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Extension Agronomy

eUpdate

04/22/2021

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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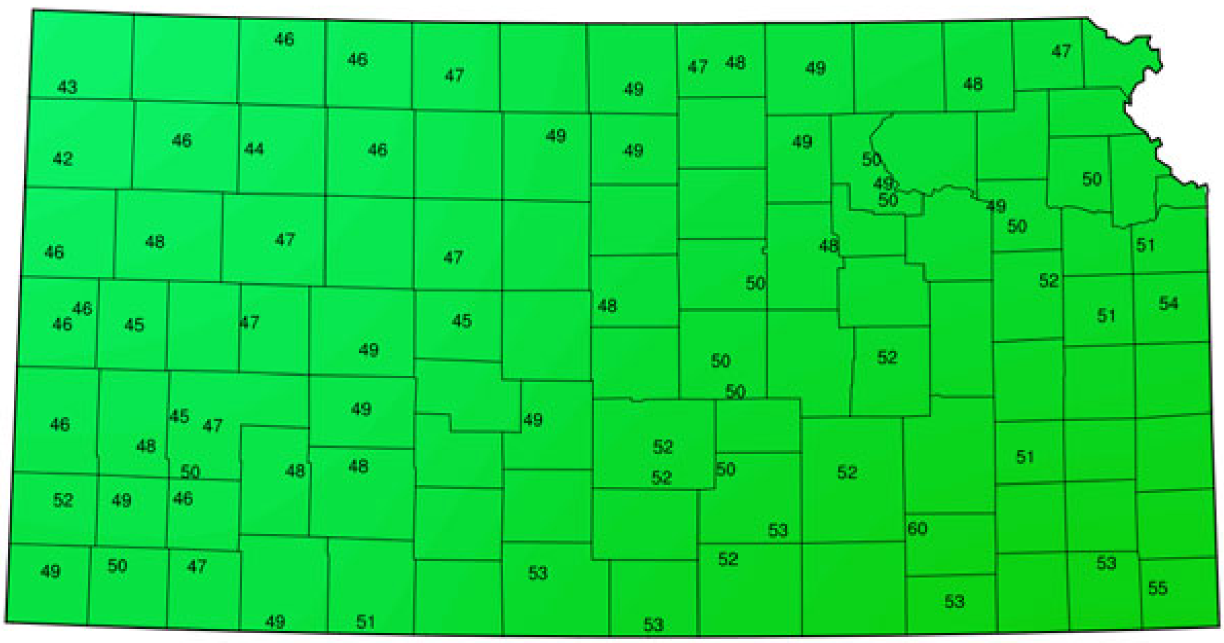
1. Soil temperature update and cold injury concerns for corn

Selection of the optimal planting date is one of the most critical factors in the decision-making process for producers. In making this decision, producers should consider soil temperatures rather than just calendar dates. Soils have been slow to warm this year, due to the wetter-than-normal conditions in March, as well as the cooler-than-normal temperatures that have lingered into April.

For this week (April 16-22), the average soil temperature at 2 inches ranged from 42°F in northwest Kansas to 55°F in the southeast. Temperatures at the 4-inch depth are not much different. Weekly average soil temperatures at the 4-inch depth ranged from 43°F in the northwest to 56°F in southeast Kansas (Figure 1).



Kansas Mesonet - 7 Day 2inch Soil Temp Avg at 2021-04-22 07:56 (CST)

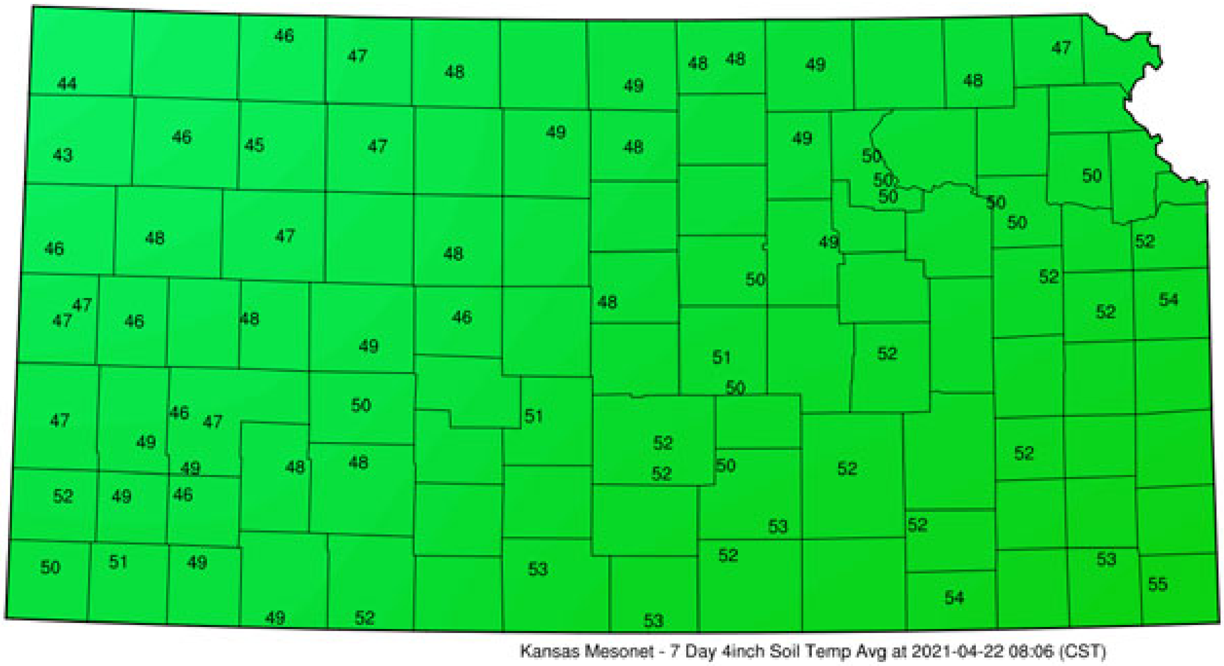


Figure 1. Average soil temperatures at 2-inch (upper panel) and 4-inch (lower panel) soil depth for the week of April 16 - 22, 2021.

Daily soil temperature variation within the last week (7-day report) was recorded across Kansas for several locations (Figure 2), presenting variations around 20°F. The warming pattern has been uneven across the state. In the west, temperatures have remained fairly steady following a quick cool down mid-week. In the east, there has been a slight decline. Soil temperatures were at 60°F by Monday, April 19, in several locations, before dropping to 45°F or less on Thursday, April 22 (Figure 2).

