Issue 823

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Extension Agronomy

eUpdate

10/16/2020

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. Rate of dry down in sorghum before harvest

The latest Crop Progress and Condition report from Kansas Agricultural Statistics, on October 11, stated that grain sorghum maturity was 88%, well ahead of last year (68%) and the average (75%). Harvest is well underway at 30% for this year, ahead of the 5-year average (20%).

The weather conditions experienced from early-September to early-October are critical for sorghum as related to the grain-filling rate and determining final grain weight. After a cold start to September, including freezing temperatures in the west, warmer temperatures have prevailed. The entire state has seen also seen much lower than normal precipitation. The greatest departures are in the east, where higher precipitation amounts are normal (Figure 1).

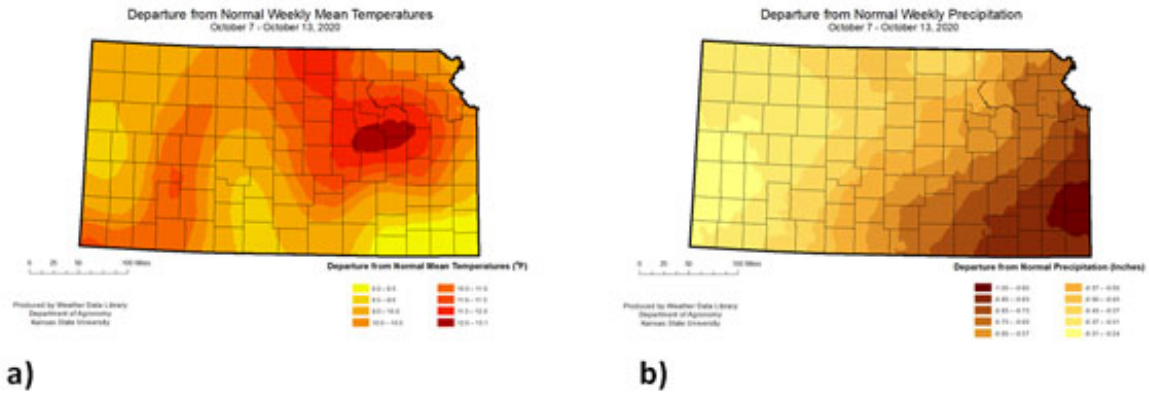

Figure 1. a) Departure from normal temperatures; b) Departure from normal precipitation. Maps by Kansas Weather Data Library.

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 not available. The weather outlook for November calls for an increased chance of above-normal temperatures with chances for normal precipitation. Normal precipitation in November is much less than in October. This would favor a faster dry down rate than average but any sorghum impacted by freeze 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 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.

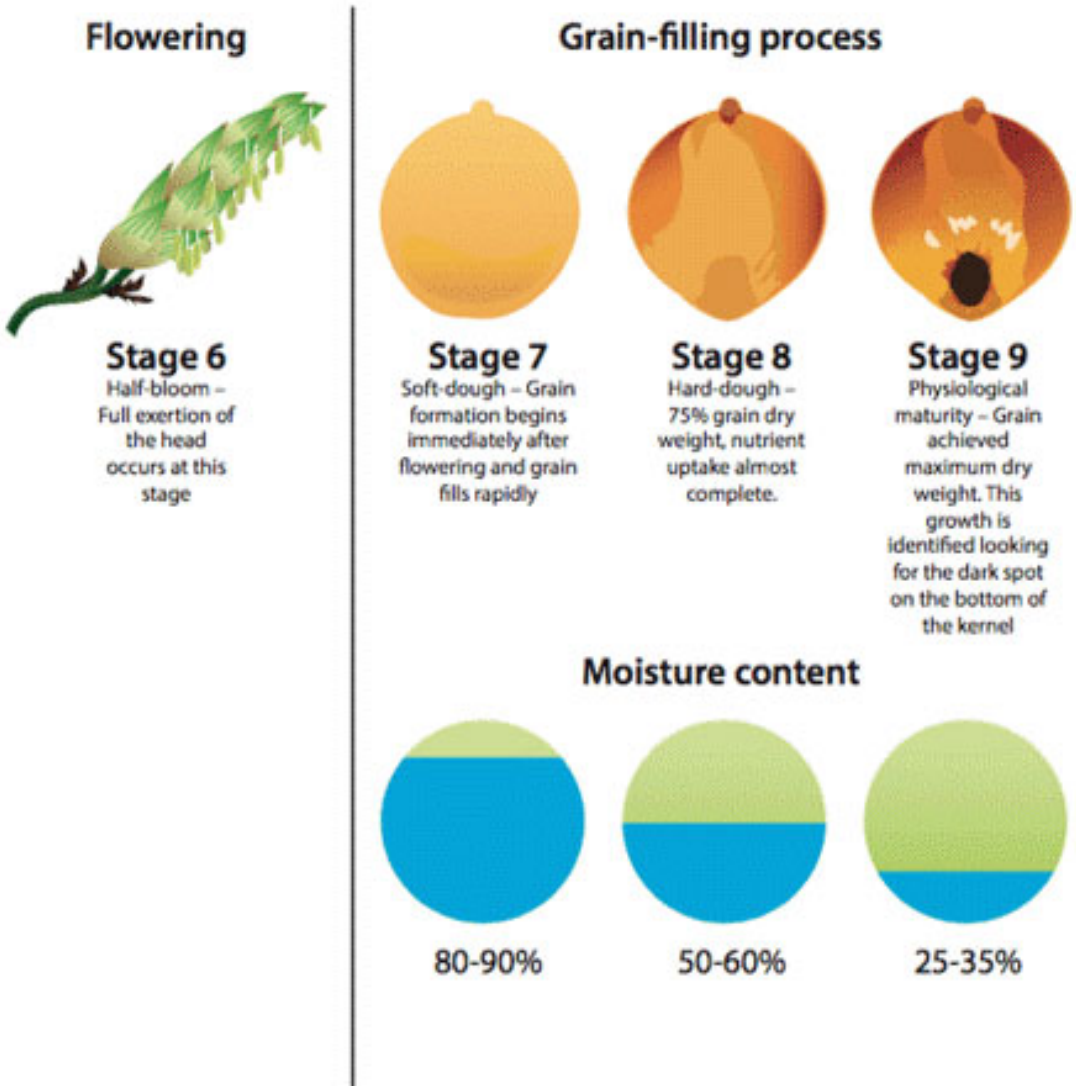

Figure 2. Sorghum growth stages from half-bloom and grain filling (including soft dough, hard dough, and physiological maturity). Infographic representing changes in grain coloration and moisture content during grain filling period until black layer formation, maturity. Graphic by K-State Research and 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, the Figure 2 presents the changes in grain moisture from soft dough until 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 (from early September until early October), the overall dry down rate was around 0.7% per day (from 34% to 17% grain moisture) – taking an overall of 26 days (from September 9 to October 10).

