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These e-Updates are a regular weekly item from K-State Extension Agronomy and Kathy Gehl, Agronomy eUpdate Editor. All of the Research and Extension faculty in Agronomy will be involved as sources from time to time. If you have any questions or suggestions for topics you'd like to have us address in this weekly update, contact Kathy Gehl, 785-532-3354 kgehl@ksu.edu, or Dalas Peterson, Extension Agronomy State Leader and Weed Management Specialist 785-532-0405 dpeterso@ksu.edu.

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1. Wheat planting: Be cautious of planting too early

The general target date for planting wheat for optimum grain yields in Kansas is within a week of the best pest management planting date, or BPMP (formerly known as the "Hessian fly-free") date (Figure 1). If forage production is the primary goal, earlier planting (mid-September) can increase forage yield. However, if grain yield is the primary goal, then waiting until the BPMP date to start planting is the best approach (Figure 2). Planting in mid-September is ideal for dual-purpose wheat systems where forage yields need to be maximized while reducing the effects of early planting on reduced grain yields. However, due to the current dry conditions, coupled with the outlook of continued drought in Kansas (see accompanying article on the 2023 fall weather outlook), planting wheat for dual-purpose or for forage only does not seem like a viable option this year.

Optimum wheat planting dates in Kansas depend on location within the state. Suggested planting dates by zone are as follows:

Zone 1: September 10-30

Zone 2: September 15 – October 20

Zone 3: September 25 – October 20

Zone 4: October 5 – 25

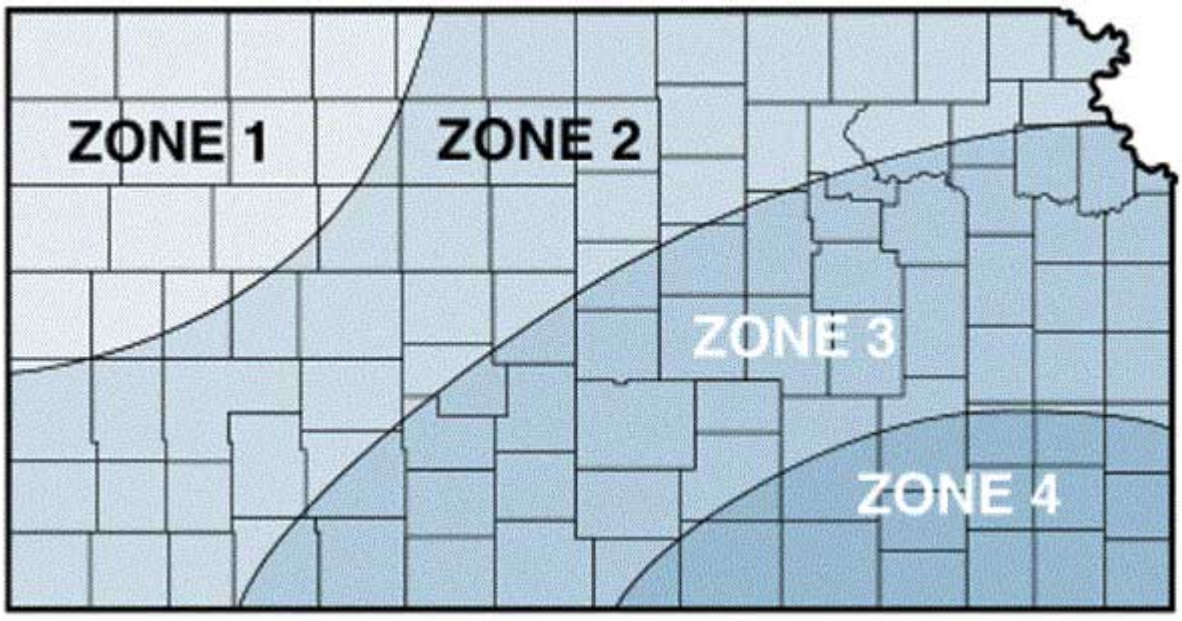

Figure 1. Optimum wheat planting dates by zone in Kansas.

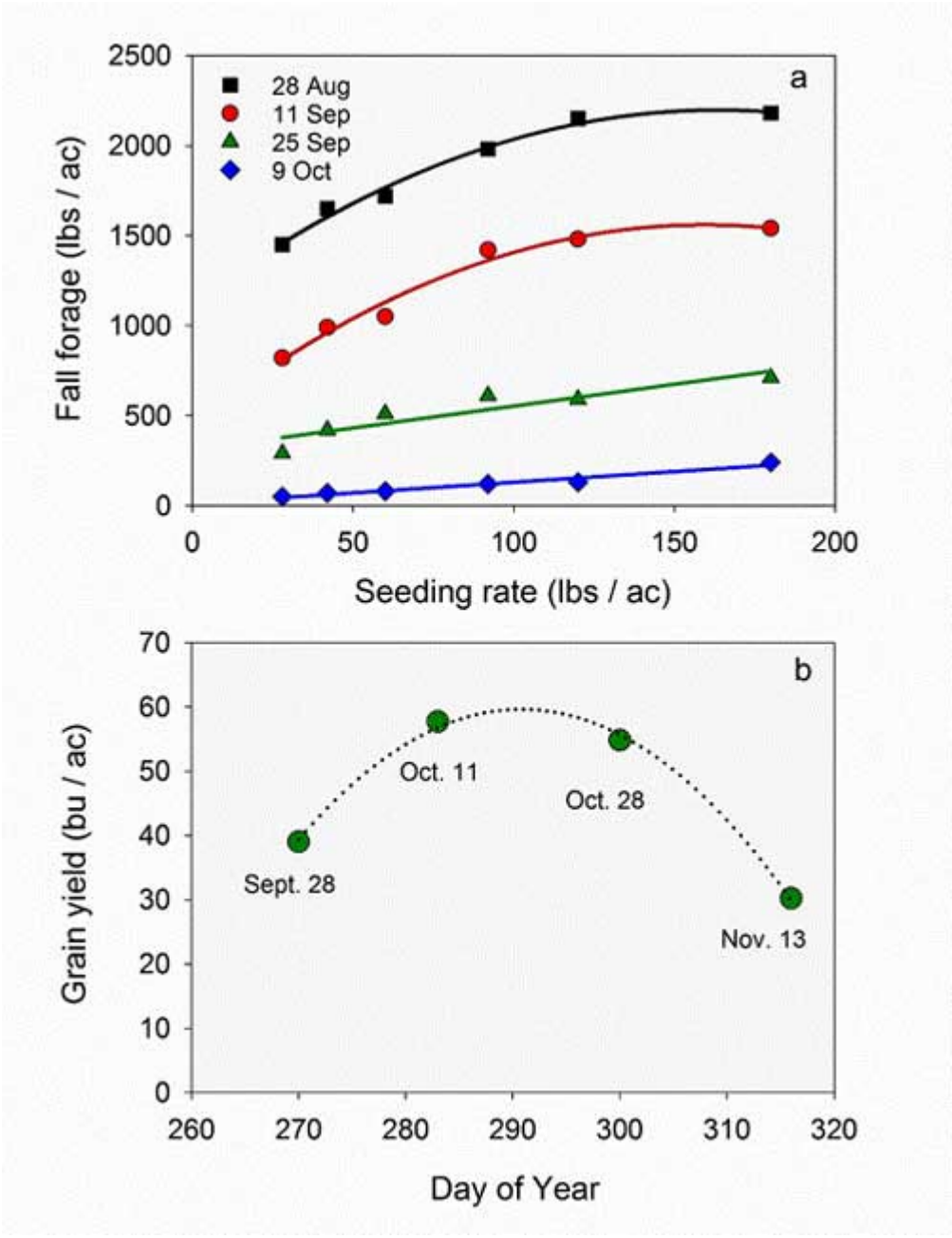

Figure 2. Effect of planting date and seeding rate on wheat fall forage yield in Lahoma, north-central Oklahoma (a) and effect of planting date on wheat grain yield near Hutchinson, south-central Kansas (b). Figure adapted from KSRE numbered publication MF3375.

