Issue 947

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eUpdate

03/16/2023

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. Residual herbicides for corn

Residual herbicides that kill weed seeds/seedlings as they germinate or emerge are an important component of herbicide applications at or before the time of corn planting. These herbicides can control weeds for several weeks, which prevents yield loss due to early-season weed competition and can greatly improve the effectiveness of a post-emergence herbicide application and give more flexibility for post-application timing. Residual herbicides are also an important component of sequential herbicide applications later in the growing season. In general, preventing the emergence of weeds, especially herbicide resistant weeds, is preferable to controlling them after they emerge (Figure 1).

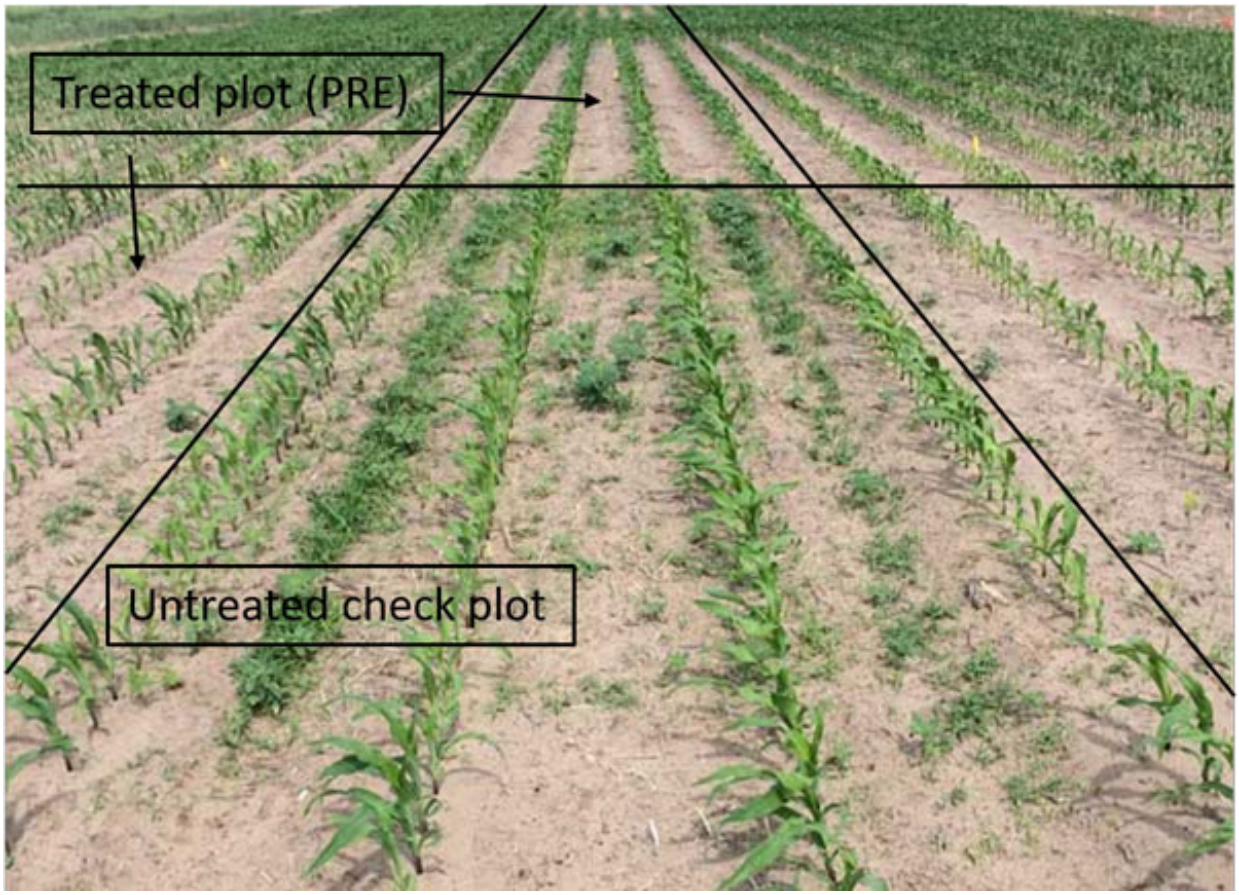

Figure 1. The corn plot in the foreground received no pre-emergence herbicide. The plots adjacent to the untreated check received an application of pre-emergence herbicide. The photo was taken just prior to the prescribed post-emergence treatment in May 2018 at the Kansas River Valley Experiment Field in Rossville. Photo by Stu Duncan, K-State Research and Extension.

Many cases of herbicide-resistant weeds have resulted from over-reliance on post-emergence herbicide applications, thus it is essential to include one or more residual herbicides available for corn. However, it is also important to remember to change residual herbicides to prevent selection of tolerant or resistant weeds. The importance of this is reflected in the recent confirmation of

waterhemp and Palmer amaranth that are resistant to *S*-metolachlor (Dual).

The specific herbicide you use is important, but it is usually less important than making the decision to use a residual herbicide program that includes at least two effective herbicides. But, it is important to know the strengths and weaknesses of each product in terms of the spectrum of weeds controlled. A table summarizing weed species response to various corn herbicides can be found on pages 24-26 of *2023 Chemical Weed Control for Field Crops, Pastures, Rangeland, and Noncropland* (SRP 1162) at: https://www.bookstore.ksre.ksu.edu/pubs/SRP1176.pdf

Categories of residual herbicides for corn

Photosystem II Inhibitors (Group 5). Atrazine is the most widely used PS II inhibitor in corn. It controls a wide variety of broadleaf weeds, including pigweeds, ragweeds, morningglories, and mustards, as well as some grass species. However, atrazine resistance has been reported for many weed species. Atrazine use rates are influenced by soil type, soil pH, and organic matter, and use is prohibited in instances where water contamination is likely. Unless your situation prohibits atrazine use, it is recommended to include atrazine when you apply HPPD-inhibitor and acetamide herbicides.

Very Long Chain Fatty Acid Inhibitors (Group 15). The main VLCFA products used in corn include acetochlor, *S*-metolachlor, metolachlor, dimethamid-P, and pyroxasulfone In general, these products are very effective in controlling most annual grasses (except shattercane) and small-seeded broadleaf weeds such as pigweeds. They are much less effective in controlling kochia or large-seeded broadleaf weeds such as cocklebur, devilsclaw, morningglory, sunflower, and velvetleaf. An exception are those products containing pyroxasulfone. Though resistance to Group 15 herbicides have been reported in corn/soybean rotations in Illinois, there have been no cases of weed populations in Kansas developing resistance to the Group 15 herbicides to date.

Group 15 herbicides are most effective when applied with atrazine. In past years, often because of cost, reduced rates of these products were applied to help manage heavy summer annual grass pressure, then followed up with a good post-emergence herbicide program. With the increased occurrence of glyphosate- and other herbicide-resistant weeds, it is essential to use the full rates of these products in conjunction with a POST program.

HPPD-inhibitors (Group 27). Examples of HPPD-inhibitors are isoxaflutole (e.g. Balance Flexx) and mesotrione (e.g. Callisto and many generics). These products should be applied with atrazine. HPPD-inhibitors provide excellent for control of kochia, pigweeds, velvetleaf, and many other broadleaf weeds, as well as grasses. Corvus (thiencarbazone + isoxaflutole) will control shattercane and common sunflower better than Balance Flexx, provided the sunflower is not ALS-resistant. Keep in mind, products containing Balance should not be applied to coarse-textured soils when the water table is less than 25 feet below the soil surface. Balance Flexx does not provide adequate control of sunflower.