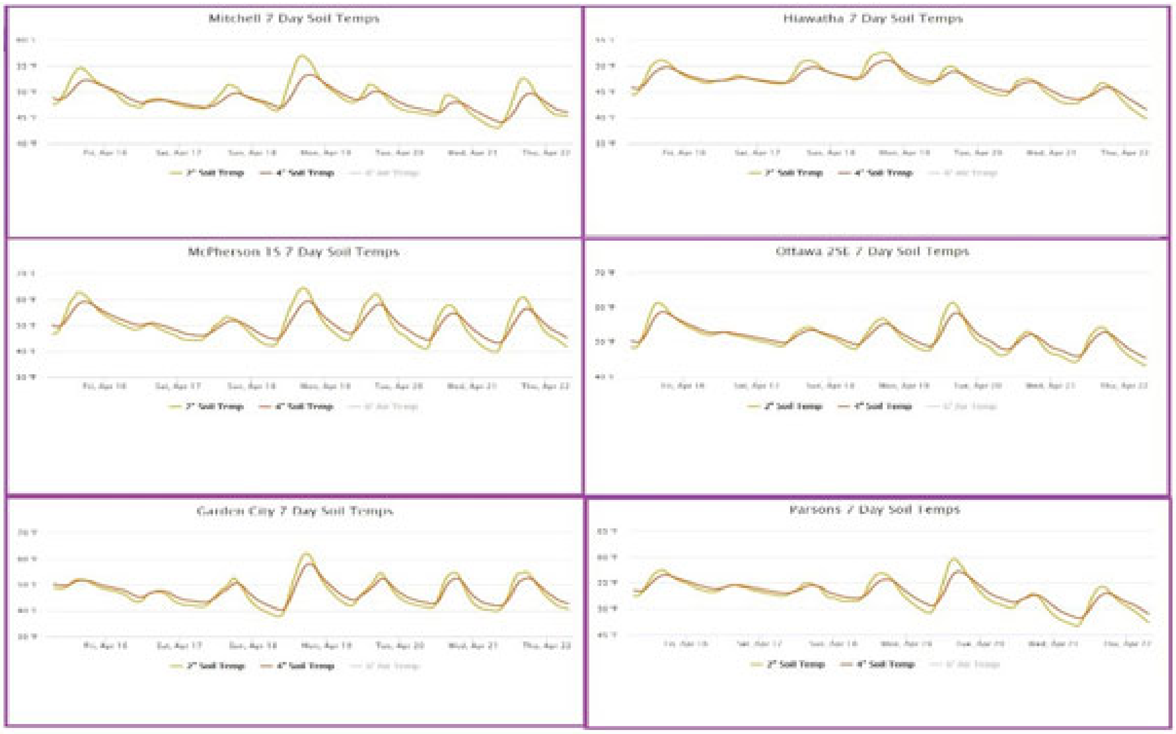


Figure 2. 7-day soil temperatures (2- and 4-inch soil depth) for Mitchell, Hiawatha, McPherson, Ottawa, Garden City, and Parson (top left to bottom right). 2-inch depth represented by yellow line; 4-inch depth represented by orange line. Graphs produced by the Kansas Mesonet.

Chilling Injury to seeds

Cold temperatures can result in injury to the germinating seed as it is absorbing moisture – a problem called imbibitional chilling injury. Damage to germinating seeds can occur when soil temperatures remain at or below 50 degrees F after planting.

Soil temperatures at the 4-inch depth during the first 24-72 hours after planting are critical. It is during this window that the kernels imbibe water and begin the germination process. Kernels naturally swell when hydrating – taking in water. If the cell tissues of the kernel are too cold, they become less elastic and may rupture during the swelling process, resulting in "leaky" cells. Injury symptoms may include swollen kernels that fail to germinate or aborted growth of the radicle and/or coleoptile after germination has begun.

Chilling injury can also occur following germination as the seedlings enter the emergence process. Chilling injury to seedlings can result in:

- Reduced plant metabolism and vigor, potentially causing stunting or death of the seminal roots
- Deformed elongation ("corkscrewing") of the mesocotyl
- Leaf burn (Figure 3)
- Delayed or complete failure of emergence, often leafing out underground

Chilled seedlings may also be more sensitive to herbicides and seedling blights.

Before making any decisions, fields should be scouted 4-7 days after the cold occurred as the extent of the damage and potential for new growth will be evident during this time.

Figure 3. Leaf burn from freeze damage early after corn emergence. Photo by Ignacio Ciampitti, K-State Research and Extension.

Producers should consider all these factors when deciding on the planting time. 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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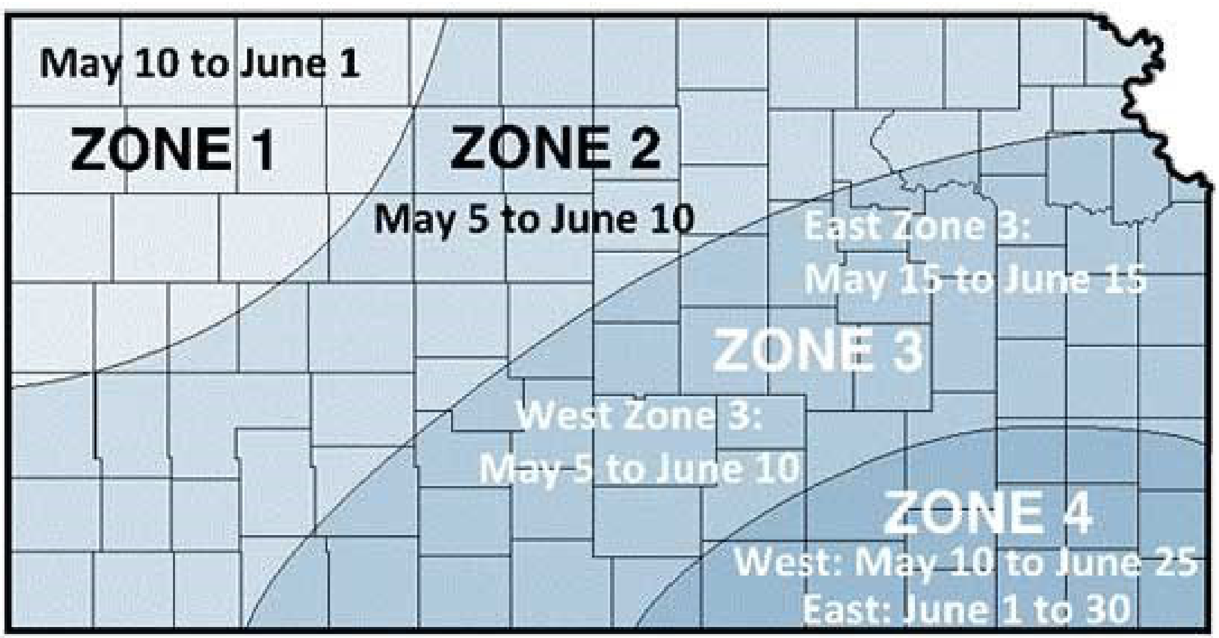
2. K-State recommendations for soybean planting dates and maturity group

After considering the effects of genetic yield potential and the environment, planting date is one of the primary management practices under the farmer's control that can highly influence soybean yields. In recent years, Kansas producers have been planting soybeans slightly earlier -- at the rate of about one-third-of-day per year. The past growing seasons, however, the "50% planting date" mark was achieved at a similar time (first week of June) statewide – with exception of 2019 that was marked by extremely wet conditions that resulted in late planting.

Kansas planting dates and maturity groups

Soybeans can be planted over a wide range of dates (Figure 1, upper panel) with adequate soil moisture conditions, although germination and emergence could be reduced and/or delayed in cool soils (less than 60°F). The recommended maturity varies across Kansas by area (Figure 1, lower panel).