While the effects of planting date on wheat yield shown in Figure 2 will hold true for most years, they will largely depend on environmental conditions and disease pressure during the growing season. In some years, earlier-planted wheat does best and in some years the later-planted wheat does best, and these year-specific performances usually relate to the weather experienced in the fall and spring. For instance, early-planted fields in growing seasons with a warm fall might produce excessive biomass that will use an excessive amount of water during the fall. If the following spring is dry, soil water deficit during grain filling then can reduce grain yield. Conversely, a warm fall would favor tillering of a later-planted wheat crop, helping to compensate for this delay. The opposite is also true: in years with an early onset of cold temperatures during the fall, an earlier planted crop might

perform better than a later planted crop due to its ability to produce enough fall tillers to maximize grain yield. Research conducted by Merle Witt with late-sown wheat in Garden City from 1985 through 1991 is summarized in Figure 3. Averaged across all these years, delaying wheat sowing from October 1 to November 1 delayed heading date by 6 days and decreased wheat yields in 23%. The grain-filling period was progressively shortened by about 1.7 days and occurred under hotter temperatures (about 1.5°F) for every month of delay in sowing date.

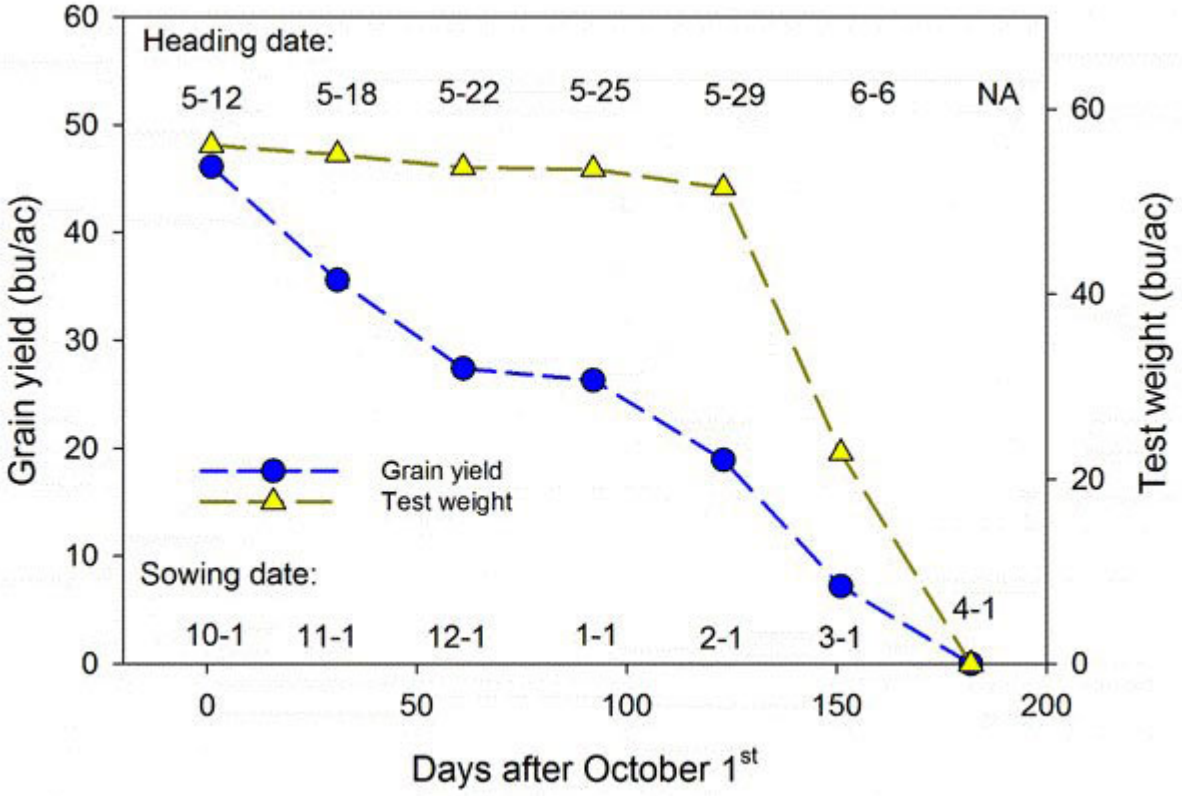

Figure 3. Wheat grain yield, test weight, and heading date responses to sowing date between 1985 and 1991. Data adapted from Kansas Agric. Exp. St. SRL 107.

In dry years, seedling emergence and stand establishment can be uneven. These dry conditions can also lead to poor crown root development and fall tillering. If fields become too wet to plant by mid-October and stay that way through the remainder of the fall, then producers end up planting much later than the optimum planting date. Following an unusual year, producers will often start planting earlier than the recommended date if soil conditions are good because the negative consequences of adverse conditions are fresh on their minds. However, planting early also increases the risk of other production problems including multiple diseases, insect pests, weed infestations, and undesirable growth of the crop.

Potential risks of planting wheat early

Increased risk of **wheat streak mosaic and related diseases**. Wheat curl mites that spread these diseases survive the summer on volunteer wheat and certain other grasses. As those plants die off, the wheat curl mites leave in search of new plants to feed on. Early-planted wheat is likely to become infested, and thus become infected with wheat streak mosaic virus, high plains virus, and Triticum

mosaic virus. The wheat curl mites are moved by wind and can be carried a mile or more before dying, so if wheat is planted early, make sure all volunteer wheat within a mile is completely dead at least two weeks before planting. For growers considering planting early, a good management consideration would be to select wheat varieties with resistance to the wheat streak mosaic virus and/or with tolerance to the wheat curl mite, especially in the western portions of the state.

Increased risk of **Hessian fly**. Over the summer, Hessian fly pupae live in the old crowns of wheat residue. After the first good soaking rain in late summer or early fall, these pupae (or "flaxseed") will hatch out as adult Hessian flies and start looking for live wheat plants to lay eggs on. They are most likely to find either volunteer wheat or early-planted wheat at that time. After the BPMP date, many of the adult Hessian flies in a given area will have laid their eggs, so there is generally less risk of Hessian fly infestation for wheat planted after that date. Hessian fly adult activity has been noted through November or even early December in Kansas. If planting early, consider varieties with improved tolerance to Hessian fly.

Armyworms and other lepidopteran larvae may also still pose a serious problem to early planted wheat. They may feed on the green wheat plants until the first cold front comes through (temperatures in the mid-20-degree F range for a couple of hours). Insecticide seed treatments do not work well against lepidoptera larvae.

Volunteer wheat herbicide applications and insecticides

Because of the relatively large and widespread populations of armyworms/fall armyworms in 2020 and 2021, many wheat producers have been talking about adding an insecticide to their herbicide application this year for volunteer wheat in order to save on application costs. In 2021, many fields of volunteer wheat were heavily infested with these caterpillars, which wasn't bad as they helped control some volunteer wheat stands but some were still around when the planted wheat germinated. The addition of an insecticide to a volunteer wheat herbicide application is probably not a good idea for several reasons: 1) If armyworms/fall armyworms are present in the volunteer now, killing the volunteer should cause the larvae to starve, or initiate pupation if they are far enough along in their development, or expose them to birds and/or other predators; 2) you should NOT use an insecticide unless the pest is at a vulnerable stage and has reached a treatment threshold; and 3) insecticides applied with a herbicide will not have insecticidal activity by the time the planted wheat germinates anyway. Please resist the urge to mix an insecticide with a volunteer wheat herbicide application but do control the volunteer wheat.