PPO-inhibitors (Group 14). Examples of PPO-inhibitors include flumioxazin (e.g. Valor) and saflufenacil (Sharpen). Herbicides containing flumiozaxin must be applied 7 to 30 days before corn planting. These herbicides provide excellent control of pigweeds; however, they are marginal on kochia. Fierce (flumioxazin + pyroxasulfone) will provide improved control of velvetleaf and kochia

compared to Valor. The addition of atrazine will enhance kochia, pigweed, velvetleaf, and morningglory control, provided the populations are not triazine-resistant. Sharpen and Verdict (saflufenacil + dimethenamid-P) have excellent activity on pigweeds, kochia, and large-seeded broadleaf weeds. However, the length of residual activity can be shorter than other pre-emergence products when all are compared at full rates. Approximately 7 to 10 days of residual can be expected per 1 oz of Sharpen and 5 oz of Verdict.

ALS-inhibitors (Group 2). One example of a pre-emergence ALS-inhibitor used in corn is flumetsulam (Python), which only has broadleaf activity and provides good control of large-seeded broadleaf weeds such as cocklebur, sunflower, and velvetleaf, or the small-seeded common lambsquarters. Flumetsulam is also a component of Hornet, Stanza, SureStart II, and TripleFlex II. These products are especially effective for control of sunflower, along with cocklebur and velvetleaf, but less effective for morningglory control.

Rimsulfuron is another ALS-inhibiting herbicide that is a component of Basis Blend, Instigate, Prequel, Realm Q and Steadfast Q. Products with rimsulfuron will provide short residual control of grass and broadleaf weeds and should be used as a setup herbicide with a good post-emergence weed control program. If ALS-resistant broadleaf weeds are present, these ALS-containing herbicides often will be less effective.

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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2. Spring planting is approaching: Soil temperature and moisture status

Planting date is one of the most critical factors to decide for row crops. Rather than just calendar dates, farmers should consider basing this decision based on soil temperature and moisture.

Soil temperature

After a cooling trend during the second week of March, air temperatures across Kansas seem to be back to normal again but forecast indicates we may fall below normal in the coming days.

For the 7-day period between March 9-15, average soil temperatures at 2 inches across KS districts ranged from 36°F to 47°F (Figure 1). You can monitor soil temperatures across the state by using the Kansas Mesonet's soil temperature tracking tool at https://mesonet.k-state.edu/agriculture/soiltemp/ .

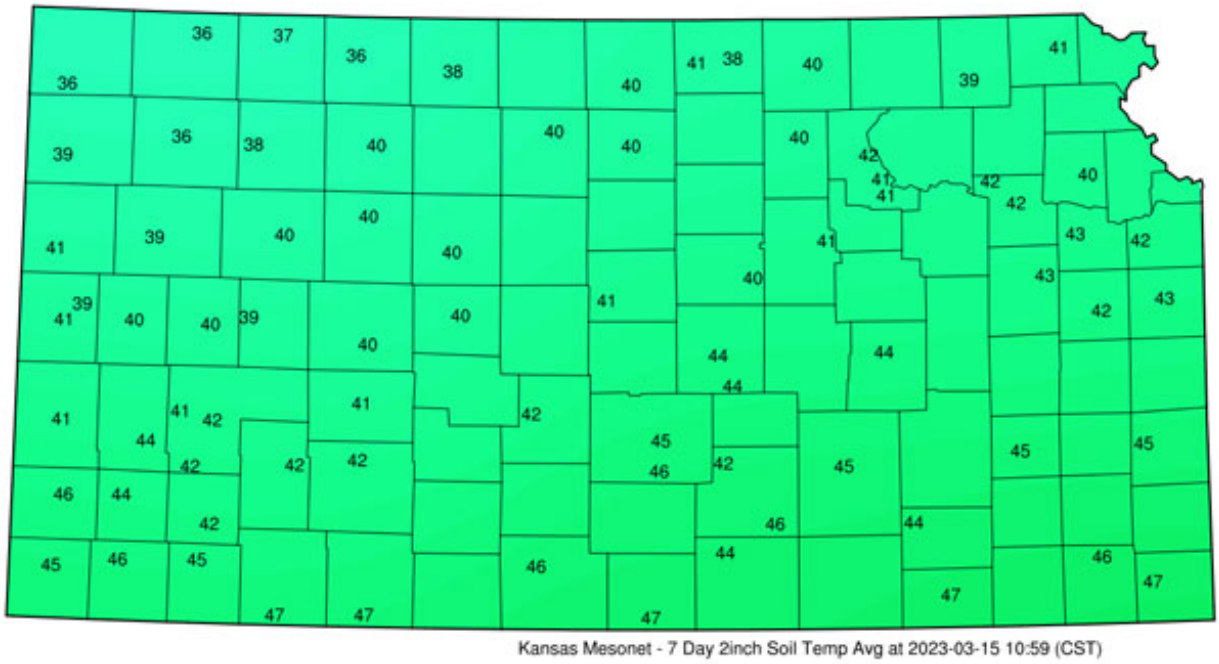

Figure 1. Average soil temperatures at 2-inch soil depth for the week of March 9 to 15, 2023. Source: Kansas Mesonet. (https://mesonet.k-state.edu/agriculture/soiltemp/**)**

Projections for the next 8 to 14 days call for leaning below-normal temperatures statewide (Figure 2). In parallel, the above-normal precipitation outlook may contribute maintaining cool soil temperatures (Figure 3).

It is worth to mention that topsoil temperature differences could be large depending on multiple factors. Actual changes in any given field will be affected by several factors including soil type, soil moisture, residue cover, tillage, landscape position, and others. For example, wet soils under a no-tillage system are expected to warm up at a slower pace. Dry soils will fluctuate more rapidly, matching air temperatures, particularly if skies are clear.