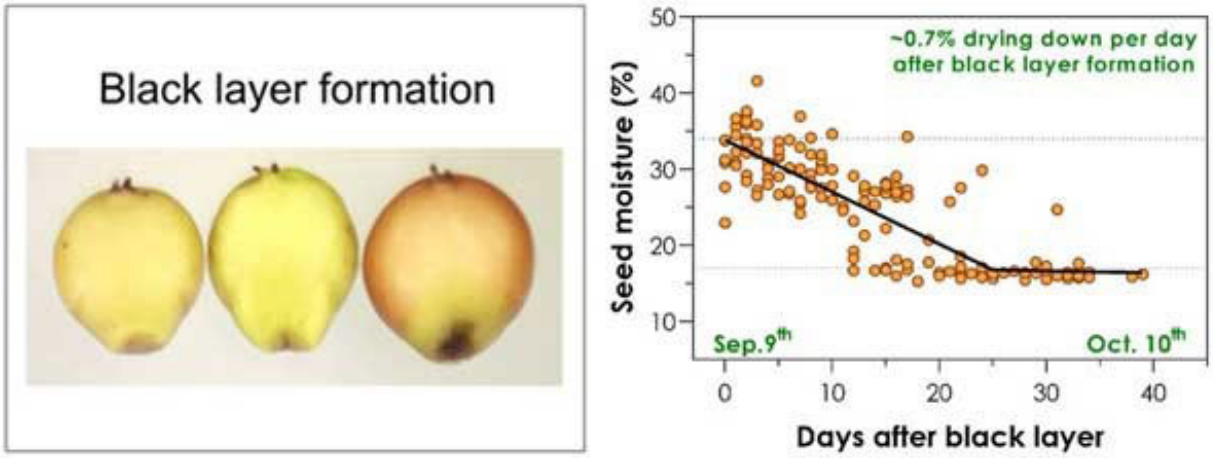

Figure 3. Grain moisture dry down across different sorghum hybrids for a study located near Manhattan, KS (2019 growing season). Horizontal dashed lines marked the 34% grain moisture at black layer formation and 17% grain moisture around harvest time. The infographic in the right panel reflects the different stages of the grain for sorghum from right to left – before to black layer formation. 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 <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 web site at http://mesonet.k-state.edu/weather/historical/ by selecting the station and time period of interest.

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2. Emergency measures to control wind erosion

Cropland can be quite susceptible to wind erosion under some conditions. Cooler-than-normal temperatures and drought conditions may limit vegetative growth and cover. Burning or removing crop residues for forage creates a particularly serious hazard. Winter wheat and other fall-planted crop fields also may be susceptible during periods of low cover in the winter and early spring. This is particularly true during drought. Marginally productive cropland may not produce sufficient residue to protect against wind erosion. In addition, overgrazed or poorly vegetated rangeland may also subject to wind erosion. Recent wind conditions have been conducive to erosion (Figure 1), given the peak wind gusts that have been recorded in Kansas over the last few days (Figure 2).

Figure 1. Blowing soil in Colby on October 11, 2020. Photo taken by Lucas Haag, K-State Research and Extension.