Increased risk of **barley yellow dwarf**. Many types of aphids can spread barley yellow dwarf. In Kansas, greenbugs and bird cherry-oat aphids are the primary vectors of this viral disease. These insects are more likely to infest wheat during warm weather early in the fall than during cooler weather. Planting wheat after the BPMD reduces the risk of problems with aphids and barley yellow dwarf. If planting early, consider varieties with improved tolerance to Barley Yellow Dwarf virus, especially in central and eastern Kansas or consider the use of seed treatments with imidacloprid (such as Gaucho XT or Rancona Crest).

Increased risk of **excessive fall growth and excessive fall tillering**. For optimum grain yields and winter survival, the goal is for wheat plants to go into winter with established crown roots and 3-5 tillers. Wheat that is planted early can grow much more than this, especially if moisture, temperature, and nitrogen levels are not limiting. If wheat gets too lush in the fall, it can use up too much soil moisture in unproductive vegetative growth. These fields often experience more drought stress in

the spring if soil conditions remain dry, and can show more symptoms of low-temperature damage during the winter (Figure 4). The wheat on the left (showing white discoloration of the leaves) was planted in mid-September for dual-purpose evaluation and had an excessive amount of fall growth (nearly 3,000 pounds of dry matter per acre). The wheat on the right was planted early to mid-October for grain-only purposes and had much more limited fall biomass. The white discoloration of the high biomass plots occurred after a late-winter, early-spring freeze that was more damaging to the dual-purpose crop. Notice the darker green plots in the upper left corner, amid discolored plots: while these were planted early, their growth was cut back by simulated grazing.

Figure 4. Aerial photo of side-by-side wheat trials near Hutchinson, KS, during the 2021-22 growing season. Photo taken March 2022 by Jorge Romero Soler.

Increased risk of **take-all, dryland foot rot, and common root rot**. Take-all is usually worse on early-planted wheat than on later-planted wheat. In addition, one of the ways to avoid dryland foot rot (*Fusarium graminearum* and other *Fusarium* species) is to avoid early seeding. This practice promotes large plants that more often become water-stressed in the fall predisposing them to invasion by the fungi. Early planting of wheat also favors common root rot because this gives the root rot fungi more time to invade and colonize root and crown tissue in the fall. Seed treatments are an option for controlling early-season seedling diseases. More information: https://bookstore.ksre.ksu.edu/pubs/MF2955.pdf

Grassy weed infestations become more expensive to control. If cheatgrass, downy brome, Japanese brome, or annual rye come up before the wheat is planted, they can be controlled with glyphosate or tillage. If wheat is planted early and these grassy weeds come up after the wheat has emerged, producers will have to use an appropriate grass herbicide to control them. If a field has a known history of grassy weed problems, consider planting a Clearfield or CoAxium wheat variety.

Germination problems due to high soil temperatures. Early-planted wheat is sown in hotter soils, which may become problematic because some wheat varieties are sensitive to high temperatures during germination. In fact, some varieties will not germinate when soil temperatures are greater

than 85°F. Additionally, some varieties can have their coleoptile length reduced by as much as 40% in hot as compared to cool soils. If planting early, it is important to select varieties that do not have high-temperature germination sensitivity or sow sensitive varieties later in the fall, when soil temperatures have cooled down.

Emergence problems due to shortened coleoptile length. Hotter soils tend to decrease the coleoptile length of the germinating wheat. Therefore, deeply planted wheat may not have long enough coleoptiles to break through the soil surface resulting in decreased emergence and poor stand establishment. When soil temperatures are hot, it is often better to plant wheat at a shallower depth (3/4 to 1 inch deep) even if moisture is absent in the top layers of soil. Planting wheat deep (>2 inches) increases the risk of poor emergence and unacceptable stands.

Summary

Early sowing of wheat can lead to several problems, from increased chances of insect- or mite-transmitted viral diseases to decreased emergence due to high temperatures and its consequences on wheat germination of particular varieties and reduced coleoptile length. Ideally, growers should consider planting around the optimum window; but, if planting early due to moisture availability or a dual-purpose system, growers should consider selecting wheat varieties with tolerance to the major yield-reducing factors in their respective region. Growers should strongly consider a seed treatment with both fungicides and insecticides if planting wheat early in Kansas.

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2. Wheat seed treatment considerations in 2023

Seed treatments are an important part of wheat production in Kansas. An updated version of the K-State publication MF2955, *Seed Treatment Fungicides for Wheat Disease Management 2023* is now available at: http://www.ksre.ksu.edu/bookstore/pubs/MF2955.pdf

This updated publication features updated product efficacy information, recommendations for setting seed treatment priorities, considerations for seed treatment success, a key to common seed treatment active ingredients, and a list of some of the more common seed treatments labeled for use in Kansas.

It is important to make sure the seed treatment chosen matches the diseases and pests you are looking to control. Most seed treatments available for wheat in Kansas include one or more fungicide active ingredients (FRAC CODES 3 or 11) that provide protection against a suite of seedborne fungal diseases (common bunt, loose smut, flag smut) as well as soilborne seedling diseases which may result in poor emergence or damping off. These products may also provide early-season suppression of foliar diseases like powdery mildew and rusts. These products may provide suppression of root and foot rots but will not provide full season control against spring infections. Some seed treatments include metalaxyl or mefenoxam (FRAC CODE 4) which control soilborne oomycete diseases like Pythium root rot. Some products also contain insecticides like imidacloprid or thiamethoxam for early-season control of aphids, wireworms, and other insect pests. It is important to note that seed treatments will only provide protection from diseases and pests for approximately 30-45 days after planting and do not provide disease or insect control through the spring months. It is important to take note of grazing restrictions if the seed treatment contains an insecticide.

Adequate seed coverage is critical to ensure the maximum efficacy of any seed treatment products. Seed that is heavily contaminated with chaff or dust may limit the adherence of seed treatments. In addition, if too much clumping of the product occurs, the seed may not be uniformly covered and may not flow well through planting equipment.

Seed treatment priorities in 2023

Fusarium head blight (scab) in northwest Kansas: Fusarium head blight is a serious disease that can result in direct yield loss, discounts, and rejections due to mycotoxin (DON) accumulation, and loss of seed viability. Seed saved from fields with Fusarium head blight may face emergence issues in the fall. Luckily, seed treatments and proper seed cleaning can greatly reduce stand loss in these seed lots. In 2023, there were higher-than-normal levels of Fusarium head blight in northwest Kansas due to untimely rainfall while wheat was flowering (Figure 1). Affected seed lots should be tested for germination (recent eUpdate article on seed tests: https://bit.ly/3NK71Ts) and considered as candidates for a seed treatment containing a FRAC 3 or FRAC 11 fungicide (such as difenoconazole, prothioconazole, or tebuconazole).

Figure 1. Left: Field showing severe Fusarium head blight (scab) symptoms at the soft dough stage of development in 2023. Photo by Kelsey Andersen Onofre, K-State Research and Extension.

Fungicide seed treatments help keep seed-borne diseases such as smuts and bunts in check. Loose smut control and common bunt (Figure 2), sometimes called, "stinking smut", can be controlled very effectively with most commercial treatments. Some regions of the state have struggled with these diseases in recent years. If you are planning to keep seed that is known to have or has been exposed to common bunt, it is critical to use a fungicide seed treatment or to purchase certified seed to avoid problems in the future.