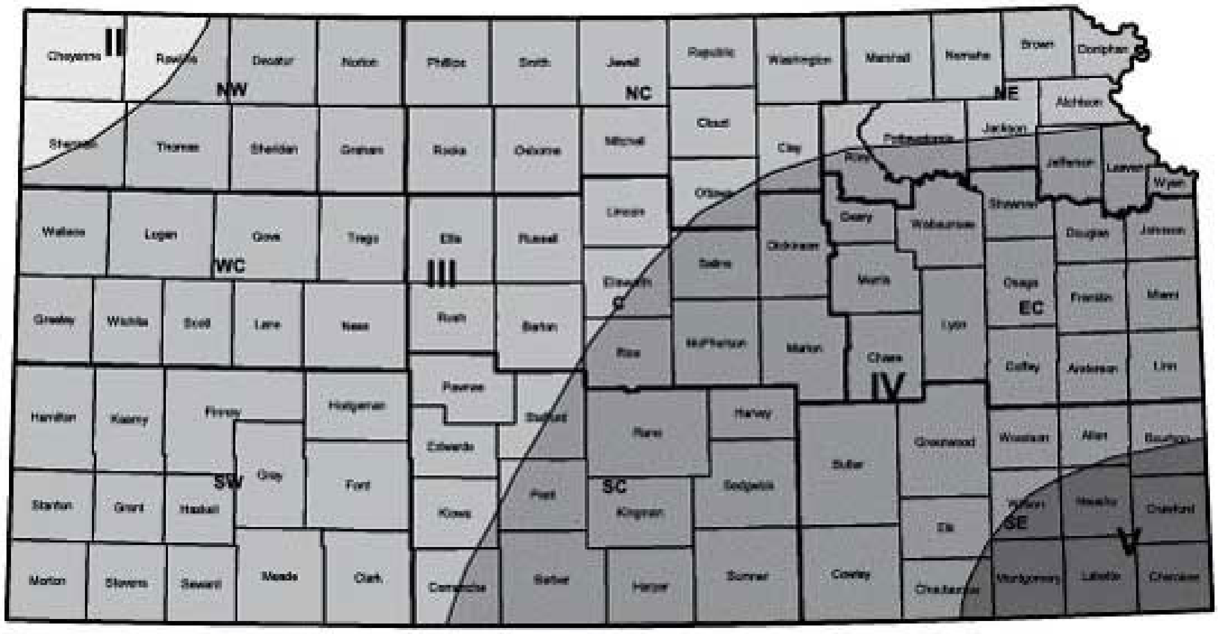


Figure 1. Recommended soybean planting dates (upper panel) and suggested maturity groups (bottom panel) across Kansas. Maps from K-State Research and Extension.

Recommendations

- Ultimately, weather patterns dictate soybean yields, especially under dryland conditions. There is no guarantee that any certain planting date will always work out the best when it comes to soybean yields in Kansas. In fact, the distribution and amount of rainfall and the day/night temperature variations around flowering and during the grain filling periods have large impacts on defining soybean yield potential. Thus, when the risk of drought stress during the growing season is high, diversifying planting dates may be a good approach to consider.

- When planting early (many farmers are trying to plant soybeans before corn), seed should be treated with a fungicide and insecticide. Selecting varieties with resistance to soybean cyst nematode and sudden death syndrome is advisable. Do not plant into soils that are too wet. Also, do not plant until soil temperatures are close to 60°F. If planted into soils cooler than 60°F, seedlings may eventually emerge but will have poor vigor.

- In drier areas of Kansas and on shallow soils, yields have been most consistent when planting soybeans in late May to early June. By planting during that window, soybeans will bloom and fill seed in August and early September, when nights are cooler and the worst of heat and drought stress is usually over.

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3. Risk of freeze injury to Kansas wheat for April 20-22, 2021

Cold air temperatures occurred on April 20-22 and have potential to cause freeze injury to the 2021 Kansas wheat crop. Factors that influence the potential for freeze injury to wheat primarily include:

- Growth stage of the crop
- Air temperatures
- Duration of cold temperatures
- Soil temperatures
- Snow cover

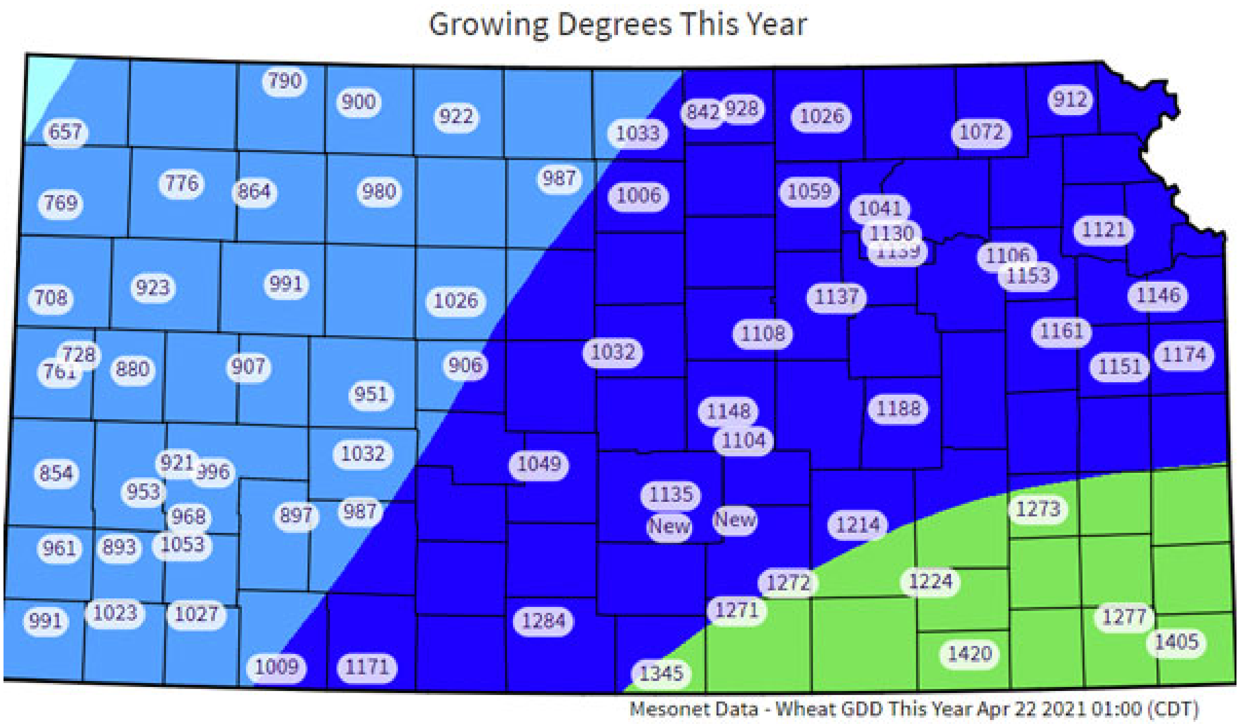
Other factors, such as position in the landscape and presence of residue covering the soil surface, might also impact the extent of freeze damage within a field. The challenge is to integrate all these factors into a reasonable estimate of freeze injury.