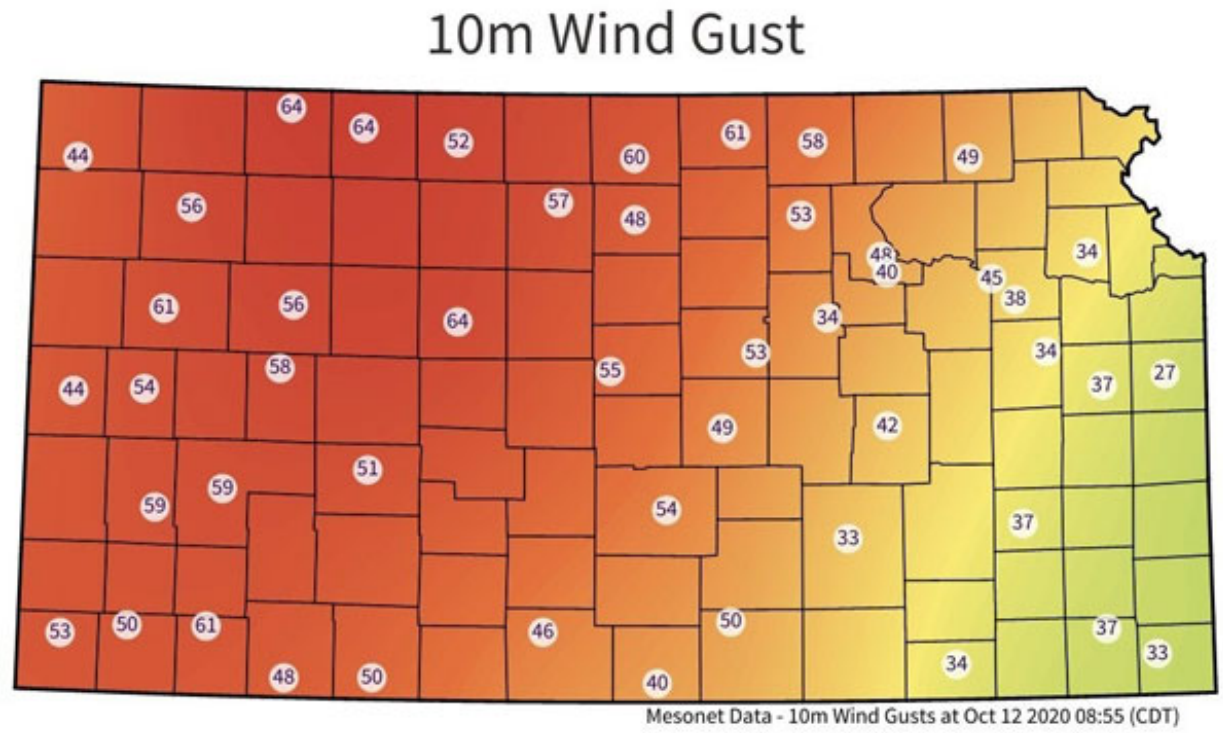

Figure 2. Peak 24-hour wind gusts measured at 10 meters for October 12, 2020. http://mesonet.k-state.edu

It is important to monitor field conditions and identify fields that are in a condition to blow. Such conditions include low vegetation cover and a high proportion of erodible-sized clods (less than 1 mm in size, or about the thickness of a dime). It is better to be proactive and treat potential problems before they occur than to try to react and catch up once a field is actively eroding. Once soil movement has started, it is difficult to completely stop further damage. However, prompt action may prevent a small erodible spot from damaging an entire field or adjacent fields.

Emergency control measures

Mulching. If wind erosion has already started, it can be reduced by mulching with manure or other anchored plant materials such as straw or hay. To be effective, at least 1.5 to 2 tons per acre of straw or grass or 3 to 4 tons per acre of corn or sorghum stover are needed to control areas of erosion, and the straw or hay must be anchored. Residue can be spread by hand, spreader or other mechanical equipment.

A stubble puncher or disk set straight may be used to anchor residue and prevent it from being blown away. Wet manure application should be 15 to 20 tons/acre and not incorporated into the soil. Care should be taken to not add wheel paths parallel to the wind direction as the mulch is applied. Traffic areas and wheel paths can contribute to wind erosion.

Generally, mulches are practical only for small areas, so mulching is most effective when applied before the soil starts to move. Producers should scout fields to identify areas that might be susceptible to wind erosion (low vegetation cover and a high proportion of erodible-sized clods less than the thickness of a dime) if they plan to use mulch or manure to controls.

Emergency tillage. Emergency tillage is a last-resort method that can be effective if done promptly and with the right equipment. The goal of emergency tillage is to make the soil surface rougher by producing resistant clods and surface ridges (Figures 3 and 4). A rough surface reduces wind speed. The larger clods and ridges resist movement and provide traps to catch the moving soil particles.

Chisels with single or only a few tool ranks are frequently used to roughen the soil surface. The combination of chisel point size, speed, and depth that produces the roughest surface with the firmest, most resistant clods should be used for emergency tillage.

Research has shown that a narrow chisel (2 inches wide) on 24- to 54-inch spacing, operated 3 to 6 inches deep will usually bring enough resistant clods to the surface to control erosion on fine-textured (clay-based) soils. A medium shovel (4 inches wide) can be effective for medium-textured soils (loamy soils). Spacings should typically be narrower where there is no cover and wider in areas of partial cover, such as a growing crop or plant residue.

If the erosion conditions recur or persist, a second, deeper chiseling should split the first spacing. Tillage passes should be made perpendicular to the direction of the prevailing wind causing the erosion.

Figure 3. Emergency tillage across 50 percent of the field. Photo courtesy of USDA-ARS Engineering and Wind Erosion Unit, Manhattan, Kansas.

Figure 4. Widely spaced shanks used for emergency tillage, making clods to roughen the soil surface. Photo courtesy of University of Nebraska.

If emergency tillage is to be used in growing crops that are covered by crop insurance, producers should check with their crop insurance providers regarding emergency tillage insurance rules. Emergency tillage does not significantly reduce wheat yields of an established crop. Studies in southwest Kansas and Manhattan demonstrate that the use of a chisel on 40-inch spacing reduced wheat yields by 5.5 bushels per acre on the emergency tillage area, due to direct injury caused by the tillage action. Since the entire field is rarely tilled when performing emergency tillage, the overall yield reduction for the field will be less than 5.5 bushels per acre. In fact, yields in the untilled portion of the field actually can be increased by the use of emergency tillage since that tillage will reduce the amount of damage to wheat caused by wind erosion. The overall reduction in yield for fields that have received emergency tillage has been as little as 1 bushel per acre in the studies mentioned above.

Performing emergency, clod-forming tillage across the field is effective in reducing wind erosion. The degree of success of emergency tillage is highly dependent on climatic, soil, and cover condition. It is often not necessary to till the entire field, but rather, it is very effective to perform emergency tillage passes across 50% of the field (till a pass, leave a pass, repeat). Narrow chisel spacing (20 to 24 inches) is best for this method.

If 50% of the area has been tilled and wind erosion persists, the omitted strips can be emergency-tilled in a second operation to make result in full-cover tillage. If a second tillage pass is needed, it should be at a greater depth than the first pass. Wide-chisel spacings are used in the full-field coverage method. The space between chisel grooves can be chiseled later should wind erosion persist.

All tillage operations should be perpendicular or across the direction of the prevailing or eroding wind. For most of Kansas, this means that an east-west direction of tillage is likely best.

The best wind erosion control is created with maximum surface roughness when resistant clods cover a major portion of the surface. Research shows that lower travel speeds of 2 to 3 mph generally produce the largest and most resistant clods. However, speeds of 5 to 7 mph produce the greatest roughness. Because clod resistance is usually reduced at higher speeds, the effect may not be as long-lasting as at lower speeds. Thus, higher speeds are recommended where erosion is already in progress, while lower speeds might be a better choice in anticipation of erosion.

Depth of tillage usually affects clod stability more than travel speed, but optimum depth is highly dependent on soil conditions (such as moisture level) and compaction. Deeper tillage passes can produce more resistant clods than shallow passes.