Figure 2. Left: A wheat seed lot with severe common bunt (also known as "stinking smut"). When common bunt infection occurs, the grain is entirely replaced with black fungal spores, leaving only the outer seed coat. These "bunt balls" can easily break open and infect otherwise healthy seed. Right: Infected plants prior to harvest. Photos by Kelsey Andersen Onofre, K-State Research and Extension.

Seed treatments can aid stand establishment when planting wheat after soybean harvest, even on seed that has high test weight and good germination. Planting wheat late into cool, wet soils often delays emergence and reduces the tillering capacity of wheat seedlings. This reduced tillering capacity diminishes the plant's ability to compensate for stand loss and maintain yield potential.

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3. New soybean Sudden Death Syndrome diagnostic test now available

The K-State Plant Disease Diagnostic Lab has implemented a new Soybean Sudden Death Syndrome (SDS) molecular diagnostic tool to help growers properly identify this disease. This new SDS molecular test is faster and has higher detection capabilities than conventional methods.

Although SDS root infection happens early in the season, foliar symptoms may show up later in the season at the reproductive growth stages. SDS foliar symptoms (Figure 1A) are typically described as interveinal chlorosis/necrosis and can be confused with insect damage, such as *Dectes* stem borer and other diseases such as stem canker and brown stem rot. In addition, some triazole fungicides when sprayed during hot and dry weather conditions are also known to cause foliar phytotoxicity symptoms that are similar to SDS symptoms (Figure 1B). Check out this online resource for diagnosing interveinal chlorosis in soybeans: Diagnosing Interveinal Chlorosis In Soybeans – It's not just SDS (Crop Protection Network)

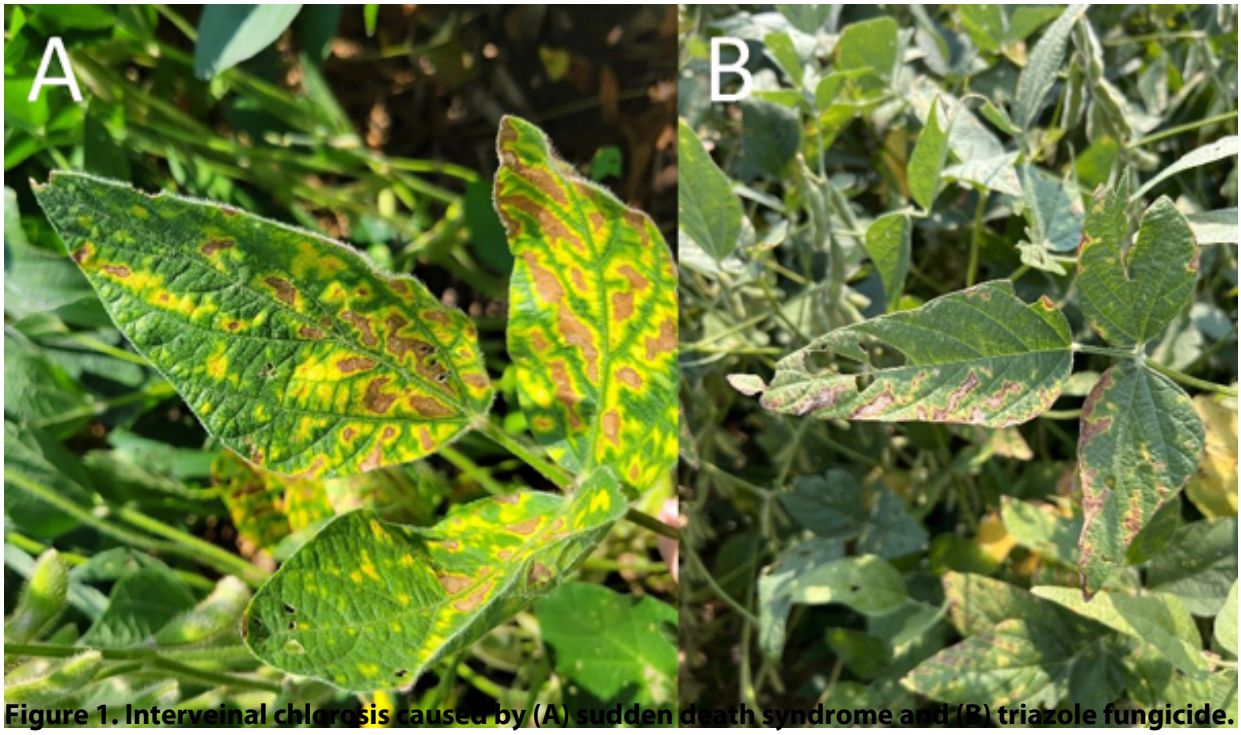

Figure 1. Interveinal chlorosis caused by (A) sudden death syndrome and (B) triazole fungicide. Photos by K-State Plant Pathology.

To confirm SDS, the K-State Plant Disease Diagnostic Lab offers a molecular diagnostic test that is fast and increases detection capabilities. Soybeans commonly have multiple diseases present and diagnosing based on symptoms alone is not recommended. For more information on how to submit a sample, contact your local KSRE extension agent and follow the instructions below.

Lab Submission Form: Include as much information as possible
Services and Fees: Within KSRE: $50 | Individuals outside KSRE: $70
Collection/Shipping Guidelines: Submit entire plants including the root system. The SDS molecular

testing is performed on the taproot/lateral roots, therefore an intact root system is crucial.

If SDS is detected in a field, sampling for Soybean Cyst Nematode (SCN) is recommended. SDS and SCN commonly occur together and, in order to make the best management decisions possible, growers need to know which pathogens they are dealing with.

SCN Soil Sampling Recommendation

Questions? Call (785-532-1383) or email (clinic@ksu.edu)

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4. Planting winter canola? Be aware of rotation restrictions with herbicides

Recent developments associated with market opportunities for winter canola may lead to increased planting in the fall of 2023 and beyond. As you make seeding plans, be sure to consider the herbicides you use or have used in your fall and summer crops. Table 1 highlights some herbicides used in fall and summer crops that may or may not have rotation restrictions for canola. As you consider this information, please remember that rotation intervals required by the EPA only consider the time that is required to ensure no illegal herbicide residues are found in the second crop. However, in some cases, additional information can be provided by the herbicide registrant regarding the potential for injury. When appropriate, that information will be noted in Table 1.

Table 1. Active ingredients, field half-lives, and crop rotation intervals of some herbicides applied to summer crops that may be of concern for winter canola.

Herbicide	Active ingredient	Half-life (days)	Rotation interval	Comments
Aatrex, others	atrazine	29	one year to avoid crop injury	
Balance Flexx, others	isoxaflutole	1.3	18 months	Also requires 15" of precipitation
*Beyond **	imazamox	30-60	18 months	
Callisto, others	mesotrione	5	10 months	
Classic	chlorimuron	28	9 to 18 months	See label for details
Component of Acuron (others)	bicyclopyrone	213	18 months	
Dimetric, others	metribuzin	19	18 months	
Dual II Magnum, others	S-metolachlor	23	12 months	
*Finesse **	chlorsulfuron metsulfuron	14-42		Field bioassay required
Harmony, others	thifensulfuron	10	45 days	
Harness, Warrant, others	acetochlor	12	Not listed	
Huskie	pyrasulfotole	30	9 months	
Outlook, others	dimethenamid-P	16	4 to 6 months	Interval increases with increasing rate
Permit, others	halosulfuron	14	15 months	Bioassay if drought or cool conditions prevail
Powerflex HL	pyroxsulam	13	9 months	
Python, others	flumetsulam	45	26 months	Also requires bioassay
Spartan, other	sulfentrazone	541	24 months	
Valor, others	flumioxazin	18	6 or 12 months	6 months if tilled

Zidua, others	pyroxasulfone	22	12 to 18 months	Interval increases with increasing rate
FirstRate	cloransulam	10	18 months	
Pursuit	imazethapyr	51	40 months	Also requires bioassay
Reflex	fomesafen	86	18 months	

* *To avoid plant back restrictions for canola, consider planting a Clearfield® winter canola after applying Beyond in wheat, and a sulfonylurea herbicide carryover tolerant winter canola after applying Finesse or similar Group 2 herbicides in wheat.*

For producers using the CoAXium® wheat system, remember that there is no rotation restriction for canola. However, to protect the efficacy of controlling weeds in both crops, it is recommended to rotate herbicide modes of action.