Wheat growth stage around Kansas

Based on simple wheat development models and observations from K-State Extension personnel, the wheat growth stage around Kansas ranges from upright tillers to the first node in the northwest part of the state, from the first node to flag leaf emergence in central and southwest Kansas, and from flag leaf emergence to boot in the southeast region (Figure 1).

For fields that have not jointed yet, the crop generally withstands temperatures of 15-20°F fairly well, especially if the growing point is still below ground, which might be the case for some late planted wheat fields in northwest Kansas. If the growing point is already above ground (first joint visible), wheat can sustain temperatures down to about 24°F for a few hours. Minimum temperatures below 24°F for extended periods of time increase the risk of crop injury. Information from the K-State Mesonet indicates that air temperatures dipped below this 24-degree F threshold for as many as 18 hours in the northwest part of the state, as many as 4 hours in the southwest, up to 5 hours in the northeast and did not reach these temperatures in central or the rest of eastern Kansas. This total of hours (4-18 h) below the 24-degree F threshold can cause damage to fields at the first node of development or more advanced stages.

More advanced fields, such as second node to flag leaf emergence, are more vulnerable to freeze injury, as temperatures near the 24-28 degrees F threshold can cause injury. There were anywhere from 1.5-10 hours below the 28-degree F mark in parts of southwest and central Kansas, which increases the risk of freeze damage to the crop.



Color	GDD °F	Estimated Wheat Growth Stage
	0 to 600	Seedling growth or tillering
	600 to 800	Tillering or strongly upright tillers
	800 to 1000	Strongly upright tillers or jointing (first node)
	1000 to 1200	Jointing (first node) or approaching flag leaf emergence
	1200 to 1400	Flag leaf emergence or boot

Figure 1. Estimated wheat growth stage as of April 22, 2021, for Kansas. Growth stage is estimated for each county based on temperatures accumulated in the season. Local growth stage may vary with planting date and variety. The KSU Wheat GDD Growth Stage model is available at: https://mesonet.k-state.edu/agriculture/wheat/gdd/

Snow cover and soil temperatures

While the snow cover (0.6-7.5 inches snow depth) helped buffer the cold temperatures on April 20; the snow quickly melted away and provided no buffer for the cold temperatures experienced on April 21 and 22.

While soil temperatures can help buffer freezing air temperatures if the growing point is below ground or near the soil surface, its buffering capacity decreases as the crop develops and the growing point moves away from the soil surface. Thus, we can expect a positive effect of the soil temperatures in north central and northwest Kansas where soil temperatures were sustained above 37°F during the entire week and the crop is around the first node stage of development. However, the more advanced crop in south central and southeast Kansas likely did not benefit as much from the soil temperature buffering capacity.

Integrated risk of freeze injury to Kansas wheat

Based on the factors above, we estimate that parts of southwest, central, and northwest Kansas are at the highest risk for freeze injury from the cold temperatures on April 20-22 (Figure 2). This area of high risk corresponds to: (i) areas with more hours below threshold for the predominant crop growth stage (northwest), and (ii) more advanced crop development with temperatures at or below the threshold for freeze damage for the corresponding stage (Figure 2). There was also some risk of freeze damage to more advanced crops in southeast Kansas. The risk of freeze injury decreases as we move to north central and northeast Kansas, because the crop is still behind in development and because the temperatures were not as cold. Across the entire state, the risk of freeze damage would be greater in the most advanced fields that are also more susceptible to freeze damage at higher temperatures.

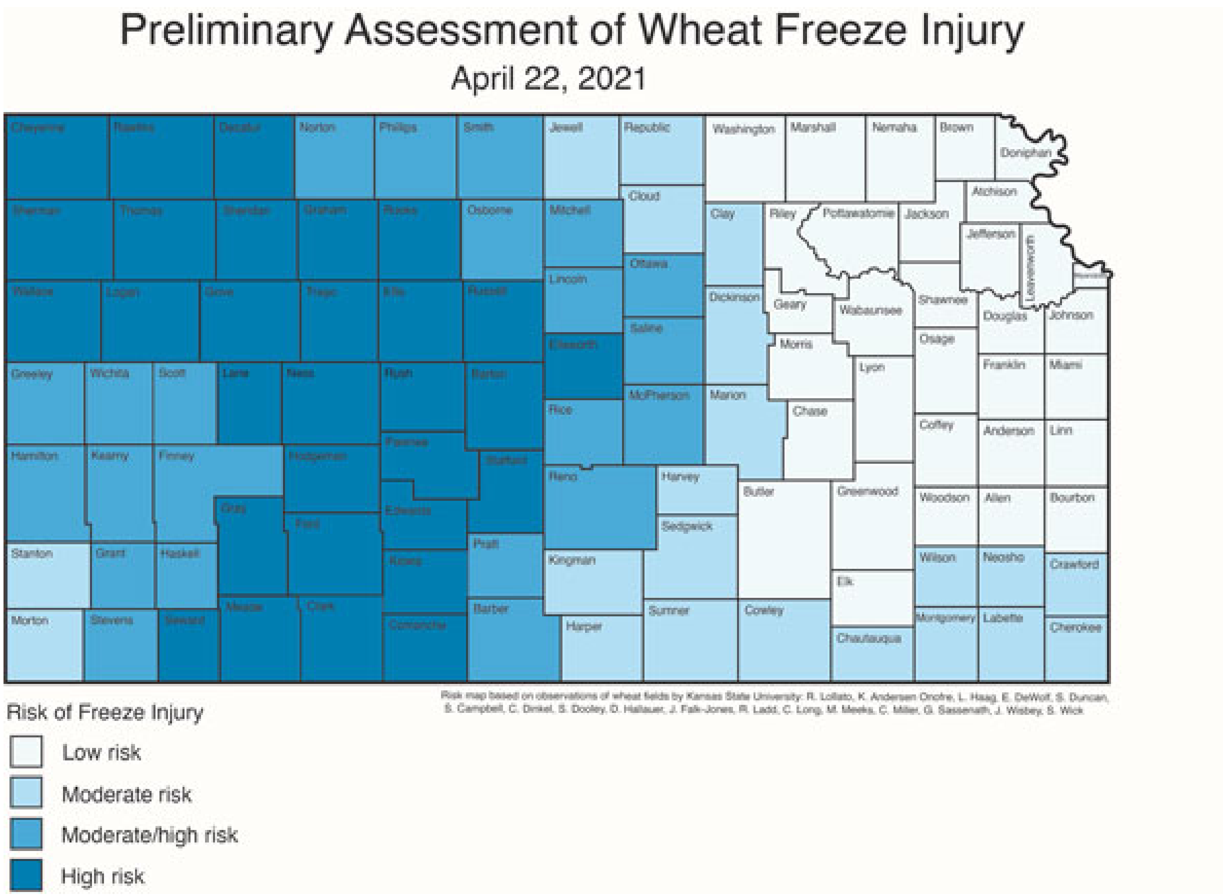


Figure 2. Estimated risk of freeze damage due to a combination of wheat growth stage sensitivity, lowest temperatures during April 20-22, 2021, number of hours below 24 and 28 degrees F during the same period, cumulative snowfall during the period, and soil temperatures at the 2-inch depth. Map created by Erick DeWolf, K-State Research and Extension.

