



Extension Agronomy

eUpdate

08/31/2018

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. Drought-stressed corn - Considerations when harvesting for grain

Corn harvest is slowly beginning in parts of Kansas. Harvest may present some challenges when drought is a major factor.

Aflatoxin

Drought-stressed corn may have high levels of aflatoxin (see companion article in this eUpdate). Aflatoxin levels may increase during storage if the corn is held very long at moisture levels above 14 percent. Growers intending storage for more than a week or two should have the corn tested for aflatoxin. Corn testing above 100 ppb should probably not be stored long-term.

Ear Drop

Ears may drop more easily in corn that has gone through drought, especially during grain fill. Some causes of increased ear drop include:

- The ear shank may not develop normally in stressed conditions.
- Rapid drydown may result in brittle tissue where the ear attaches.
- A “pinched shank” or constriction on one side of the shank may occur. This is usually associated with missing kernels on the bottom of the ear on the same side as the pinch.
- Hybrid differences. For example, some hybrids may have a smaller-diameter shank attachment.
- Fusarium stalk rot (pink stalk rot) may infect the ear shank, causing deterioration of the tissues and greater numbers of dropped ears.

Stalk Lodging

Droughty conditions, especially during grain fill, can predispose corn to a number of stalk rots, which in turn may result in stalk lodging. Stalk lodging in corn occurs when the stalk weakens and breaks at some point below the ear. When this occurs, it results in harvest losses and slows down harvesting considerably. Grain moisture levels may also be unacceptably high in lodged corn.

We often find stalk rot disease organisms (charcoal rot, Fusarium, Gibberella, anthracnose, and others) on corn with stalk lodging. Although stalk rot is often the ultimate cause of lodging, in most cases, the stalk rot diseases were only able to infect the plants because certain other factors predisposed the plants to disease infection. Such factors include:

** Hybrid differences in stalk strength or stalk rot susceptibility.* Some hybrids have genetically stronger stalks than others. This is often related to a hybrid’s yield potential and how it allocates carbohydrates during grain fill. But there are also genetic differences in stalk strength due to other reasons, including better resistance to stalk rot diseases. If a field of corn has stalk lodging problems, it could be due in part to hybrid selection.

** Poor root growth and other stresses.* Cold, waterlogged soils early in the season; severe drought; and soil compaction all can result in small, inadequate root systems. Under these conditions, the roots may not be able to effectively extract enough water and nutrients from soil to support plant growth and carbohydrate production. When carbohydrate production is below normal during any part of the

growing season, the ears will continue to take what they need during grain fill, which can leave the stalks depleted even under average yield conditions. The developing ear always has priority for carbohydrates within the plant.

* *Poor leaf health.* Any factor that results in poor leaf health will reduce carbohydrate production during the season. If overall carbohydrate reserves in the plants are low when grain fill begins, stalk integrity will often suffer as the available supply of carbohydrates moves into grain production. Maintaining good leaf health is important in minimizing stalk rots. The more photosynthesis, the less need for the plant to tap stalk reserves. Stay green characteristics in hybrids are highly correlated to stalk rot resistance and reduced lodging.

* *High plant densities.* Plants can become tall and thin when plant densities are too high, which can result in thin stalks with inadequate strength. In addition, plant-to-plant competition for light, nutrients, and water enhances the competition for carbohydrates between the stalk and ear within the plant, thus reducing the vigor of the cells in the stalk and predisposing them to invasion by stalk rot.

* *Nutrient imbalances and/or deficiencies* predispose corn plants to stalk rot and stalk lodging. Both potassium and chloride deficiency have been shown to reduce stalk quality and strength, and stalk rot resistance. High nitrogen coupled with low potassium levels increase the amount of premature stalk death, and create an ideal situation for stalk rot and lodging. Soil chloride levels should be maintained above 20 lbs per acre.

* *Corn rootworm and corn borers.* Damage caused by corn rootworm and the European corn borer can predispose the corn plant to invasion by stalk rotting organisms, as well as lead to outright yield loss.

* *Mid-season hail damage.* Similar to the damage caused by insects, the physical damage caused by mid-season hail can set up the plant for invasion by stalk rotting organisms. Stalk bruising and the resulting internal damage may also physically weaken corn stalks, making them more likely to lodge later in the season.

Summary

Where corn has been under drought stress, there is increased likelihood for small kernels, dropped ears, stalk lodging, and grain toxins. In this situation, it is especially important that corn is harvested in a timely manner and with a well-adjusted combine after a dry growing season.

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2. Aflatoxin in corn: A potential concern in dry years

Much of the eastern half of the state is in various stages of drought and has been for a large part of the summer. In many instances in the most severely affected areas, the plants never even developed an ear and that corn has been chopped for silage. In a recent survey of central Kansas, *Aspergillus* ear mold was not hard to find, with some fields showing active colonies on 10-15% of the ears. In one field near Canton, the area of the field inspected had colonies on 50% of the ears.

We are most concerned about *Aspergillus* because it can produce aflatoxin, a known carcinogen that is highly regulated by the Food and Drug Administration (FDA). On the ear, colonies of *Aspergillus flavus* are a greenish-yellow, dime- to quarter-sized mold that grows between the kernels (Figure 1). In severe cases, the mold may cover much larger portions of the ear (Figure 2). Often there is little correlation between the percent moldy ears in a field and actual level of aflatoxin. Corn that dries down rapidly may accumulate less toxin and some field strains are poor producers of aflatoxin. On the other hand, strains that produce copious amounts of aflatoxin may need to be present on a relatively low percentage of ears to cause problems at the elevator.



Figure 1. *Aspergillus* ear rot colony. Photo by Doug Jardine, K-State Research and Extension.



Figure 2. Severe case of *Aspergillus* ear rot. Photo by Doug Jardine, K-State Research and Extension.

Aspergillus ear mold is favored by hot, humid, and droughty conditions and for that reason, is more often found in eastern Kansas rather than in the less-humid western counties.

Most elevators now use one of several commercial quantitative tests that can be performed in a very short time period right at the point of delivery, rather than using the outdated black light method. Samples testing at less than 100 parts per billion (ppb) are usually accepted without penalty. Levels over 100 ppb may be docked a percentage or not accepted at all.

The FDA has established 20 ppb or higher as the level deemed unsafe for human consumption. However, buyers of corn for consumption by humans or pets typically have much more stringent standards and may require levels to be 10 ppb or less. Ethanol plants may also refuse aflatoxin-contaminated grain since the toxin is heat stable and can concentrate as much as three- to four-fold in the distiller's grains. Aflatoxin contaminated corn at any level should not be fed to lactating dairy cows because it can be passed through to the milk.