For more detailed information, see the "2023 Chemical Weed Control for Field Crops, Pastures, and Noncropland" guide available online at https://bookstore.ksre.ksu.edu/pubs/SRP1176.pdf or check with your local K-State Research and Extension office for a paper copy.

For more information on canola planting considerations, see the "Great Plains Canola Production Handbook" available at https://www.bookstore.ksre.ksu.edu/pubs/mf2734.pdf.

The use of trade names is for clarity to readers and does not imply endorsement of a particular product, nor does exclusion imply non-approval. Always consult the herbicide label for the most current use requirements.

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5. Alfalfa management: Deciding on the last cutting this fall

Alfalfa will quit growing after the first hard freeze (when temperatures reach below 26°F), which in Kansas occurs on average around October 15, but can be as early as October 1 or as late as November 1. The decision should be weather-based at this time of the year because the timing of the last two cuttings impacts the winter survival and productivity of the stand in the following year.

The last cutting, prior to fall dormancy, should be made based on expected crown regrowth rather than one-tenth bloom because of the decreasing photoperiod. The last cutting should be made so there will be 8 to 12 inches of foliage, or 4 to 6 weeks of growth time, before the first killing frost. This should allow adequate time for replenishment of root reserves. This means the second to final cutting should occur around early September.

At this stage of the growing season, alfalfa plants need to store enough carbohydrates to survive the winter. If root reserves are not replenished adequately before the first killing freeze in the fall, the stand is more susceptible to winter damage than it would be normally. That could result in slower greenup and early growth next spring, and in some cases stand loss due to winter kill. The potential of the alfalfa crop to grow new foliar tissue in the spring is greater with greater root reserves in the fall, thus root reserves this fall are the main driver of next crop's yield and quality. Varieties are continually being selected for winter hardiness so varieties today are less susceptible than varieties of yesterday to winter injury but it is still important to manage varieties for best success. Otherwise, spring growth can be reduced and stand loss can occur.

The final cutting should occur right after the first killing freeze before too many of the leaves have dropped. Producers should be prepared to enter the fields as soon as soil moisture conditions allow. After a killing freeze, the remaining forage (if any) can be hayed safely. However, the producer should act quickly because the leaves will soon drop off.

Figure 1. Alfalfa stand with approximately 12 inches of top growth prior to winter dormancy. The last cut in this stand was performed in early September, and this photo was taken in late October. This stand will be hayed immediately following the first killing frost. Photo by Romulo Lollato, K-State Research and Extension.

Consider soil sampling alfalfa fields now

Late fall is also a great time of the year to soil sample alfalfa ground. This timing allows for an accurate assessment of available soil nutrients and provides enough time to make nutrient management decisions before the crop starts growing in the spring. Key soil tests include pH, phosphorus, and potassium, and to a lesser extent, sulfur and boron. In particular, potassium is highly related to winter survival so it's important to make sure to have an optimum range of potassium in soil before entering the winter. When sampling for immobile nutrients, the sampling depth should be six inches, while mobile nutrients (sulfur) should be sampled to 24 inches. Based on the soil test, a fertility program can be established to ensure nutrient replenishment and maintain hayfield productivity. To submit soil samples to the K-State Research and Extension Soil Testing Laboratory, see this website: https://www.agronomy.k-state.edu/outreach-and-services/soil-testing-lab/.

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6. Weed management practices: Fall scouting and equipment cleaning

Weed management encompasses more than controlling actively growing weeds. Farmers can be proactive to help prevent the future spread of weeds. Two different management practices are discussed in this article: fall scouting for weed escapes and equipment cleaning.

Fall scouting can help plan for future control

Weeds that escape control by in-season management practices can cause several problems, including the possibility of reduced harvest efficiency and crop yield. Even if these factors do not justify an herbicide application, it is important to consider the future costs of seeds produced by those escapes – particularly if those escaped weeds produce a lot of seed and/or are herbicide resistant.

Just a few escapes of species such as waterhemp or Palmer amaranth can have a big impact (Figure 1). For example, research conducted in Georgia showed that one female plant in five acres added about two million seeds per acre to the soil. Those seeds can have impacts for many years. It took six years of total Palmer amaranth control to deplete the seedbank by 98% in Texas. In some situations, scouting during the weeks leading up to harvest may provide an opportunity to remove these plants by hand to reduce the number of seeds in the soil.

Figure 1. The waterhemp plants growing between these corn rows may not have reduced grain yield, but they will produce seeds that must be controlled in future years. Photo by Sarah Lancaster, K-State Research and Extension.

Scouting for weeds at harvest, even if you simply make notes from the combine, is important for planning future weed management.

When scouting, make notes about

- which weed species are present,
- where weed escapes are present, and
- any changes in the size or location of areas with weed escapes.

Some observations might be the result of soil or environmental conditions, while others might suggest problems with the herbicide selection or application equipment. However, some of these escapes might indicate the presence of herbicide-resistant weeds in your field – especially if the same herbicide program has been used for a number of years. Two examples of observations that might indicate herbicide resistance are 1) a growing patch of a particular species, or 2) herbicide failure on a few plants of a single species that is normally controlled.

Stop spreading weed seed during harvest activities

Weeds can spread in a variety of ways, including on farm equipment. As you move harvest equipment from field to field, be aware of the potential to spread weed seed – especially if uncontrolled weeds are known or suspected to be herbicide resistant. Some steps to prevent spreading weeds when moving harvest equipment from one field to another are listed below.

- Clean new-to-you equipment so someone else's weeds are not introduced to your farm.
- If possible, harvest fields with excellent weed control first.
- Harvest fields where weeds are or might be herbicide resistant last.
- Harvest around areas with extremely dense weed populations.
- Slow the combine to 'self-clean' between fields.
    - Run the unloading auger empty for a minute or two.
    - Open grain elevator doors, rock tramp, and unloading auger sump then run the separator with maximum airflow and suction.
- Use an air compressor to remove material remaining in the rock trap and grain auger and from the head, feeder house, straw spreader.
- Take half a day to do a deeper clean when possible.
- Check fall-tillage equipment between fields.

It is very difficult to completely remove weed seeds from harvest equipment. However, taking a few minutes to reduce the number of seeds on your harvest equipment may save time and money in the future.

References: Bagavathiannan and Norsworthy, 2012; Webster and Grey, 2017

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7. Kansas cool-season forage performance tests

The results of the 2023 Kansas Performance Tests for cool-season annual forage varieties are available online at https://www.agronomy.k-state.edu/outreach-and-services/crop-performance-tests/forages/hay-and-silage/. The results are summarized by location (Garden City, Hays, and Scandia). At this time, only yield results are available for the cool-season forages. Quality results for the forages will be released in the near future.

Annual forage performance tests are conducted each year by the Kansas Agricultural Experiment Station (Figure 1). The objectives of these variety trials are to evaluate the performance of released and experimental varieties, determine where these varieties are best adapted, and increase the visibility of summer annual forages in Kansas. Breeders, marketers, and producers use data collected from the trials to make informed variety selections.

This work was funded in part by the Kansas Agricultural Experiment Station and seed suppliers. Sincere appreciation is expressed to all participating researchers and seed suppliers who have a vested interest in expanding and promoting annual forage production in the U.S.