Symptoms of freeze injury

A detailed companion article in this eUpdate issue discusses the symptoms of freeze injury and what producers should be looking for over the next several days. Be sure to check it out!

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4. Injury symptoms from freeze damage to wheat

The recent cold temperatures experienced this week (April 20-22, 2021) were enough to cause freeze damage to Kansas wheat. The actual freeze damage will be region-specific depending on crop growth stage and minimum temperatures (some regions had a worst combination of temperatures and crop growth stage). Additionally, the degree of injury within a region will be field-specific, owing to many individual aspects such as crop density, residue level, etc.

While there is nothing that can be done immediately, growers can prioritize fields where they sample for freeze damage symptoms depending on conditions that were more likely to result in freeze damage. This article provides information about these individual conditions that might help growers prioritize fields to be sampled; as well as specific injury symptoms.

Field conditions that can affect the potential for freeze damage

Density of the stand and condition of the plants. If the stand is thick, that will tend to reduce the extent of freeze damage as the warmth of the soil will radiate up into the canopy. On the other hand, well-fertilized, succulent wheat has often sustained more freeze injury than wheat that is not as well fertilized. Thin stands are at higher risk of injury because the air can penetrate the stand more easily. If the plants were wet before the freeze, this can result in a coat of ice on the plants that may protect the growing point to some extent. If temperatures get too low, however, the cold will go through the ice.

Residue. No-till fields can often sustain more freeze damage because the residue acts as a blanket and doesn't allow the heat from the soil to radiate up into the plant canopy.

Soil moisture. There is often less freeze injury at a given temperature when soils are wet than when dry. Wetter soils tend to radiate a little more warmth than dry soils. On the other hand, drought-stressed plants tend to be more hardened against cold injury and their lower leaf water content tends to decrease the severity of the freeze injury.

Wind speed. Windy conditions during the nighttime hours when temperatures reach their lows will reduce the amount of warmth radiating from the soil and increase the chance of injury.

Temperature gradients within the field (position on the landscape). Low spots in the field are almost always the first to have freeze injury. The coldest air tends to settle in the low areas, especially under calm (no wind) conditions.

Wheat variety. Although the sensitivity to freezing temperatures at a given growth stage is very similar across all varieties, varieties can differ in their release from winter dormancy by as much as three weeks. Because of differences in winter-dormancy release, late-release varieties may escape a freeze injury because they are delayed in their development.

Injury symptoms to look for in the coming days

There are many possible scenarios after a freeze. Producers should not take any immediate action following a freeze event. Several days of warm temperatures are needed to properly assess freeze damage to the wheat crop.

Jointing

Where wheat was at the jointing stage (north central and northwest Kansas), producers should watch their fields closely over the next 7 to 10 days for the following:

- The color of newly emerging leaves. If they are nice and green, that probably indicates the tiller is alive. If newly emerging leaves are yellow, that probably indicates the tiller is dead. The color of existing leaves is not terribly important, except for the flag leaf, which should not have emerged at this point in time yet. Existing leaves will almost always turn bluish-black after a hard freeze, and give off a silage odor. Those leaves are burned back and dead, but that in itself is not a problem as long as newly emerging leaves are green.
- The color of the developing head or growing point in wheat that has jointed. As long as heads are light green, crisp, and turgid, the head in that tiller is fine. If the head is whitish, flaccid, and mushy, it has died (Fig. 1).
- Ice in the stems. If there was ice in the stems below the first node the morning of the freeze, those tillers may be damaged (although not always) and may not produce grain. You may see split stems from ice accumulation.
- Stem integrity. If the wheat lodged immediately after the freeze, that indicates stem damage. Later tillers may eventually cover the damaged tillers. Even if there is no immediate lodging, look for lesions or crimps anywhere on the stems. If these symptoms are present, it usually means the wheat will lodge at some point during the season. If the stems look undamaged, that's a good sign.

Figure 1. Following an early freeze, wheat at jointing might still develop healthy heads (left

panel), but depending on minimum temperatures and duration of the freeze event, the developing head might be killed even if still within the stem (right panel). The dead head is whitish and flaccid while the healthy head is light green and turgid. Photos by Romulo Lollato, K-State Research and Extension.

The best thing producers can do for the first few days is simply walk the fields to observe lodging, crimped stems, and damaged leaves. Producers should not take any immediate actions as a result of the freeze, such as destroying the field for re-cropping. It will take several days of warm weather to accurately evaluate the extent of damage. After several days, producers should split open some stems and check the developing head.

Where stems and/or growing points were killed by the freeze, new tiller growth (coming from the crown area) will occur (Fig. 2). In many cases, new tiller growth can be observed even when the stems do not show any symptoms of freeze damage for some time. In those cases, the first sign that the tillers are dead is the sudden growth of new tillers at the base of the plant.

If secondary tillers may begin growing normally and fill out the stand, the wheat may look ragged because the main tillers are absent. Producers should scout for bird cherry oat aphids and other potential insect or disease problems on these late-developing tillers. Enough tillers may survive to produce good yields if spring growing conditions are favorable. If both the main and secondary tillers are injured, the field may eventually have large areas that have a yellowish cast and reduced yield potential.

Figure 2. Left: A stem that was split open by having ice form within the stem. This stem has died and a new tiller has begun to grow at the base. Right: Some of the tillers on this plant had freeze damage to the lower stems. These stems are dying, but the symptoms may not be immediately evident. The growth of new tillers from the base of the plant is a sure sign that the main tillers are dead or dying. Note the brown lesion on the stem with the two new tillers.

Photos by Jim Shroyer, professor emeritus, K-State Research and Extension.

Boot

Some crops in south central Kansas and southeast Kansas might have been at this stage when the freeze happened. At the boot stage, wheat can be injured if temperatures drop down into the mid to upper 20's for several hours. Injury is more likely if this occurs repeatedly and if it is windy at night. To detect injury, producers should wait several days then split open some stems and look at the developing head. If the head is green or light greenish in color and seems firm, it is most likely going to be fine. If the head is yellowish and mushy, that's a sign of freeze injury.

Freeze injury at the boot stage causes a number of symptoms when the heads are enclosed in the sheaths of the flag leaves. Freezing may trap the spikes inside the boots so that they cannot emerge normally. When this happens, the spikes will remain in the boots, split out the sides of the boots, or emerge base-first from the boots.

Sometimes heads emerge normally from the boots after freezing, but remain yellow or even white instead of their usual green color. When this happens, all or part of the heads have been killed. Frequently, only the male parts (anthers) of the flowers die because they are more sensitive to low temperatures than the female parts. Since wheat is self-pollinated, sterility caused by freeze injury results in poor kernel set and low grain yield.

It's possible for some of the spikelets to be alive and be a healthy dark green while other spikelets on the same head are damaged. If a spikelet flowers normally and the kernels on that spikelet develop normally, then the head is at least partially viable and will produce grain (unless it freezes again, of course).