If the problem is severe and the wheat has already been destroyed or the ground is bare, chisels 4 to 6 inches wide on a 24- to 30-inch spacing will generally provide enough clods to control erosion. Operating depth should be 4 to 6 inches.

Controlling wind erosion on sandy soils

Loose sandy soils require a different tillage approach to effectively control erosion. Clods cannot be formed at the surface that will be sufficiently resistant to erosion on sandy soils. Erosion resistance is achieved through building ridges and furrows in the field to provide adequate protection.

A 14-inch moldboard lister spaced 40 to 50 inches apart (or an 8-inch lister on 20- to 24-inch spacing) is needed to create sufficient surface roughness. The first listing pass should be shallow, not more than about 4 to 5 inches deep. Then, when additional treatment is needed, the depth should become progressively deeper. Alternatively, for the second treatment, the original ridge may be split.

The addition of manure to the ridged surface may also be beneficial in these situations.

Tips for effective emergency tillage

- Watch the weather forecast for periods of high winds, particularly when soils are dry.
- Assess residue and plant cover prior to the wind blowing, and take preventive action with emergency tillage. It is much easier to prevent the problem from starting than to stop erosion after it begins. If you wait, the soil only gets drier and some moisture is needed to form clods.
- Use the combination of tractor speed, tillage depth, and chisel point size that will produce the roughest surface with the most resistant clods. If wind erosion is anticipated, do some test tillage prior to an erosion event to see what tillage tool, depth, and speed will provide adequate clods and surface roughness.
- Always start at the upwind location when the field is blowing. A sufficient area upwind of the eroding spot should be tilled, in addition to the area presently blowing.
- Till in a direction perpendicular to the prevailing wind direction. For row crop areas it may be necessary to compromise direction and follow the row pattern. Maintain as much anchored stubble in the field as possible.

For more information, see K-State Research and Extension publication MF2206, *Emergency Wind Erosion Control*, at: http://www.ksre.ksu.edu/bookstore/pubs/MF2206.pdf

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3. Musk thistle control in the fall

Musk thistle (*Carduus nutans*) is one of 12 state-wide noxious weeds in Kansas infesting over 700,000 acres. Musk thistle has been reported in nearly every county in Kansas (Figure 1) and is found primarily in pastures, rangeland, hay meadows, alfalfa, fallow, roadsides, and waste areas.

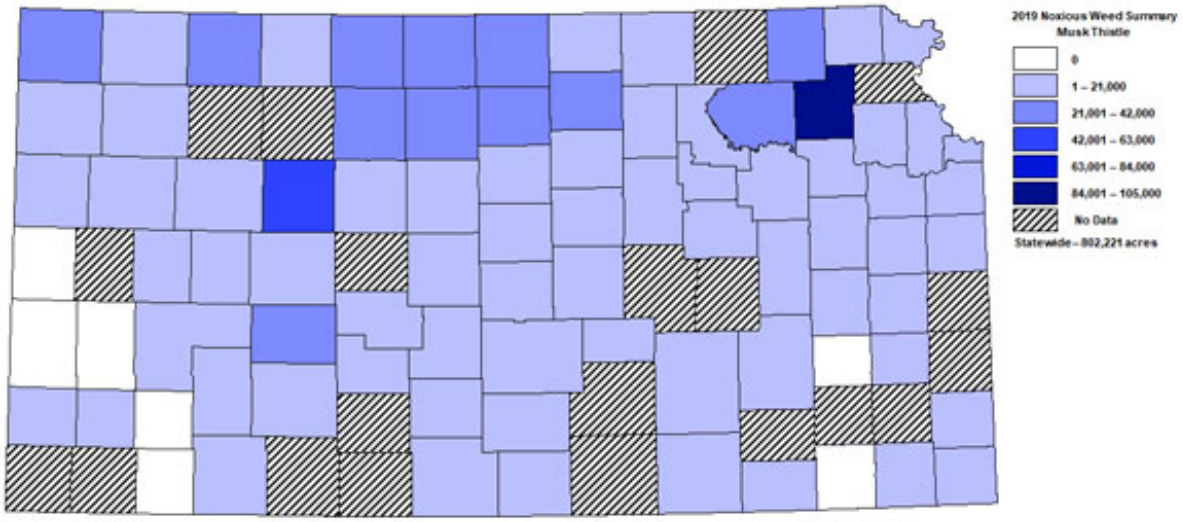

Figure 1. Distribution of musk thistle in Kansas. Map courtesy of the Kansas Department of Agriculture.

Musk thistle is primarily a biennial or winter annual species. Biennials take two growing seasons to complete their life cycle. Thistles that germinate in the spring will spend the entire summer as a rosette, live through the winter, and bolt the next year in May and June. Winter annual plants will germinate with moisture and warm temperatures in the fall, live through the winter, and bolt the following year.

Most people recognize musk thistle during the early summer when the plants are actively blooming (Figure 2, top photo). However, musk thistle control is easiest as a rosette (Figure 2, bottom photo).

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Figure 2. Musk thistle in flowering and rosette stages of growth. Photo courtesy of Walt Fick, K-State Research and Extension.

Fall is an excellent time to spray musk thistle as all are in the rosette stage of growth. Another advantage for treatment in the fall is reduced risk of off-target drift. Waiting until most deciduous trees have lost their leaves and most crops are harvested will greatly reduce the likelihood of damage from herbicide drift. A wider window of opportunity for treating musk thistle also exists in the fall. The spraying window in the fall probably extends until the ground is frozen and the musk thistle plants have shut down activity until warmer temperatures in the spring. Freezing temperatures will start to damage musk thistle plants, with some yellowing and curling of leaves. However, the plants are susceptible to herbicides as long as green tissue exists.

Dry conditions in the fall can reduce control of musk thistle with certain herbicides, but studies in Kansas indicated that a fall application of 2,4-D LVE at 2 lbs per acre was more effective (80% control) than a similar rate of 2,4-D amine (49% control). Dicamba + 2,4-D amine at 0.25 + 0.75 lbs per acre and picloram at 0.125 lbs per acre were also effective (>90% control) on musk thistle treated in the fall.

