Issue 808

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eUpdate

07/02/2020

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. Fungicide considerations for corn diseases: Scouting is key

We are entering the time window in Kansas where corn producers should be scouting fields and assessing the need for a foliar fungicide application. Several fields in eastern and central Kansas are in VT and R1 (flowering) stage of growth, with a few fields already going through pollination. On the western side of the state, the early to mid-May planting dates are progressing toward V12-V14 with only a couple weeks until flowering.

Factors in corn yield response to fungicide applications

Years of fungicide application research clearly demonstrates that the single best time to apply a fungicide to corn for gray leaf spot control is from VT to R1. A single application at V7 – V8 will not hold up against late-season pressure. Those who choose to put a fungicide down with their last herbicide treatment will most likely have to apply second cover at VT – R1 if there is any gray leaf spot pressure at all. A VT – R1 application may also provide some suppression of southern rust, should it arrive early enough to cause yield loss.

University fungicide trials also reveal that final disease severity plays a critical role in the magnitude and consistency of yield response to a foliar fungicide application. The tricky part is being able to predict before the VT to R1 stages what the disease pressure will be several weeks later. To make such a prediction, you need to consider "disease risk factors" and to scout for disease.

Disease risk factors include:

Susceptibility level of corn hybrid. Seed companies typically provide information on the susceptibility of their hybrids to gray leaf spot in their catalogs. In general, hybrids that are more susceptible to fungal foliar diseases will have a greater response to a foliar fungicide (if disease pressure is high enough).

Previous crop. Because gray leaf spot survives in corn residue, the risk of disease increases when corn is planted back into a field that was in corn the previous year.

Weather. Rainy and/or humid weather generally is most favorable to gray leaf spot. In growing seasons when these conditions prevail, the risk for disease development increases.

Field history. Some field locations may have a history of high foliar disease severity. Fields in river bottoms or low areas or surrounded by trees may be more prone to having gray leaf spot.

Begin scouting for gray leaf spot in corn about two weeks before expected tassel emergence. Gray leaf spot is characterized by rectangular lesions that are 1-2 inches in length and cover the entire area between the leaf veins. Early lesions are small, necrotic spots with yellow halos that gradually expand to full-sized lesions. Lesions are usually tan in color but may turn gray during foggy or rainy conditions. The key diagnostic feature is that the lesions are usually very rectangular in shape.

