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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: Tips for good stand establishment

Regardless of the soil moisture conditions at wheat planting time, producers can take a few important steps to improve their chances of getting a good stand of wheat.

Proper tractor speed. It is best to use a tractor speed of between 5 and 6 miles per hour in most cases when drilling wheat, depending on the amount of down pressure on the openers. If higher speeds are used, the openers can tend to "ride up" in the soil now and then if down pressure is insufficient.

Proper, uniform seeding depth. In most cases, the ideal planting depth for wheat is about 1.5 inches. When planting early into very warm soils, it is especially important not to plant too deep since coleoptile lengths are shortened planting into warm soil. On the other extreme, producers should also be careful not to plant too deep when planting later than the recommended planting date into very cool soils. Ensuring a uniform seeding depth will help with stand establishment. Planting into fields with heavy residue or uneven chaff distribution from the previous crop can make uneven planting depth and furrow closure a serious problem. In those situations, it is common to end up with poor stand establishment in field areas where the drill opener rode up over the residue or chaff and could not penetrate the soil to the same depth as in other field areas.

Firm seedbed. Planting into loose, fluffy soils where soils have been tilled repeatedly during the summer can be a problem. When seeds are planted into loose soils, rains in the fall will settle the soil and leave the crowns of the seedlings too close to the soil surface. A good closing system behind the drill openers, with adequate down pressure, should help. Avoiding tillage prior to 30 days ahead of planting will increase the likelihood of a rain to settle the soil between the last tillage pass and planting.

Plant during the optimum window. In general, wheat should be planted somewhere around the Hessian fly-free date. There may be good reasons to plant some wheat before the fly-free date, such as planting for pasture or time pressures from having considerable acreage to plant. However, it's important to be aware that stand establishment and ultimate grain yields are usually best when wheat is planted after the best pest management planting date (BPMP, former Hessian fly-free date) and before deadlines set by crop insurance. Planting more than three weeks after the BPMP can be risky. Late-planted wheat often does not develop an adequate root system before winter, forming fewer productive fall tillers. Seeding rates should be increased by 25 to 50 percent when planting late to help ensure an adequate stand and compensate for the lack of tillering. See this recent eUpdate article about the risks of planting wheat too early (https://eupdate.agronomy.ksu.edu/article/wheat-planting-be-cautious-of-planting-too-early-607-1).

Adequate soil fertility. In general, producers should apply at least part of their nitrogen before or at planting time to get the plants off to a strong start. Nitrogen rates of 20-30 lbs can help with fall establishment and tillering. If the soil is low or very low in phosphorus or potassium, these nutrients should also be applied at planting time so that the plants benefit early in their development. Starter phosphorus with the seed or band-applied close to the seed can also help with fall early growth and establishment, particularly in low-testing soils. Low soil pH can be a concern, particularly early in the season when root systems are mostly near the surface, which is often an area of lower pH. Soil tests will determine the need for pH adjustment and the potential for aluminum toxicity. Variety selection and phosphorus application with the seed are potential management strategies for low pH and aluminum toxicity issues if it is too late to apply lime before seeding.

Make adjustments for planting into row crop stubble. When planting wheat into grain sorghum stubble, producers will need an extra 30 lbs N per acre over their normal N rate. Also, it is important to ensure the sorghum is dead before planting wheat. When planting wheat into soybean stubble, producers should not reduce their N rates since the N credit from soybeans doesn't take effect until the following spring. If the wheat is planted no-till after row crop harvest, N rates should be increased by 20 lbs N per acre over the normal N rate. Seeding rates should be increased when planting wheat late after row crop harvest. It's best to use a seeding rate of 90 to 120 lbs per acre in central and eastern Kansas and 75 to 100 lbs per acre in western Kansas. When planting more than three weeks after the BPMP date, producers should use a seeding rate of 120 lbs per acre.

Watch out for potential disease issues when planting into corn residue. The risk of some diseases may be higher when wheat is planted in fields with large amounts of corn residue left on the soil surface. Fusarium head blight (scab) of wheat, for example, is caused by a fungus known to cause stalk rot in corn.

Using a seed treatment. Seed treatments can sometimes act as insurance, helping avoid seed-born and early-season fungal diseases. Check out a previous eUpdate article on seed treatments for wheat disease management at https://eupdate.agronomy.ksu.edu/article/seed-treatment-fungicides-for-wheat-disease-management-608-4.

Romulo Lollato, Wheat and Forages Specialist
lollato@ksu.edu

John Holman, Cropping Systems Agronomist – Garden City
jholman@ksu.edu

2. Alfalfa management options for short or drought-stressed stands

A recent eUpdate article from early September discussed the best time for the last cuttings of alfalfa ahead of the winter months (https://eupdate.agronomy.ksu.edu/article/alfalfa-management-deciding-on-the-last-cutting-this-fall-607-4). 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.

This article answers some questions about the last cutting for stands that are shorter than normal or under drought stress (Figure 1).

What if the alfalfa stand is short (less than 12 inches)?

In this case, the recommendation would be to avoid cutting it as the alfalfa tonnage would likely be low enough, not justifying costs. Additionally, avoiding cutting a short stand of alfalfa if there is insufficient growth to warrant harvesting from an economic standpoint actually helps the stand. This decision may also depend on stand thickness, but there should be about 12 to 15 inches of plant height to warrant harvesting. If there isn't that much growth, wait for sufficient second growth once rainfall is received.

Figure 1. Alfalfa field in northeast Kansas with reduced stand height. Photos by David Hallauer, K-State Research and Extension.

What are the best management options for drought-stressed alfalfa stands?

Is it too late to cut a stand now, assuming there won't be a hard freeze until November?

Always use caution when harvesting alfalfa in the fall, especially if the plant is already drought-stressed. Cutting the crop without leaving 6-8 weeks of re-growth before the first freeze can damage the stand and reduce persistence for subsequent years. Here, growers should base the anticipated

timing of the freeze event on the average freeze date for their location and not count on a later date. Thus, if the crop is drought-stressed, the most appropriate management would be to wait until a good hard freeze before harvesting it. If yield is limiting enough not to cover harvest costs later in the fall, an option would be to graze after a hard freeze event (below 25F for 4+ hours). These measures would give the stand the best possible situation going into the fall. That way, you will have a good stand and (hopefully) precipitation to work with the next year.

Should I keep the thinning stand?

Alfalfa stands decline in both tonnage and quality as they age and thin. Stands past their economically productive life also serve as a weed and disease source for surrounding fields. Operators should carefully weigh their projected returns from rotating out of alfalfa to maximize profit. Fields having less than four to five plants per square foot are considered poor and should be rotated. Another method is counting the number of stems per square foot when growth is around 5 inches tall. More than 55 stems per square foot indicate that yields are not limited, 40 to 55 stems indicate yields are somewhat limited, and fields with less than 40 stems per square foot should be considered for rotation.