Data presented in Table 1 were collected in July 2013 following treatment on December 6, 2012. Conditions at the time of treatment were 50 degrees F air temperature, 66% relative humidity, and 6-8 mph wind speed. Skies were overcast and cloudy. All treatments provided excellent control of rosettes present at the time of spraying (data not shown).

The data in this table reflect residual control of rosettes that germinated during spring 2013. The number of rosettes on untreated plots increased 92% between December 2012 and July 2013, indicating spring germination. The only treatment not providing nearly 100% residual control was 2,4-D LVE applied at 64 fl oz per acre. The active ingredient in Milestone is aminopyralid. Tordon 22K contains 2 lbs per gallon picloram. Chaparral contains aminopyralid and metsulfuron. These products are all labelled for use on range and pasture. Milestone, 2,4-D, and Tordon 22K are also labeled for use on non-cropland sites including roadsides, right-of-ways, and industrial sites. Opensight was not included in this test, but is a product similar to Chaparral that can be used on non-cropland sites.

Table 1. Musk thistle control with herbicides applied on December 6, 2012.

Herbicide	Rate	% control, July 5, 2013
Milestone	3 fl oz	99
Milestone	4 fl oz	100
Milestone	5 fl oz	100
Tordon 22K	10 fl oz	100
2,4-D LVE	64 fl oz	43
Chaparral	1.5 oz	100
Untreated	---	0

If you need to treat musk thistle this fall, herbicides exist that will not only control the rosettes at the time of application, but will carryover and control new emerging rosettes next spring. If possible, select a warm, sunny day when spraying musk thistle this fall.

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4. What does a La Nina winter mean for Kansas?

An El Niño-Southern Oscillation (ENSO) event is defined as five consecutive 3-month periods where the waters of the Pacific along the equator are either warmer or colder than normal. If the water measures at least +0.5 degrees Celsius (C) warmer, an El Niño exists. However, if the water measures (via satellite) -0.5 degrees Celsius (C) or cooler-than-average a La Niña is present. As indicated by the current sea-surface temperatures (Figure 1), a weak La Niña is present, and is expected to strengthen and persist through the spring.

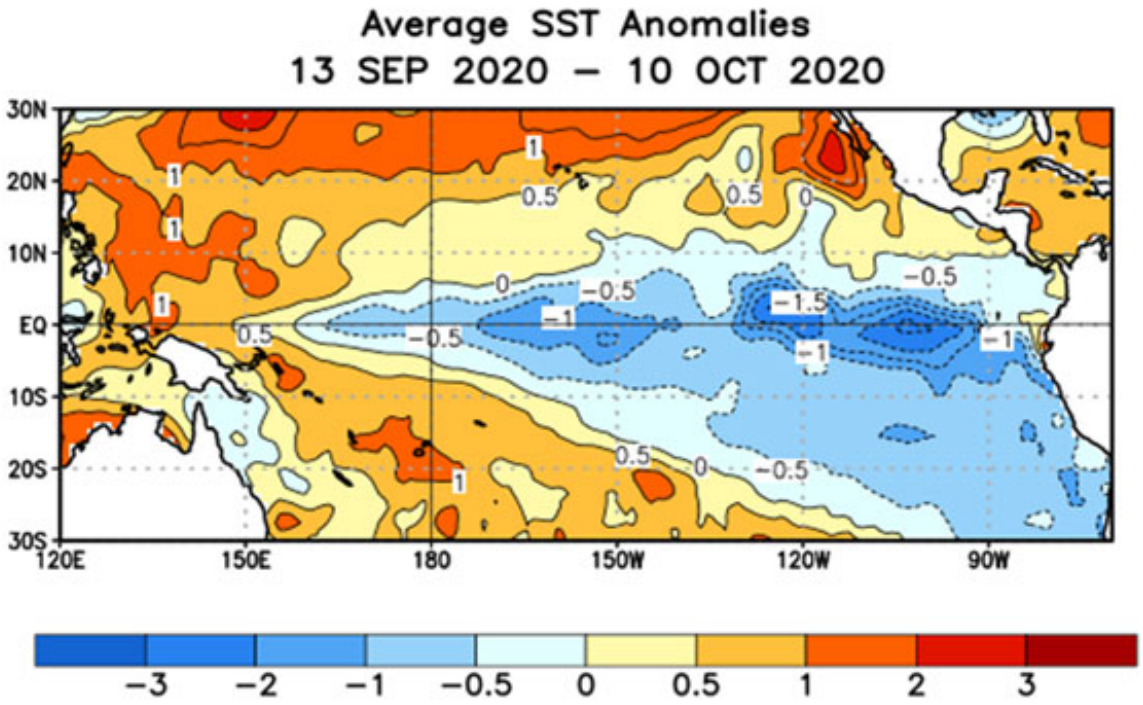

Figure 1. Current sea surface temperatures (SST) from the Climate Prediction Center.

The latest weekly Niño-4 index value was -0.8 degrees Celsius, and the Niño-3 and Niño-1+2 indices were at or below -1.0 degrees C. Based on the latest observations and forecast guidance, forecasters believe this weak-to-moderate La Niña (3-month Niño-3.4 values between -0.5°C and -1.5°C) will continue to strengthen, peaking around December, and persisting into the spring (Figure 2).