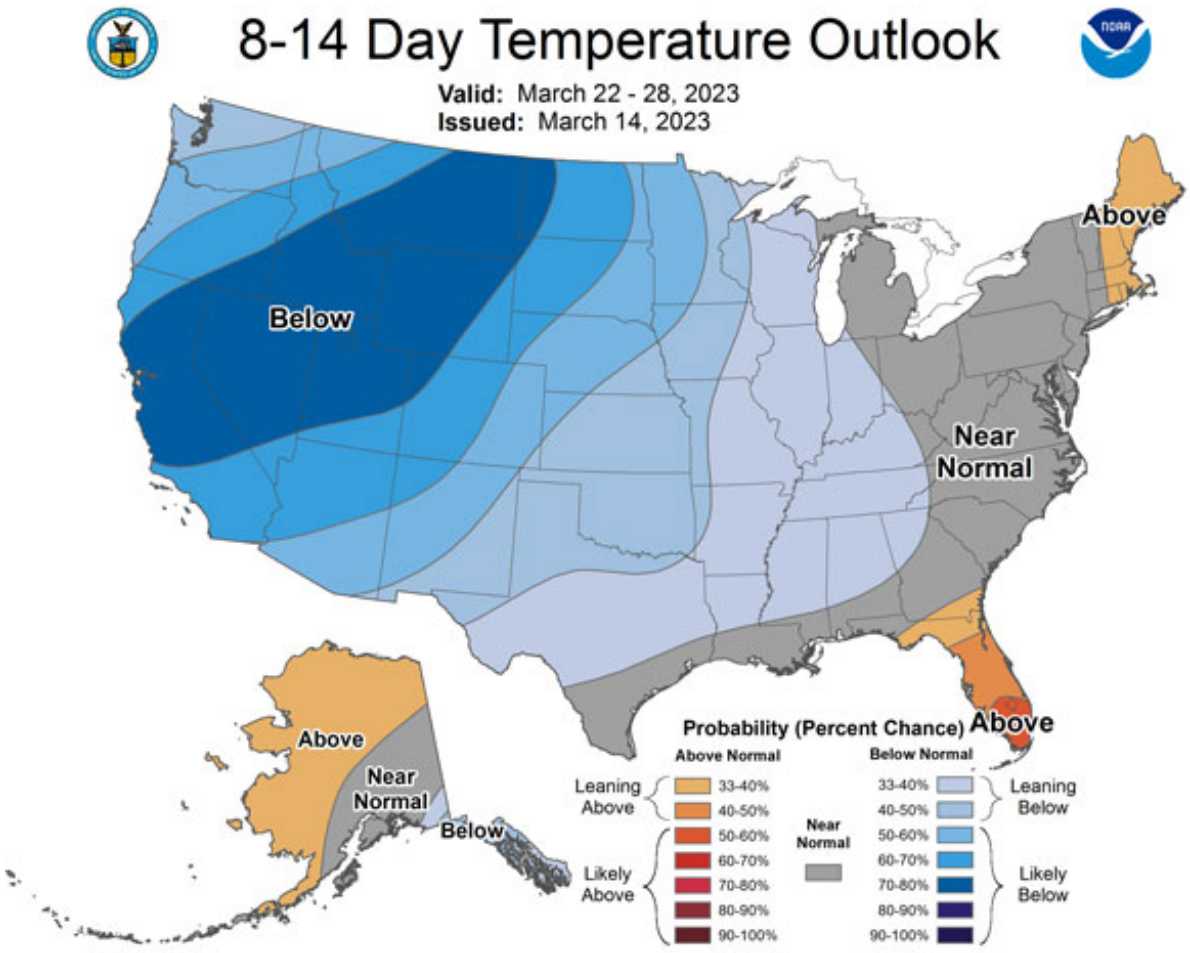

Figure 2. 8 to 14-day outlook temperature outlook for March 22 – 28, 2023. Source: NOAA.

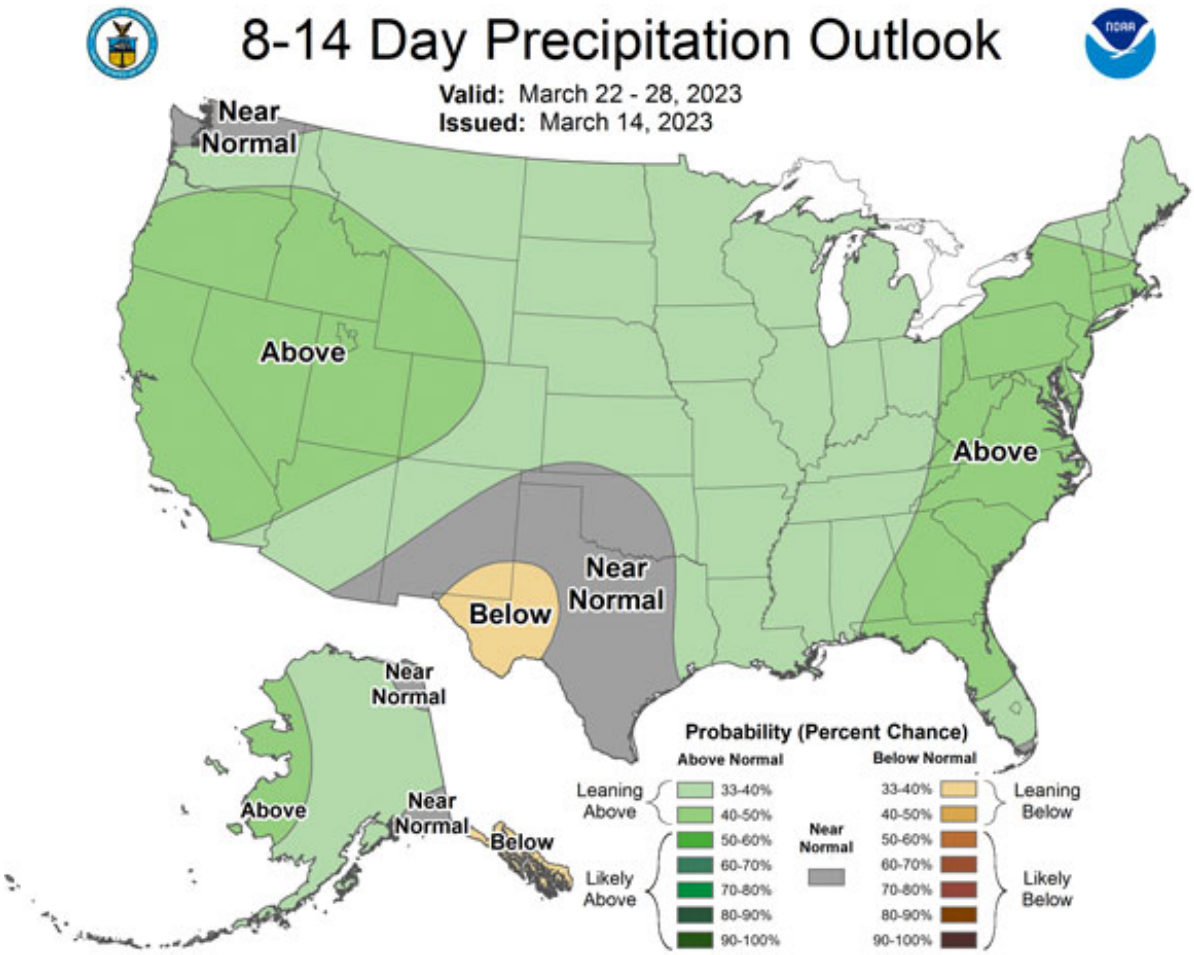

Figure 3. 8 to 14-day outlook precipitation outlook for March 22 – 28, 2023. Source: NOAA.

Soil moisture

Current soil moisture status across Kansas indicates particularly dry conditions toward the southwest portion of the state, increasing to moderate or high saturation when moving to north central, northwest, and northeast regions, respectively (Figure 4).

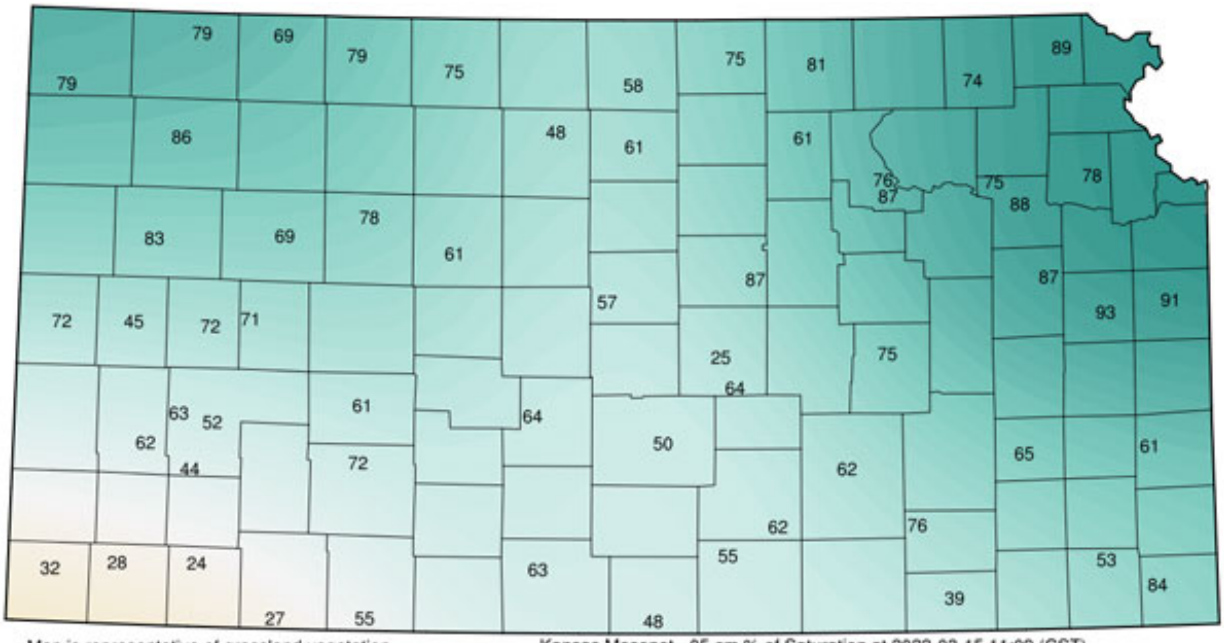

Figure 4. Soil moisture at 2 inches (5 cm) as of March 15, 2023. Source: Kansas Mesonet
https://mesonet.k-state.edu/agriculture/soilmoist/

The largest weekly departure in precipitation occurred in the southeast corner of Kansas (Figure 5). After the wet upcoming week, projections for the last part of March call for precipitation to be a bit above-normal for most of the state (Figure 3).