"Rule of Hat" Method: If you do not have a measuring square, a standard baseball cap with brim measures approximately half a square foot, so stem counts can be doubled or threshold halved. For example, if 30 stems are counted under the hat, then multiply 30 by 2 to estimate 60 stems per square foot.

Romulo Lollato, Wheat and Forage Specialist
lollato@ksu.edu

John Holman, Cropping Systems Agronomist – Garden City
jholman@ksu.edu

Tina Sullivan, Northeast Area Agronomist
tsullivan@ksu.edu

3. Small grain forage options for this fall

Pasture productivity has been reduced in the past two years, and forage supplies have been greatly reduced due to dry weather. In 2022, conditions tended to be worse in western KS, and in 2023, eastern KS suffered drought. Looking at 2024, 95% of the state is abnormally dry again. Some regions of the state have had two years of very dry conditions. Filling the forage needs outside summer grazing can be challenging even in normal years. This challenge is even greater when summer pasture productivity is reduced and forage supplies are low. Small grain forages planted in the fall or spring can provide a profitable forage option for producers. Cool season forages, especially in the vegetative stage, are high in crude protein and energy. Forages can be terminated in early spring, allowing time to plant a summer row crop if soil moisture is adequate.

There are six common small grain options for forage: spring oats, spring triticale, winter wheat, winter barley, winter cereal rye, and winter triticale. Each option has strengths and weaknesses.

Spring oats. Spring oats are usually planted in late February or March in Kansas. However, spring oats can also be planted in late August through late September -- and if done so, they will produce much more fall forage compared to other small grain forages in the fall before a killing freeze. They will rarely produce grain if planted in August. Spring oats do not need to vernalize before heading. They will develop rapidly in the fall if they have enough moisture and fertility and may even head out before termination by the first hard freeze in the mid-20 degree F range, but in most years, they will not have time to produce viable grain. In very mild winters, however, much of the spring oats planted in the fall might survive the winter in southern Kansas.

Spring oats can be utilized in the fall for either hay or grazing. Spring oats can be ready to graze 6 to 8 weeks after planting with adequate moisture and after a good crown root system has developed. Under good conditions, spring oats can produce up to 1 to 2 tons of forage per acre, but as planting is delayed past mid-September, expect less tonnage. Spring oats are not very drought-tolerant and will not establish well or produce much forage if soils are very dry. Rye, triticale, or barley are more drought-tolerant than spring oats.

Spring oats can also be planted in a mixture with a winter small grain. The spring small grain can increase fall biomass, and the winter small grain will overwinter and produce forage in the spring. Winter small grain biomass production might be less than if planted alone, but the combination of oat and winter small grain biomass will likely be higher than winter small grain planted alone. If a mixture is used, plant oats at a 50% seeding rate and the winter small grain at a 100% seeding rate.

Spring oats should be seeded at the rate of 2 to 3 bushels (64 to 96 pounds) per acre. Depending on forage potential and if no excess nitrogen is available in the soil, about 30 to 70 pounds of nitrogen (N) per acre will be adequate. Avoid overapplying N and make sure soils are adequate in sulfur (S) and phosphorus (P) to reduce the risk of high nitrates.

Oat pasture can generally carry 500 pounds of beef per acre. Average daily gains range from 1.5 to 2.5 pounds per head per day. Forage quality on actively growing oats is high, with protein content in the 20 to 25% range.

Oats are fairly susceptible to atrazine, so if producers plan on planting oats this fall after corn or sorghum, there is a risk of herbicide carryover that can kill seedlings.

Spring triticale. Like oats, spring triticale can be planted in the fall or spring. Spring triticale tends to have better heat and drought tolerance than oats. A drawback of triticale is many varieties have awns which, if fed as baled feed, can result in lump jaw in cattle. The risk of nitrates is slightly less in triticale than in spring oats.

Winter wheat. Wheat is often used for grazing and grain in so-called "dual-purpose" systems (Figure 1). These systems are usually balanced between getting good forage and good grain yields without maximizing yields on either side. Dual-purpose wheat is typically planted at least two to three weeks earlier than wheat planted for grain only to maximize forage production in winter wheat. In addition, producers wanting both grazing and grain should use a higher-than-normal seeding rate (90-120 pounds of seed per acre) and increase the N rate by 30 pounds per acre for every 1,000 pounds per acre of dry matter forage yield.

Figure 1. Cattle grazing on a wheat field. Photo courtesy of Great Plains Grazing.

Producers who need more pasture than normal can plant even earlier, at the likely expense of lower grain yields. Planting very early opens wheat to many risks, such as wheat streak mosaic, barley yellow dwarf, Hessian fly, grasshopper damage, planting into hot soils (and consequent shortened coleoptile length), and common root rot. If beef prices are more favorable in the spring, wheat can also be grazed out, foregoing grain yield altogether. Wheat usually produces most of its forage in late fall and early winter and again in the spring. There are differences among varieties in how much fall forage is produced. Grow an awnless variety if planning on grazing the wheat out.

For more information on dual-purpose wheat, please refer to the KSRE publication, "Managing wheat for forage and grain: the dual-purpose system." Please refer to the publication "Dual-Purpose Wheat Variety Performance 2024" to compare wheat variety performance under grain-only versus dual-purpose systems.

Winter barley. New, improved varieties of winter barley are available with better winterhardiness, especially under grazing. Many of the newer varieties also produce more forage than older varieties. Barley produces palatable growth rapidly in the fall under favorable conditions. It is considered superior to other cereals for fall and early winter pasture, but wheat, triticale, and rye provide better late winter and spring grazing. Barley has excellent drought and heat tolerance. Winter barley forage is typically the most palatable of the small grain cereals, and feed quality is the highest, although tonnage of barely is usually less than triticale or rye.

Winter rye. Rye establishes fall pasture quickly. It also regrows rapidly in late winter and early spring. However, rye becomes "stemmy" and unpalatable earlier in the spring than other cereals. Since rye is less palatable and higher in fiber than wheat or barley, cattle gains during grazing are normally greater on oat, wheat, triticale, and barley pasture than on rye pasture. Rye is the hardiest of the small grain cereals for overall tolerance to drought, heat, winterkill, and poor soil conditions. Prevent rye from going to seed to avoid potential volunteer issues in winter wheat.

