Issue 1023

K-STATE Research and Extension

Extension Agronomy

eUpdate

10/03/2024

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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eUpdate Table of Contents | 10/03/2024 | Issue 1023

1. Planting cereal rye after corn harvest

A publication from K-State and the Midwest Cover Crop Council provides helpful information for producers looking to incorporate a cereal rye cover crop following corn harvest. This factsheet is an excellent resource for farmers that are new to cover crops.

Cereal rye can be part of an effective weed management program in soybean production. The growing cover crop competes with weeds that emerge early in the spring, and residue from the terminated cereal rye can suppress weed growth. Cereal rye residue can also reduce evaporation from the soil during the growing season (Figure 1).

Figure 1. "Clean" soybeans - the heavy residue mat from the terminated cereal rye cover crop is helping control weeds throughout the growing season. Photo by DeAnn Presley, K-State Research and Extension.

Planning and Preparation

- **Residual corn herbicides**—Fall-seeded cereal rye can be established successfully following the application of most herbicides used in corn production, but success is influenced by herbicide rate and environmental conditions that follow the herbicide application. If cereal rye will be grazed or fed to livestock, there are some restrictions. See the USDA-NRCS Cover

Crop Termination Guidelines, or consult your agricultural chemical supplier or agronomist for potential carryover herbicide concerns, and always read and follow the instructions on the herbicide label.
- **Seed purchase**—Order cereal rye seed early. Named varieties can produce substantially more growth or more predictable growth and maturity but are more expensive than VNS (variety not stated) seed. Start with VNS seed with a good germination rate that is purchased from a reputable seed dealer. This means the seed has been cleaned, tested for germination, and has a seed tag even though it is VNS.

Fall Work

- **Corn harvest**—Harvest the crop as early as possible in fields to be planted to cereal rye.
- **Tillage or no-tillage**—To allow for adequate cover crop growth, it is best or easier if no full-width tillage is planned for after rye planting or before the intended rye termination date. Thus, it is easier to integrate cover crops into no-till or strip-till systems.
- **Timing of planting**—Plant cereal rye as soon after corn harvest as possible. Use the Cover Crop Selector Tool (in Resources) to find planting dates for your county. For most of Kansas, plant no later than November 1.
- **Seeding rate**—The recommended drilled seeding rate is 55 to 60 pounds per acre; if seeded with an airplane, the rates should be 1.5 times the drilled rate (required if participating in USDA-NRCS programs). These rates are based on high-quality seed with germination rates of 85 to 98%. Increase rates with later plantings.
- **Planting method**—Drill seed 0.75 to 1.50 inches deep or broadcast with shallow incorporation.

This publication covers various topics, which are summarized in this article. The complete factsheet can be viewed at: https://bookstore.ksre.ksu.edu/pubs/MF3504.pdf.

Additional resources

Cover Crop Selector Tool – http://mccc.msu.edu/selector-tool/, available from Midwest Cover Crops Council, www.mccc.msu.edu

USDA-NRCS Cover Crop Termination Guidelines – https://www.rma.usda.gov/en/Topics/Cover-Crops