Awns beginning to appear

If the awns have begun to appear, there can be significant injury to the heads if temperatures reach about 30 degrees or lower for several hours. The heads may fully exert from the boot, but few, if any, of the spikelets may pollinate normally and fill grain. Damaged heads from a freeze at this stage of growth may seem green and firm at first glance, but the floral parts will be yellowish and mushy.

Flowering

While the majority of the Kansas wheat fields are not at flowering when temperatures got below freezing on April 22, it is possible that a few fields in southeast Kansas may be in nearing this stage, particularly early-maturing varieties. Wheat is particularly vulnerable to damage from freezing weather as the head starts to emerge through the flowering stage. Temperatures of 30 degrees or lower can damage anthers.

If the wheat was in the flowering stage at the time of the freeze, you can determine if the anthers are damaged by examining them with a magnifying lens. Healthy anthers will first be lime green, then yellow (Figure 3-left). If they are damaged by a freeze, they will begin twisting within 2 to 3 days (Figure 3-center). Shortly afterward, they will begin to turn whitish or brown (Figure 3-right). The stigma in the florets may or may not also be damaged by a freeze. If the anthers are damaged by freeze, the flowers may fail to develop a kernel.

Fortunately, wheat doesn't flower all at the same time on the head. Flowering proceeds from florets near the center of wheat spikes to florets at the top and bottom of the spikes over a 3- to 5-day period. This small difference in flowering stage when freezing occurs can produce some odd-looking heads. The center or one or both ends of the spikes might be void of grain because those florets were at a sensitive stage when they were frozen. Grain might develop in other parts of the spikes, however, because flowering had not started or was already completed in those florets when the freeze occurred.

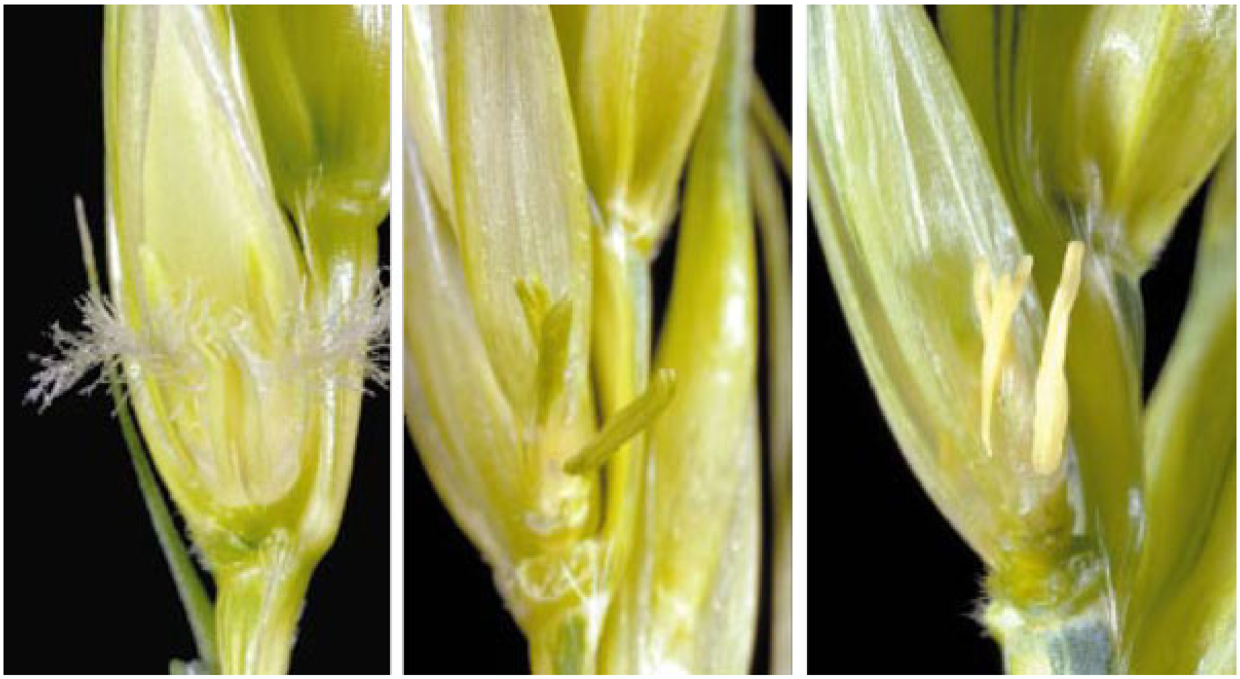

Figure 3. Left: Healthy wheat anthers are trilobed, light green and turgid before pollen is shed. Each wheat floret contains three anthers. Healthy stigmas are white and have a feathery appearance. Center: Anthers become twisted and shriveled, yet they are still their normal color within 24 to 48 hours after a freeze. A hand lens is necessary to detect these symptoms. Right: If damaged, anthers become white after 3 to 5 days and eventually turn whitish-brown. The anthers will not shed pollen or extrude from the florets. Photos from Spring Freeze Injury to Kansas Wheat, K-State Research and Extension publication C646.

If you are unsure whether there has been freeze damage to the anthers, wait several days and determine whether kernels are developing normally. A week after flowering, kernels should be well-formed up and down the head under normal conditions.

In addition to this, be watching for any freeze damage to lower stems. If the damage is severe enough, the plants will eventually lodge.

More information on freeze damage to wheat is available in *Spring Freeze Injury to Kansas Wheat*, K-State Research and Extension publication C646, available at: http://www.ksre.ksu.edu/bookstore/pubs/C646.pdf

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5. Spring freeze effects on weed management

Farmers have had to pause their preparation for spring planting due to the recent cold and snowy weather across much of Kansas. The recent drops in temperature have prompted concerns about the effectiveness of burndown herbicide applications made during cold weather. Will herbicide applications made in recent days be effective? Here are some factors that could influence the outcome on your farm.

Type of herbicide. Glyphosate and 2,4-D are two common components of burndown herbicide applications. They are both systemic, phloem mobile herbicides, meaning they have to move through the plant with the sugars made through photosynthesis. Data suggest that glyphosate translocation reaches its peak about 4 days after application. This means anything that slows down photosynthesis within 4 days of application is likely to reduce the effectiveness of the herbicide.

Other herbicides, like paraquat (Gramoxone, others) are contact herbicides, meaning they do not move through the plant. There is a theory that paraquat may be less effected by cold temperatures because it does not have to be translocated throughout the plant to be effective. However, the plant still needs to be actively growing for maximum herbicide effectiveness.

Weed characteristics. There is some variation in plant response to temperatures, but in general, weeds grow best with temperatures greater than 60°F. Even a cool-season plant like marestail grows better at 75°F than at 65°F (Figure 1). Low temperatures are only one factor that can influence herbicide interactions with weeds. Other stressors, such as drought can also reduce herbicide absorption and/or translocation. Plant characteristics such as growth habit, leaf hairs, or natural herbicide tolerance can also interact with cold weather to further reduce herbicide effectiveness.

Figure 1. This marestail will be even more difficult to control if herbicides are applied during cold weather. Photo by Dallas Peterson, K-State Research and Extension.