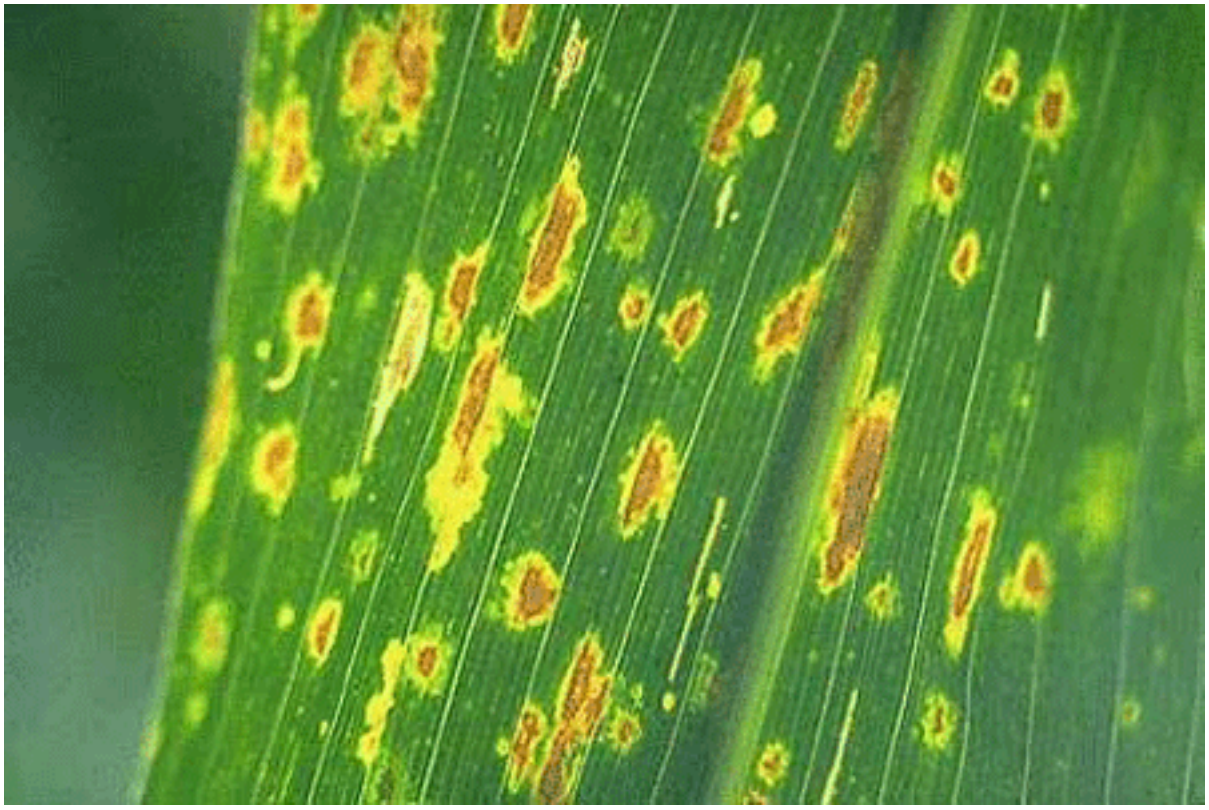

Figure 1. Early development of gray leaf spot lesions showing a distinct yellow halo. Photo courtesy of Doug Jardine, K-State Research and Extension.

Current disease management guidelines suggest the following criteria for considering an application of foliar fungicide:

- **For susceptible hybrids** (those with the lowest rating within a company's lineup): Fungicide applications should be considered if disease symptoms are present on the third leaf below the ear or higher on 50 percent of the plants examined.
- **For intermediate hybrids** (those with an average rating within a company's lineup): Fungicide applications should be considered if disease symptoms are present on the third leaf below the ear or higher on 50 percent of the plants examined, if the field is in an area with a history of foliar disease problems, if the previous crop was corn, if there is 35 percent or more surface residue, and if the weather is warm and humid.
- **For resistant hybrids** (those with the best rating within a company's lineup): Fungicide applications generally are not recommended.

According to the data from Illinois corn fungicide trials, if at least 5 percent of the ear leaf area is affected by disease at the end of the season, a foliar fungicide applied between VT and R1 would likely have been beneficial. Using the disease risk factors and scouting observations collected just before tassel emergence will help you predict how severe disease may be several weeks after the VT to R1 stages, and help you decide whether to apply a foliar fungicide.

If no disease is present or pressure is low, I recommend holding off on the R1 application since efficacy will begin to wane in three to four weeks, just as late season pressure may begin to develop. Data exists that would suggest that if pressure begins to develop later, an R2 application can be

economical and will provide protection later into the grain fill period. This later application could also protect against any late-season southern rust pressure.

Distinguishing between gray leaf spot and bacterial streak

Bacterial streak, identified as a new corn disease in the U.S. in 2016, is now active in most of western Kansas. We have received reports of bacterial leaf streak earlier than usual this year. While yield loss potential for this disease remains unknown, we do know that it can be misidentified as gray leaf spot, resulting in unwarranted fungicide applications. Fungicides will not have any effect on bacterial streak. Keep in mind that gray leaf spot typically has very sharp edges defined by the leaf veins, whereas bacterial streak will have a wavy edge that can cross the leaf vein (Figure 2). Also, when backlit with light, gray leaf spot lesions will have an opaque appearance while bacterial streak lesions are more translucent (Figure 3). If you are unsure about symptoms, please contact the K-State plant disease diagnostic clinic via email at clinic@ksu.edu.