At 20 to 100 ppb, corn can still be fed to breeding cattle, swine, and mature poultry. Grain testing at 100 to 200 ppb can be used for finishing swine over 100 pounds and for beef cattle. For levels between 200 and 300 ppb, uses are limited to finishing beef cattle only.

Grain with aflatoxin levels higher than 300 ppb cannot be used as feed unless it has been cleaned or blended to safe levels. Blended corn can only be used for direct feeding on the farm where it is blended. It cannot be sold unless a specific blending exemption from the FDA is granted, such as

occurred during the 2012 outbreak.

Drought stressed corn harvested for silage may also contain aflatoxin. Producers wishing to have silage tested for aflatoxin can do so through the Veterinary Medicine Diagnostic Lab at the University of Missouri. See their website at <http://www.vmdl.missouri.edu/services.html> for information on pricing and sample submission.

Once the fungus is detected in grain, the affected corn should be separated from “sound” corn and extra care used in cleaning bins that held contaminated corn.

Producers can reduce the incidence of aflatoxin and other mycotoxins after harvest by taking the following precautions:

- Harvest when moisture content allows minimum kernel damage (24 to 26 percent).
- Adjust equipment for minimum kernel damage and maximum cleaning.
- Dry shelled grain to at least 15 percent moisture, 24 to 48 hours after harvest.
- Dry grain to below 13 percent moisture for long-term storage.
- Cool the grain as quickly as possible after drying to 35 to 40 degrees F, realizing that with current weather conditions, this is not feasible.
- Aerate and test for "hot spots" at one- to four-week intervals during the storage period.

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3. Kansas Soil of the Month(s): The Eudora and Sarpy Complex

Summer in Kansas can be a complex time of year for farmers: crops are in the ground and growing (hopefully), insects and disease make an appearance (unfortunately), Kansas weather (no explanation needed), and many others. Turns out, summer is also complex for two certain 'Soil of the Month' authors, hence no July article and our combined offering of the July/August Soil of the Month – the Eudora-Sarpy complex.

Soils are “complex”

The Kansas River begins in Junction City (so named for the meeting of the Republican and Smoky Hill Rivers) and joins the Missouri River near Kansas City. The Kansas River Valley has very productive soils for agriculture, but the soils are highly variable over short distances. Eudora and Sarpy are two soil series often found side-by-side but are relatively different. Sometimes these two soils are so intermingled with each other that soil mappers describe that area as the “Eudora-Sarpy complex” (Figure 1).

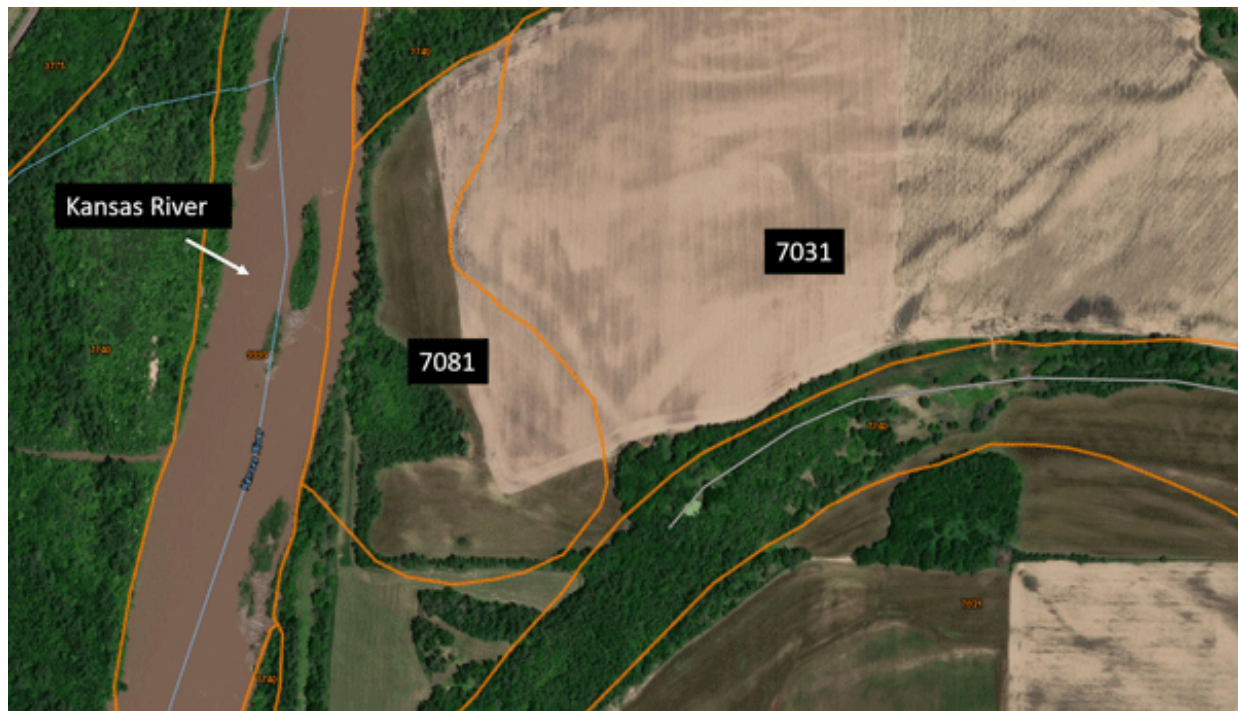


Figure 1. This field adjacent to the Kansas River in Geary County, KS has variable soils. The area labeled 7031 is the Eudora soil, and the area labeled 7081 is the Sarpy soil. Graphic created using the [NRCS Web Soil Survey](https://websoilsurvey.sc.egov.usda.gov/).

Eudora vs. Sarpy

Eudora soils are Mollisols, and Sarpy soils are Entisols. In our first installment of this eUpdate series, we discussed these same two soil orders: the [Ulysses \(Mollisol\)](#) and [Colby \(Entisol\)](#), both soils of western Kansas. Travel across the state to the northeast and you will find the Eudora and Sarpy soils. Eudora soil has a large accumulation of soil organic matter as indicated by darker colors, while the Sarpy is a very young soil with minimal development (Figure 2).

The Sarpy series has nine inches of loamy sand in the surface horizons, and between 9 and 60 inches, it is fine sand. Notice in the Sarpy profile there is a second “A” horizon at the bottom of the profile. This is a *buried soil horizon*. Buried soil horizons were formed in place and then covered by recently transported material. Buried “A” horizons are not uncommon in soils found in floodplains.