Figure 1. Harvesting a forage variety trial at the Southwest Research and Extension Center in Garden City, KS. Photo from John Holman, K-State Research and Extension.

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8. Self-guided tours of herbicide evaluation plots are open near Manhattan

Each summer, the Extension Weed Science team evaluates herbicide programs for corn and soybeans. This year, those plots are available for viewing by interested individuals who are passing through the Manhattan area for football games or other reasons.

If you'd like to see the plots, just take your friends and a smartphone to the fields in the northwest corner of the intersection of W 40th Ave and S 33rd St, off of McDowell Creek Road (39.116867375199035, -96.63615418650708). You'll see some signs that have a QR code to scan with your phone. That QR code will direct you to a website that hosts the treatment lists for the plots. If you want to preview the trial names and treatment lists you can do so here: https://sites.google.com/view/2023-herbicide-evaluation-plot?usp=sharing

Plots will be available through harvest (approximately at the end of September).

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9. Looking ahead - The 2023 Fall Weather Outlook for Kansas

A prominent area of high pressure has once again built back in across the Central Plains with much warmer-than-normal temperatures returning. With a third heatwave this summer, many are interested in what the fall will provide in terms of harvest and planting weather. We will provide a very brief summary of the past, a look at the current, and how that all plays a role in the coming months.

The Past

August was highlighted by a substantial heat wave towards the end of the month. Numerous daily records were broken, especially in the north-central part of Kansas. Temperatures were at/above 100°F for much of the state for seven straight days. This was the result of the Southern Plains high pressure expanding northward and persisting through the period. The high pressure gave way with the influence of post-hurricane Hilary breaking it down with a potent cold front. However, when we look at the state as a whole over the entirety of the month, temperatures were only a preliminary 1.4°F above normal, good enough to tie for the 40th warmest August on record.

Precipitation, on the other hand, was 104% of normal, making it the 61st wettest August on record. Precipitation wasn't equally distributed as the west and central divisions generally saw the most. This was the result of an influx of moisture from post-tropical storm Harold getting wrapped into a stationary front from the influences of Hilary. Meanwhile, the east continued to develop increasing drought.

The Current

Over the first few days of September, the Southern Plains high pressure has expanded back northward again. This has resulted in substantial warm and dry conditions returning for the state. This is only worsening the drought situation that began to expand east in August. Additionally, it was a centerpiece of the September outlook issued by the Climate Prediction Center (CPC) (Figure 1). Fairly good confidence exists in warmer-than-normal temperatures and drier-than-normal conditions for the state.

This is a very similar look to last September which ended with much above-normal temperatures (3.4°F above) and much below-normal precipitation (less than 50% of normal moisture) in 2022. Typically, September consists of decreasing moisture as we begin to approach winter (average 2.68 inches statewide). The heat of summer also begins to wear off with the statewide average temperature for the month being 68.1°F. The hope is that we can have adequate moisture in time for post-winter wheat planting but also without hampering harvest. This can be tricky to fit the bill right for both.

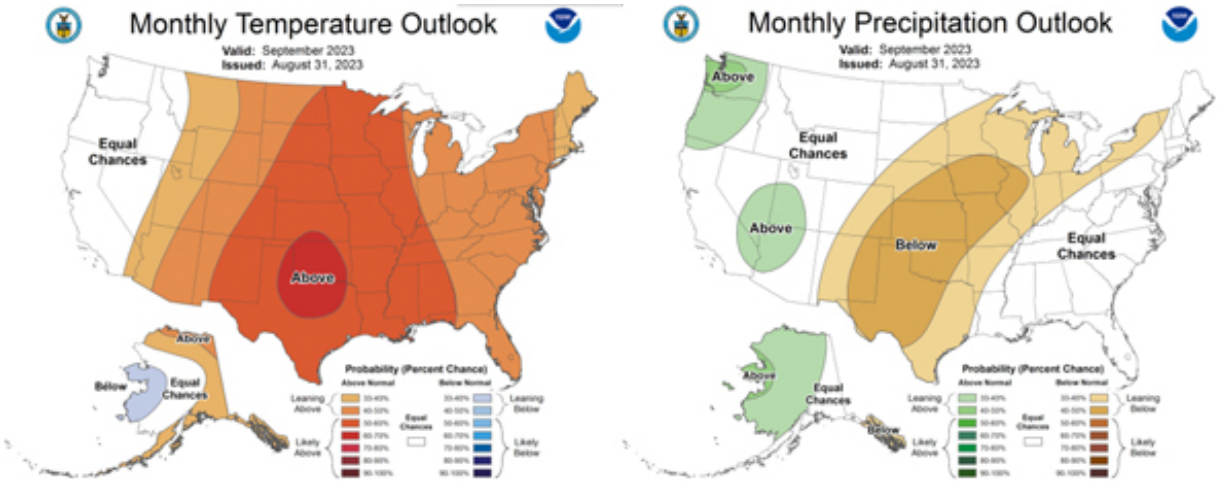

Figure 1. Climate Prediction Center September outlook for temperatures (left) and moisture (right).

The Future

The large high pressure is expected to shift west over the next week. This will allow a cold front to drop south into the Plains and stall somewhere in the vicinity of Kansas. This will be a welcome relief with cooler-than-normal temperatures accompanied by a good influx of moisture. While the current outlook suggests the opposite, keep in mind it averages over the entire month; it doesn't represent singular events.