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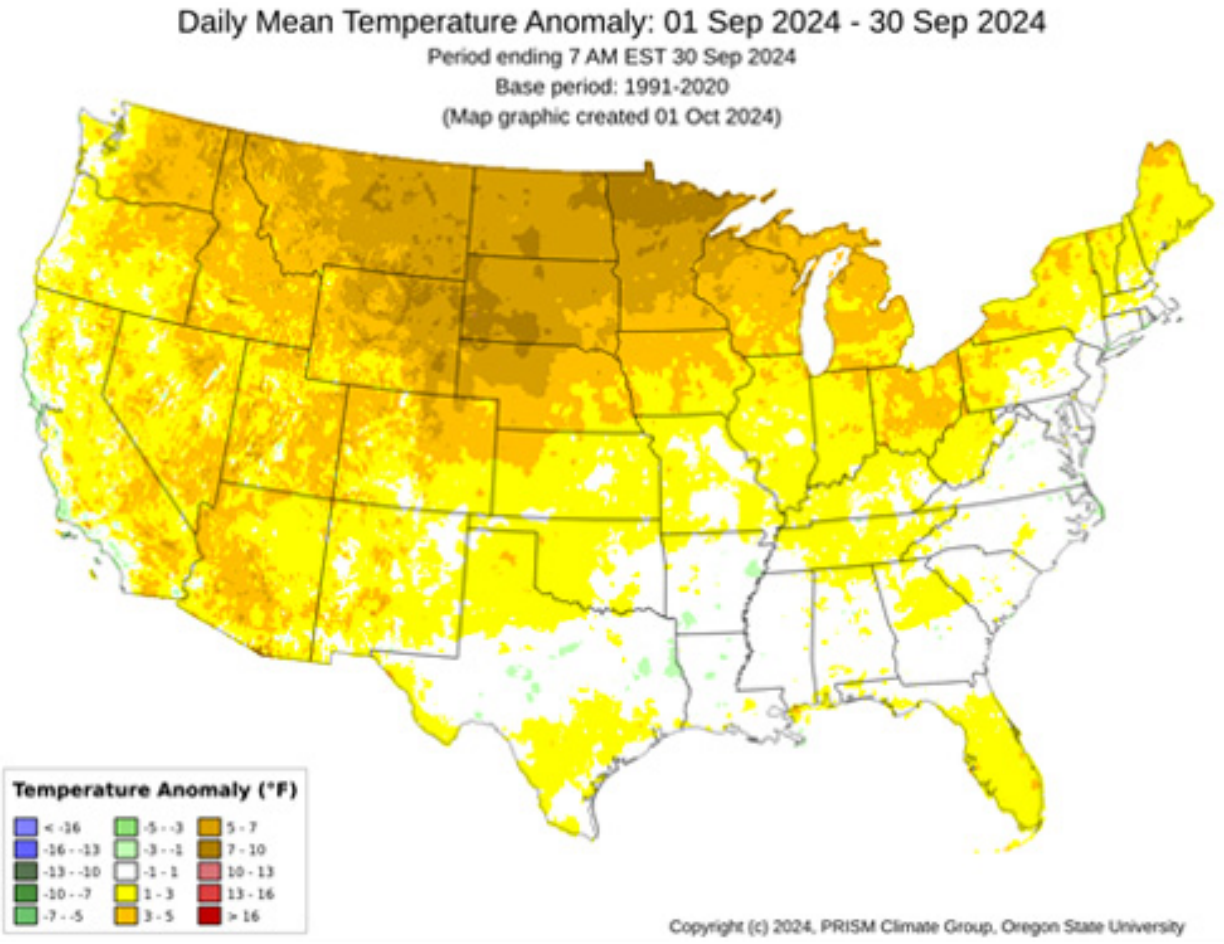
2. Rate of dry down in sorghum before harvest

The latest Crop Progress and Condition report from Kansas Agricultural Statistics, on September 30, stated that grain sorghum maturity was 60%, near 56% last year, and ahead of the average (50%). Harvest is underway at 17% this year, ahead of the 5-year average (11%).

The weather conditions experienced from early September to early October are critical for sorghum as they are related to the grain-filling rate and the determination of final grain weight. While there were periods of briefly cooler conditions, temperatures were, on average, warmer than normal during September (Figure 1). Temperature swings were 30-40°F daily with dry air in place. Precipitation was much more varied, with isolated portions of south-central and east-central Kansas receiving 4+ inches of rain. Despite the higher amounts in some locations, the intensity of the rainfall led to briefly increased runoff and poor uptake by the soil. Areas that missed the heaviest precipitation events only received 10-20% of normal for the month (Figure 1). Therefore, drier-than-normal conditions prevailed to end the month across the state, even where moisture was received.