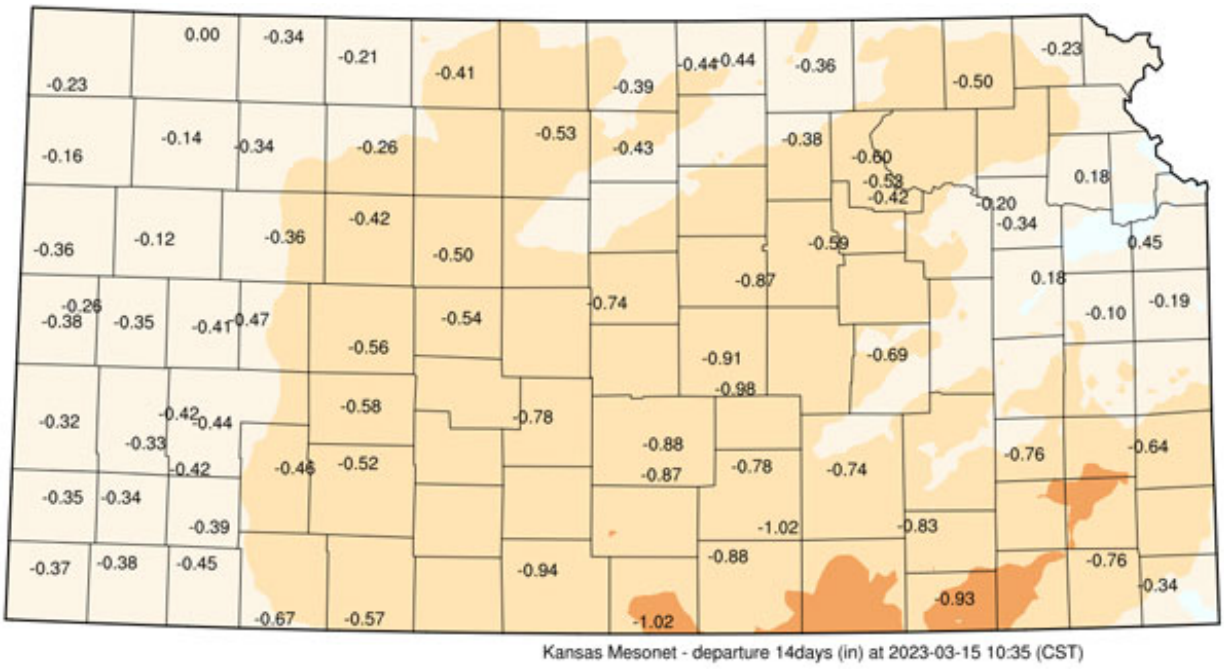

Figure 5. Departure from normal precipitation for the first two weeks of March, 2023. Source: Kansas Mesonet.

Management considerations

Optimal soil temperature for crop emergence

Every summer row crop has an optimal soil temperature for its emergence. A minimum for corn is 50°F for germination and early growth. When soil temperatures remain at or below 50°F after planting, the damage to germinating seed can be particularly severe.

Uniformity and synchrony in emergence is critical and primarily achieved when soil temperatures are consistently above 55°F. Uneven soil temperatures around the seed zone can produce non-uniform crop germination and emergence. Lack of uniformity in emergence can greatly impact corn potential yields. Competition between early-emerged and late-emerged plants, as well as competition to weeds may negatively impact biomass and grain production. Compensation mechanisms like tillering have limited potential compared to other crops compensation mechanisms like branching in soybeans.

Impact of a hard freeze on corn

Corn is also more likely than other summer crops to be affected by a hard freeze after emergence if it is planted too early. The impact of a hard freeze on emerged corn will vary depending on how low the temperature gets, the intensity and duration of the low temperatures, field variability and residue distribution, tillage systems, soil type and moisture conditions (more severe under dry conditions), and the growth stage of the plant. Injury is most likely on very young seedlings or on plants beyond the V5-6 growth stage, when the growing point is above the soil surface.

The average day for last spring freeze (32°F) is considerably variable across the state (Figure 6). From southeast to northwest Kansas; the earliest last spring freeze date is April 1-14 and latest is May 5-12. Thus, corn planting dates before the second week of April in the southeast or the second week of May in the northwest would represent a high risk of suffering from a late spring frost damage.

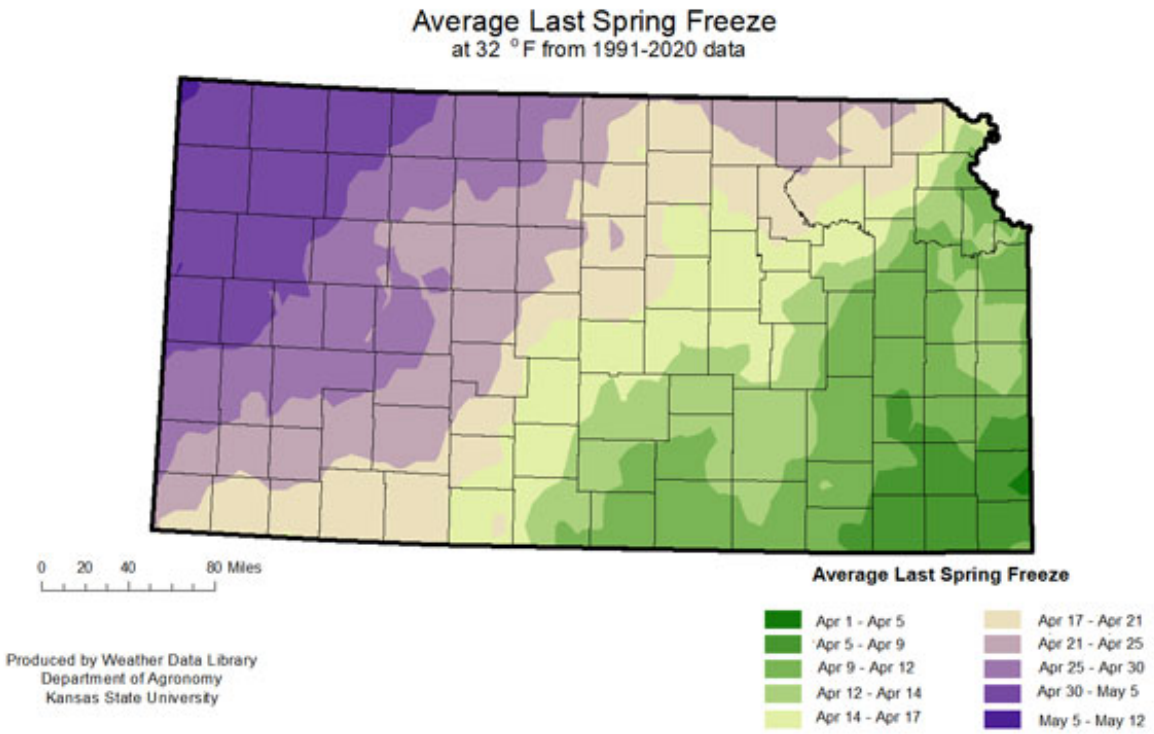

Figure 6. Average last spring freeze (32 degrees F) for Kansas. Source: Kansas Mesonet.

More information about the planting status of summer row crops will be provided in upcoming issues of the Agronomy eUpdate. Stay tuned!

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3. Soil temperatures across Kansas: Current and historical averages

We are now two weeks into meteorological spring. Warmer air temperatures are fast approaching, and those will lead to warming soil temperatures. One important benchmark for spring planting is the arrival of soil temperatures that reach and consistently stay above 50°F. As of March 15, no location in Kansas is at or above that threshold at the 2-inch soil depth (Figure 1). Are we ahead or behind normal this year in the race to reach 50°F? Let's take a closer look.