The Eudora series has a silt loam texture in the upper 26 inches, and from 26-60 inches is very fine sandy loam. These soils are mapped right next to each other in the same field (Figure 1). However, Eudora is considered prime cropland (Class 1) while Sarpy is Class 4s if it is not irrigated. The “4” means that it has very severe limitations that restrict the choice of plants or requires very careful management, and the “s” means that there is a soil limitation in the rooting zone. In this case, the “s” designation means low moisture-holding capacity because of the high sand content.

Being prime farmland, Eudora soils are mostly cultivated, primarily to corn, grain sorghum, soybeans, and wheat. Native vegetation include tall grasses and a few deciduous trees. Eudora soils occur mostly along the Big Blue and Kansas Rivers in northeastern Kansas and their extent is around 66,000 acres. Sarpy soils typically have native vegetation consisting of thin stands of native prairie grasses and sandburs, with cottonwood and willow trees. Cleared areas are usually in pasture, with some portions cultivated to forage crops. You can find Sarpy soils mainly along the Missouri River and other major streams in Kansas, Nebraska, Missouri, Iowa, and Illinois. Its extent acreage is 88,200 acres total ([USDA-NRCS Official Soil Series Descriptions](#))



Figure 2. Monoliths of the Eudora and Sarpy soil series. Photo by Kathy Gehl, K-State Research and Extension.

Soil formation and floods

For both soils, the parent material is *alluvium*, transported sediment deposited by rivers for hundreds or thousands of years. Floods, like wildfires, are natural occurrences that often provide ecosystem benefits. However, extreme events can be devastating. One of the most damaging floods in [Kansas history occurred on July 13, 1951](#), often referred to as Black Friday. In some parts of the Kansas River Valley, 6 to 30 inches of sediment was deposited on fields and valuable topsoil was washed away. Most of the affected areas were plowed to great depths to mix the sandy deposits with the more fertile, silty soil beneath. Many lives were lost and around a half million Kansans were displaced. Farther away in Kansas City, the flood waters destroyed the Kansas City Stockyards and the Fairfax Airport, prompting the city to relocate the new airport that would later become the Kansas City International Airport. To sum up a long story, the 1951 flood resulted in the building of multiple flood control dams, including the Tuttle Creek Reservoir to the north of Manhattan. More information on this pivotal event in Kansas history can be found at the following websites:

- www.kshs.org
- <https://pubs.usgs.gov/fs/2001/0041/report.pdf>
- <https://www.weather.gov/media/top/flood51.pdf>

Looking back over the last few months, here are the previous Soil of the Month articles.

- [January/February: Colby and Ulysses](#)
- [March: Dwight](#)
- [April: Pawnee](#)
- [May: Quinlan](#)
- [June: Harney](#)

What Kansas soil will be chosen for our September article? Stay tuned!

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4. SoilWeb: An on-the-go soil mapping resource at your fingertips

Have you ever needed soil information while out in the field or away from your home computer? Now you can have portable soil information wherever you have cellular service. A few operating systems ago, there was a free app that could be downloaded called “SoilWeb”, but you may have noticed that it is no longer supported. Good news: You can access the website from your mobile device and use it essentially the same way.

How to download and save the app to your device

For iPhone users: Navigate to <https://casoilresource.lawr.ucdavis.edu/gmap/>. When you have the website open, you will see a “Welcome” window (see Figure 3). Clear this by hitting OK. Next, click the icon at the bottom that looks like a square with an arrow pointing up, and then find the “Add to Home” button (Figure 1).

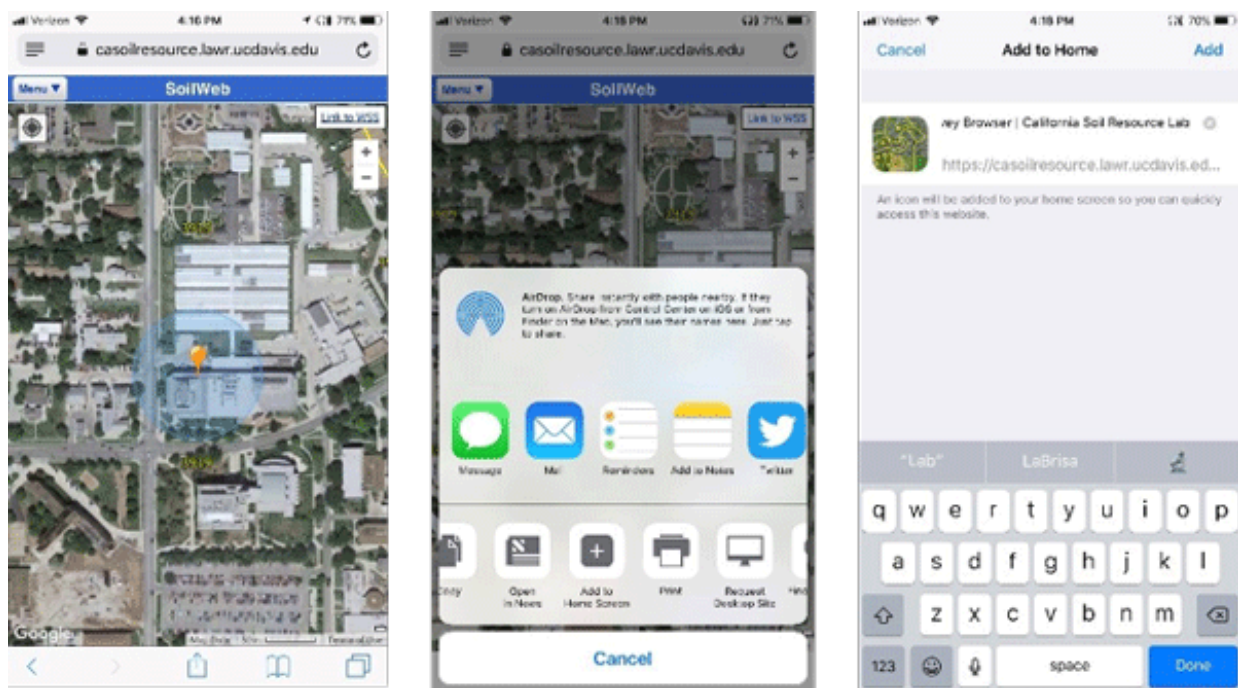


Figure 1. Series of screenshots to illustrate for iOS users the steps to access and save the Soil Web app on their mobile device.

For Android devices, clear out the “Welcome” message as described above and tap the button in the upper right corner (3 vertical dots) and select “Add to Home screen” (Figure 2).