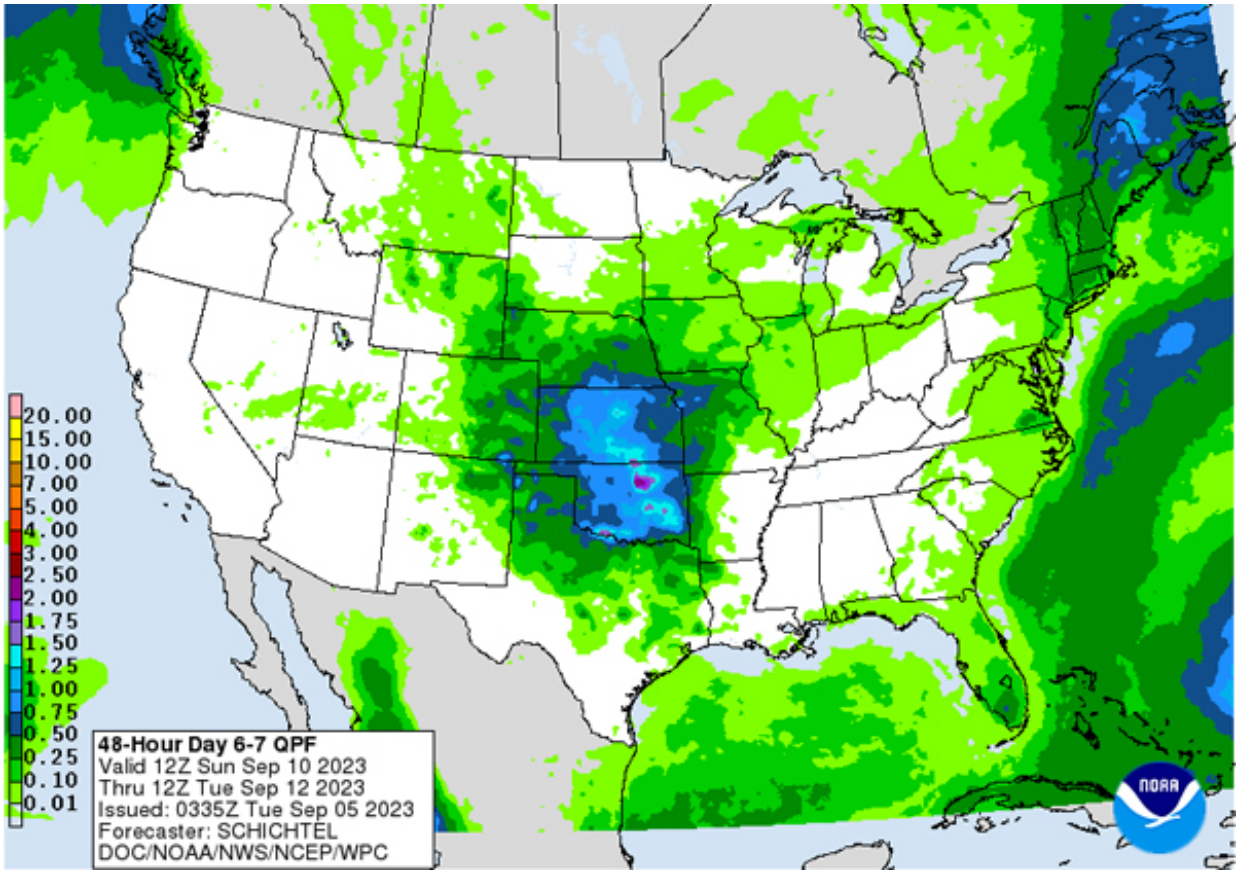

Figure 2. The estimated precipitation from Sunday to Tuesday of next week from the Weather Prediction Center.

The current CPC outlooks beyond this weekend also hint at this pattern change remaining for the following week as well. Hopefully, moisture won't be as sparse as in recent weeks and that substantial heat may be kept south and west thanks to the persistent stalled front. Precipitation through the period is likely to be in the form of thunderstorm complexes. These can drop substantial amounts of rain in isolated areas but also miss many others. Therefore, widespread rainfall to overcome drought is not expected.

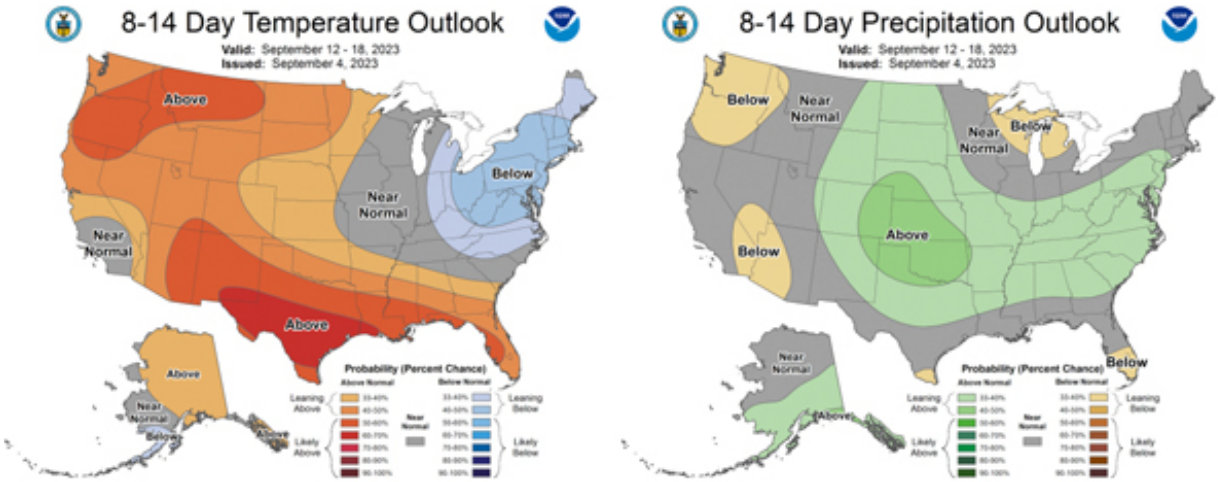

Figure 3. Climate Prediction Center's outlook for September 12-18, 2023.

In fact, looking further into the fall, the CPC has recognized that the Central Plains drought is likely to expand during the fall months (Figure 4). This is unfortunate news for water supply concerns in eastern Kansas that really need a positive longer-term influx to improve stream flows and reservoir levels. This, however, would be a good result for harvesters who need dry conditions to get in the field.

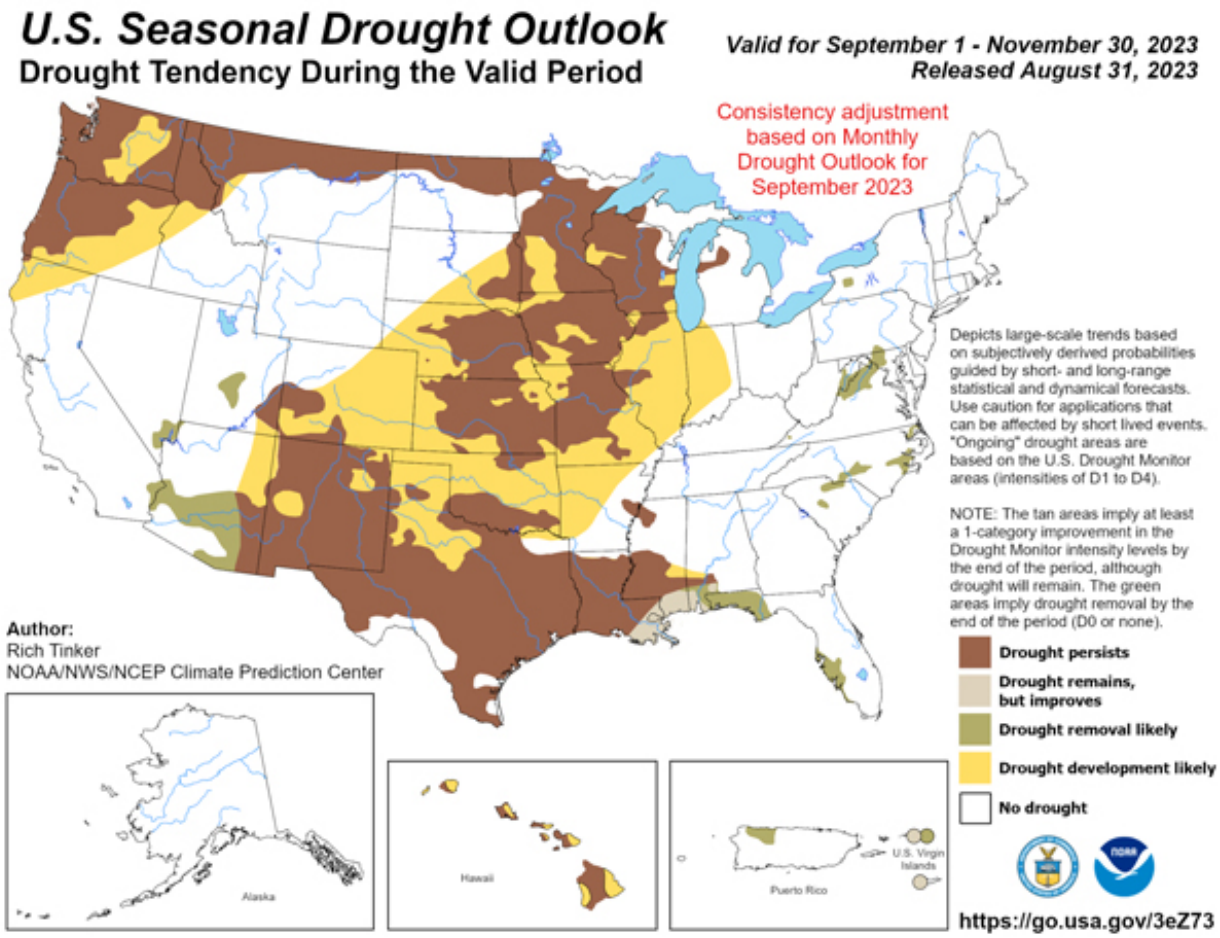

Figure 4. Seasonal Drought Outlook for Fall 2023 (September 1 through November 30). Source: Climate Prediction Center.