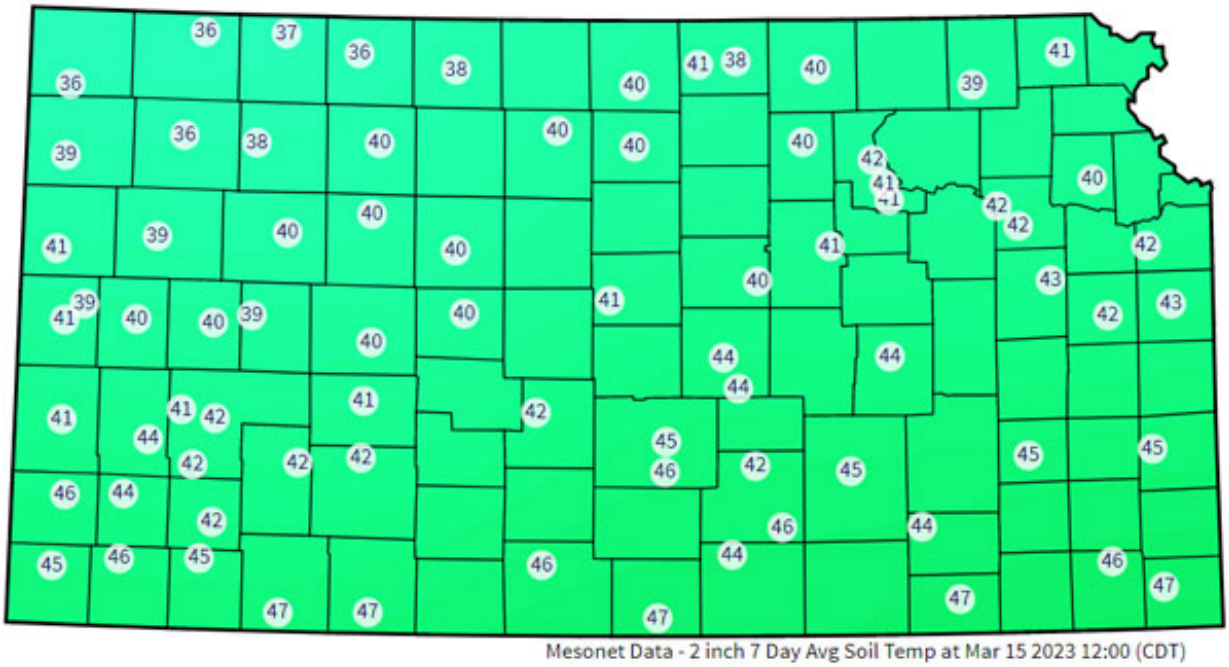

Figure 1. Average 2-inch soil temperature (°F) across the Kansas Mesonet network for the 7-day period ending at 12 PM CDT on March 15, 2023.

For this report, we will define "soil temperatures consistently above 50°F" as a 7-day average soil temperature at the 2-inch depth of at least 50°F. We can find the average date this occurs using data from the Kansas Mesonet. There are 12 Kansas Mesonet sites with over 30 years of soil temperature data. If we limit the data to the period 1991-2020, as NCEI does for calculating average air temperatures, we can calculate 30-year normals for these 12 locations for every day of the year (Table 1). To generate a statewide average for a 7-day period, we can average both spatially and temporally across the daily averages at each of these sites.

Table 1. 7-day average 2-inch soil temperatures (°F) at selected Kansas Mesonet sites, based on 1991-2020 data. Dates listed are the last date of the 7-day average period. Yellow/orange shades indicate the threshold of 50°F was reached or exceeded.

	Mar	Mar	Mar	Mar	Mar	Mar	Mar	Apr	Apr	Apr	Apr

	1	6	11	16	21	26	31	5	10	15	20
Manhattan	39	41	42	45	48	49	50	52	53	55	58
Colby	37	39	41	43	45	47	48	51	52	53	55
Garden City	40	42	44	46	48	50	51	53	54	55	57
Hays	38	40	42	45	46	48	50	51	52	55	57
Hutchinson	42	43	45	48	49	51	52	53	54	56	58
Ottawa	41	44	46	48	50	52	52	55	56	58	60
Parsons	40	41	43	45	47	49	50	52	53	55	57
Rossville	36	38	40	43	46	47	49	51	52	53	56
Scandia	39	40	42	45	48	49	50	52	54	55	57
Silver Lake	38	39	42	45	48	49	50	52	54	55	58
St John	38	41	43	45	47	49	50	52	53	54	56
Tribune	41	43	44	47	49	50	51	53	54	56	58
STATEWIDE AVERAGE	**39**	**41**	**43**	**46**	**47**	**49**	**50**	**52**	**53**	**55**	**57**

Using the Mesonet data, the first date on which the statewide 7-day average 2-inch soil temperature reaches 50°F is March 31. This is an increase of 11 degrees from the average of 39°F on March 1, and four degrees warmer than the March 16 average of 46°F. During March, soil temperatures typically rise quickly, in response to warmer air temperatures. Any locations where the ground is still frozen also thaw quickly thanks to the higher sun angle. But 2023 has thrown us a curveball, as we are currently in an extended period with below-normal air temperatures. Back in late February, the state was on average running around 2°F below normal (Figure 2), in part due to frozen ground beneath significant snow cover in the northwest. February 23 and 24 were particularly cold, with lows in the single digits above and below zero at most locations. A quick warmup ensued on February 26 and lasted into the beginning of March. In response, soil temperatures began increasing. By March 6, the state was running around 2°F above normal, and it looked as if we were well on our way to an early beginning to the growing season. But cold air returned on the 6th, and by March 15, soil temperatures were decreasing, and we are back below normal again.

Short-term temperature forecast for Kansas

We look to fall even further behind normal in the coming weeks. The 8 to 14-day outlook from the Climate Prediction Center (Figure 3) favors below-normal air temperatures into late March, and the outlook for the following two weeks (Figure 4) indicates below-normal air temperatures are favored into early April. Should these two forecast maps verify, it will further delay 2-inch soil temperatures reaching 50°F across the state, and thus the growing season will be starting later than normal this year.

You can monitor March's march towards 50° soil temperatures on the Kansas Mesonet's web site at the following URL: http://mesonet.k-state.edu/agriculture/soiltemp/. Here you will find current readings as well as 7-day minimum, maximum and average soil temperatures at both the 2-inch and 4-inch depths for over 75 sites across Kansas.