Winter triticale. Triticale, a cross between wheat and rye, possesses the toughness of rye and wheat quality. It can be grazed much harder than wheat and still recover to produce grain. Triticale and rye can be planted about a month earlier than wheat with a decreased risk of wheat streak mosaic (while the triticale might not show symptoms of wheat streak mosaic virus infection, it may vector the mites that might affect a neighboring wheat field). However, there is still a risk of grasshopper feeding in the fall, hessian fly, barley yellow dwarf, or root rot. Planting triticale (Figure 2) or rye earlier in the fall increases the amount of fall forage available compared to winter wheat. Triticale has longer effective spring grazing than rye but not as long as wheat. Depending on the variety, winter triticale will head later than rye so that the forage can remain higher in quality later into the spring. Heading date on all winter cereals should be a consideration if spring grazing is the goal.

Figure 2. Cattle grazing on a triticale research field. Photo courtesy of Dr. John Holman, K-State Research and Extension.

Small grain pasture management

As planting dates get later, producers will get more fall forage production from triticale and rye. The later it gets, the more rye becomes the best option for fall forage needs. Relative pasture production of small grain cereals can be found at https://bookstore.ksre.ksu.edu/pubs/mf1072.pdf. It may help to identify the right forage or complementary forages to fill the gap in the system.

When planting a small grain cereal primarily for forage, use a seeding rate about 50-100 percent higher than if the crop were grown for grain. In western Kansas and under dry soil conditions, a seeding rate of 1.5 bushels per acre is recommended. In eastern Kansas or under irrigation, a seeding rate near 2 bushels per acre is recommended. The planting depth for these grains should still be between 1.5 to 2 inches. When planting a small grain cereal for grazing purposes, increase N rates by about 30 to 50 pounds per acre. To determine the actual amount of additional N needed, the following formula can be used:

Additional lbs N/acre = (Number of animals/acre) x (lbs of weight gain/animal) x 0.4

In a graze-out program, all the N may be applied in the fall. However, split applications will reduce the chances of having a problem with nitrate toxicity. In addition, there may be excess N in the fall from failed summer crops, so producers should use caution when putting on N without a profile N soil test.

Under good growing conditions, a well-fertilized small grain dryland pasture can carry about 500 pounds of cattle per acre. Under poor growing conditions, stocking rates should be reduced

considerably. Cattle gains of 1.5 to 2.5 or more pounds per acre per day are possible during periods of good pasture production. Under irrigation, with intensive management, much higher stocking rates can be attained.

Grazing management

Fall grazing management is critical to the success of small grain pastures. Begin grazing when the plants are well rooted and tillered, usually about 6 to 8 weeks after planting. If the foliage is too tall when the animals are introduced, or if the crop is overgrazed, the plants will be more susceptible to winterkill. Make sure some green leaves remain below the grazing level. The minimum stubble height should be about 3 to 4 inches. Rye has a more upright growth pattern than most wheat varieties, so it should not be grazed as low. Winter barley is more susceptible to winterkill than rye or wheat. However, newer varieties of barley are exhibiting increased winter hardiness.

Forage quality considerations

Overall forage quality of hay, barley is the highest, followed by oats, wheat, triticale, and rye. Yet, the forage quality of all small grains in the vegetative stage is more than sufficient for any grazing animal. During the fall and early spring periods of peak production, the crude protein content of small grain pasture is normally about 20-25 percent. Growing cattle requires about 12 percent crude protein; thus, no protein supplements are necessary.

Small grain pastures can cause bloat. Daily supplementation with poloxalene (Bloat Guard) is highly effective in reducing bloat and is available in many different feeding forms. Feeding high-quality grass hay, silage, and/or an ionophore such as Rumensin or Bovatec can also protect against bloat. Rumensin and Bovatec have also been shown to increase stocker cattle weight gains on wheat pasture.

Cows with high milk production grazing in small grain pastures in the spring can experience grass tetany. To prevent this, provide a mineral supplement containing magnesium. Cattle should be started on the mineral two weeks before to mitigate the risk of grass tetany.

Romulo Lollato, Wheat and Forages Specialist
lollato@ksu.edu

John Holman, Cropping Systems Agronomist, Southwest Research-Extension Center
jholman@ksu.edu

Tina Sullivan, Northeast Area Agronomist
tsullivan@ksu.edu

4. Harvest aid application decisions in cotton

The use of harvest aid products is a common practice in cotton production in the U.S. Cotton Belt to prepare the crop for harvest and optimize lint yield and fiber quality. Harvest aid categories include boll openers, defoliants, desiccants, and regrowth inhibitors.

Harvest aid timing

The timing of harvest aid applications relative to crop maturity is essential. Several methods exist to determine crop maturity and defoliation readiness, including counting nodes above the highest cracked boll and the percentage of open bolls. When using the method of counting nodes above the highest cracked boll, the common recommendation is either 4 or 5 nodes above the cracked boll (NACB). However, waiting until 4-5 NACB is often too late in this thermally-limited region, where the first fall freeze of the season typically occurs in mid to late October (Figure 1).

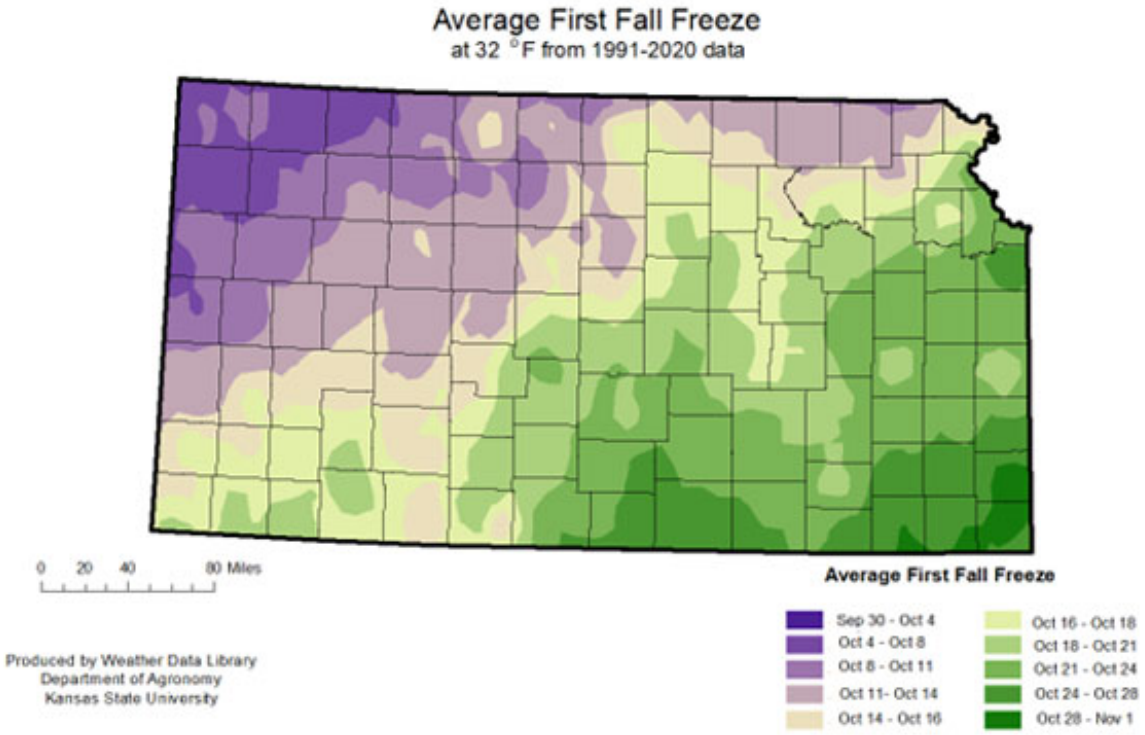

Figure 1. Average fall freeze dates. Courtesy of the Kansas State Weather Data Library.