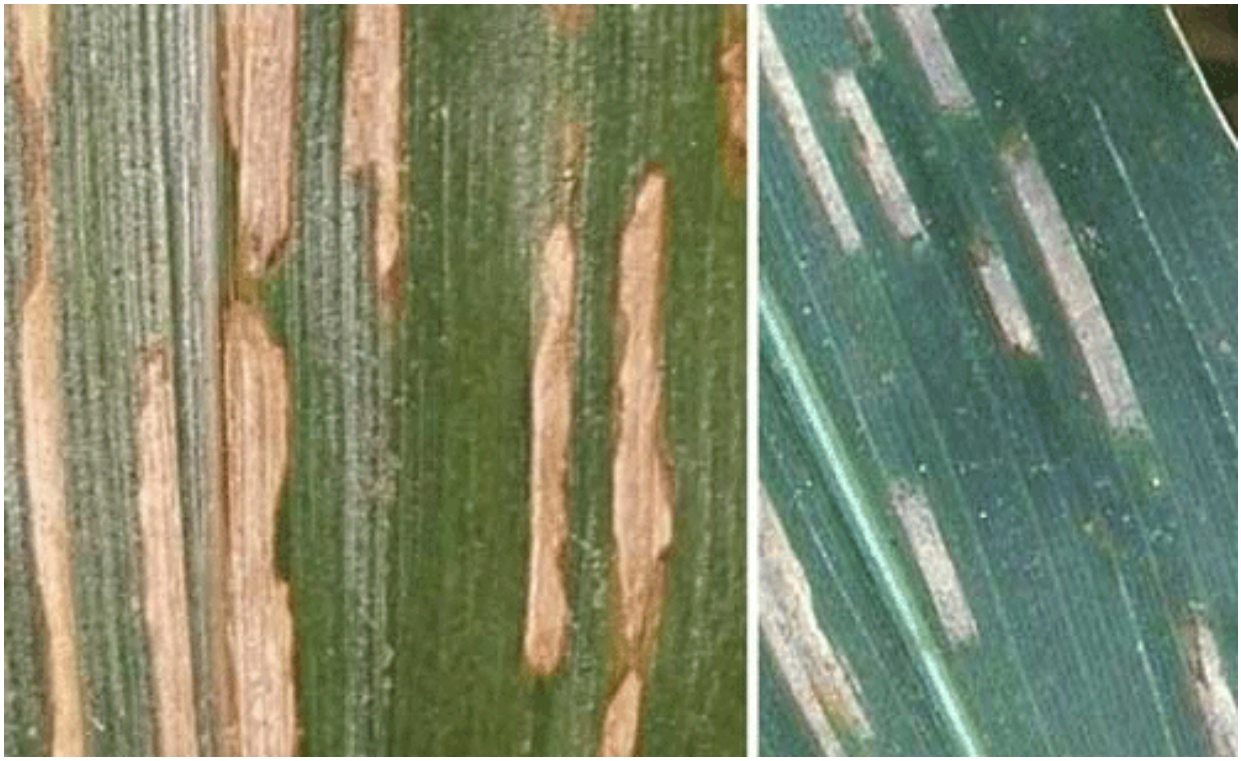

Figure 2. Comparison of sharp-edged gray leaf spot lesions (right) with wavy-edged bacterial streak lesions (left). Photo courtesy of the University of Nebraska.