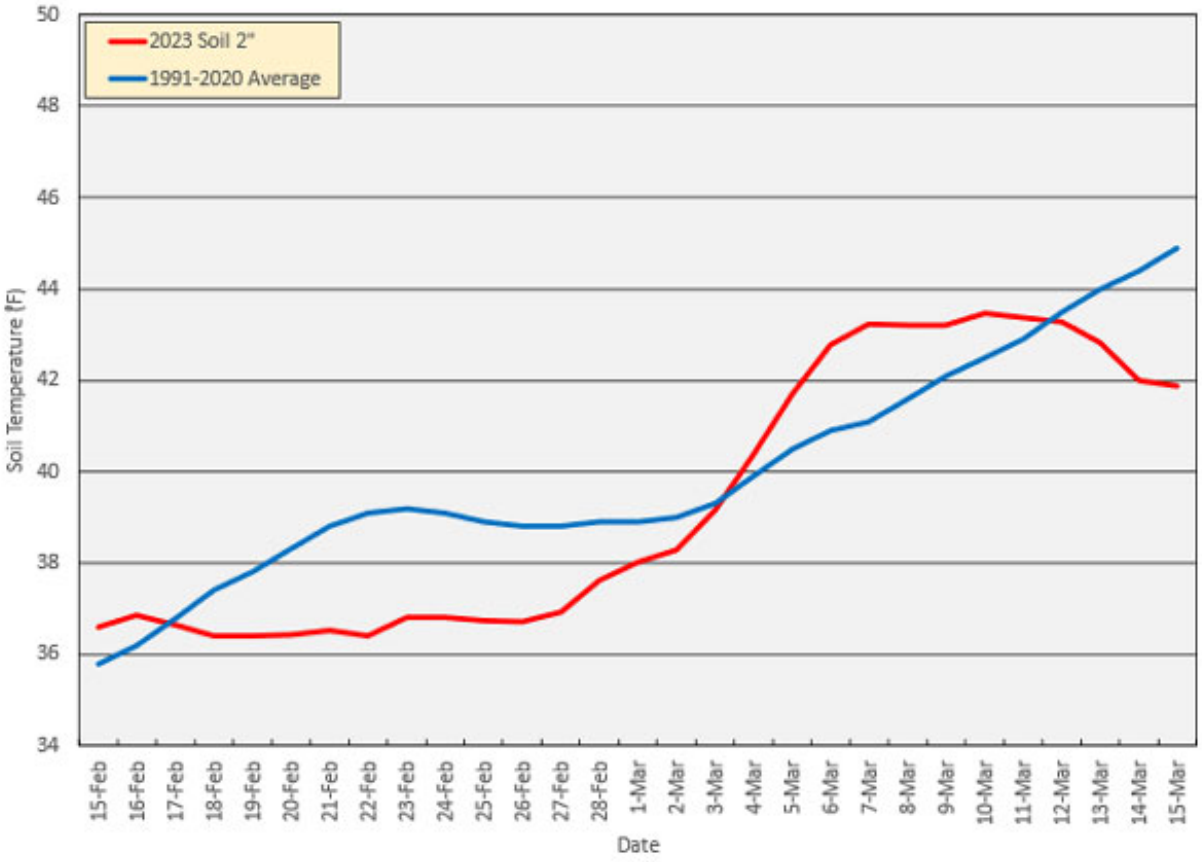

Figure 2. Statewide 7-day average 2-inch soil temperatures across the Kansas Mesonet in 2023 along with average 30-year normals from 1991-2020. Dates listed are the last day of the 7-day average period.

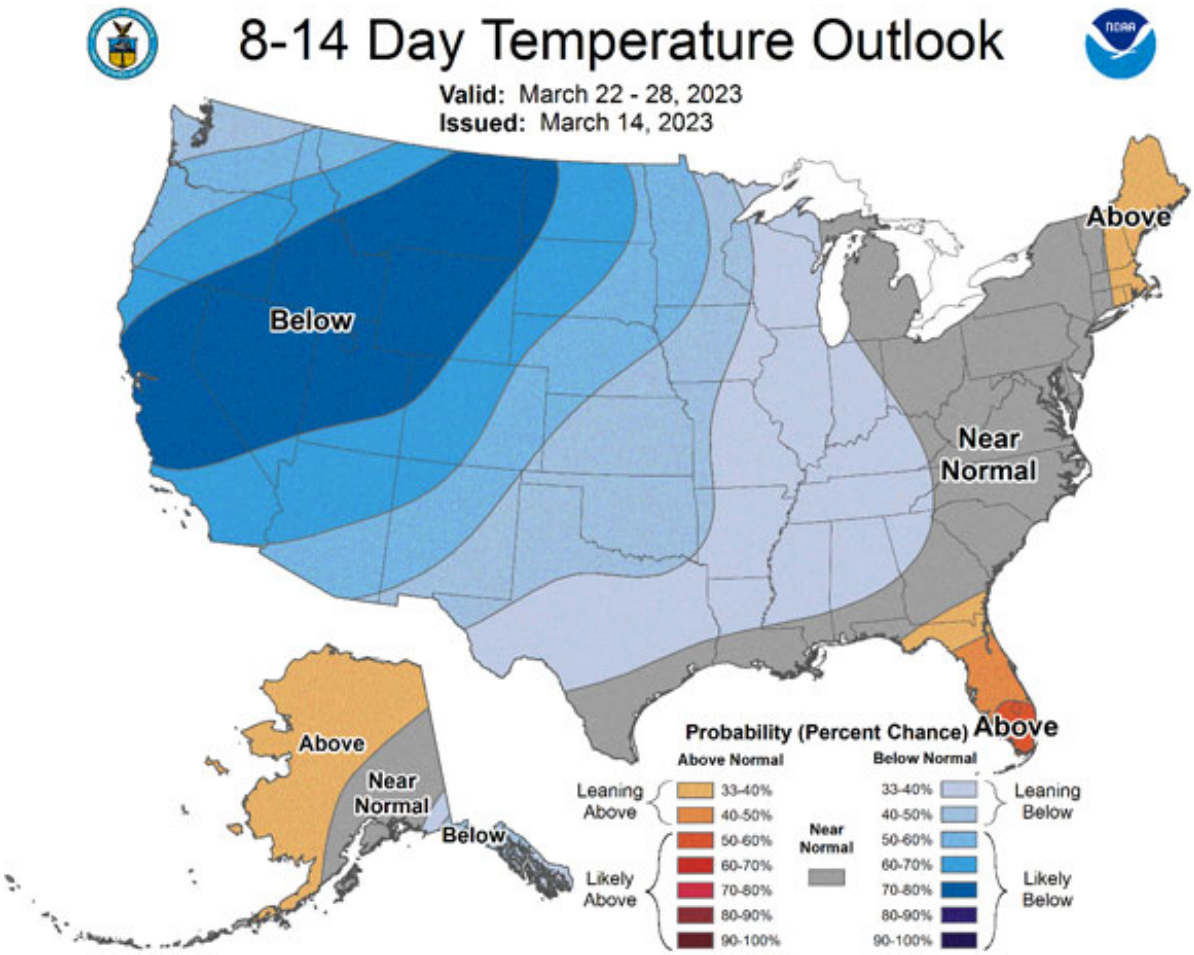

Figure 3. The Climate Prediction Center's 8 to 14-day air temperature outlook, valid for the period March 22-28, 2023.