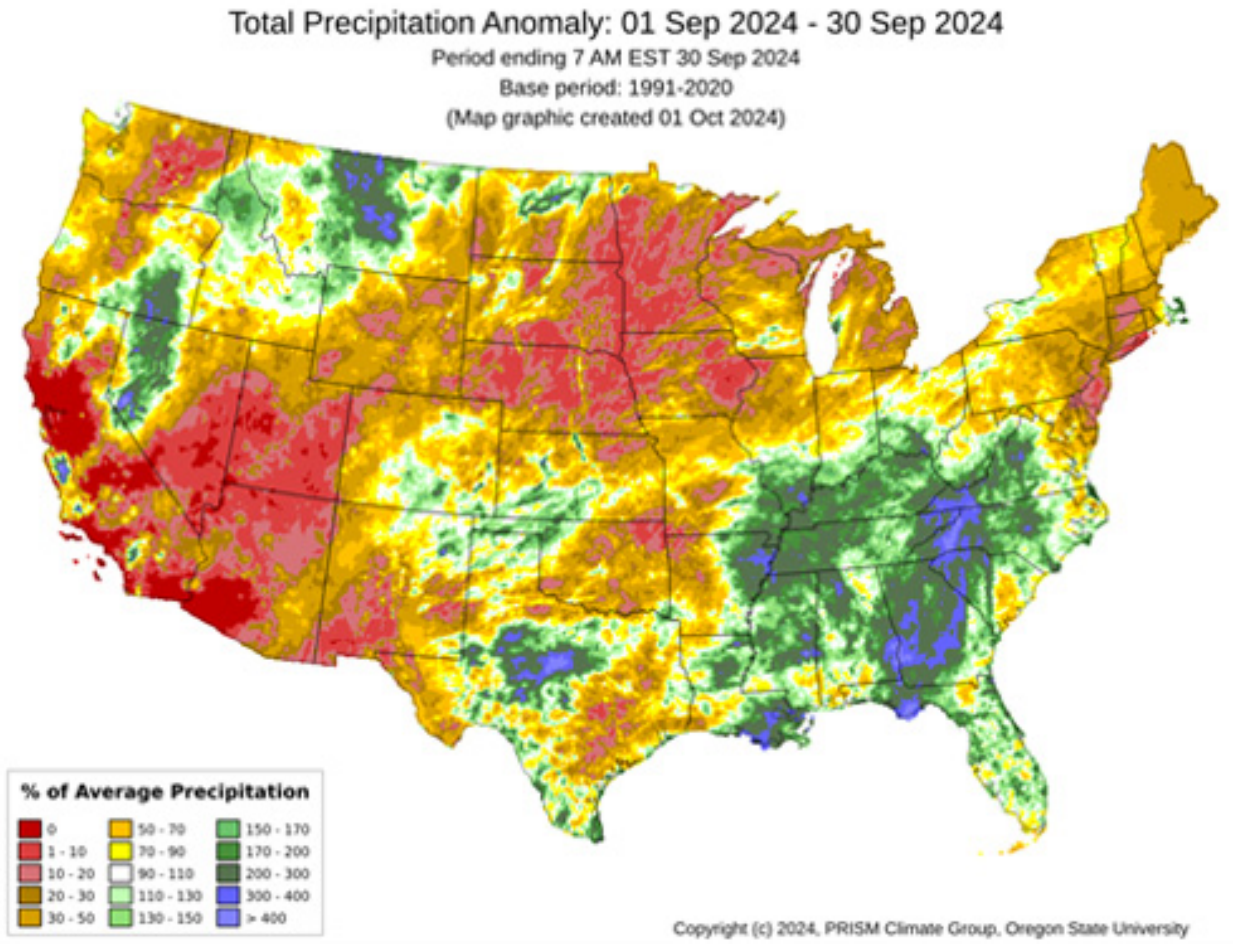


Figure 1. Departure from normal temperatures (top map) and percent of normal precipitation (bottom map) from September 1 – 30, 2024. Maps by Kansas Weather Data Library.

In recent years, a common question from producers is related to the dry down rate for sorghum when approaching the end of the season. Based on previous information, the average dry down rate depends on the weather, primarily temperature and moisture conditions, but data from modern hybrids is limited. The weather outlook for the remainder of October and into November favors the continuation of below-normal precipitation for the state. With normal precipitation in November much less than in October, this could mean almost no moisture. This would favor a faster dry down rate than average, but any sorghum impacted by freeze (should an event occur) will present challenges in the dry down rate.

From a crop perspective, the overall cumulative GDD from flowering to maturity is about 800-1200 (based on 50 degrees F as the base temperature), with the shortest requirement in GDD for short-season hybrids. Before maturity, from the beginning of grain filling (soft dough until maturity), grain moisture content within a grain will go from 80-90% to 25-35%, where black-layer is usually formed (Figure 2). From maturity (seen as a "black-layer" near the seed base; Figure 2) to harvest time, sorghum grain will dry down from about 35 to 20 percent moisture, but the final maximum dry mass accumulation and final nutrient content will have already been attained at maturity.