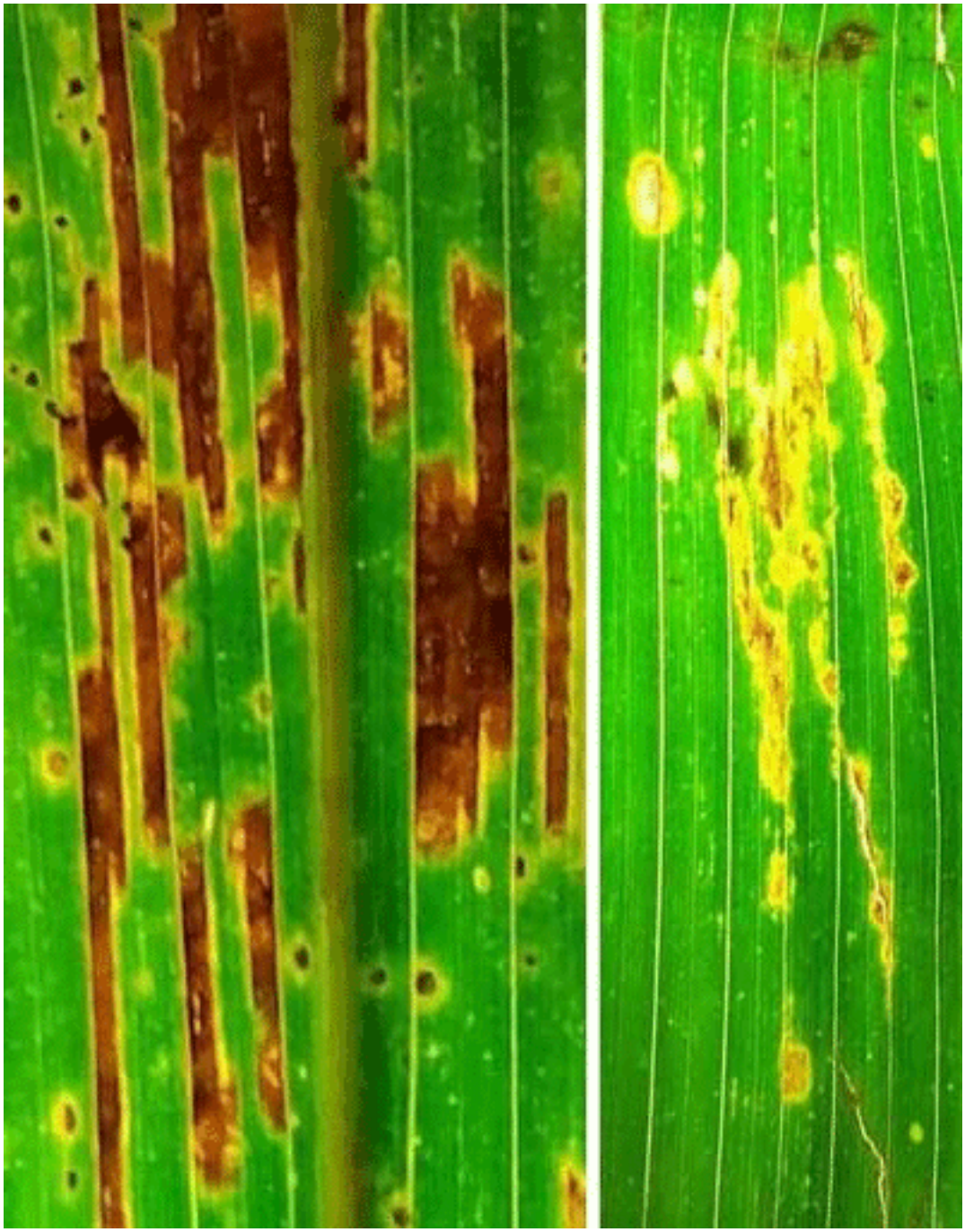

Figure 3. Gray leaf spot lesions (left) have an opaque appearance whereas as bacterial streak allows light to more easily pass through giving it a translucent appearance (right). Photo by Doug Jardine, K-State Research and Extension.

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2. What factors should be considered before baling or burning wheat residue?

Following wheat harvest there are some producers that might be thinking about baling or burning their wheat stubble. Producers may consider burning for several reasons: as a management practice to control plant diseases or weeds, to improve the seedbed for the subsequent crop, and possibly other reasons. While burning is inexpensive and baling provides additional income, producers should understand the true value of leaving crop residue in the field. Some of the information below comes from K-State Extension publication MF-2604, *The Value of Crop Residue*.

There are four main factors to consider:

Loss of nutrients

The products of burned wheat stubble are gases and ash. Nutrients such as nitrogen (N) and sulfur (S) are largely combustion products, while phosphorus (P) and potassium (K) remain in the ash. When residue is burned, about one-third to one-half of the N and S will combust. The nutrients in the ash may remain for use by the plants, if it doesn't blow or wash away first (more on that below). Therefore, instead of cycling these important plant nutrients back into the soil, they can essentially become air pollutants when the residue is burned.

Table 1. Amounts of nutrients remaining in wheat stubble when assuming 50 bu/acre yield.

Nutrient	Pounds present in 5,000 lbs of wheat straw
N	27.0
P_2O_5	7.5
K_2O	37.5
S	5.0

Protection from soil erosion

Bare soil is subject to wind and water erosion. Without residue, the soil will receive the full impact of raindrops, thus increasing the amount of soil particles that may become detached during a rainfall event. Bare, tilled soils can lose up to 30 tons per acre topsoil annually. In no-till or CRP systems where residue is left, annual soil losses are often less than 1 ton per acre. The detachment of soil particles can lead to crusting of the soil surface, which then contributes to greater amounts of sediment-laden runoff, and thus, reduced water infiltration and drier soils.