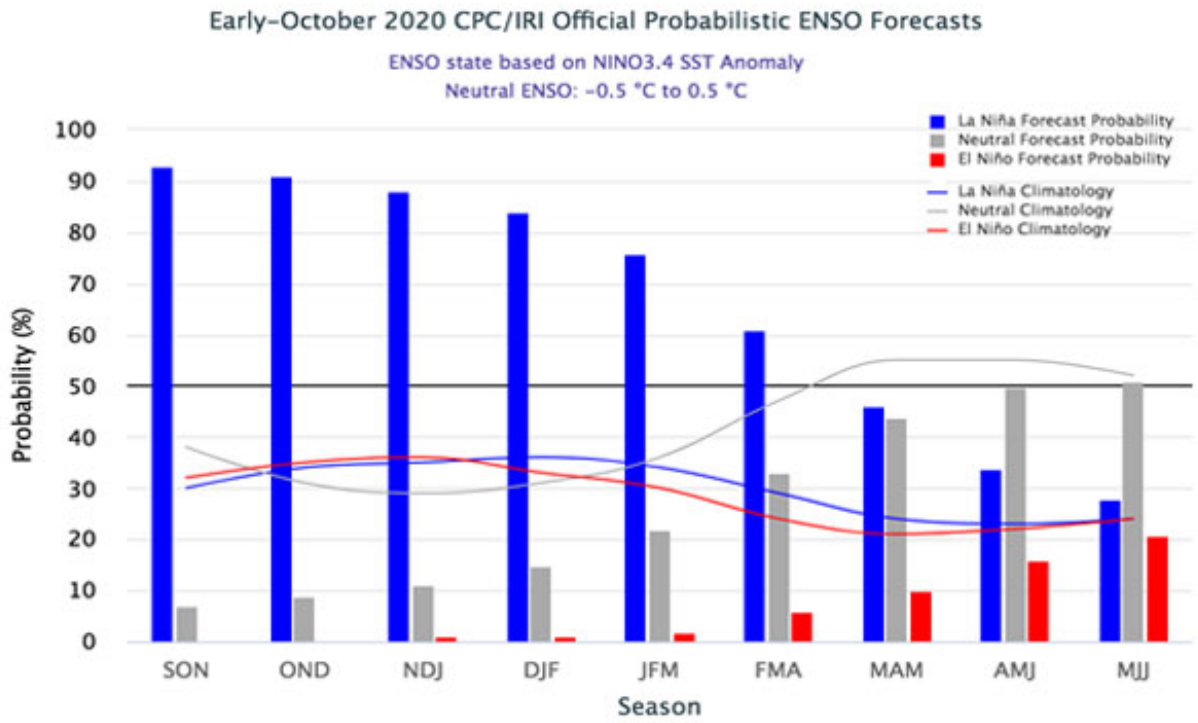

Figure 2. ENSO Forecasts (Climate Prediction Center)

What can Kansas expect during a La Niña winter?

For Kansas, of the previous eight La Niña events recorded since 2000 (Figure 3), only one event had a positive (above-normal) precipitation anomaly during the late fall/early winter season of November through January. During the 2011 event, the November to January departure from the 1981-2010 normal was +1.71 inches, while the average deficit is -0.70 inches.

This pattern of a negative anomaly is one of the factors guiding the Climate Prediction Center's precipitation outlook for the period which was posted on October 15, 2020 (Figure 4).

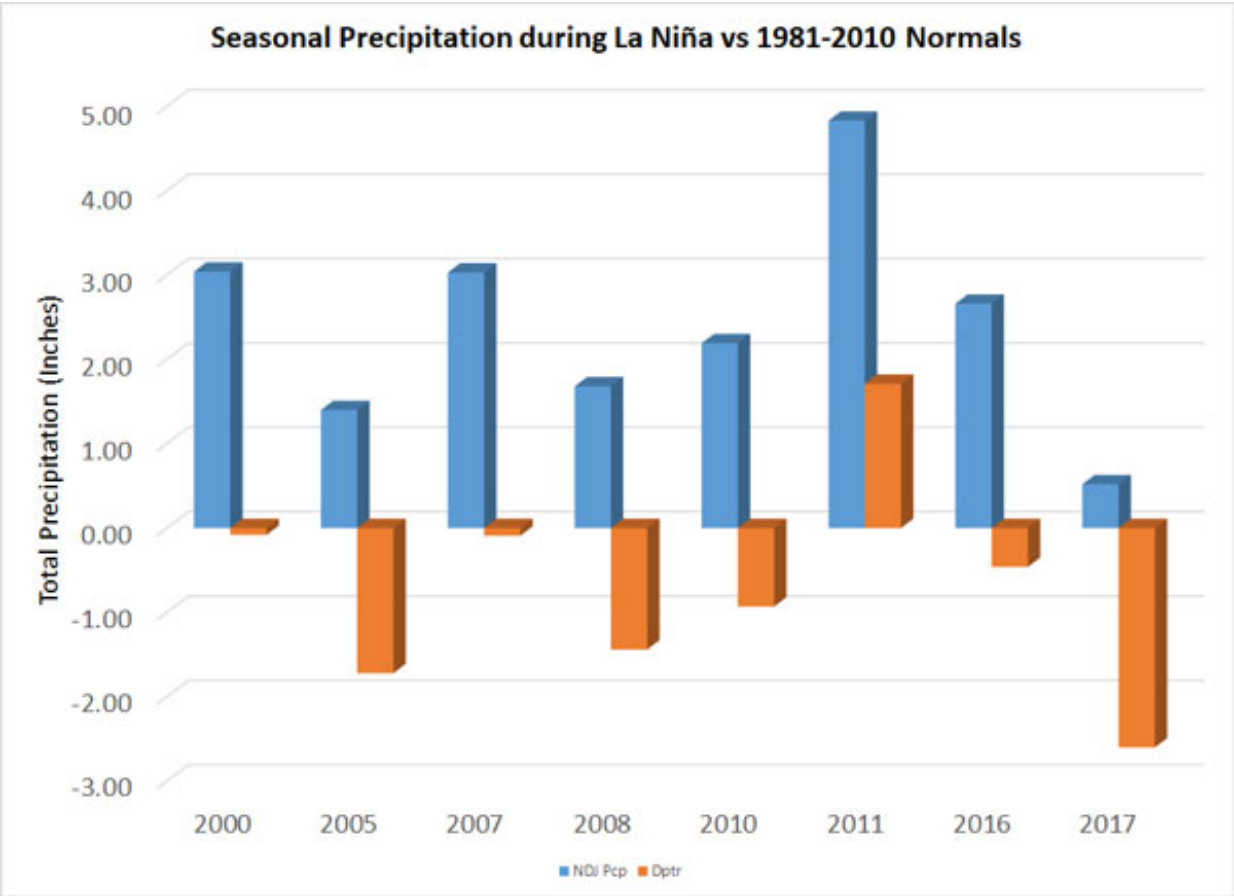

Figure 3. Seasonal observed and departures from normal during La Niña events in NDJ (November, December and January). Source: Weather Data Library.