To count NACB, find your top mature boll in the first fruiting position that is just splitting (not fully open), and count the number of mainstem nodes above it to the top of the plant. If that number is 4 or less, you're ready to go. If the number is greater than 4, any boll above that is likely to be less mature than you would like (ideally).

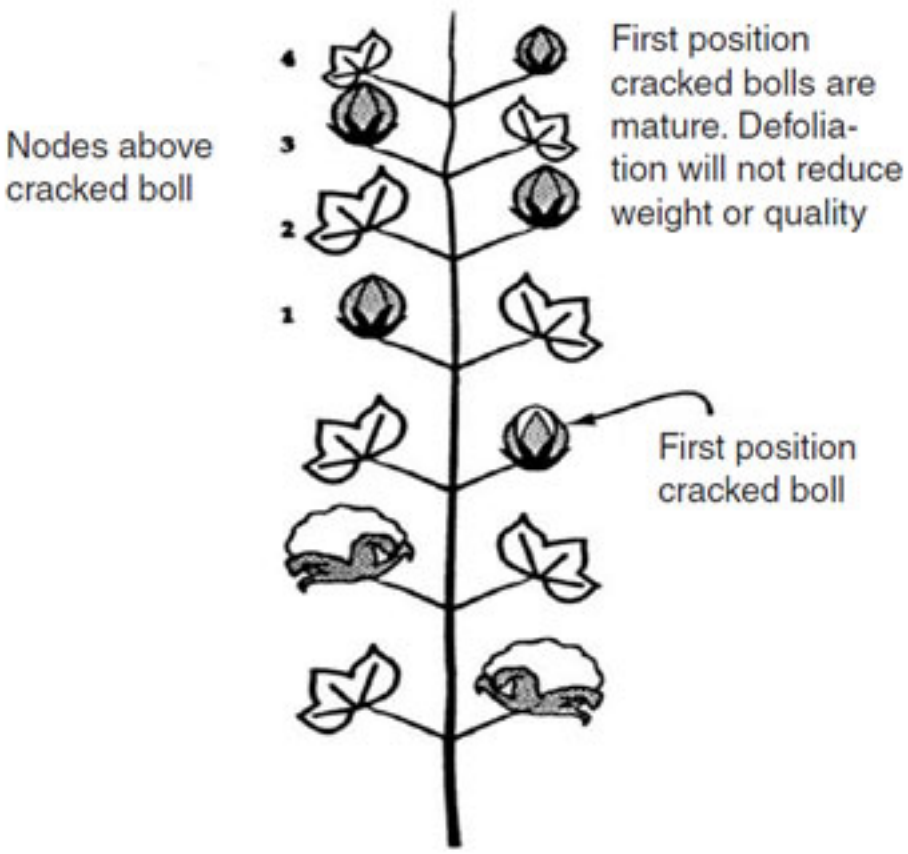

Figure 2. Determining nodes above cracked boll (NACB). Source: Guthrie, D., Cothren, T., and Snipes, C. 1993. The Art and Science of Defoliation. Cotton Physiology Today Volume 4, No. 7, National Cotton Council, Cordova, TN.

Currently, the most common method used in Kansas is timing harvest-aid applications based on percentage open bolls. Typically, harvest-aids are applied at 60% open bolls (Figure 3). However, Kansas cotton growers have been surprised to see applications at 20% or even 10% open bolls result in no or minimal differences in lint quality. However, these early harvest aid applications could have a negative effect on the cotton seed weight and payment received for cotton seed, which is often 15 to 20% of total gross returns from a cotton crop. In Kansas, the value of the cottonseed is typically used to cover, at least in part, the cost of ginning with the remainder paid to the producer, referred to as seed credit.

Figure 3. Open cotton boll. Photo by Logan Simon, K-State Research & Extension.

Immature cotton seeds may have lower seed weights as well as lower oil and protein concentrations. With this in mind, another method for timing harvest aid applications is monitoring the seed maturity of the uppermost harvestable bolls. In this case, the decision to apply harvest aids occurs when the uppermost harvestable bolls have mature seeds (seed coats have turned black) (Figure 3).

Figure 4. Cotton boll with mature seeds (seed coats have turned black). Photo courtesy of Rex Friesen, Southern Kansas Cotton Growers.

Harvest aid products

In addition to timing, Kansas cotton producers must also decide about harvest-aid product selection and sequence. Several products are available as harvest aids in cotton (Table 1.) In Kansas, harvest aids are typically applied in two sequential applications. The most common and least expensive strategy used for rainfed cotton is the application of 32-40 oz/A Prep (Ethephon, a boll opener) with 3-4 oz/A Gramoxone (Paraquat, a desiccant) followed by 16-24 oz/A Gramoxone 10-14 days later. For irrigated cotton, which typically has a denser canopy than rainfed cotton, the most common strategy is the application of 32-40 oz/A Prep with 3 oz/A Folex (S, S, S-Tributyl phosphorotrithioate, a defoliant) followed by 16-24 oz/A Gramoxone 10-14 days later. This strategy is less common for rainfed cotton, mostly due to the increased expense associated with Folex.

Table 1. Cotton percent defoliation 14 days after application of harvest aid treatments at Mount Hope and Bently, KS, in 2023.

	Percent open bolls

Product	Rate (Ounces a.i./acre)	50% Mount Hope (% defoliation)	75% Mount Hope (% defoliation)
Aim[†]	0.2	78	80
	0.4	60	81
Folex	11	75	86
Reviton	0.3	85	84
	0.9	80	85
Sharpen	0.3	75	90
	0.6	68	93
		Bently (% defoliation)	
Aim	0.2	87	96
	0.4	86	93
Folex	11	86	97
Reviton	0.3	96	98
	0.9	95	95
Sharpen	0.3	98	99
	0.6	99	99

[†]Aim, carfentrazone; Folex, Tributyl phosphorotrithioate; Reviton, Tiafenacil; Sharpen, Saflufenacil. All treatments included Prep (Ethephon) at 18 oz a.i./acre as a boll opener.