Leaving residue on the field also increases surface roughness, which decreases the risk of both wind and water erosion. Most agricultural soils in Kansas have a "T" value, or tolerable amount of soil loss, of between 4 and 5 tons per acre per year, which is about equal to the thickness of a dime. To prevent water erosion, 30% ground cover or greater may be needed to reduce water erosion to "T" or less, especially in fields without erosion-control structures such as terraces.

Standing stubble is more effective at preventing wind erosion than flat stubble. On occasion, accidental residue burns have resulted in devastating wind erosion events that happen over and over again until a new ground cover is established. Once a field begins to erode from wind, it is extremely difficult to stop. During extended droughts the soil profile gets dried out and not even emergency tillage is effective at stopping the wind erosion. Losing topsoil degrades soil productivity, and the long-term effect of this loss is not easy to quantify.

Research results from six locations in western Kansas are shown in Figure 1. In this experiment, crop residue was removed at different levels by cutting the crop residue at different heights. For example, if the residue was 10" after it was combined, the residue would be cut to 5" and removed from the plot, and that would equal 50% removal. The wind erodible fraction is the part of the soil less than 0.84 mm in size.

Figure 1. Effects of crop residue removal on the wind erodible fraction of soil, defined as <0.84 mm. Values on the x-axis (different shadings of the bars) refer to the percent residue removed. For example: 0% means no residue was removed, while 100% means that all residue was removed. Lowercase letters indicate treatment differences at p<0.05. From: He et al., 2017, available at: https://doi.org/10.1111/gcbb.12483

Soil moisture, infiltration rates, and conservation

Wheat residue enhances soil moisture by increasing rainfall infiltration into the soil and by reducing evaporation. Residues physically protect the soil surface and keep it receptive to water movement into and through the soil surface. Without physical protection, water and soil will run off the surface more quickly.

Ponded infiltration rates were measured at Hesston in September 2007. Very low infiltration rates (1.9 mm/hour) were observed for continuous winter wheat in which the residue was burned each year prior to disking and planting the following crop. In contrast, high infiltration rates (13.3 mm/hour) were observed for a no-till wheat/grain sorghum rotation (Presley, unpublished data).

Another way residue increases soil moisture is by reducing evaporation rates. Residue blocks solar radiation from the sun and keeps the soil surface cooler by several degrees in the summer. Evaporation rates can decline dramatically when the soil is protected with residue. Research from dryland experiments has shown that crop residues are worth 2 to 4 inches of water annually in the central Great Plains states (*Efficient crop water use in Kansas*, MF3066).

Soil quality concerns

Over time, the continued burning of cropland could significantly degrade soil organic matter levels. By continually burning residue, soil organic matter is not allowed to rebuild. Soil organic matter is beneficial for plant growth as it contributes to water holding capacity and cation exchange capacity. Soil organic matter binds soil particles into aggregates, which increases porosity and soil structure and thus, increases water infiltration and decreases the potential for soil erosion. One burn, however, will not significantly reduce the organic matter content of a soil (unless the field erodes, as discussed above).

If producers do choose to burn or harvest their wheat stubble, timing is important, and should minimize the time that the field will be without residue cover and vulnerable to erosion. Before choosing to burn residue, producers should check with the USDA Natural Resources Conservation Service and/or the Farm Service Agency to find out if this will affect their compliance in any conservation programs.

For more information, see:

- *Efficient crop water use in Kansas*, MF3066, available at: http://www.ksre.ksu.edu/bookstore/pubs/mf3066.pdf
- *Emergency wind erosion control*, MF2206, available at: http://www.ksre.ksu.edu/bookstore/pubs/MF2206.pdf
- *Crop residue harvest impacts wind erodibility and simulated soil loss in the Central Great Plains*. 2017. Global Change Biology Bioenergy, https://doi.org/10.1111/gcbb.12483

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3. 2020 Kansas Corn Yield Contest

Now that corn is in the ground and growing, harvest in Kansas will be here before you know it. Corn producers in the state are encouraged to keep in mind the Kansas Corn Yield Contest before they fire up the combines this year.