The outlooks for temperature and precipitation take on a more El Niño look when we consider the CPC September through November outlooks (Figure 5). El Niño is best known for impacts of moisture in the southeast (and lack in the northwest) along with warmer-than-normal temperatures along the southern portion of the US. With an El Niño advisory in place and moderate El Niño ongoing, this is a major player in the outlooks of fall and winter. For Kansas, more uncertainty exists with equal chances of at/above/below normal temperature and moisture expected.

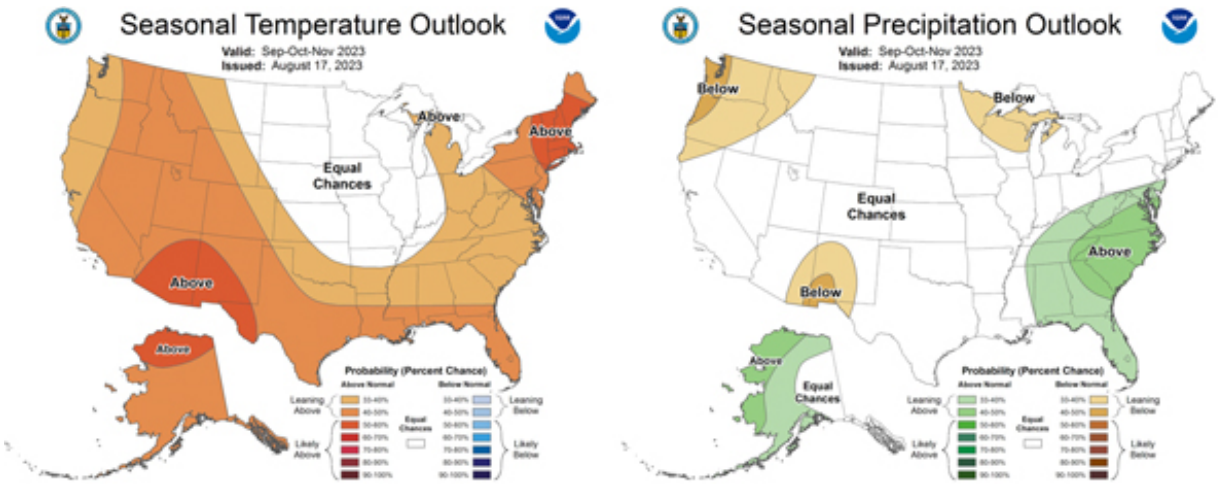

Figure 5. The Climate Prediction Center's Outlook for September through November 2023.

Interestingly enough, Kansas has an increased risk of cold extremes through the September-November timeframe during El Niño conditions (Figure 6). Precipitation is much more unknown. This is part of the reason for the projected drought expansion across a lot of the Plains. If we do see a higher potential for cooler weather this fall, it usually involves big pushes of cold air from the northwest. These are typically dry and result in wind events but no ample moisture. This is especially concerning given the amount of grass across much of Kansas. Despite some portions of the state not seeing much moisture in the summer, much of the state saw ample moisture for significant grass growth. This could potentially increase the wildfire risk this fall.

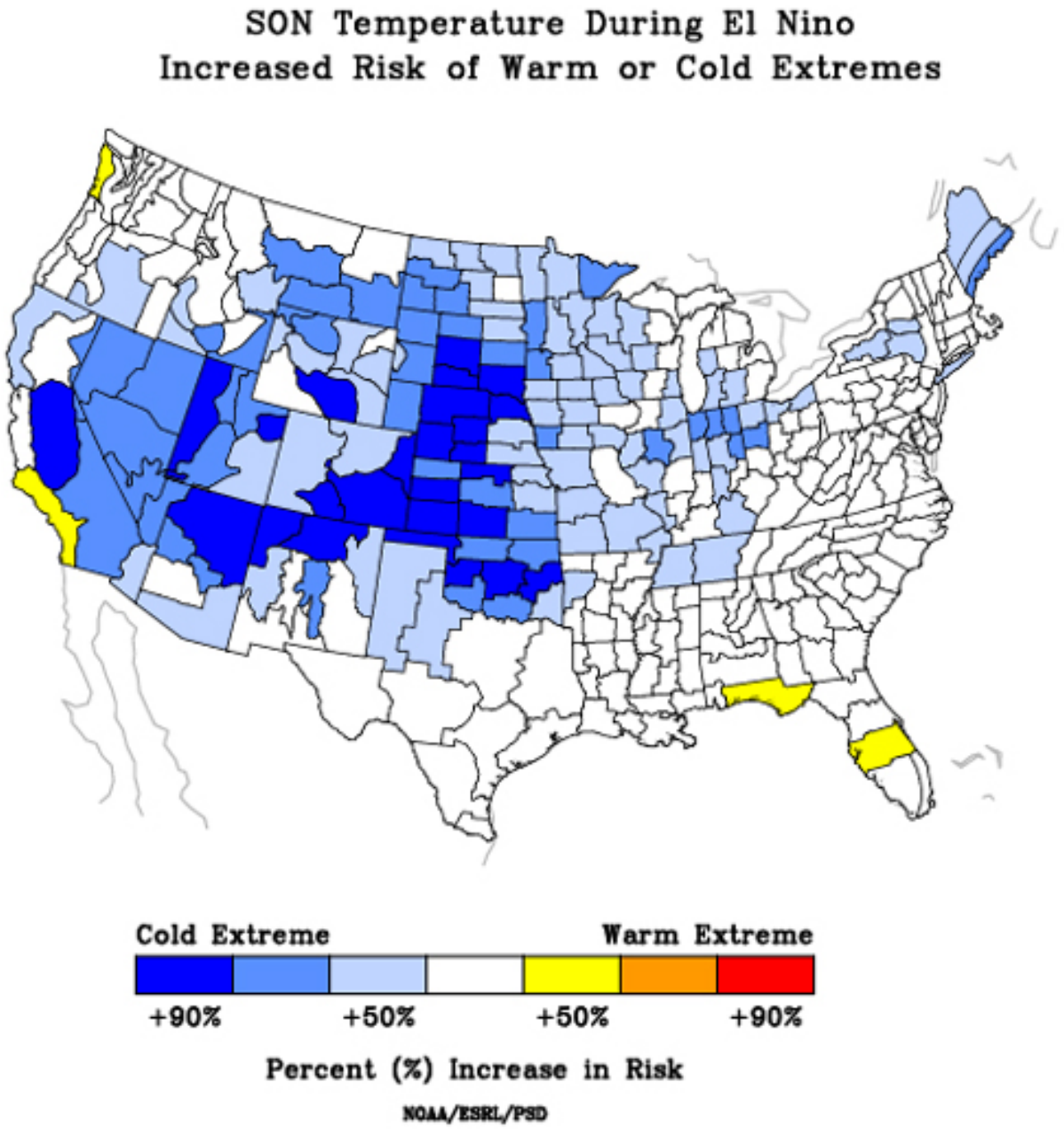

Figure 6. September through November increased risk of extremes associated with El Niño events from the NOAA Physical Science Library.

The Bottom Line

As with any transition season (spring and fall), there are many unknowns of the expected weather. El Niño remains our most dominant seasonal driver along with tropical influences for the short term. With ongoing drought expansion, despite some moisture in the coming weeks, drought is expected to remain and potentially increase. Temperatures are expected to moderate in the next week but increased uncertainty remains further out.

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