Other considerations for harvest aid application

Spray coverage is key, with carrier volume being critically important. Increased carrier volume provides greater coverage and more rapid and effective defoliation and boll opening. Nozzle tips that produce coarse to medium-fine droplet sizes are recommended for optimum coverage. Slower ground speed also typically allows for better coverage and deeper penetration through the crop canopy. Most boll opener labels will outline rate suggestions based on temperature ranges. Refer to the label of your specific boll opener selection for details.

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.

Logan Simon, Southwest Area Agronomist, Garden City
lsimon@ksu.edu

Sarah Lancaster, Extension Weed Management Specialist
slancaster@ksu.edu

5. 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. This article discusses two different management practices: 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 seed bank 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 result from 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 several years. Two 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, and 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

Sarah Lancaster, Extension Weed Science Specialist
slancaster@ksu.edu

6. World of Weeds: Longspine sandbur

This World of Weeds feature is longspine sandbur, sometimes called mat sandbur or grassy sandbur. As the name implies, this grass produces seeds in spiny burs. The burs quickly attach to anything contacting the mature plants, such as animal fur, vehicle tires, or human clothing and skin, enabling distribution.

Ecology

Longspine sandbur (*Cenchrus longspinus*) is a native annual species found throughout the United States. Its range extends from the southern Canadian provinces south into northern parts of South America. The plant has also become naturalized in parts of Europe, Africa, and Australia. It grows in disturbed areas, including cultivated fields, roadsides, field edges, and farmsteads. The plant not only competes with desirable plants for resources, but its nuisance factor ranks among the worst of plants. It is listed as a noxious weed in some areas of the U. S. Full-season interference from sandbur has been shown to reduce corn yields by up to 35%.[2] Livestock will not utilize the mature plants due to mouth and nose injuries caused by the burs.

Identification

Longspine sandbur is a tufted, decumbent (lying flat to the ground with ends that turn upwards) plant that often forms a mat (Figure 1). In the Central Great Plains, sandbur normally emerges in late May through late June.[1] The base of the stems is often reddish-purple and flattened. Stems are generally hairless and grow to a length of 36 inches. Leaves may reach 8 inches long and 0.25 inches wide, generally have a rough feeling on the upper surface, and are folded near the base (next to the stem). The ligule is a short tuft of hair (Figure 2).

Figure 1. A mat of Longspine sandbur near the edge of a sorghum field. Photo by Patrick Geier, K-State Research and Extension.

Figure 2. Hairy ligule of Longspine Sandbur. Photo by Patrick Geier, K-State Research and Extension.

The panicle of burs at the end of each stem is the most conspicuous identifier of the species. Panicles contain up to 30 burs, with each bur containing 1 to 3 seeds (Figure 3). Seeds typically germinate from within the burs, and the burs can often be found clinging to seedling plants when pulled from the soil. Longspine sandbur burs may have 40 to 75 spines each.[2]

Figure 3. Burs attached to the panicle of Longspine sandbur. Note the zig-zag appearance of the center rachis. Photo by Patrick Geier, K-State Research and Extension.

Management

In corn and sorghum, preemergence herbicides such as Group 5 (atrazine, etc.) and Group 15 (S-metolachlor, etc.) provide fair to good control of this late-emerging weed. A good corn stand will aid suppression since sandbur emerges later than many grasses. However, postemergence control options are more limited. Glyphosate (Group 9) is very effective at controlling sandbur in glyphosate-resistant corn. Glufosinate (Liberty, etc.) in glufosinate-resistant corn and Group 2 herbicides such as Accent are somewhat less effective. In sorghum, postemergence herbicides are only used in herbicide-resistant varieties Double Team (FirstAct herbicide), Igrowth (ImiFlex herbicide), and Inzen (Zest herbicide). Sandbur pressure may be reduced by delaying sorghum planting until the first flush of sandbur can be controlled using tillage or a nonselective herbicide. Though not 100% effective, a strong preemergence herbicide in sorghum that includes atrazine and a Group 15 herbicide will also

help reduce sandbur competition.

Sandbur management in broadleaf crops such as soybean, sunflower, and cotton is somewhat easier. In addition to starting clean, applying a good foundation herbicide at planting, and the option to use herbicide-resistant varieties, these crops allow the use of group 1 herbicides postemergence. These herbicides, which include quizalofop (Assure II, etc.), clethodim (Select, etc.), and sethoxydim (Poast Plus), selectively target grass weeds. All are very effective at controlling longspine sandbur when used according to label directions.

References

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Patrick Geier, Weed Scientist, Garden City
pgeier@ksu.edu

Jeanne Falk Jones, Multi-County Agronomist, Colby
jfalkjones@ksu.edu

Sarah Lancaster, Extension Weed Management Specialist
slancaster@ksu.edu

7. Fall frost and freeze: Not yet, but not far off

Meteorological fall began on September 1. The month began with cool mornings, as the average daily low temperature across the Kansas Mesonet ranged from 52° to 59° from the 1st through the 8th, collectively averaging around five degrees below normal. No site has been in the 30s this fall, but the Hiawatha site in Brown County recorded a chilly 42° on the morning of the 8th, the coldest reading so far this fall.

Daytime highs averaged within a few degrees of normal early in the month but began to consistently average above normal starting on the 8th. As of Sept. 18, we have strung together 11 straight days with above-normal highs across the state. The average high across the Kansas Mesonet was at least 90 degrees on five of those days. Summer-like highs well into the 90s have been recorded at many locations, particularly in the western half of Kansas, with even a couple of triple-digit readings. The co-operative observers in Atwood (Rawlins County) and at Webster Dam (Rooks County) recorded 101° highs on September 9, and the co-operative observer in Healy reported a high of 100° on September 15.

While not unprecedented, the very warm days as of late are atypical of what one expects in mid-September. The normal highs across the state on September 19 range from 77° at Bonner Springs and Olathe to 85° in Sublette. Morning lows for this same date range from 46° in Brewster to 59° in Wichita. Morning lows have been averaging in the 60s for the past week, so it hardly seems the time to discuss the potential for frost and freezing conditions. But climatologically speaking, those two events typically occur in just a few weeks from now. The autumnal equinox, which marks the beginning of astronomical fall, begins this Sunday, September 22. The word equinox is derived from the Latin for "equal night". Days and nights are roughly the same length on this date, and nights will grow longer with each passing day until December. Less daytime and more nighttime ultimately means cooler temperatures. We will eventually experience a first frost and, in time, a first freeze, which may put an end to the growing season, depending on how far below freezing the temperature gets and how many hours sub-freezing conditions persist. **When do the first frost and freeze typically occur in Kansas?** Let's take a closer look at the average dates for these two significant cold weather events.