Kansas Corn, in conjunction with K-State Research and Extension, will conduct a 2020 Kansas Corn Yield Contest. All Kansas corn producers are eligible to enter the free contest, but they must be active members of the Kansas Corn Growers Association.

The contest is a fun way for producers to showcase their high yielding and high quality corn with other growers in the state, and provide motivation to producers to increase yields. The contest also serves as a vehicle to improve farming operations and increase awareness of best management practices (BMPs) to improve and sustain corn yields.

In addition to grower recognition, cash awards will be awarded at the district and state levels. The districts align with crop reporting districts, plus a NNE district was created to include Doniphan and parts of Brown and Atchison (Figure 1). In addition, one statewide dryland winner and one statewide irrigated winner will be announced. Entries for 2019 contest are presented in Figure 2. District winners will receive $300 and a plaque. Second place entries will receive a $200 prize and third place will receive a $100 prize. The highest yielding dryland and irrigated entries statewide will receive an additional $500 prize. All farmers entering the contest and completing the harvest form will receive a shirt from Kansas Corn, if they have not earned one already through the Corn Challenge. Contest winners will be recognized at the Kansas Corn Symposium in January 2021.

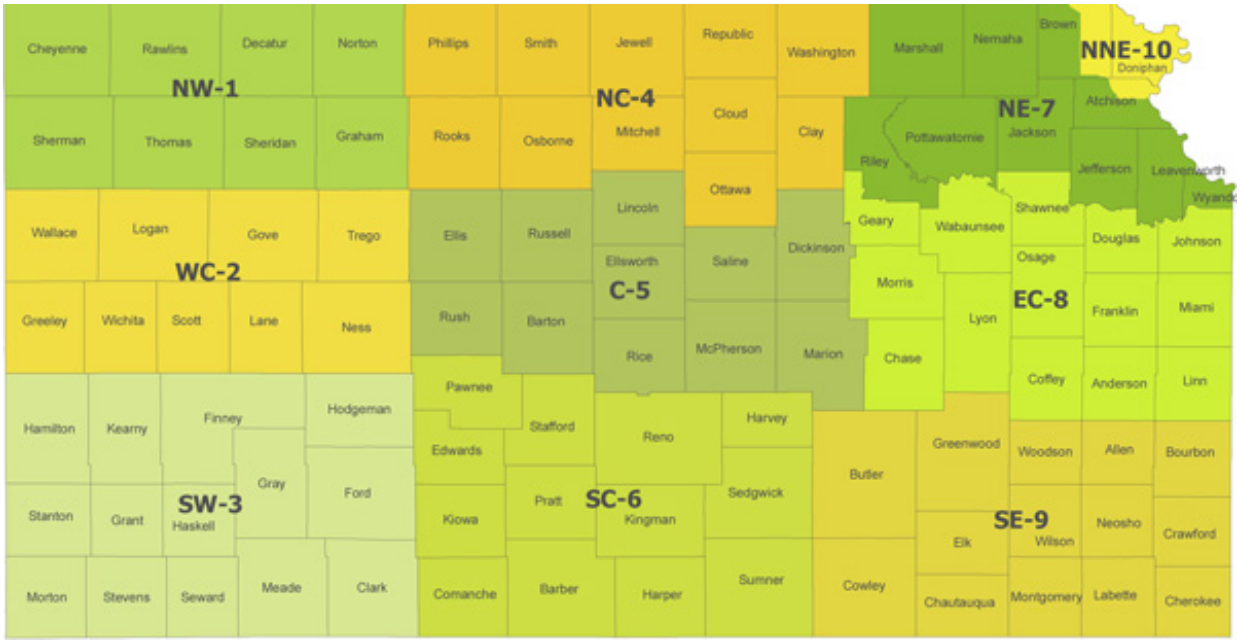

Figure 1. Dryland and irrigated contest districts. Note: NNE includes only those fields north and/or east of KS Hwy 73 in Brown, Doniphan, and Atchison counties.