The general recommendation for this situation is to wait for warmer weather to make herbicide applications, but that is not always possible. If you cannot wait, consider increasing herbicide rates to the maximum allowed by the label and utilize adjuvants that might be optional under normal temperature conditions.

Cold weather also increases the risk of crop injury (Figure 2). If you applied pre-emergence herbicides to corn, be aware that corn stressed by cold soil will not metabolize herbicides well. Applications of Group 15 herbicides such as S-metolachlor (Dual, others), Group 27 herbicides like mesotrione (Callisto and others), and other types of herbicides may result in crop injury during extended periods with cold, wet soil conditions.

Figure 2. Corn 'buggy whipping' caused by a Group 15 herbicide (left) and bleaching caused by a Group 27 herbicide (right). Photo by Sarah Lancaster, K-State Research and Extension.

References:

Feng et al. 2004; Nandula et al. 2015

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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.

6. Imazamox-resistant shattercane populations identified from sorghum fields in northwest Kansas

Shattercane is a summer annual grass weed species commonly present in grain sorghum producing regions, including Kansas. Shattercane is closely related to grain sorghum and can exchange genes through crossing and hybridization. If left uncontrolled, season-long infestation of shattercane can cause >95% yield reductions in grain sorghum.

Sorghum hybrids (igrowth® and Inzen™) with tolerance to ALS inhibitors such as imazamox (IMIFLEX™ herbicide) and nicosulfuron (Zest™ WDG herbicide) have recently been developed. Both Inzen™ and igrowth® sorghum will allow producers to use POST applications of ALS inhibitors (Zest™ WDG on Inzen™ and IMIFLEX™ on igrowth® sorghum) for grass weed control. **However, it is important to note that shattercane is NOT included on either the IMIFLEX™ or Zest™ labels.** For the 2021 growing season, igrowth® sorghum will be available for commercial production, while Inzen™ sorghum will be available with a limited seed supply. Double Team™ sorghum with tolerance to quizalofop-p-ethyl (FirstAct™ herbicide) will also be available for selected fields for the 2021 growing season.

A field survey sponsored by the United Sorghum Checkoff was initiated in fall of 2020 for seed collection of shattercane and Johnsongrass populations to better understand their sensitivity to IMIFLEX™, Zest™, and FirstAct™ herbicides. In a preliminary greenhouse study, three different shattercane populations collected from three different counties (Decatur, Graham, and Phillips) in northwest Kansas survived the field-use rate (6 fl oz/a) of POST applied IMIFLEX™ herbicide, indicating a suspected resistance to imazamox.

Greenhouse study on imazamox-resistant shattercane

Dose-response experiments were conducted at the K-State Agricultural Research Center in Hays, KS to confirm the levels of resistance to IMIFLEX™ in the same three shattercane populations identified in the preliminary study mentioned above. Additionally, seeds of a previously known susceptible shattercane population that were originally collected from a sorghum field in Rooks County, KS were used. The IMIFLEX™ herbicide doses of 0, 1.5, 3, 6, 9, 12, 18, and 24 fl oz/a were tested on 3 to 4-leaf stage of shattercane seedlings. Results indicated that the all three suspected populations had a 3.5- to 5.3-fold resistance to IMIFLEX™ herbicide as compared to the susceptible population (Figure 1).

Response of imazamox-resistant shattercane to alternative herbicides

A separate greenhouse study also evaluated all four shattercane populations with alternative herbicides such as Zest™ (nicosulfuron) at 0.9 oz/a, Aggressor™ (quizalofop-p-ethyl) at 8 fl oz/a, Select Max® (clethodim) at 10 fl oz/a, and Roundup PowerMax® (glyphosate) at 32 fl oz/a. All four herbicides provided an excellent control (95 to 100% control at 3 weeks after treatment) of all four shattercane populations.

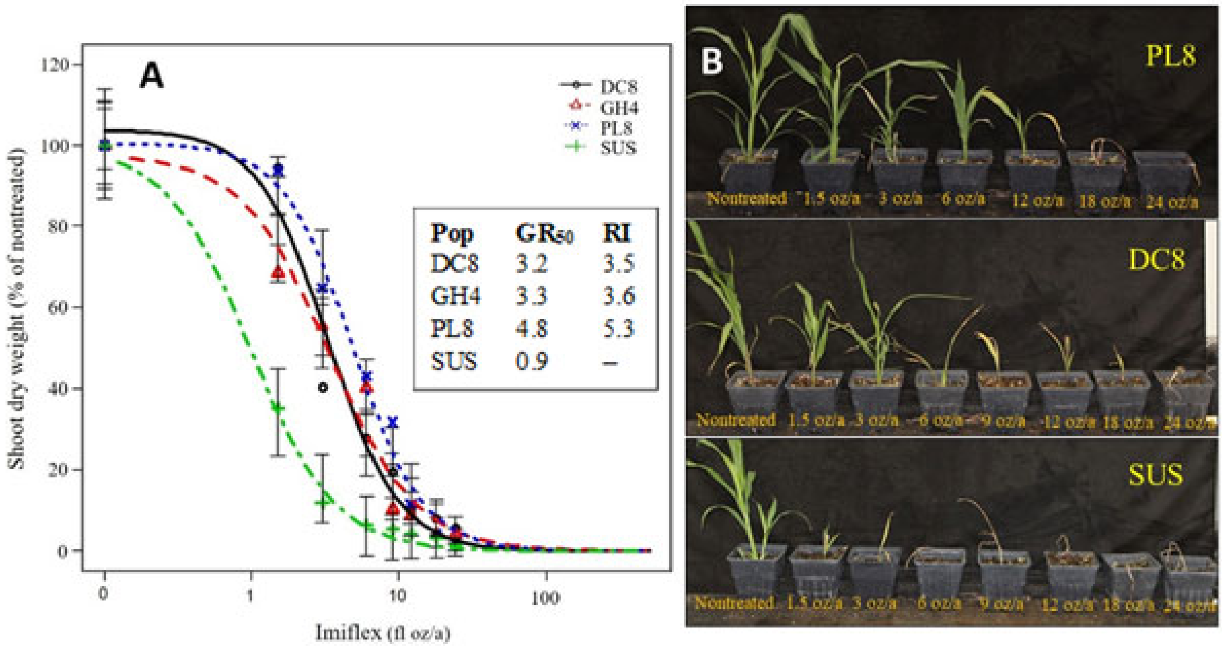

Figure 1. Shoot dry weight (A) and visual injury (B) response of four shattercane populations (DC8, GH4, PL8, and SUS) in a dose-response study with IMIFLEX™ **herbicide at 3 weeks after treatment**. **Photos by Vipan Kumar, K-State Research and Extension**

*GR_{50} value is the effective dose (fl oz/a) of IMIFLEX™ herbicide needed for 50% reduction in shoot dry weights of each shattercane population. RI (Resistance Index) is the ratio of GR_{50} value of each resistant population to that of GR_{50} value of susceptible population.

Summary

Although only three shattercane populations have thus far been confirmed and characterized, it is concerning that all three populations showed low-to-moderate resistance to imazamox in Kansas. Herbicide screening of additional shattercane and Johnsongrass populations collected from a 2020 sorghum field survey in western Kansas is still underway. These results will be shared with producers as they become available.