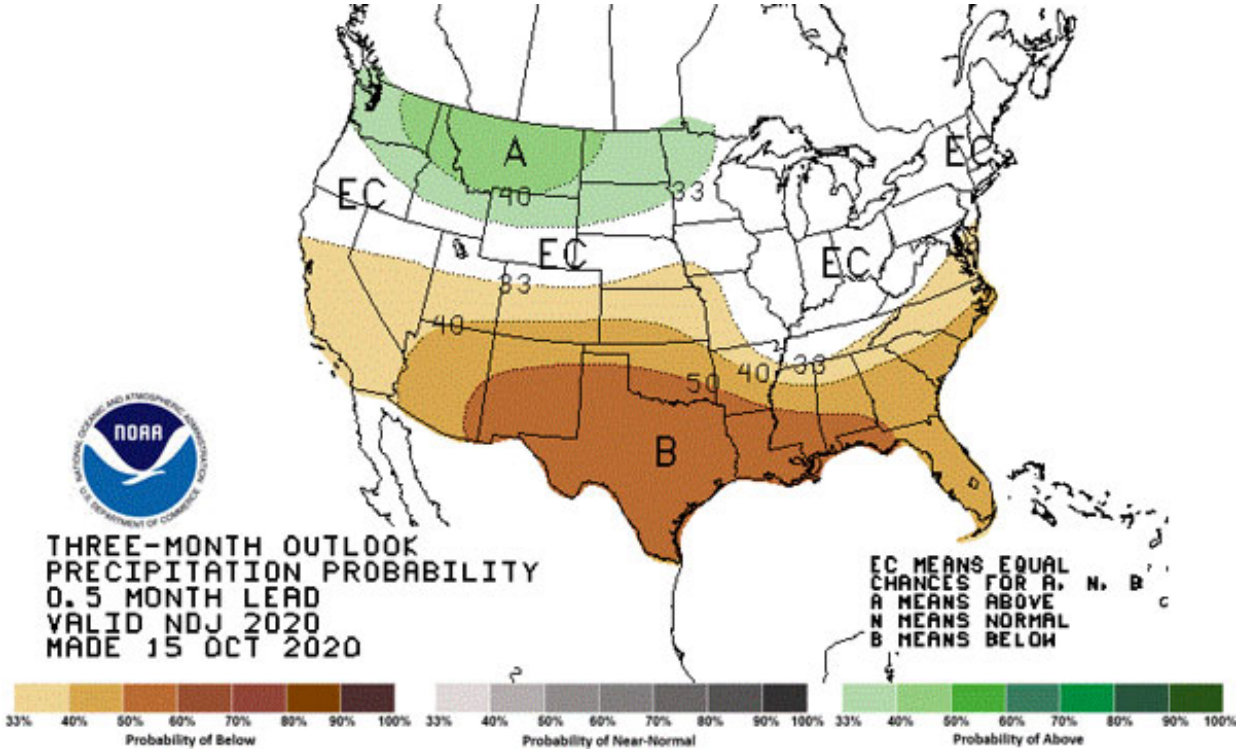

Figure 4. Three-month precipitation outlook (Climate Prediction Center)

As seen in the normal precipitation map below (Figure 5), November is critical to maintain and establish fall planted crops including winter wheat, canola, and cover crops. Even wetter-than-normal conditions are unlikely to improve the current drought conditions which have accumulated substantial precipitation deficits over the last 30 days (Figure 6).

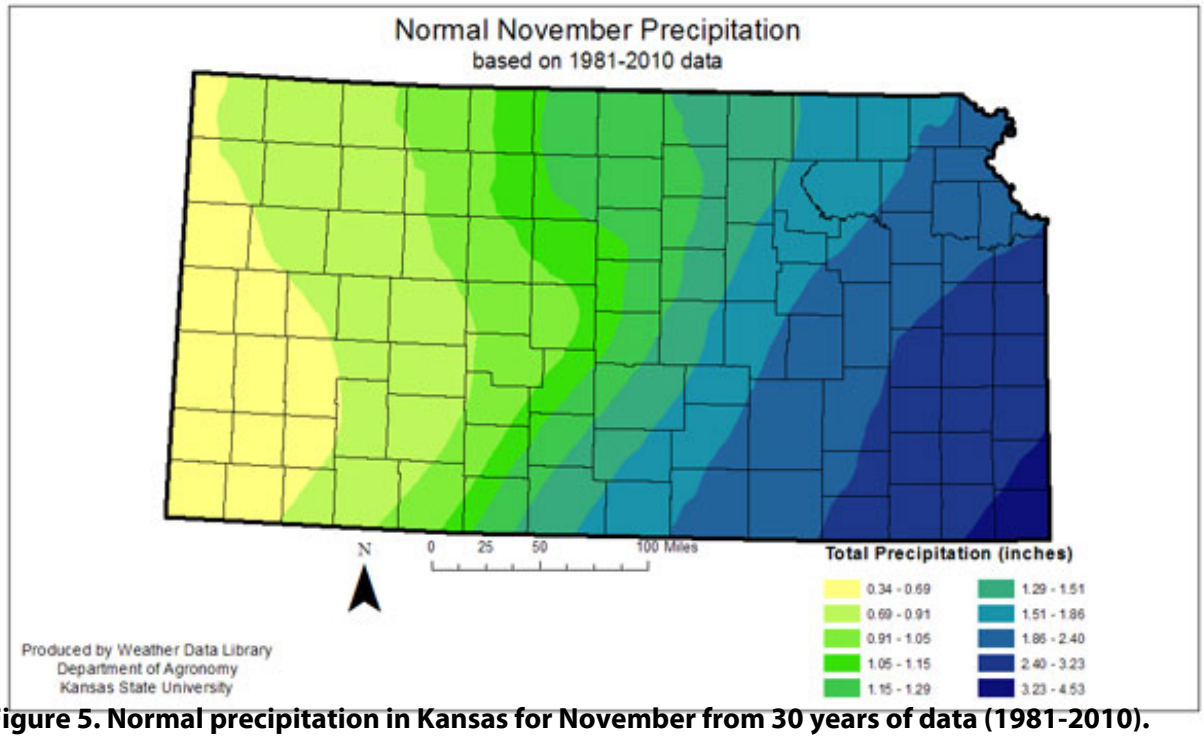

Figure 5. Normal precipitation in Kansas for November from 30 years of data (1981-2010).