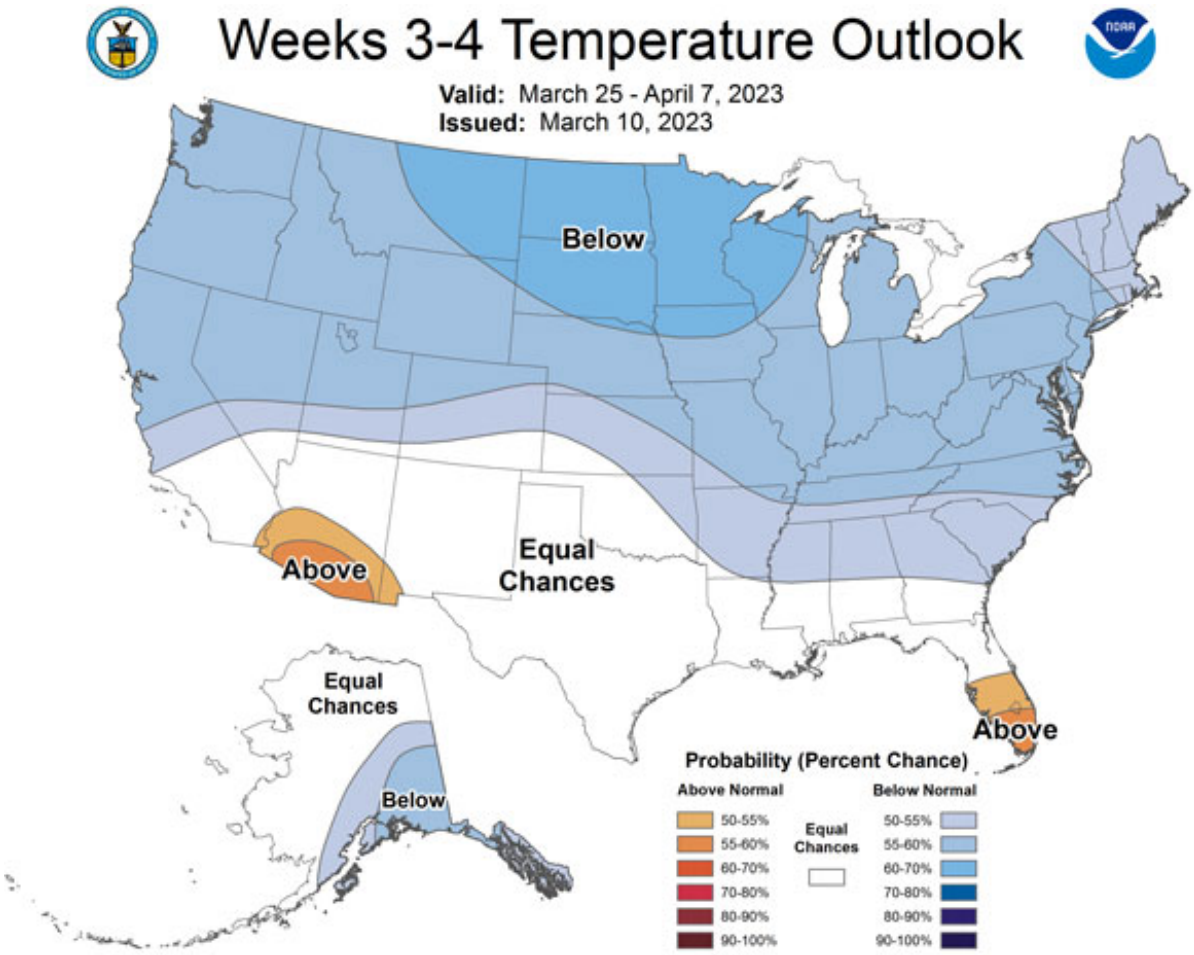

Figure 4. The Climate Prediction Center's air temperature outlook for the period March 25-April 7, 2023.

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4. Considerations for early fungicide applications on wheat in 2023

As wheat starts to green-up across the state, questions are coming in about the benefit of early fungicide applications.

Research at K-State and in other regions continues to demonstrate that it is often possible to achieve high levels of foliar disease control with a single fungicide applied between flag leaf emergence and heading growth stages. The yield response to this later fungicide application is influenced by the level of disease risk (amount of disease and predicted weather conditions), variety resistance to the most threatening fungal diseases, yield potential of the crop, foliar fungicide efficacy, and other factors.

Fungicides can also be applied as an early application made between "spring green-up" and jointing. This application may provide some yield benefit in some fields and years. It's important to note that an application during these early stages of crop development is *not a substitute for a flag leaf application*, as any leaf that emerged after the application will not be protected. Early fungicide applications may result in small yield advantages due to a reduction in early disease establishment in the lower canopy. This may be particularly true for "leaf spot diseases" such as tan spot or Septoria leaf blotch that survive in wheat residue and can establish early in the year. Yield benefits are most likely in wheat fields planted back into wheat stubble and when weather conditions are wet enough to favor fungal disease development.

If deciding to make an early application, it is important to factor that into the full season fungicide program. Many active ingredients have use restrictions, where a limited amount of an active ingredient can be applied during a single season. It is important to make sure the early fungicide does not limit options for fungicide applications at flag leaf (which have the potential for higher yield protection in conducive disease years).

Advantages and limitations of split applications

These are some advantages to making an early application:

- **Low cost**. There is no additional cost for application if the fungicide is tank mixed with other products, such as liquid nitrogen fertilizer or herbicide. Often, however, the optimal timing for an early fungicide application is not until after the wheat has jointed – with one or two joints present. This is usually sometime in mid- to late-March in southern Kansas and later in northern Kansas. Top-dressed nitrogen and many postemergence herbicides should be applied before this stage to be most effective and, in many cases, to be within label restrictions, so the optimal timing of both applications may not match. A separate trip for an early fungicide application adds to the cost of production.

  Since the payoff for an early application is less certain than with later applications, it is perhaps best to consider using a low-cost generic fungicide for the early application and saving more expensive products, if desired, for the later application.

- **Provides suppression of early-season disease** caused by tan spot, powdery mildew, and septoria leaf blotch (Figures 1 & 2) that overwinter locally in Kansas. The benefits of fungicides applied at green-up is more sporadic for diseases like leaf rust and stripe rust (Figure 3), which are less likely to survive the winter in Kansas. The rust diseases typically

blow into the state from Texas and Oklahoma during the spring, and often become established as the crop transitions from jointing to flag leaf emergence. If a field has hot spots of stripe rust at jointing or earlier, a fungicide application made at jointing could help suppress the developing epidemic. However, a second application will be needed to protect the flag leaves during the early stages of grain development.

The limitations of early-season fungicide application include:

- Leaves not present at the time of application will not be protected. Therefore, these applications will not control leaf rust or stripe rust epidemics that come in from the south at later stages of growth. The early applications are most effective when combined with a second, later application of a fungicide.
- Additional product cost may not pay off under some conditions, especially this growing season when the yield potential of the crop may be limited by drought. Remember, the second application does the heavy lifting in the dual-application approach. If capital resources are limited because of low prices, it may be best to invest your money where you are likely to see the largest yield response.

Product rates and restrictions

Producers considering the use of split applications must pay close attention to label restrictions. Every active ingredient in a fungicide has a maximum total amount that can be applied during the season.

For example, if an early application of a generic form of tebuconazole is applied at 4 oz/acre, a subsequent application of any fungicide containing tebuconazole alone or in combination with other ingredients (e.g. premix) around heading could put you over the limit for the crop season. Thus, be sure to read the label to determine the maximum amount of a chemical that can be applied in a single season and the exact amount of a chemical(s) that is in a fungicide.

For information on the efficacy of different foliar fungicide products, refer to K-State Research and Extension publication: Foliar Fungicide Efficacy Ratings for Wheat Disease Management 2023, EP130.

Conclusions

The main conclusions we can draw from recent studies in Kansas and Oklahoma are:

- In K-State studies, the greatest average profit has come from the flag leaf application of fungicides. Fungicides applied prior to jointing are less likely to result in a positive profit.
- The likelihood of profit for an early-season fungicide application is greatest for susceptible varieties in continuous wheat systems with a high level of surface wheat residue.
- Fields with hot-spots of tan spot, septoria leaf blotch, and stripe rust prior to flag leaf emergence are candidates for an early fungicide application, provided environmental conditions are conductive for further disease development and yield potential of the crop. These applications are often most effective when made around the jointing stages of growth.

Additional resources

KSRE publication *Foliar Fungicide Efficacy Ratings for Wheat Disease Management 2023*.

For information on assessing the need for wheat foliar fungicide, refer to KSRE publication *Evaluating the Need for Wheat Foliar Fungicides*, MF3057.

Another publication providing good information, from which a few excerpts were used in this article, is Oklahoma State University's *Split Versus Single Applications of Fungicides to Control Foliar Wheat Diseases*, PSS-2138.

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5. First hollow stem update - March 13, 2023

Cattle should be removed from wheat pastures when the crop reaches first hollow stem (FHS). Grazing past this stage can severely affect wheat yields (for a full explanation, please refer to the eUpdate article "Optimal time to remove cattle from wheat pastures: First hollow stem").

First hollow stem update

In order to screen for FHS during this important time in the growing season, the K-State Extension Wheat and Forages crew measures FHS on a weekly basis in 22 different commonly grown wheat varieties in Kansas. The varieties are in a September-sown replicated trial at the South Central Experiment Field near Hutchinson.

Ten stems are split open per variety per replication (Figure 1), for a total of 40 stems monitored per variety. The average length of hollow stem is reported for each variety in Table 1. As of March 13, no variety had reached first hollow stem, but all varieties had started to elongate their stems. If temperatures are warm following the initiation of the first hollow stem elongation, varieties can reach first hollow stem fairly quick.

Figure 1. Ten main wheat stems were split open per replication per variety to estimate first hollow stem for this report, for a total of 40 stems split per variety. Photo by Romulo Lollato, K-State Research and Extension.