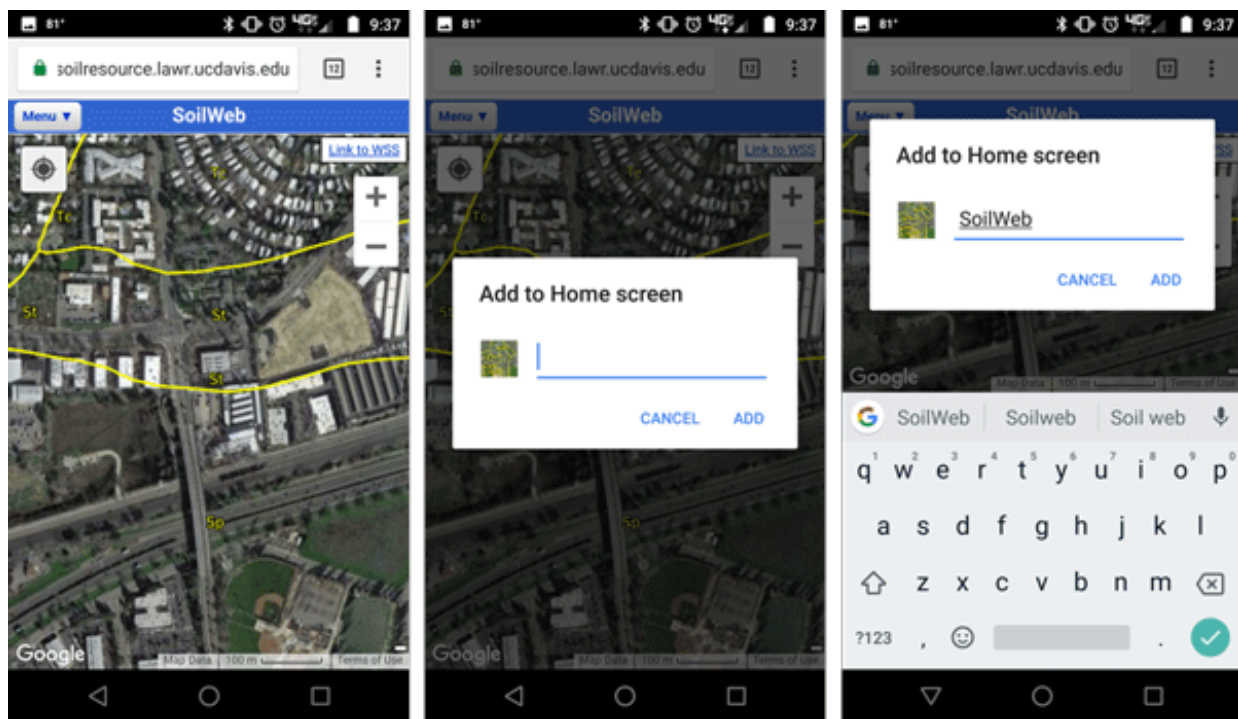


Figure 2. Series of screenshots to illustrate for Android users the steps to access and save the Soil Web app on their mobile device.

How to use the SoilWeb app

A welcome screen gives users an easy-to-follow set of instructions to get started (Figure 3). You can zoom to your current location or navigate to a particular location.

Welcome

This interactive map allows you to explore USDA-NCSS soil survey data for locations throughout most of the U.S. It is compatible with smartphones, tablets, and desktop computers.

Getting Started

- 1) Go to *Menu->Zoom To Location* to enter your area of interest or let your browser determine your current location.
- 2) Click on the map to identify "map units", which are delineated by the yellow lines. Then click on the expandable category headings to view the data of interest to you.

For more help with the use of this app, or for help with soil survey terms and definitions, see the topics under *Menu->Help*.

About This App

This app was developed by the [California Soil Resource Lab](#) at UC Davis and UC-ANR in collaboration with the [USDA Natural Resources Conservation Service](#).



Figure 3. Introductory screen with instructions for using the SoilWeb app.

Here is an example of the types of information I would select to learn more about the soils mapped at my office location in Manhattan, Kansas (Figure 4).

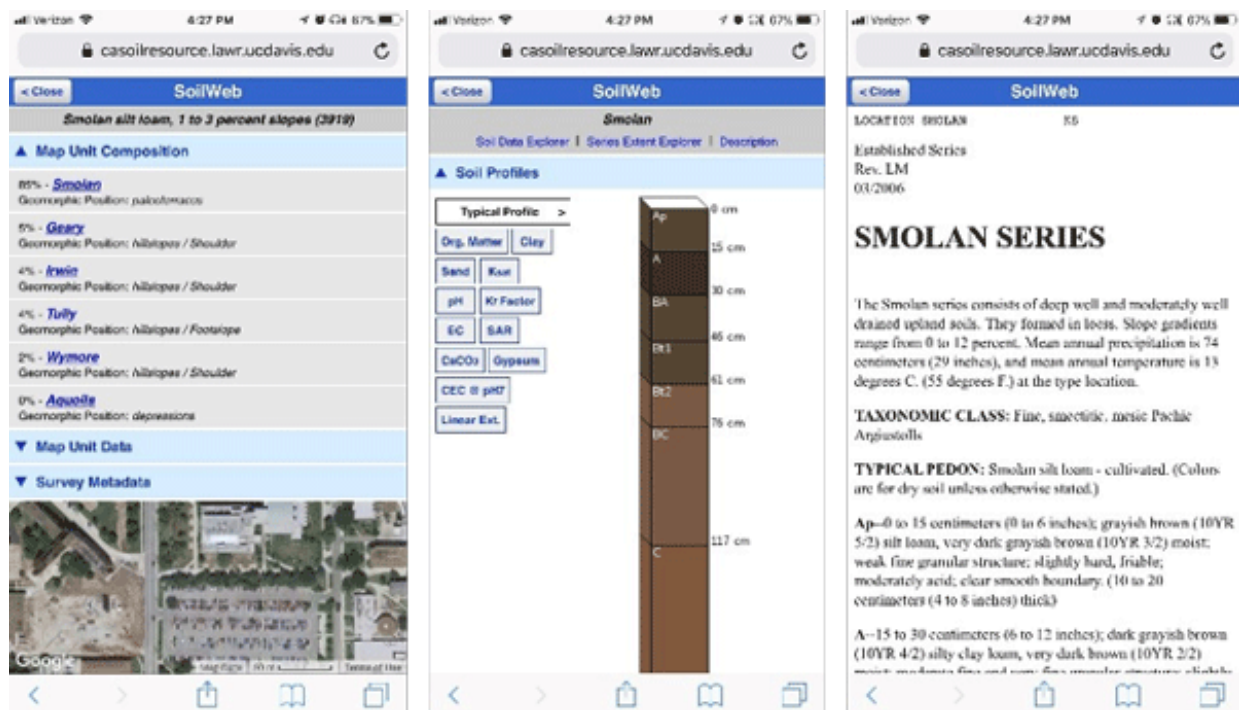


Figure 4. Information available at your selected location include types of soils (left panel), specific soil profile descriptions (middle panel), and Official Soil Series Descriptions (right panel).