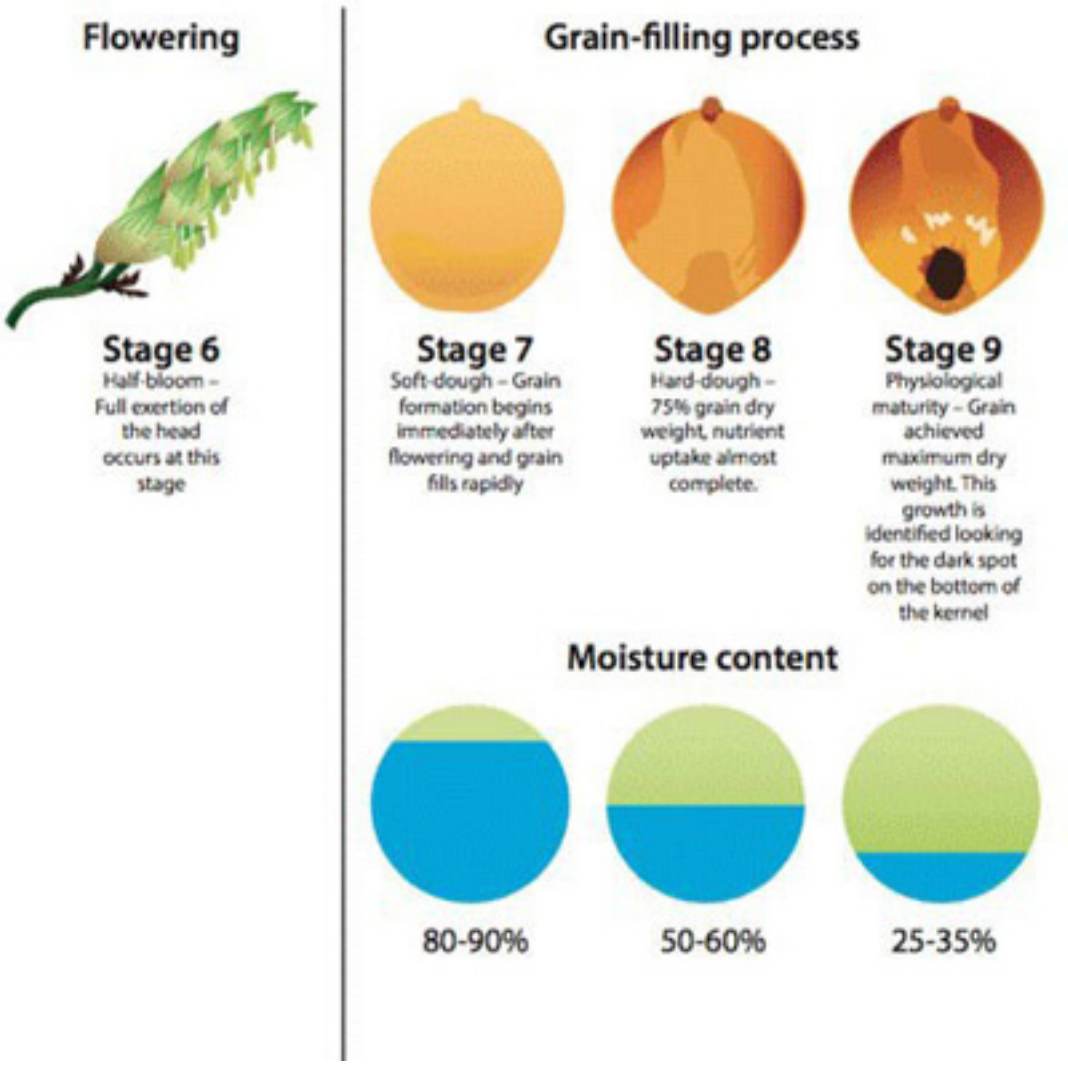


Figure 2. Sorghum growth stages from half-bloom and grain filling (including soft dough, hard dough, and physiological maturity). Infographic representing changes in grain coloration and moisture content during grain filling period until black layer formation (maturity). For further reference on sorghum growth and development please check: https://bookstore.ksre.ksu.edu/pubs/MF3234.pdf. Graphic by K-State Research and Extension.

Grain water loss occurs at different rates but with two distinct phases: 1) before "black-layer" or maturity (Figure 2), and 2) after black-layer. For the first phase, Figure 2 presents the changes in grain moisture from soft dough until the physiological maturity of sorghum.

To answer the rate of dry down question from many of our producers, a study was conducted to investigate the effect of the grain dry down rate from the moment of "black-layer" until commercial harvest grain moisture is reached. For the conditions experienced in 2019, 2021 and 2022 (from early September until Mid-October), the overall dry down rate was around 0.7% per day (from 31-34% to 16-17% grain moisture) – taking an overall of 30 days.