Table 1. Length of hollow stem measured on February 22, 27, March 6, and 13, 2023 for 22 wheat varieties sown mid-September 2022 at the South Central Experiment Field near Hutchinson. The critical FHS length is 1.5 cm (about a half-inch or the diameter of a dime). Value(s) in bold indicate the highest FHS group.

	First hollow stem (cm)			
Variety	**2/20/2023**	**2/27/2023**	**3/6/2023**	**3/13/2023**
AM Cartwright	0	0	0.08	0.19
AP EverRock	0	0	0.08	0.29
AP Prolific	0	0	0.04	0.16
AP Roadrunner	0	0	0.06	0.28
AP18 AX	0	0	0.06	0.3
ARMOR EXP55	0	0	0.05	0.24
ARMOR EXP6 AX	0	0	0.05	0.29
CP7017 AX	0	0	0.06	0.29
CP7050 AX	0	0	0.06	0.27
CP7266 AX	0	0	0.07	0.2
CP7869	0	0	0.08	0.26
CP7909	0	0	0.11	0.23
KS Ahearn	0	0	0.09	0.21
KS Hatchett	0	0	0.06	0.18
KS Providence	0	0	0.07	0.2
LCS19DH-152-6	0	0	0.02	0.17
LCS Atomic AX	0	0	0.06	0.32
LCS Galloway AX	0	0	0.06	0.22
LCS Steel AX	0	0	0.05	0.25
Guardian	0	0	0.05	0.22
Kivari AX	0	0	0.08	0.21
Whistler	0	0	0.05	0.25

We will report first hollow stem during the next few weeks again until all varieties are past this stage. Additionally, first hollow stem is generally achieved within a few days from when the stem starts to elongate, so we advise producers to closely monitor their wheat pastures at this time.

The intention of this report is to provide producers an update on the progress of first hollow stem development in different wheat varieties. Producers should use this information as a guide, but it is extremely important to monitor FHS from an ungrazed portion of each individual wheat pasture to make the decision of removing cattle from wheat pastures.

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6. Potential pest of soybeans and alfalfa in Kansas: Mealybugs

First identified in 2008 as a potential pest of soybeans in the United States, trochanter mealybugs (*Pseudococcus sp.*) have a wide variety of hosts, including corn, sorghum and alfalfa. While their role as a pest of soybeans is still not fully understood, it appears that this mealybug has the potential to be a problem in Kansas alfalfa as sporadic infestations have been detected in the western part of the state, one as recently as 2022 (Figure 1).

Figure 1. Irrigated alfalfa field with a mealybug infestation in 2022. Photo by Jeanne Falk Jones, K-State Research and Extension.

Trochanter mealybugs are small (~2mm) unarmored, scale insects. They are flattened, whitish, and wax-covered and feed on plant roots by removing fluids from the plant with piercing-sucking mouthparts (Figure 2). Due to their small size and life history, they often go undetected.

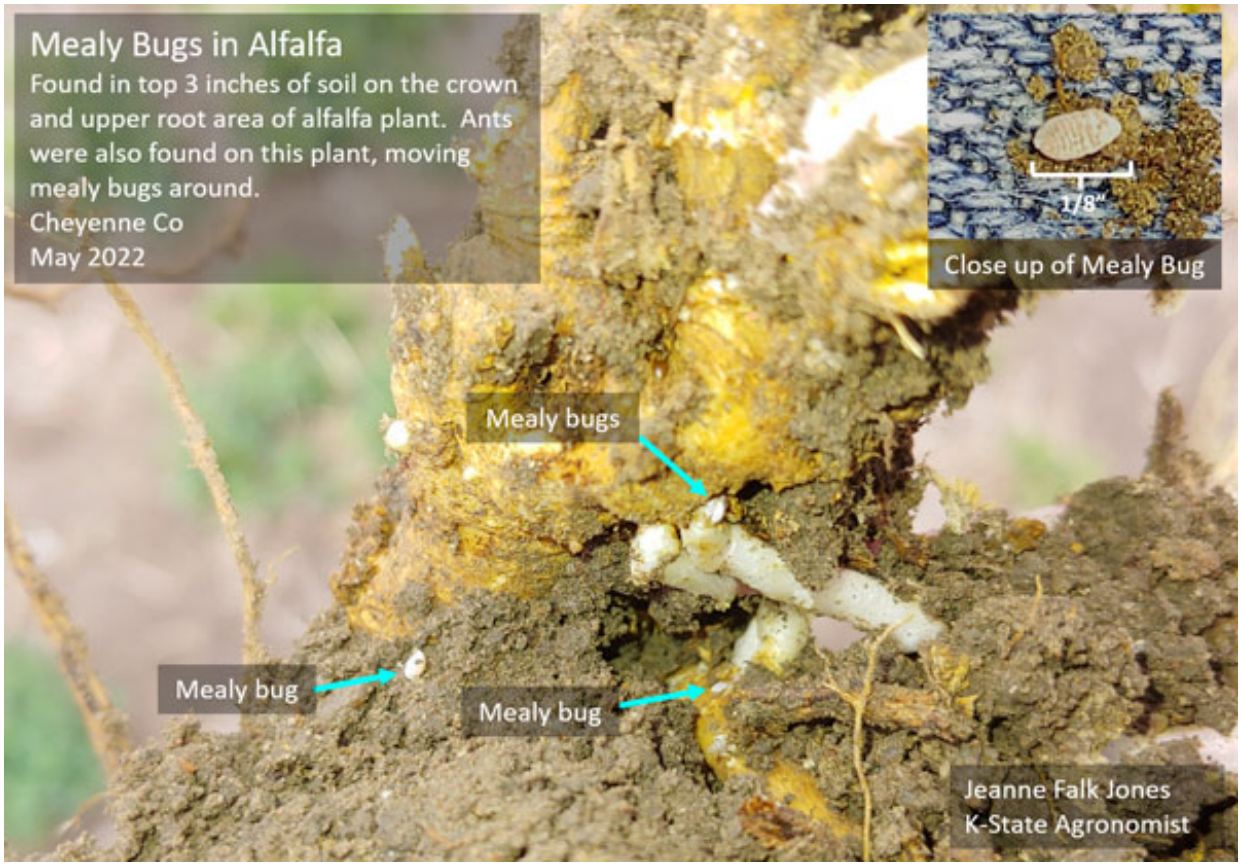

Figure 2. Mealy bugs in an alfalfa field in Cheyenne County, Kansas in May 2022. Photo by Jeanne Falk Jones, K-State Research and Extension.

When mealybugs are young, they can move short distances from one plant to the next on their own. They are also moved readily in irrigation water as the waxy covering on their bodies helps them survive being submerged. However, these insects tend to move the greatest distances with the help of ants. In fact, increased ant activity in infested fields is often noticed before mealybugs are discovered. The ants are tending the mealybugs to eat the honeydew the bugs excrete and in turn the ants protect them from predators (Figure 3).

Figure 3. Ant tending to a mealybug. Photo by Jeanne Falk Jones, K-State Research and Extension.

Plants infested with these mealybugs typically look like they have a potassium deficiency with yellowed leaf margins, stunted growth, and parts of a field may fail to adequately green up. If fields display these symptoms and they cannot be explained by other factors, plants should be dug up and the roots examined for the presence of these insects. Again, the presence of ants may be a clue and often small, sunken trails on the soil surface can be found that ants are using to move mealybugs around in the field.

There are no thresholds or control measures for this pest. Crop rotation may help, but this pest can survive on several crop and weed species. Attempts to control the ants in a field will not eliminate the mealybug population.

The distribution of these mealybugs in Kansas alfalfa is currently not well understood. If you do find trochanter mealybugs in your fields, please do not hesitate to contact your local extension professionals.

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7. 2022 Kansas cool-season forage performance tests

The results of the 2022 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). Results are available for both yield and nutrient value for the cool-season forages.

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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