If you are ever in need of portable soil survey information, this is a free and simple resource.

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5. Control woody plants on rangeland: Basal bark and cut-stump herbicide applications

Late summer and fall can be an excellent time to treat unwanted stands of woody plants. Scattered stands of individual trees should either be treated individually using the basal bark method (for labeled plants less than 4-6 inches in diameter) or the cut stump treatment method. The basal bark and cut stump treatments will not be effective if the plants cannot be treated down to the soil line. Avoid conditions where water (or snow later in the season) prevents spraying to the ground line.

Producers can treat smaller diameter susceptible woody plants individually this fall by spraying the basal stem parts with triclopyr plus diesel fuel. The lower 12-15 inches of the stems or trunks of susceptible small trees should be thoroughly wetted on all sides with a triclopyr-diesel mixture. Triclopyr goes by the tradenames Remedy Ultra and Pathfinder II. Remedy Ultra is a 4 lb/gallon product.

The labeled recommendations for Remedy Ultra are 20-30% solution in diesel. Pathfinder II is a ready-to-use product and does not have to be mixed with diesel. PastureGard HL is a premix of triclopyr and fluroxypyr, and can be applied as a basal bark or cut-stump treatment as a 25% solution in diesel. Crossbow, a mixture of triclopyr and 2,4-D, can also provide control of certain woody plants as a 4% solution in diesel. Milestone, with the active ingredient aminopyralid, is effective on black and common honeylocust. Mix Milestone 5% v/v with a compatible basal oil; e.g. Dyne-Amic from Helena Chemical. Before selecting a basal oil, do a jar test by mixing Milestone and basal oil to determine compatibility.

If the woody plant is greater than 6 inches in diameter, the best method is to:

- Cut it off at ground level.
- Treat the cut surface with triclopyr and diesel fuel within 30-60 minutes, before the sap seals over the exposed area.
- Spray the cambium and light-colored sapwood to insure translocation of the herbicide.
- Treat any exposed trunk or exposed roots.

The stump of ash, cottonwood, elm, oaks, persimmon, and Russian olive can be treated with a 1:1 ratio of dicamba (Banvel, Clarity) in water instead of triclopyr if desired. The stumps of Eastern red cedar do not need to be treated since, unlike many woody plants, this species does not root sprout. Simply cutting Eastern red cedar below the lowest green branch will kill it. Common trees in Kansas that resprout after cutting include ash, cottonwood, elm, oaks, osage orange (hedge), persimmon, black and common honey locust, saltcedar, and Russian olive. In sprouting species, new shoots arise from dormant buds at or below the ground often resulting in a multi-stemmed clump.

Table 1. Cut-Stump Herbicides

Herbicide	Active ingredients per gallon	Rate
Crossbow ¹	2 lb 2,4-D + 1 lb triclopyr	4% in diesel
Remedy Ultra	4 lb triclopyr	20-30% in diesel
Pathfinder II	0.75 lb triclopyr	Ready to use
PastureGard HL	3 lb triclopyr + 1 lb fluroxypyr	25% in diesel
Milestone	2 lb aminopyralid	10% in water
Banvel/Clarity	4 lb dicamba	25-50% in water
Roundup PowerMAX	5.5 lb glyphosate	50-100% in water
Arsenal	2 lb imazapyr	10% in water
Tordon 22K	2 lb picloram	10% in water

¹ Trade names are used to help identify herbicides. No endorsement is intended, nor is any criticism implied of similar products not mentioned.

Common honeylocust can resprout from a wide diameter area around the main plant because of root suckers. One option is to make a basal bark treatment with triclopyr-containing products to kill the entire plant in the fall. Then the main plant can be cut down in subsequent years once the tree is dead. Cut-stump applications of Milestone as a 10% solution in water has been more effective than triclopyr on common honeylocust.

Table 2. Cut-Stump Treatments

Species	Herbicides
Ash	Crossbow, Pathfinder II, Banvel/Clarity, Arsenal
Common honeylocust	Remedy Ultra, Pathfinder II, PastureGard HL, Milestone, Banvel/Clarity, Tordon 22K
Cottonwood	Crossbow, Remedy Ultra, Pathfinder II, Banvel/Clarity, Arsenal
Elm	Crossbow, Remedy Ultra, Pathfinder II, PastureGard HL, Banvel/Clarity, Arsenal, Tordon 22K
Oaks	Remedy Ultra, Pathfinder II, PastureGard HL, Banvel/Clarity, Roundup PowerMAX, Arsenal, Tordon 22K
Osage orange (hedge)	Remedy Ultra, Pathfinder II, PastureGard HL
Persimmon	Remedy Ultra, Pathfinder II, PastureGard HL, Banvel/Clarity, Arsenal
Russian olive	Crossbow, Pathfinder II, Banvel/Clarity, Arsenal
Salt cedar	Remedy Ultra, Pathfinder II, PastureGard HL, Roundup Power MAX, Arsenal

Tordon RTU and Pathway can be used on cut surfaces in noncropland areas such as fence rows, roadsides, and rights-of-way. However, Tordon RTU, and Pathway are not labeled for use on range and pasture. Glyphosate labels vary on what sites are labeled for cut-stump application on

rangeland. Roundup PowerMAX can be applied on any terrestrial site. Roundup ULTRA can only be applied as a cut-stump treatment on non-cropland. Be sure to check the label as rangeland is sometimes included as a site under non-cropland on some glyphosate labels.

Application equipment for cut-stump application includes pressurized hand sprayers, small backpack sprayers, sprayer mounted on ATV with handheld gun, hydraulic tree shears or saws with an attached spray nozzle, or even a paint brush. Two of the more common pieces of equipment for cutting the woody plants are the turbo saw and the hydra clip.



Figure 1. Turbo saw on left and hydra clip on right.

Although exposure to animals is reduced by basal and cut-stump treatments, grazing and haying restrictions still need to be followed. There are no restrictions before grazing with any of the herbicides discussed. Check labels for restrictions for use prior to hay harvesting, removal of animals before slaughter, and for use around lactating dairy animals.

Application tips for using cut-stump treatments:

- Always follow directions on the herbicide label.
- Before spraying, brush any sawdust or debris off cut surface.
- Apply herbicide to freshly cut stump.
- Spray cut surface and stump to ground level.
- Spray exposed roots above soil surface.
- The cambium layer is the critical area to spray.
- Apply enough liquid that it pools on cut surface.