The contest is free of charge to members of the Kansas Corn Growers Association. Registration must be completed online by **August 31, 2020.** If harvest occurs before the August 31 deadline, the registration must be received two weeks prior to harvest**.** Exceptions can be made for late harvest, but must be requested ahead of time. All harvest entry forms must be **received online by December 1, 2020**. Entries submitted to the National Corn Yield Contest qualify to enter the state contest, but entries must be made to both contests.

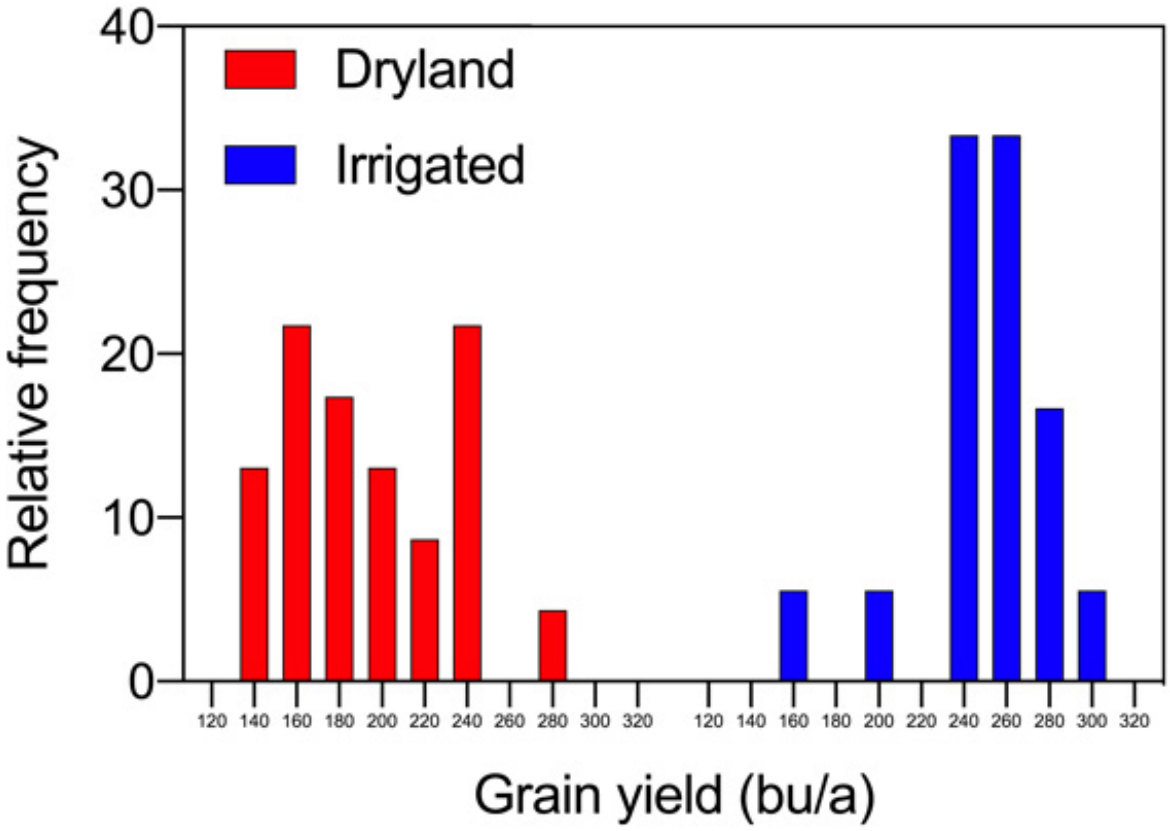

Figure 2. Kansas contest winner entries to the Kansas Corn Contest from 2019. Relative frequency referred to number of entries in the contest along the y-axis and yield values along the x-axis are in bushels per acre (red bars for dryland and blue bars for irrigated). Graph produced by Ignacio Ciampitti, K-State Research and Extension.

Results from the 2018 Kansas Corn Yield Contest can be reviewed at: https://bookstore.ksre.ksu.edu/pubs/MF3463.pdf ("Kansas Corn Yield Contest, High Yield Management")

For complete contest rules, forms, and to register, visit kscorn.com/yield.

For more information, call Kansas Corn at 785-410-5009 or email yield@ksgrains.com

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