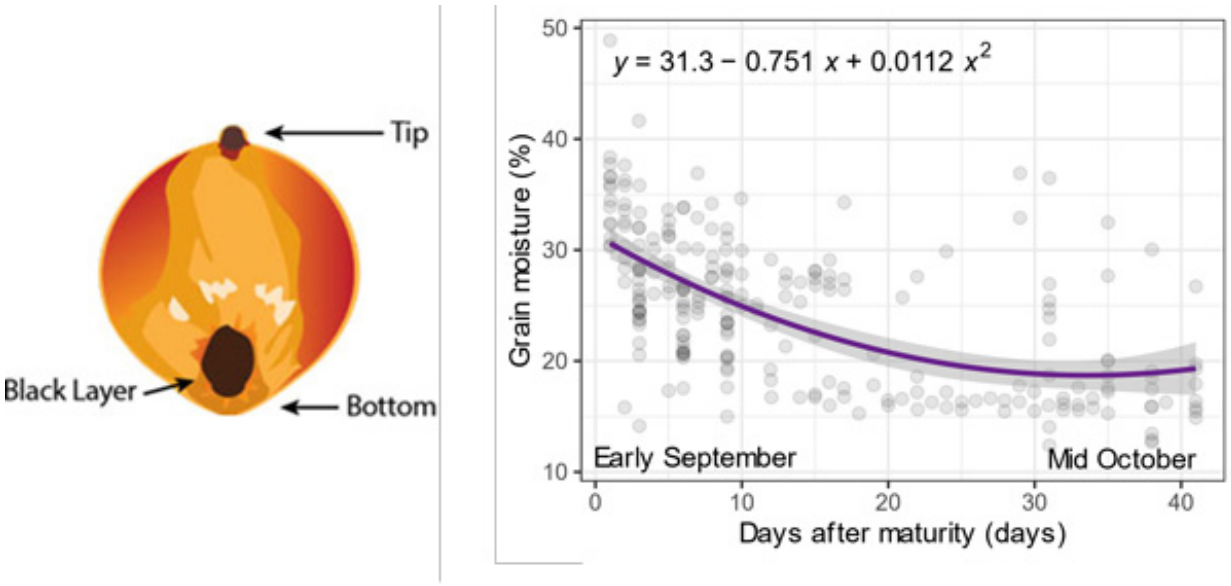


Figure 3. Grain moisture dry down across different sorghum hybrids for a study near Manhattan, KS (2019, 2021, and 2022 growing seasons). The graphic in the left panel illustrates the black layer stage of grain for sorghum. Graphics from K-State Research and Extension.

This dry down process can be delayed by:

- Low temperatures
- High humidity
- High grain moisture content at black layer (38-40%)

It is expected that the dry down rate will decrease to around<0.5% per day for late-planted sorghum entering reproductive stages later in the growing season. A similar decrease is also expected for sorghum that was exposed to late-season stress conditions (e.g., drought, heat, and freeze). Under these conditions, maturity may be reached with high grain water content, and the last stages after black layer formation could face lower temperatures and higher humidity. These main factors should be considered when the time comes to schedule harvest.

You can track temperature and humidity levels on the Kansas Mesonet website at http://mesonet.k-state.edu/weather/historical/ by selecting the station and time period of interest.

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3. Fall soil testing of hayfields and pastures

Knowing the soil nutrients is a requirement for establishing an adequate soil fertility program for forages. Soil testing can be done in either spring or fall on hayfields and pastures. 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 gives the producer some flexibility for planning nutrient applications.

Figure 1. Fertility management effect in bermudagrass pastures. The left side of the pasture received an application of nitrogen fertilizer, while the right side did not. Photo credit: K-State Research and Extension.

Soil sampling is typically recommended at least every 3-4 years, but more frequent sampling (every two years) can prevent excessive and unnecessary application of fertilizer or manure and increase yields by revealing exactly which soil nutrients are too low for optimum productivity. This is particularly important during years with high fertilizer prices.

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 also 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 (in a clean container, avoiding contamination) and mixing thoroughly. Ideally, one composite soil sample should represent a uniform and treatable area, not exceeding 40 acres, and no more than 10 acres for more variable fields. In 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 have different soil types, then soil sampling from these areas should be done separately.

For pH evaluation, the sampling depth for pastures and hayfields should be 3 to 4 inches. A 24-inch sample is needed for mobile nutrients, nitrogen, and sulfur. A 6-inch depth is preferred for phosphorus and potassium 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

Soil pH is one key soil property for forage production, especially with legumes. The optimal pH level is 6 to 7, depending on the forage species. Grasses such as brome or fescue do well at lower pH than legumes, especially alfalfa, which requires a near-neutral pH (~pH 7). Nutrient uptake can be reduced if the soil pH is too low or too high. The impact of pH on nodulation and nitrogen fixation is especially important for legumes such as alfalfa and clover. 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. 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 corrections should be made before planting. Sulfur and boron may also be a limiting nutrient for legumes, especially in eastern Kansas.

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 974, September 14, 2023.

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4. Corn stunt spiroplasma: A new threat to Kansas corn

Corn stunt spiroplasma (CSS, *Spiroplasma kunkelii*) and its associated vector (corn leafhopper, *Dalbulus maidis*) have been recently confirmed in Kansas. Corn stunt spiroplasma has been confirmed in 26 counties (Figure 1). Recent scouting efforts across Kansas confirm active leaf hoppers in many additional counties. Although the majority of the positive reports are from field corn, we also confirmed corn stunt spiroplasma in sweet corn as well. High levels of disease were found in late-planted and double-cropped corn, leading to potential yield reduction.