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6. Sorghum insect update - 'Headworms', beneficials, and aphids

Chinch bugs

Sorghum continues to get the attention of many pests and beneficials. Chinch bug populations are not diminishing even though they are not as noticeable because most are feeding around the base of the plants and behind leaf sheaths on the stalks. Much late-planted or slower-developing sorghum is still vulnerable to these chinch bugs. Bugs may also move up to the heads as they emerge from the whorl to feed on the forming kernels that provide a succulent source of nutrients.

'Headworms'

'Sorghum headworms', mostly corn earworms but also a few fall armyworms, are infesting all sorghum fields (not yet in the soft dough stage) that we monitored throughout north central Kansas. Most fields have close to, or are exceeding, 100% infestation levels (1 or more larvae/head). These larvae are present in all different sizes, or developmental stages, from 1st to 4th instars (Figure 1). Thus, they will be feeding on these kernels for at least another 7 – 10 days.

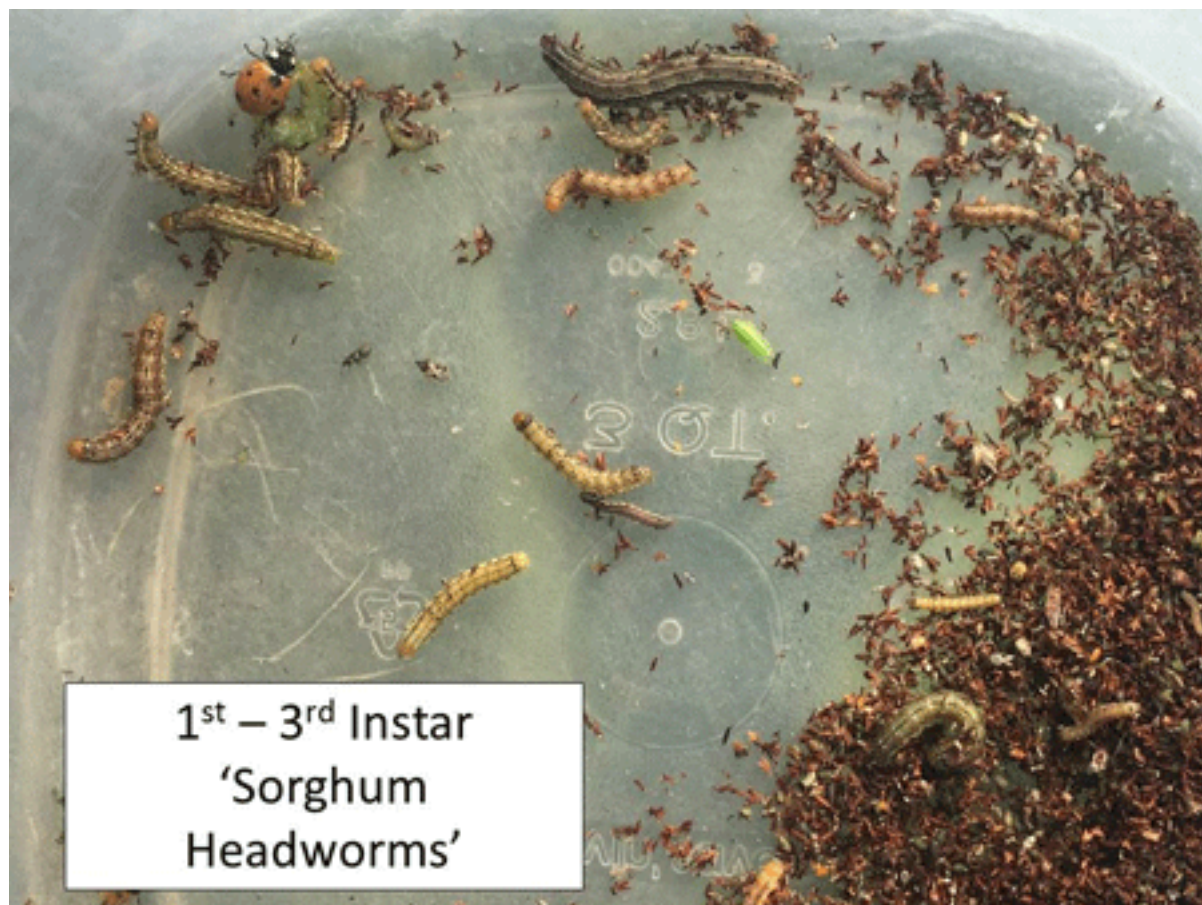


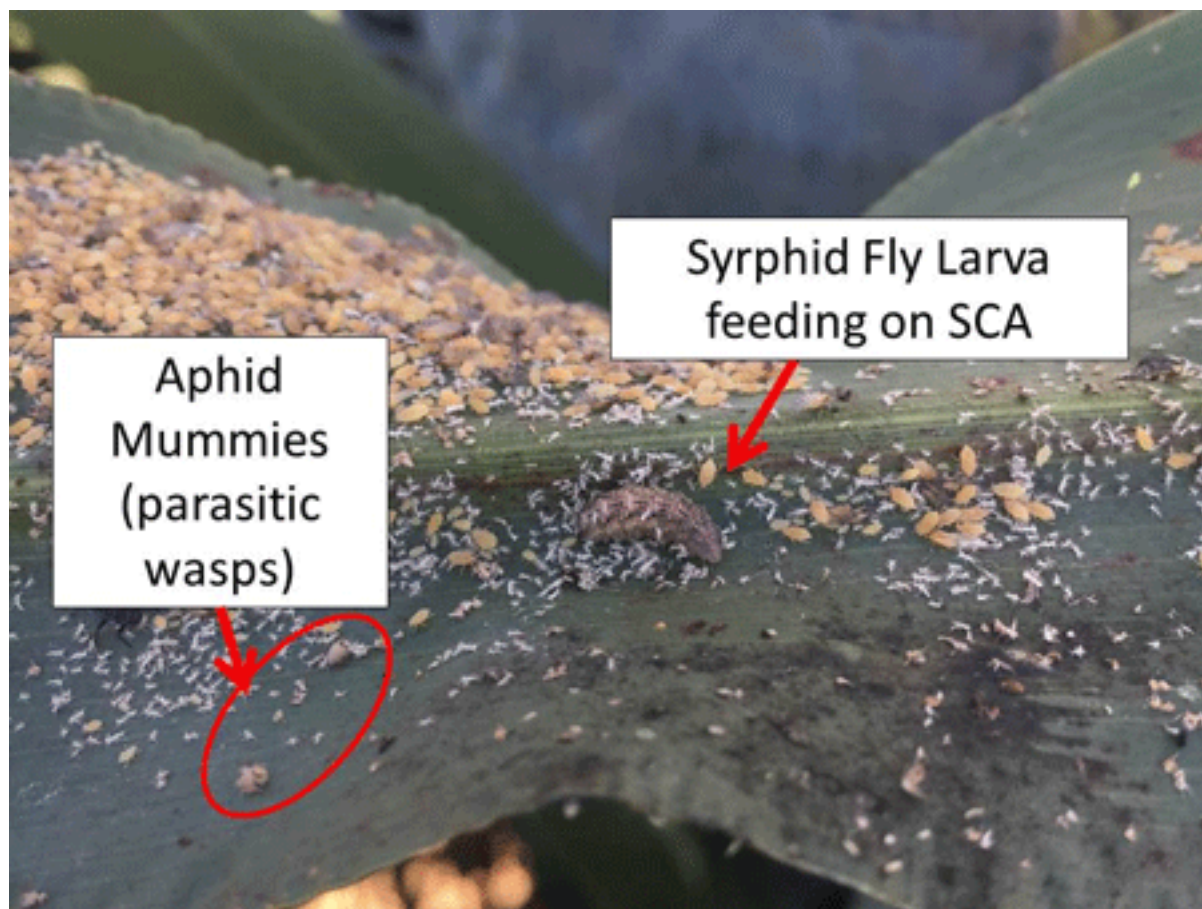
Figure 1. 'Sorghum headworms' at different developmental stages (1st-3rd instars).