Data for 20 sites in Kansas were examined using the full period of record at each location. For the purposes of this study, the first frost date is defined as the first occurrence of a temperature at or below 36°, and the first freeze is defined as the first occurrence of 32° or colder. The dates that the first frost occurred each year were sorted from earliest to latest, and then the dates on which 10%, 20%, 30%, etc., of the first frost occurred on or before were identified at each location. This methodology was repeated for the first freeze data.

When we examine the first frost data (Table 1), we see that the median date is in October, except for the far west and northwest areas of Kansas, which occurs in late September. The median date is when there is a 50% chance of the first frost having already occurred. The earliest median date is in Oberlin (September 26), and the latest is in Wichita (October 18). Except for Wichita, there is a 10% probability of the first frost occurring before the first of October at all locations and a 90% probability that the first frost has occurred by the end of October. Last year, Goodland's first frost was on October 6th, when the low was 31°. This was eight days later than the median date for the first frost, but since it was below freezing, it was also two days earlier than the average first freeze (Table 2). Wichita's first frost was the next day, on the 7th, but it was over three weeks until their first freeze on October 29. In their case, an early frost was followed by a nearly average freeze date, so an early frost

doesn't guarantee that an early freeze will follow.

Table 1. Probabilities of first fall frost occurring before the given dates based on the full period of record available for each site. Data source: SC-ACIS.

First Frost	10%	20%	30%	40%	50%	60%	70%	80%	90%
Chanute	29-Sep	3-Oct	6-Oct	9-Oct	12-Oct	15-Oct	20-Oct	25-Oct	29-Oct
Concordia	21-Sep	28-Sep	1-Oct	5-Oct	8-Oct	11-Oct	13-Oct	18-Oct	24-Oct
Dodge City	25-Sep	29-Sep	5-Oct	8-Oct	10-Oct	11-Oct	15-Oct	19-Oct	23-Oct
Emporia	28-Sep	1-Oct	6-Oct	8-Oct	10-Oct	13-Oct	16-Oct	19-Oct	25-Oct
Fort Scott	27-Sep	1-Oct	6-Oct	9-Oct	12-Oct	17-Oct	20-Oct	25-Oct	30-Oct
Garden City	20-Sep	25-Sep	27-Sep	30-Sep	5-Oct	8-Oct	10-Oct	13-Oct	18-Oct
Goodland	13-Sep	17-Sep	21-Sep	26-Sep	28-Sep	30-Sep	4-Oct	6-Oct	9-Oct
Hill City	16-Sep	20-Sep	23-Sep	27-Sep	29-Sep	5-Oct	7-Oct	10-Oct	15-Oct
Horton	21-Sep	25-Sep	28-Sep	30-Sep	6-Oct	8-Oct	10-Oct	16-Oct	20-Oct
Manhattan	21-Sep	25-Sep	29-Sep	1-Oct	5-Oct	8-Oct	10-Oct	12-Oct	17-Oct
Marysville	18-Sep	22-Sep	27-Sep	29-Sep	2-Oct	4-Oct	7-Oct	10-Oct	14-Oct
Oberlin	15-Sep	19-Sep	20-Sep	22-Sep	26-Sep	27-Sep	30-Sep	5-Oct	9-Oct
Olathe	26-Sep	1-Oct	5-Oct	8-Oct	10-Oct	13-Oct	17-Oct	20-Oct	26-Oct
Pratt	21-Sep	28-Sep	4-Oct	7-Oct	10-Oct	13-Oct	19-Oct	23-Oct	26-Oct
Russell	22-Sep	26-Sep	1-Oct	3-Oct	6-Oct	10-Oct	11-Oct	15-Oct	21-Oct
Salina	24-Sep	30-Sep	4-Oct	6-Oct	10-Oct	12-Oct	15-Oct	19-Oct	25-Oct
Sedan	27-Sep	30-Sep	5-Oct	8-Oct	12-Oct	16-Oct	19-Oct	23-Oct	26-Oct
Topeka	24-Sep	29-Sep	4-Oct	7-Oct	9-Oct	12-Oct	16-Oct	22-Oct	26-Oct
Tribune	14-Sep	17-Sep	21-Sep	24-Sep	27-Sep	30-Sep	3-Oct	7-Oct	13-Oct
Wichita	1-Oct	7-Oct	10-Oct	13-Oct	18-Oct	22-Oct	24-Oct	27-Oct	3-Nov

Table 2. Probabilities of the first fall freeze occurring before the given dates, based on the full period of record available for each site. Data source: SC-ACIS.

First Freeze	10%	20%	30%	40%	50%	60%	70%	80%	90%
Chanute	10-Oct	16-Oct	19-Oct	22-Oct	25-Oct	27-Oct	29-Oct	3-Nov	6-Nov
Concordia	6-Oct	10-Oct	12-Oct	16-Oct	19-Oct	22-Oct	25-Oct	27-Oct	30-Oct
Dodge City	6-Oct	11-Oct	15-Oct	19-Oct	21-Oct	23-Oct	25-Oct	28-Oct	2-Nov
Emporia	7-Oct	10-Oct	15-Oct	18-Oct	22-Oct	25-Oct	28-Oct	31-Oct	5-Nov
Fort Scott	9-Oct	16-Oct	19-Oct	22-Oct	24-Oct	27-Oct	28-Oct	2-Nov	6-Nov
Garden City	28-Sep	4-Oct	8-Oct	10-Oct	14-Oct	17-Oct	19-Oct	23-Oct	27-Oct
Goodland	22-Sep	26-Sep	30-Sep	4-Oct	8-Oct	11-Oct	13-Oct	18-Oct	22-Oct
Hill City	26-Sep	1-Oct	5-Oct	9-Oct	11-Oct	13-Oct	16-Oct	21-Oct	24-Oct
Horton	29-Sep	5-Oct	7-Oct	10-Oct	12-Oct	17-Oct	22-Oct	25-Oct	29-Oct
Manhattan	1-Oct	7-Oct	10-Oct	12-Oct	15-Oct	19-Oct	21-Oct	25-Oct	29-Oct
Marysville	23-Sep	1-Oct	5-Oct	7-Oct	9-Oct	12-Oct	15-Oct	18-Oct	23-Oct
Oberlin	20-Sep	24-Sep	27-Sep	29-Sep	3-Oct	6-Oct	9-Oct	12-Oct	16-Oct
Olathe	8-Oct	12-Oct	17-Oct	22-Oct	25-Oct	27-Oct	31-Oct	4-Nov	7-Nov
Pratt	6-Oct	10-Oct	14-Oct	19-Oct	22-Oct	24-Oct	27-Oct	31-Oct	5-Nov
Russell	3-Oct	6-Oct	10-Oct	13-Oct	17-Oct	19-Oct	23-Oct	25-Oct	29-Oct
Salina	6-Oct	10-Oct	14-Oct	18-Oct	22-Oct	25-Oct	26-Oct	31-Oct	5-Nov