Evolution of imazamox-resistant shattercane would be a serious concern, especially for a newly developed igrowth® sorghum. Sorghum producers are advised to adopt proper IMIFLEX™ use stewardship guidelines if they are planning to plant igrowth® sorghum this summer and are encouraged to utilize alternative herbicides in conjunction with other cultural and mechanical practices to prevent the evolution of imazamox-resistant shattercane on their production fields. In addition, check herbicide labels for specific grasses listed for control.

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7. World of Weeds: Bush honeysuckle

Two species share the common name bush honeysuckle, *Lonicera tatarica*, also known as Tatarian honeysuckle and *Lonicera maackii*, also known as Amur honeysuckle. They are similar species that have become troublesome in forest understories throughout the Midwest. In fact, they are listed on the KDA Invasive Weed Watch List.

Ecology of bush honeysuckles

Bush honeysuckles were introduced from eastern Asia as ornamental plants during 1700s and 1800s. They have also been planted for wildlife use. Bush honeysuckles are deciduous perennial shrubs that can be found in northern and eastern Kansas, as well as much of the United States. Tatarian honeysuckle is more common in northwest Kansas, while Amur honeysuckle is more common in eastern Kansas. Bush honeysuckles leaf out earlier than most plants, giving them a competitive advantage. In addition, bush honeysuckles are known to be suppress the growth of other plants. Birds and whitetail deer eat the berries and help spread bush honeysuckles.

Identification

Seedlings emerge throughout the summer. Both Amur and Tatarian honeysuckle have opposite, egg-shaped, hairy leaves (Figure 1). Stems of new growth of Amur honeysuckle is pubescent but new Tatarian honeysuckle stems have no hairs. Mature stems of both species have light brown to gray bark that splits or peels. Stems of Amur honeysuckle grow up to 30 feet tall, while Tatarian honeysuckle grows to about 13 feet tall (Figure 2).

Figure 1. Tatarian honeysuckle seedling. Image by Ohio State Weed Lab from bugwood.org.

Figure 2. Amur honeysuckle bush. Photo by Sarah Lancaster, K-State Research and Extension.

Leaves of both species are oppositely arranged and egg-shaped to oblong with entire margins and very few hairs. Amur honeysuckle leaves are about 1 to 4 inches long, while Tatarian honeysuckle leaves reach up to about 2 1/2 inches long (Tatarian).

Both species produce pairs of flowers, about ¾-inch long, in April through June. Amur honeysuckle flowers are white to yellow and Tatarian honeysuckle flowers are pink to white. Red berries, about ¼-inch in diameter, form in late summer and persist through winter. (Figure 3).

Figure 3. Amur honeysuckle flowers (left) and berries (right). Photos by Sarah Lancaster and Walt Fick, K-State Research and Extension.

Management

Foliar applications of triclopyr (Remedy Ultra, others) or glyphosate applied in early spring or fall can control bush honeysuckles; however, these herbicides will damage other sensitive plants that are sprayed.

Cutting or mowing bush honeysuckles will not be effective, unless regrowth is prevented with a cut stump herbicide application. Glyphosate is effective for that type of application. Prescribed burning in the spring may control seedlings of bush honeysuckles, but established plants will readily re-sprout.

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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8. Virtual crop scouting school now available

The 2021 Virtual Crop Scout School is now available and is free to the general public. The scout school consists of 22 webinars from crop protection specialists at eleven Midwest Universities and is offered through the Crop Protection Network (CPN).

Crop scouts, farmers, and other users can pick and choose from a variety of diverse subjects to help them become more knowledgeable on crop scouting. Topics are split into digestible bits so crop scouts can interact with subject matter in a way that best suits their time and interest.

Two K-State specialists contributed webinars related to their respective specialty. These webinars are listed below with a short summary about their topic.

Sarah Lancaster, Weed Science Extension Specialist: Grass seedlings appear similar to one another while standing up, but get closer to them and you'll be able to see that there are many different species common in crop and forage fields. In this webinar, she explains how to differentiate between common grasses utilizing characteristics such as habitat and growth habit, as well as plant parts such as auricles, collars and ligules. Grass flowers can also be used to identify weed species.

Rodrigo Onofre, Plant Pathology Postdoctoral Fellow: Identifying corn diseases in the field can be difficult and some diseases require sending samples to a lab for confirmation. In this webinar, he will share the information crop scouts should gather before heading to the field, as well as resources that help scouts gather information before arriving at the field. He will also explain common signs and symptoms of diseases, where they show up on a plant and what conditions favor disease development. Many disorders and diseases are easily confused for one another.

Crop scouting in an important part of integrated pest management (IPM) that can help farmers obtain higher yields and increased profit per acre. Scouting gives farmers and agronomists a "heads-up" about what is happening in the field, allowing preemptive action and appropriate management decisions to be applied. The field scout gathers information on the crop condition of a field, which can help in discerning which of the various management tools to use (Figure 1).

Figure 1. Scouting crop fields on a regular basis can help to determine emerging crop problems and helps to inform management decisions. Image by Brandon Kleinke.

Interested individuals can access the crop scout school at: https://cropprotectionnetwork.org/virtual-crop-scout-school

Additional resources and CEU credits

Earlier this year, the CPN released a free web book on crop scouting – Crop Scouting Basics for Corn and Soybean. This resource is available for online and is a valuable complement to the 2021 Virtual Crop Scout School.

After reading CPN publications and watching virtual webinars, like the web book and Virtual Crop Scouting School, Certified Crop Advisors can complete the corresponding quizzes to earn continuing education credits (CEUs). More information on this process is found at: https://ceu.cropprotectionnetwork.org/

CPN has partnered with Universities all over the Midwest to make these webinars a reality. This work is/was supported by the USDA National Institute of Food and Agriculture, Crop Protection and Pest Management Program through the North Central IPM Center (2018-70006-28883).

CPN is a multi-state and international partnership of university and provincial Extension specialists, and public and private professionals that provides unbiased, research-based information. CPN's goal is to communicate relevant information to farmers and agricultural personnel to help with decisions related to protecting field crops

For more information, please contact cropprotectionnetwork@gmail.com

9. Seed production management for smooth bromegrass and tall fescue

K-State Research and Extension just released an updated version of the publication MF924 - *Seed Production Management for Smooth Bromegrass and Tall Fescue.* This resource describes management practices to produce high yields of seeds from smooth bromegrass and tall fescue pastures.

Seed production from tall fescue and smooth bromegrass are alternative crops for most producers in Kansas because the stands are primarily used for grazing and hay. This dual use maximizes the total crop, even though seed yields are low. Highest seed yields are produced from cultivated rows, but a solid stand is important for forage and erosion control. These cool-season grasses are most productive when grown on deep, fertile soils with high water-holding capacity.

Two management practices are especially important in producing high seed yields:

- Clipping and removing the forage soon after the seed stalks are mature.
- Applying nitrogen during late fall or early winter.

Other management practices are discussed, including:

- Grazing
- Maintenance
- Weeds and Pests
- Seed Handling
- Marketing

This publication is available to view and download for free at:
https://bookstore.ksre.ksu.edu/pubs/MF924.pdf

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