Remember, between flowering and soft dough, these larvae will cause 5% yield loss/ worm/ head. Very few beneficials are available to help control headworm populations. However, there are huge populations of beneficials currently present to help control any aphid pests that are, or might be present in the near future.

Corn leaf aphids

Corn leaf aphid populations were common on early-planted sorghum, and still are on late-planted sorghum that is just reaching the whorl stage. These corn leaf aphids have really helped fuel the beneficial populations. Fields that have headed out are swarming with lady beetle adults and larvae, syrphid or hover flies, green lacewings, and parasitic wasps (Figure 2).





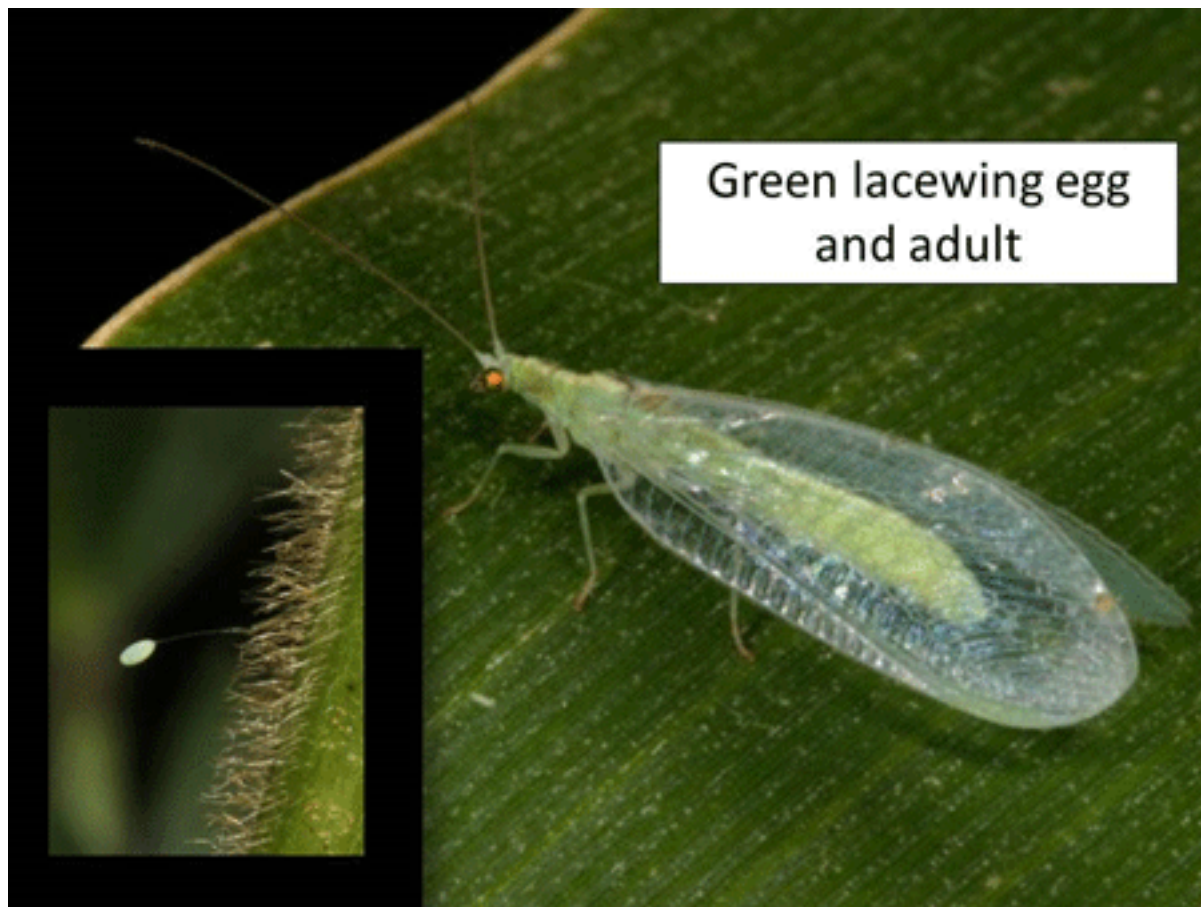


Figure 2. Selection of beneficials present in sorghum fields.

Sugarcane aphids

Sugarcane aphid (SCA) populations are becoming scattered around north central Kansas, slowly so far, and are really attracting the attention of all these beneficials, which will hopefully help control colony growth.