Sedan	6-Oct	12-Oct	18-Oct	20-Oct	24-Oct	27-Oct	29-Oct	4-Nov	8-Nov
Topeka	4-Oct	8-Oct	12-Oct	17-Oct	20-Oct	24-Oct	27-Oct	29-Oct	3-Nov
Tribune	21-Sep	25-Sep	28-Sep	4-Oct	7-Oct	10-Oct	11-Oct	14-Oct	20-Oct
Wichita	10-Oct	19-Oct	23-Oct	26-Oct	28-Oct	31-Oct	3-Nov	6-Nov	10-Nov

There is a 60% or greater chance that the first freeze will occur by the end of October at all locations, but the probabilities are higher for earlier dates in the west and north. As with the first frost data, Oberlin has the earliest median date (October 3), and Wichita has the latest date (October 28). September freezes do happen on occasion, but October is typically the month when the growing season ends. October is also when the normal lows each day decrease the fastest (Table 3); the daily normals at each location drop by 11 to 14 degrees from the beginning until the end of October. By the end of the month, Goodland, Oberlin, and Tribune all have normal lows below freezing. Only eastern and southern locations have normal lows in the 40s by October 31; all other locations have normal lows in the 30s.

Table 3. Normal low temperatures for selected dates across Kansas. Normals are based on the period 1991-2020. Data Source: National Centers for Environmental Information.

Normal Lows	Sep 21	Sep 26	Oct 1	Oct 6	Oct 11	Oct 16	Oct 21	Oct 26	Oct 31
Chanute	57	55	53	51	49	47	45	43	42
Concordia	55	52	50	48	46	44	42	39	37
Dodge City	54	52	50	48	45	43	41	38	36
Emporia	55	53	51	49	47	45	43	41	39
Fort Scott	57	55	53	51	49	47	45	43	42
Garden City	52	50	48	45	43	40	38	36	34
Goodland	48	46	44	41	39	37	35	33	31
Hill City	52	50	47	45	42	40	38	35	33
Horton	54	51	49	47	44	42	40	38	36
Manhattan	55	53	51	49	46	44	42	40	38
Marysville	52	50	48	46	43	41	39	37	35
Oberlin	49	47	44	42	40	37	35	33	31
Olathe	57	55	52	51	49	47	45	43	41
Pratt	55	53	50	48	46	43	41	39	37
Russell	55	52	50	48	45	43	40	38	36
Salina	56	54	52	49	47	45	43	41	38
Sedan	56	54	52	50	48	46	44	42	40
Topeka	55	53	51	49	47	45	43	41	39
Tribune	49	46	44	41	39	36	34	33	31
Wichita	58	56	54	52	49	47	45	43	41

Looking ahead this year

What about this year? Currently, there is no frost or freeze in the forecast, and the growing season is expected to continue across the state. While a brief cool down with some 40s is expected into early

next week, the overall forecast is for warmer-than-normal temperatures to persist into October (Figure 1). Drier air is more likely to drop temperatures to colder thresholds. However, with forecasted precipitation across much of the region this weekend, that should help prevent large temperature fluctuations. Additionally, there is no clear signal of a colder-than-normal air mass building to the north/west of the central Plains. With the potential for La Niña to emerge over the next few months, warmer-than-normal temperatures are likely into early winter (Figure 2). Over the last several years, many locations in Kansas have had some of their longest growing seasons on record. This is an increasing trend as we see overall warming in recent decades.

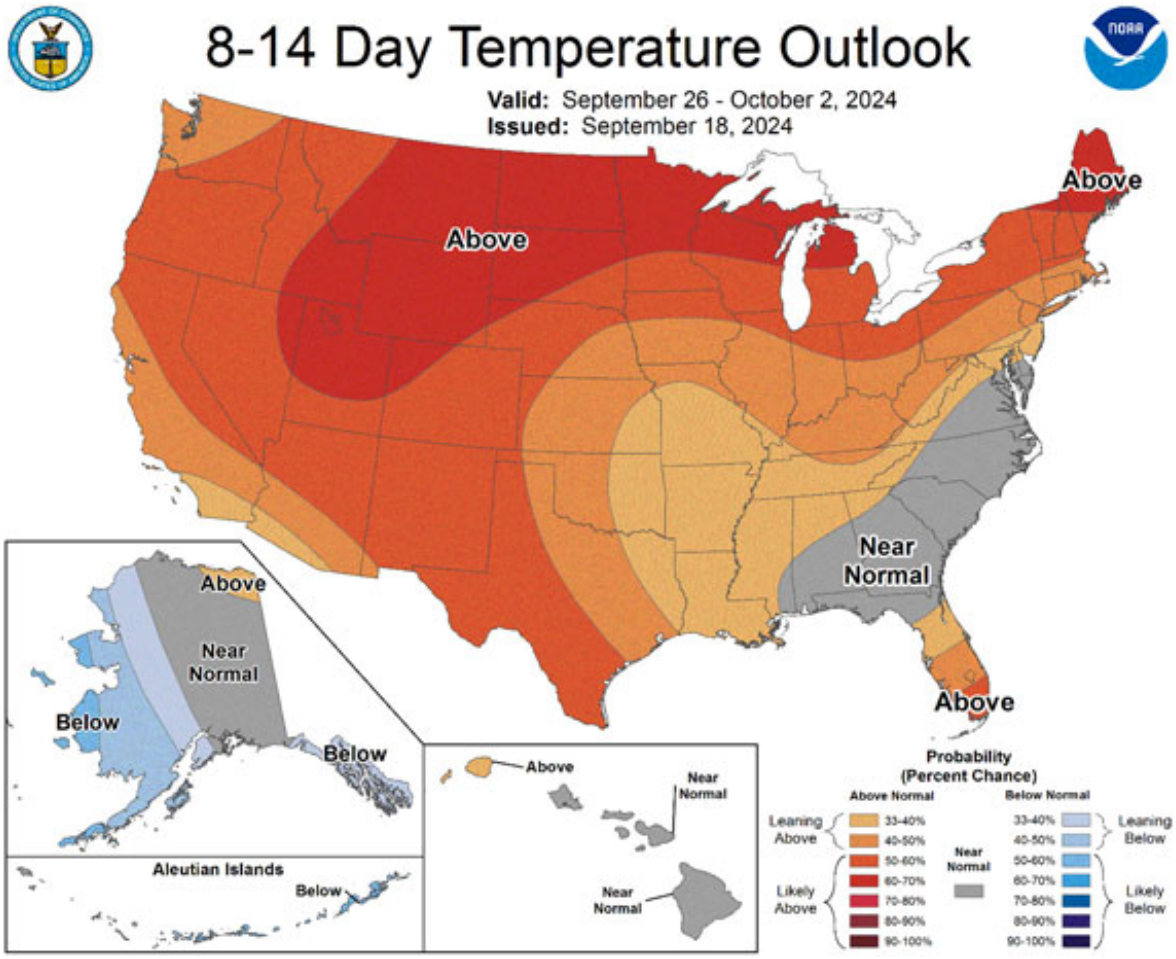

Figure 1. The Climate Prediction Center forecast favors a higher probability of above-normal temperatures into October nationwide.