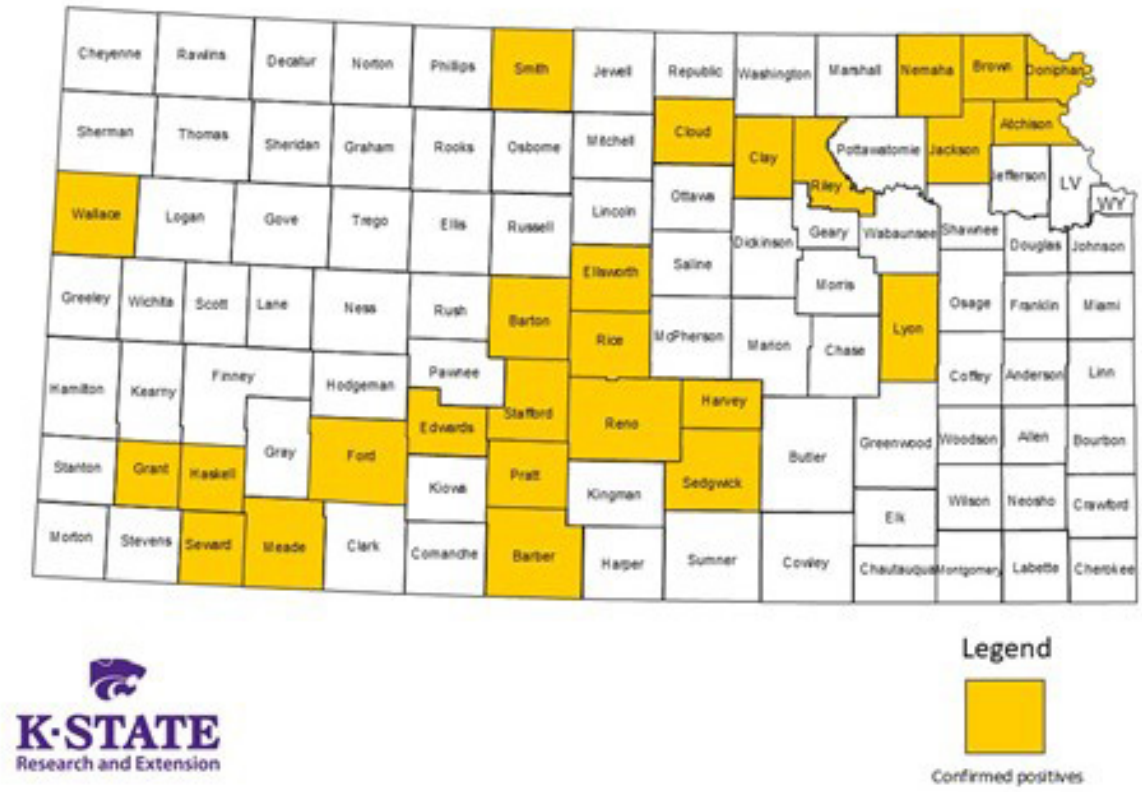

Figure 1. **Corn stunt disease distribution in Kansas in 2024 as of October 3, 2024. Yellow represents counties from which samples have been confirmed positive by laboratory testing and may not reflect complete distribution in the state.**

Symptoms of the disease may include shortened internodes, which can result in a stunted stature of the corn plant as well as leaves with red discoloration (Figure 2). Because other biotic and abiotic factors can cause red or purple discoloration in corn, laboratory testing is important to diagnose corn stunt disease and distinguish it from other stressors.

In the past, corn stunt disease has been limited in distribution to southern Texas, Florida, and California in the United States. Corn stunt is caused by a wall-less bacterial pathogen called **corn stunt spiroplasma** (CSS, *Spiroplasma kunkelii*). The corn leafhopper can also can also transmit additional pathogens, either singly or in combination with the corn stunt spiroplasma. To date, only

corn stunt spiroplasma has been detected in Kansas. Additional research is needed to determine the presence of other pathogens vectored by corn leafhopper in Kansas.

