



## Extension Agronomy

# eUpdate

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*04/17/2020*

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

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<b>1. Another round of cold weather brings a risk of freeze injury to Kansas wheat.....</b>	<b>3</b>
<b>2. Time to start scouting wheat for stripe and leaf rust .....</b>	<b>7</b>
<b>3. Cold soils can lead to chilling injury for newly planted corn.....</b>	<b>10</b>
<b>4. Nitrogen loss potential during the winter and early spring.....</b>	<b>15</b>
<b>5. Key nutrients for soybean production in Kansas.....</b>	<b>17</b>
<b>6. Herbicide applications and cold temperatures.....</b>	<b>20</b>
<b>7. Spring freeze effects on winter canola .....</b>	<b>22</b>
<b>8. Insect update on alfalfa weevils and pea aphids - April 17, 2020.....</b>	<b>30</b>
<b>9. K-State's Soil Testing Lab and Plant Disease Diagnostic Lab are OPEN!.....</b>	<b>33</b>

## 1. Another round of cold weather brings a risk of freeze injury to Kansas wheat

The week of April 13-17 saw another round of cold temperatures that have potential to cause freeze injury to the 2020 wheat crop. Factors that influence the potential for freeze injury to wheat at any point in time include primarily:

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

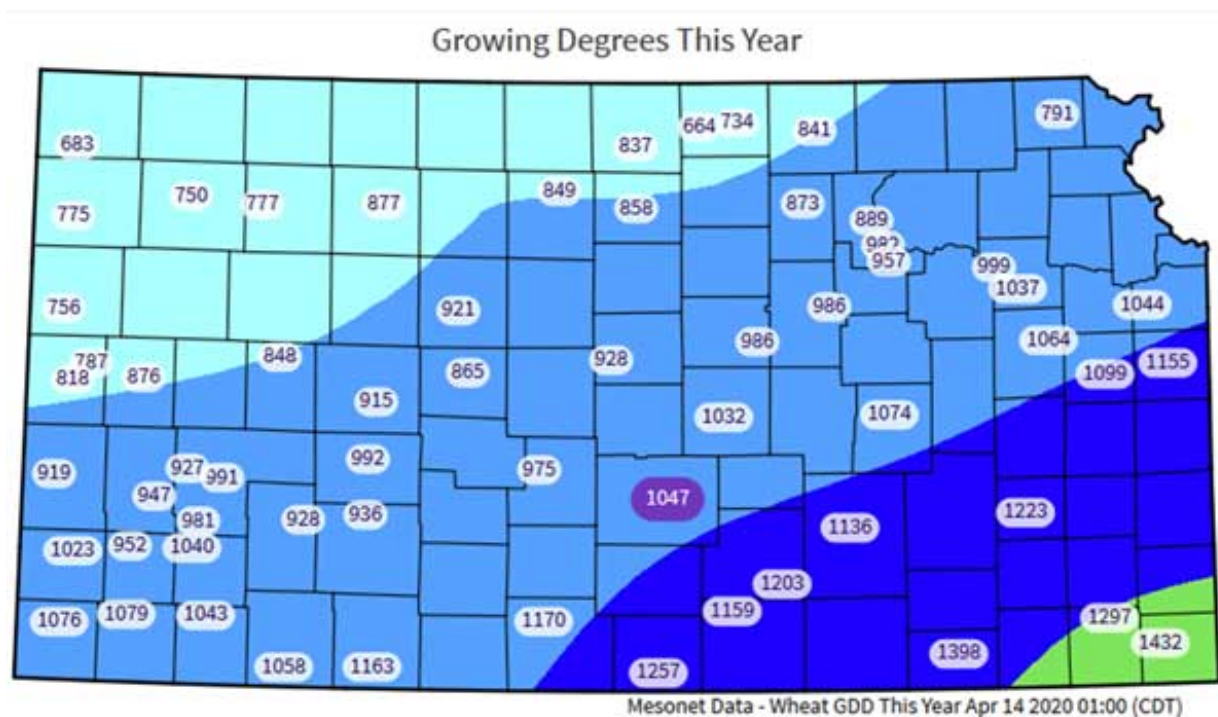
Other factors, such as position in the landscape and presence of residue covering the soil surface, might also impact the extent of freeze damage within a field. The challenge is to integrate all these factors into a reasonable estimate of freeze injury.

### **Overview of wheat growth stage and recent low temperatures across Kansas**

Based on simple wheat development models and observations from K-State Extension personnel, the wheat growth stage around Kansas ranges from tillering to Feekes 5 in the northwest part of the state, to flag leaf emergence or boot in the southeast region (Figure 1). Most of the crop in south central Kansas is at the first or second node, and the crop is less developed as we move to northwest.