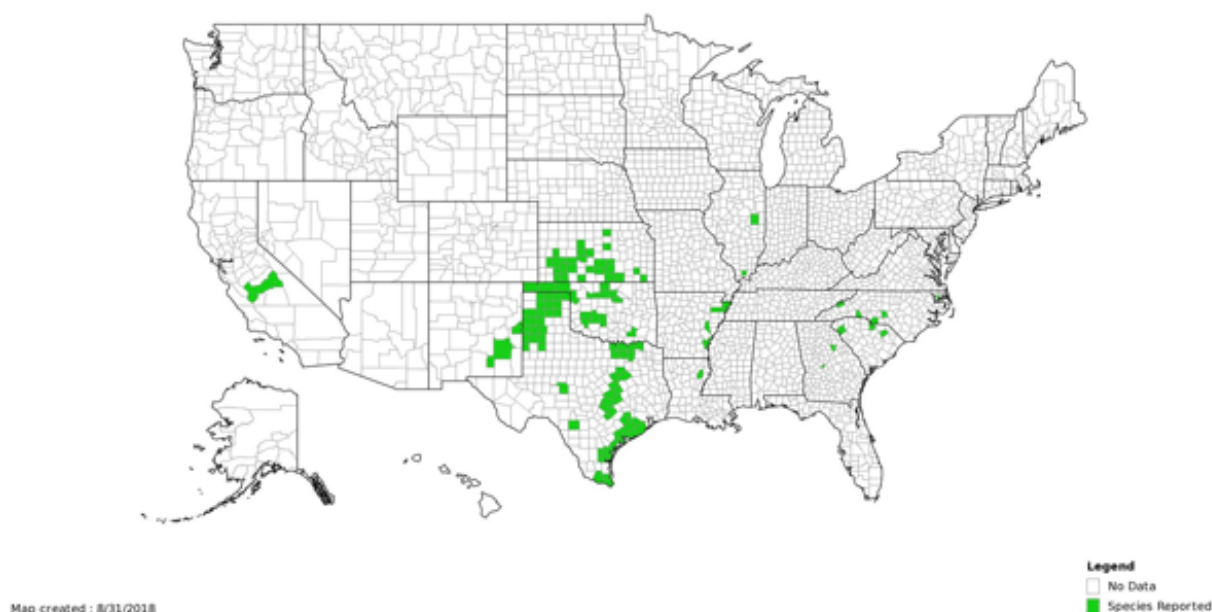


Figure 3. Current SCA infestation map for the United States. Map provided by EDDMapS.

For management considerations and recommendations for these, and other sorghum pests, please refer to the 2018 Sorghum Insect Management Guide:

<https://www.bookstore.ksre.ksu.edu/pubs/mf742.pdf>

Volunteer wheat reminder

Please remember every moisture event prompts the growth of volunteer wheat (Figure 4). This volunteer wheat needs to be controlled at least 2 weeks prior to planting to help mitigate *all* wheat pests, including pathogens, mites, and insects.



Figure 4. A field with volunteer wheat.

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7. 2018 Kansas Performance Tests with Winter Wheat Varieties report available online

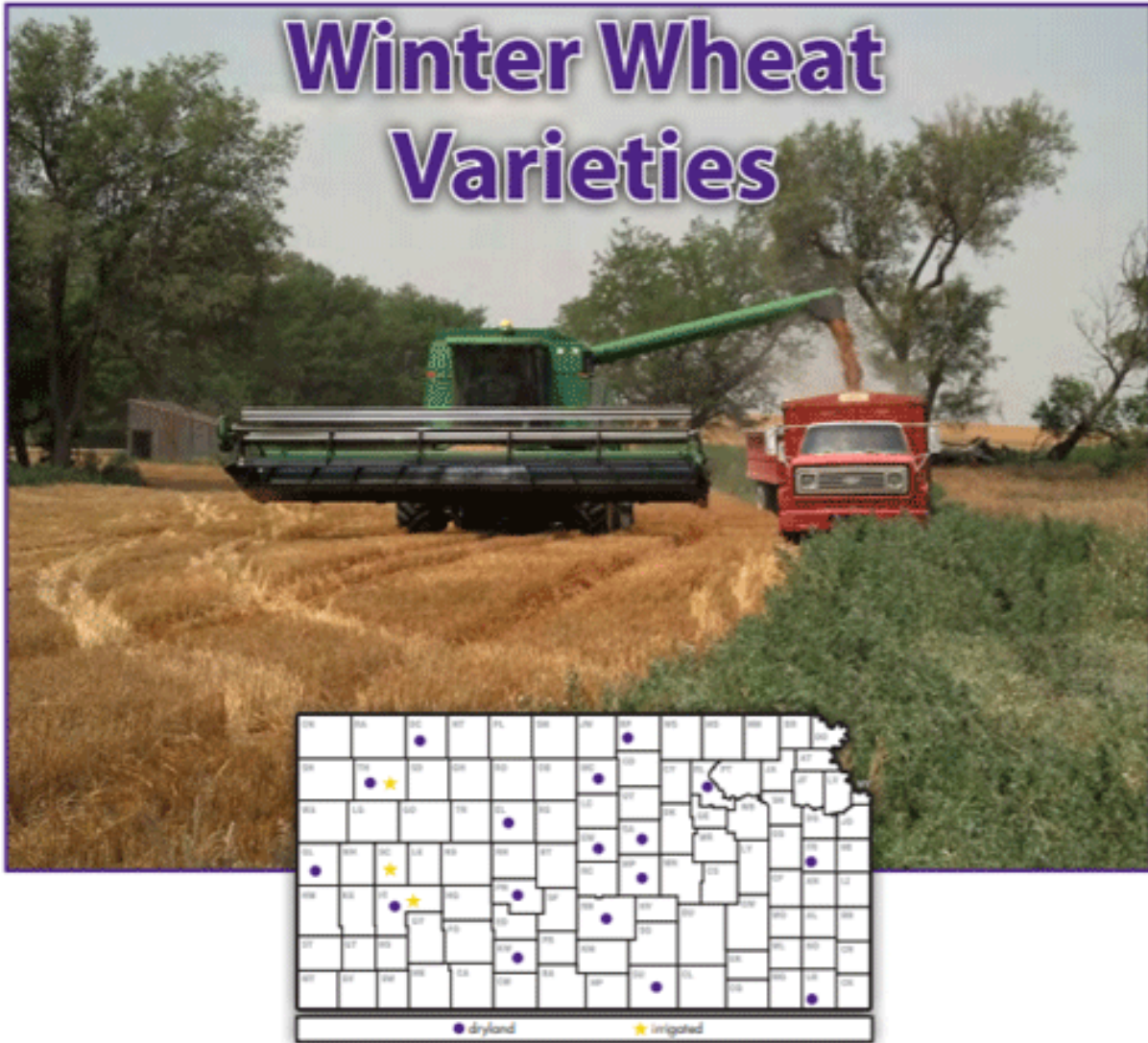
The *2018 Kansas Performance Tests with Winter Wheat Varieties* report is now online. In this report, you will find a recap of the 2017-18 wheat crop, with a detailed discussion of factors that made this year a very challenging growing season for Kansas wheat producers. More importantly, the results of the 2018 wheat variety performance tests are also shown.

Producers and crop consultants can use this resource to help select wheat varieties for their operation by checking for varieties that show a consistently good performance in their region.

Click [here](#) to access the online version of the variety performance test results. Results from previous years are available at <http://www.agronomy.k-state.edu/services/crop-performance-tests/winter-wheat/index.html>

2018 Kansas Performance Tests with

Winter Wheat Varieties



Report of Progress 1143

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