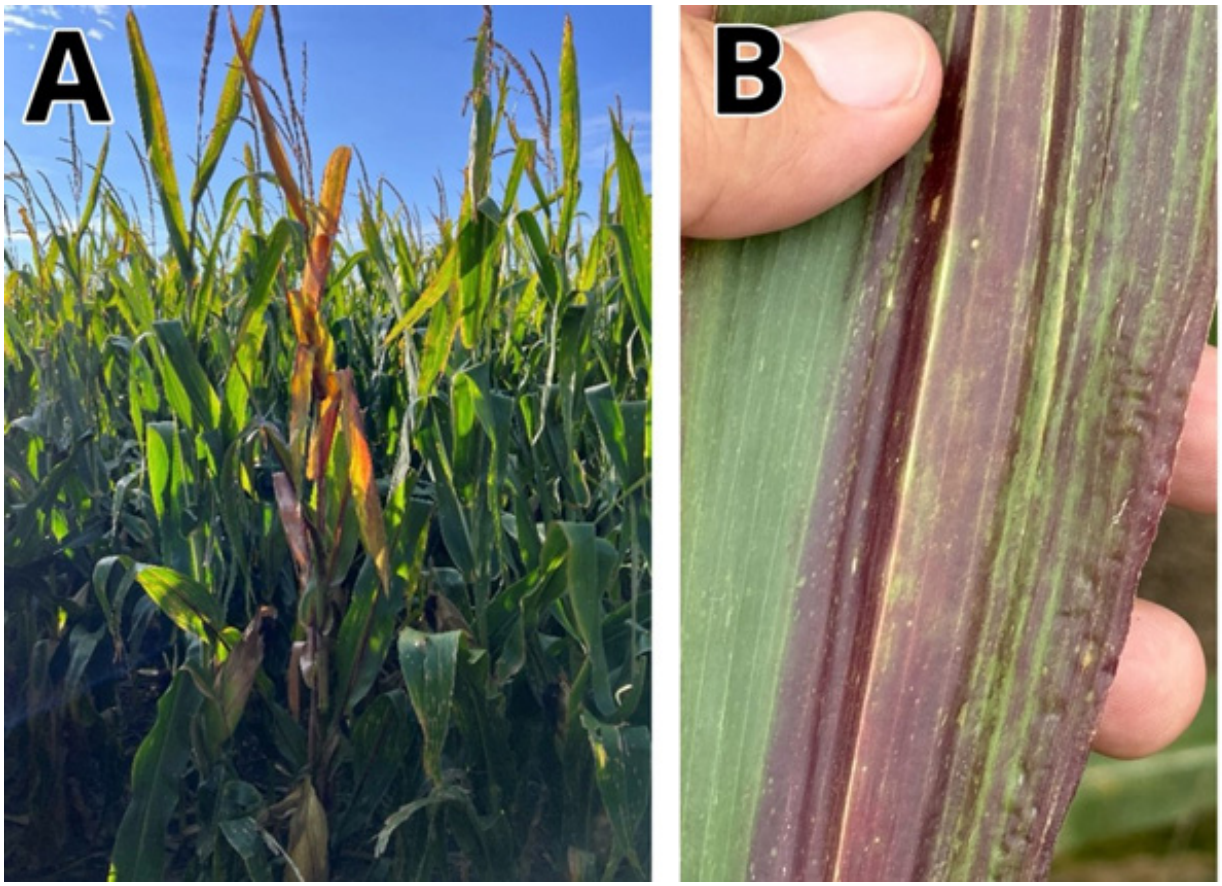

Figure 2. Symptomatic corn plant and a close-up of a leaf showing red discoloration and streaking. Photo courtesy of Rodrigo Onofre, K-State Research and Extension.

This disease is spread only by the corn leafhopper (*Dalbulus maidis*) (Figure 3), which was also just confirmed in Kansas. Corn leafhopper acquires pathogens within minutes of feeding on infected corn plants but it can take up to 30 days for the leafhopper to be able to infect healthy corn plants during feeding events.