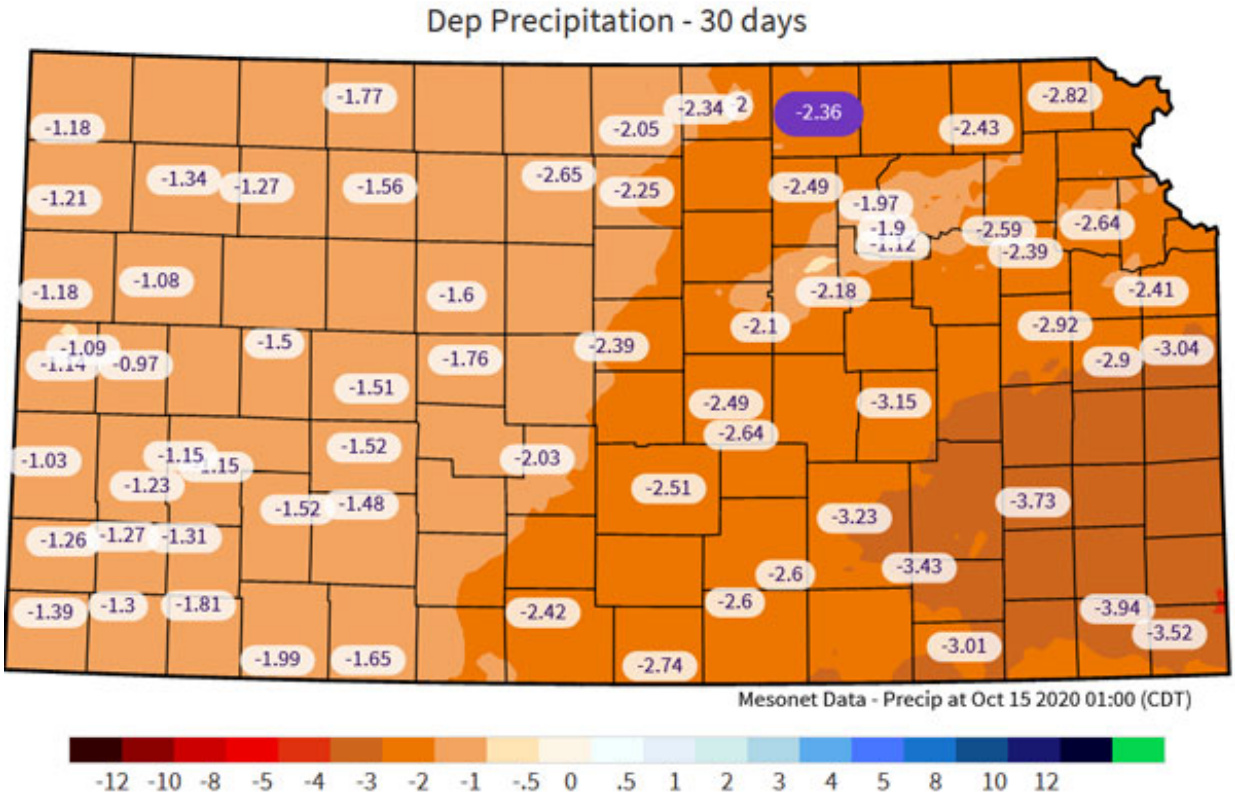

Figure 6. Departures of normal precipitation on the Kansas Mesonet (mesonet.ksu.edu) for the

last 30 days ending on October 15, 2020. Normal consists of 30 years of data (1981-2010).

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5. Don't miss the 2020 Kansas Soybean Yield and Value Contests

All soybean growers in Kansas are invited to participate in the 2020 Kansas Soybean Yield and Value Contests. As harvest progresses, those interested in competing may collect relevant records for one entry per field, and submit entries postmarked no later than **Dec. 1**.

The contests are an incentive for farmers to maximize soybean yield and protein and oil contents. They also provide an opportunity to share production practices that achieve high levels of yield and value.

Per yield contest rules, one entry per field is allowed. Eligible fields must consist of at least five contiguous acres as verified by the Farm Service Agency, GPS printout or manual measurement. A non-relative witness, either Kansas State Research and Extension (KSRE) personnel or a specified designee, must be present at harvest and should ensure that the combine grain hopper is empty prior to harvest. Official elevator-scale tickets with moisture percentage and foreign matter included must accompany entries to be considered.

Four categories - **conventional-till dryland, no-till dryland, conventional-till irrigated and no-till irrigated** - are considered for the contest, with dryland entries further divided into eight districts based on field location. A farmer may enter multiple categories.

The Kansas Soybean Commission provides monetary awards to yield contest winners. The highest dryland and irrigated yields in the contest each will receive a $1,000 award. The overall winner could earn an additional $1,000 for achieving or surpassing 100 bushels per acre. In each district, first place receives $300, second will earn $200, and third will receive $100. No-till on the Plains supplies additional awards in the no-till categories.

The value contest allows for one entry per individual and is a statewide contest that recognizes the top three contestants. Entries consist of a 20-ounce sample of seed sent to KSA; these samples are analyzed by Ag Processing Inc. for protein, oil and additional qualities to calculate a value.

Farmers are welcome to enter the just the yield contest, just the value contest, or both. The results are shared at the Kansas Soybean Expo, which is scheduled for January 6, 2021.

Contest rules and entry information is available at www.kansassoybeans.org/contests. Interested individuals can also call the Kansas Soybean office at 877-KS-SOYBEAN (877-577-6923) or contact their local KSRE offices.

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