extension specialists Tina Sullivan, Logan Simon, and Rodrigo Onofre.

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THE SORGHUM CONNECTION FIELD DAY SERIES RETURNS TO A COMMUNITY NEAR YOU

AUGUST 27 | BAVARIA, KANSAS
Located 1 1/2 mile west of Bavaria, then 3/4 mile north on South Powers Road

AUGUST 28 | RUSSELL, KANSAS
Located 9 miles south of Russell on Winterset Road, then 1/2 mile east of Highway 281

AUGUST 29 | DIGHTON, KANSAS
Located 6 miles south of Dighton, then 1 mile east at the intersection of Longhorn Road and Road 90

ALL EVENTS ARE TO BEGIN AT 10:00 A.M.
LUNCH TO FOLLOW

RSVP AT KSGRAINSORGHUM.ORG/SORGHUM-CONNECTION

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7. Upcoming webinars to address the Wheat Streak Mosaic outbreak - July 29

Kansas State University specialists will host a virtual meeting on the wheat streak mosaic complex on Monday, July 29, with two live sessions offered to accommodate varying schedules.

Wheat streak mosaic virus (WSMV), along with triticum mosaic virus and high plains wheat mosaic virus, continues to be a persistent threat to wheat yields across Kansas. The 2025 outbreak has underscored the ongoing need for vigilant management and up-to-date recommendations.

Webinar Details

Date: Monday, July 29, 2025
Session Options:

- **Afternoon:** 2:00 – 3:30 p.m.
- **Evening:** 7:00 – 8:30 p.m.

Both sessions will cover the same material and include time for Q&A.

These sessions are open to farmers, ag professionals, consultants, and anyone interested in learning more about the wheat streak mosaic complex.

Topics to be covered:

- Overview of the 2025 wheat streak mosaic outbreak
- Biology of wheat curl mites and the viruses they transmit
- Best practices for volunteer wheat control
- Variety resistance and how to select appropriate varieties
- Open Q&A and discussion with specialists

Several K-State Research and Extension specialists will be on hand to present information and answer questions. Attendees will gain practical insights into managing this complex disease system ahead of the next wheat planting season.

Registration

Details for registration and Zoom access will be announced soon. Please watch the upcoming eUpdate issues.