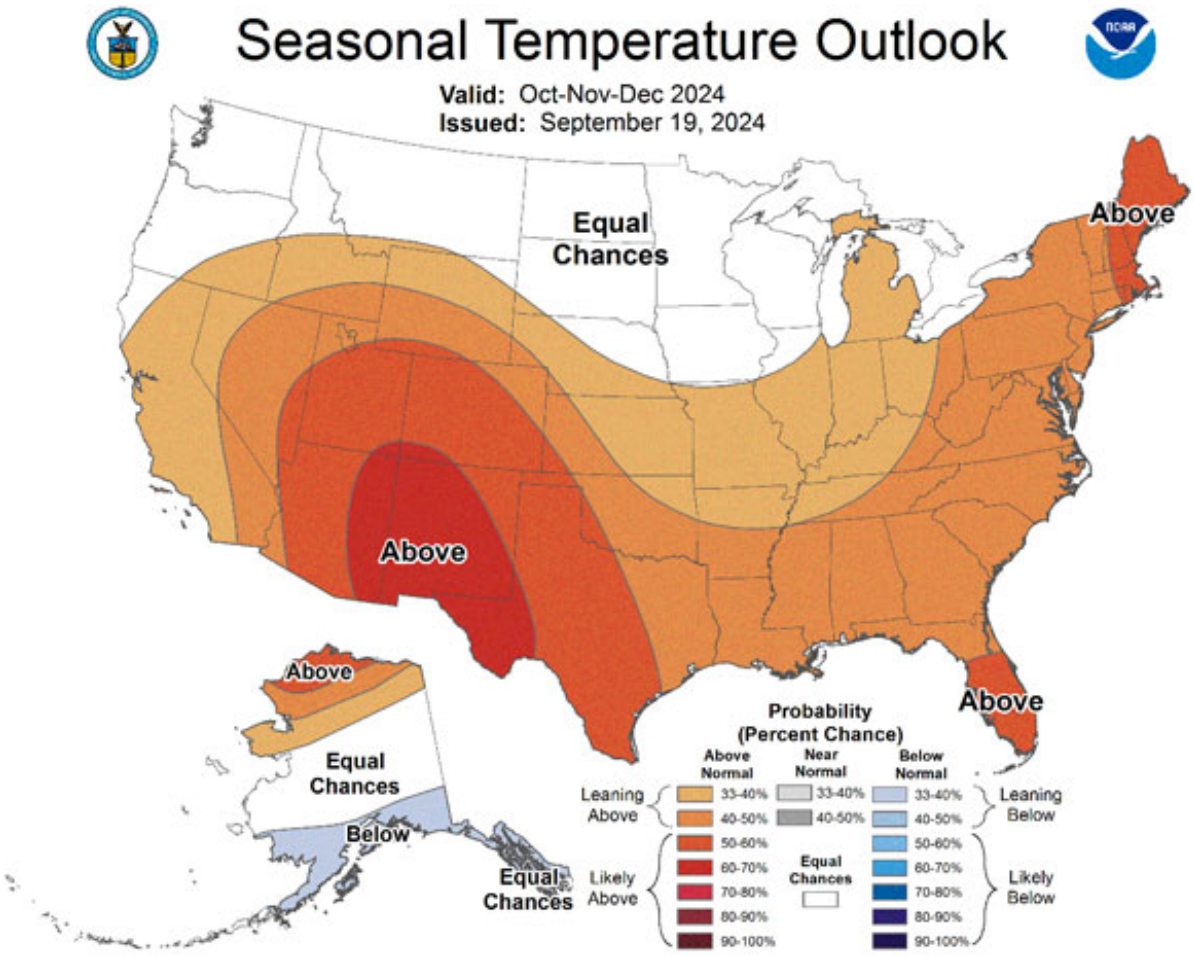

Figure 2. The Climate Prediction Center favors above-normal temperatures persisting into early winter for Kansas for the Oct-Nov-Dec average timeframe.

Could it possibly be that we won't even experience frost on the pumpkin and not see a first freeze until November? Climatologically speaking, a first frost in November is uncommon to unprecedented, depending on location. Goodland and Manhattan have never recorded a first frost in November. It has only happened once in Dodge City's 150-year period of record (Nov. 2, 1950). There are half a dozen instances of the first frost waiting until November at Topeka, the last coming in 1998. Further south, Wichita averages a first frost in November about once every eight years, the last coming in 2015. And then there's the first freeze. The latest first freeze on record is after Halloween at many locations: November 13 in Manhattan, November 14 at Dodge City, and November 21 at Topeka and Wichita. On the other hand, Goodland has never had a first freeze in November; the latest on record is October 28. Could those records be threatened this year? It's too soon to tell. A warm September doesn't guarantee a warm October, although the forecasts suggest it's more likely this year. But it takes just one cold air mass intrusion to end the growing season, and a single strong cold front will likely flip temperatures from above to below normal sometime before we reach the end of October. The later that occurs, the more likely sub-freezing weather will result. Until then, enjoy the warmth because, as the old saying goes, all good things must come to an end.

Matthew Sittel, Assistant State Climatologist

msittel@ksu.edu

Christopher “Chip” Redmond, Kansas Mesonet Manager
christopherredmond@ksu.edu

8. Survey of integrated weed management practices used by Kansas soybean producers

With the recent increase in early soybean planting, considerable research has been conducted on various weed management strategies. However, real-world farmer insights are limited. Therefore, we are conducting this survey to evaluate on-farm use of residual herbicides and other weed management practices. Our survey explores the practical aspects of early planting, chemical use, and row spacing. By gathering data on these practices, we hope to refine integrated weed management strategies and assist farmers in selecting effective and sustainable approaches.

Interested in sharing your experiences? Follow the link or scan the QR code to access the questionnaire.

https://kstate.qualtrics.com/jfe/form/SV_ermvM5eqgqYDU10

Thank you for your time and consideration. Contact us if you have any questions.

Salina Raila, Graduate Research Assistant
railasalina@ksu.edu

Sarah Lancaster, Extension Weed Management
slancaster@ksu.edu