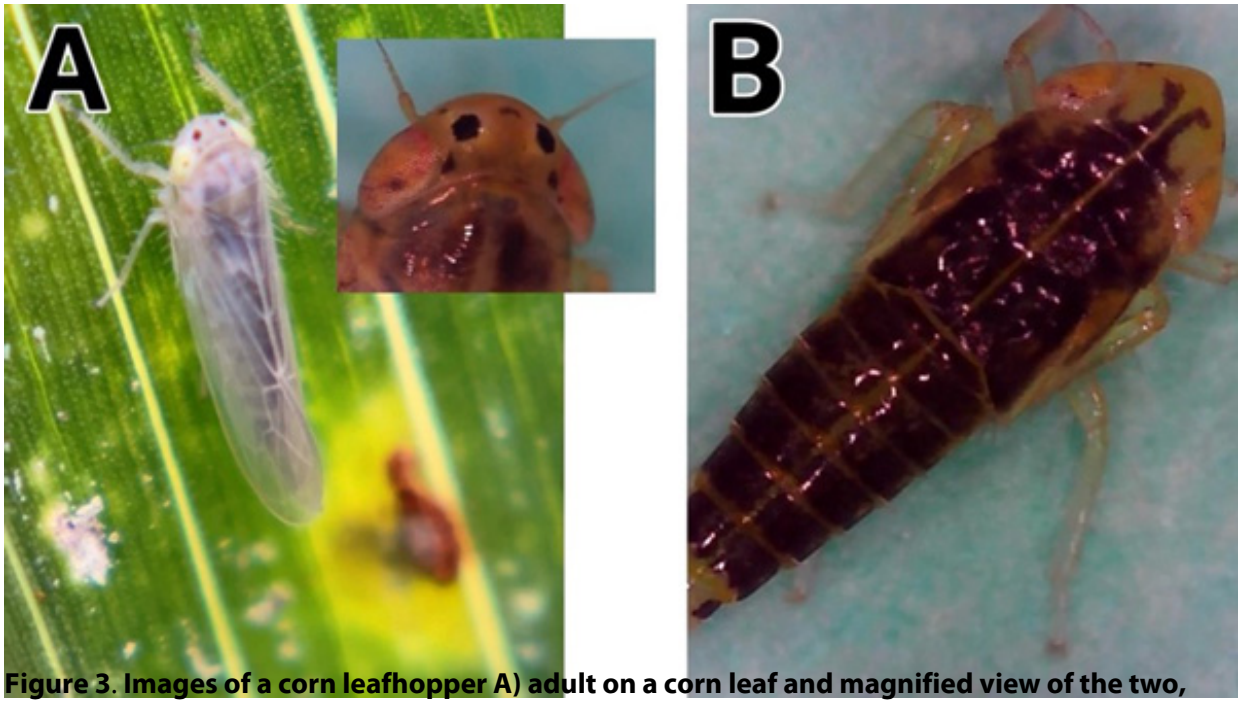

Figure 3. Images of a corn leafhopper A) adult on a corn leaf and magnified view of the two, black spots between the eyes; and B) nymph showing dark brown coloration and developing wing pads. Photo courtesy of Brian McCornack, K-State Research and Extension.

The corn leafhopper is relatively simple to identify under magnification. These leafhoppers are light tan to yellowish-white in color and approximately 1/8" long. Two distinct dark spots between the antennae and eyes are very characteristic of this species. Nymphs lack wings and can vary in color. Like most leafhoppers, all stages move quickly when disturbed and hide in shaded areas of corn plants. All stages can be sampled using a sweep net; a video showing how to sample for corn leafhoppers in mature corn canopies can be found here: https://youtu.be/QgLuWWSwHWU.

Disease testing – Help us track the disease

If you suspect a field has corn stunt, submit a sample to the K-State Plant Disease Diagnostic Lab. The best type of sample for corn stunt testing is **living symptomatic leaf tissue** (Figure 4- right side). Dry/senesced corn leaves are not recommended (Figure 4 – left side) and may lead to inconclusive results. Entire plants are not required to test for this disease, as only the midrib will be used in testing.

Figure 4. Poor dry/senesced corn leaves (left) and living symptomatic corn leaves (right).

Collection and shipping instructions can be found below:

- Collect and ship samples on or before Wednesday to avoid weekend storage
- Collect symptomatic living leaves (ideally from multiple symptomatic plants)
- Label and use plastic bags; Do not use paper bags, and do not add water.
- Fill out submission form. Include variety/hybrid info
- Ship leaves ASAP overnight via UPS or FedEx when possible. USPS can take up to 14 days
- Send photos to clinic@ksu.edu with the tracking number or date shipped
    - Three types of images to send:
        - Symptom/problem close -up and in focus
        - Entire plant from ground level to the top of plant
        - Site – capture the pattern in the field; transition areas, terraces, etc.

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5. Kansas Bankers Association Conservation Awards Program: Nominations due Nov. 8

Nominate a deserving Kansas producer or landowner for the 2024 Kansas Bankers Association Conservation Awards Program. This year, the Kansas Bankers Association, K-State Research and Extension, and the Kansas Department of Wildlife and Parks have announced six award categories:

- **Energy Conservation**
- **Water Quality**
- **Water Conservation**
- **Soil Conservation**
- **Windbreaks**
- **Wildlife Habitat**

This program aims to stimulate a greater interest in conserving Kansas's agricultural and natural resources by recognizing farmers and landowners who have made outstanding progress in practicing conservation on their farms. In 2023, 120 Kansas producers and landowners were recognized through this program.

Submit this form to the County Extension Office or District Biologist for Kansas Wildlife, Parks, and Tourism (Wildlife Award only) no later than **November 8, 2024**.

A committee of conservation professionals will submit the names of the selected recipients to the KSU Agronomy Extension office (or KDWPT for Wildlife Award) by December 6, 2024.

For more information, see: https://www.agronomy.k-state.edu/extension/kansas-bankers-award/

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