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. This is the condition for most of northwest and northern 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°F threshold for at least a few hours in most areas of the state, with the exception of south central and southeast Kansas. Many areas of the state experienced more than five hours with air temperatures below 24°F, which could 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 (such as many fields in southeast Kansas), are a little more vulnerable to freeze injury, as temperatures near the 25°F threshold can cause injury. These temperatures were also measured in south central Kansas.



Color	GDD °F	Estimated Wheat Growth Stage
	< 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

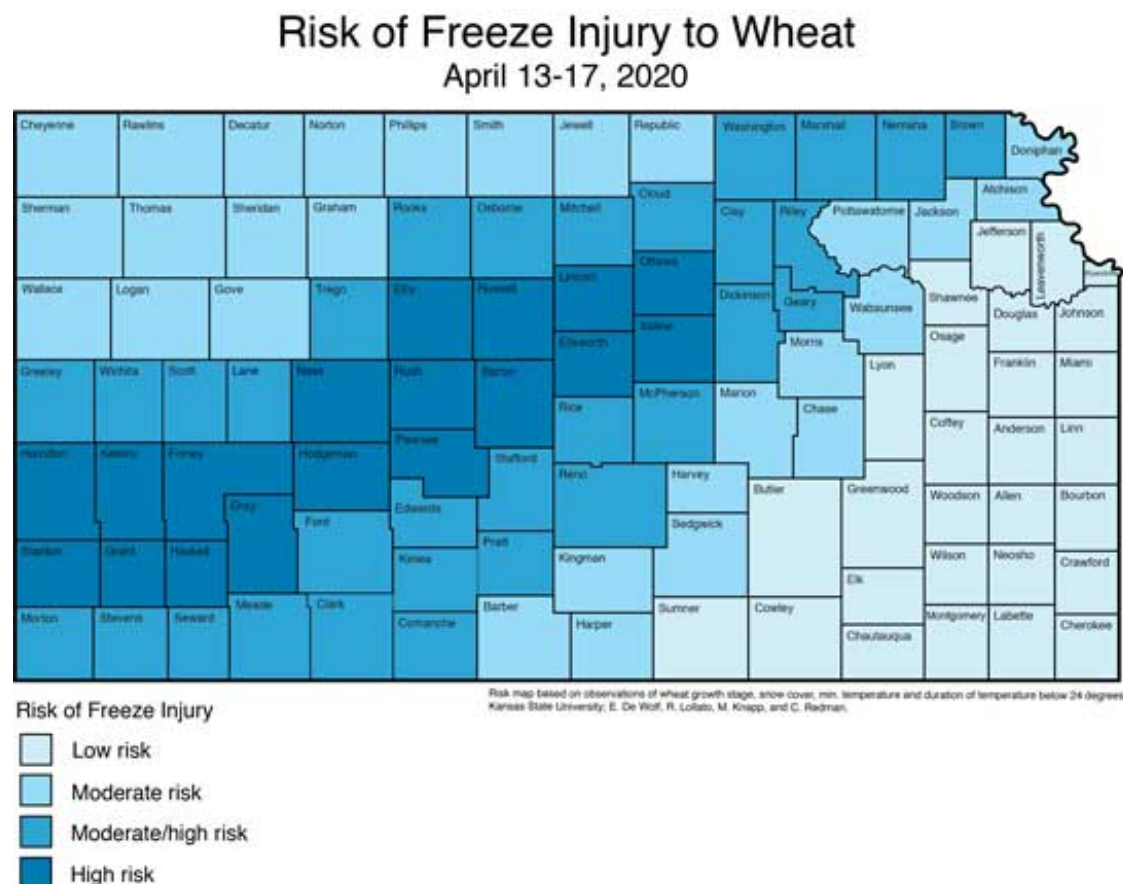
**Figure 1. Estimated wheat growth stage as of April 13, 2020, for the state of Kansas. Growth stage is estimated for each county based on temperatures accumulated in the season. Local growth stage may vary with planting date and variety.**

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, expect a positive effect of the soil temperatures in north central and northwest Kansas where soil temperatures were sustained above 38°F during the entire week and the crop is still at tillering through Feekes 5 stages of development. Soil temperatures can be viewed via the Kansas Mesonet here: [mesonet.ksu.edu/agriculture/soiltemp](http://mesonet.ksu.edu/agriculture/soiltemp). However, the more advanced crop in south central and southeast Kansas likely did not benefit as much from the soil temperature buffering capacity. There was also minimal snow cover across the state to help buffer the cold air temperatures.

### Predicting the level of risk for freeze injury in Kansas

Based on these factors, we estimate that a diagonal swath, encompassing parts of south central and southwest Kansas and extending into the central corridor of the state, is at the highest risk for freeze injury from the cold temperatures on April 13-17 (Figure 2). This area of high risk corresponds to areas with more advanced crop development and temperatures below the threshold for freeze

damage. (Figure 2). The risk of freeze injury decreases as we move to northwest Kansas, because the crop is still behind in development; and to southeast, because the temperatures were not as cold as in central Kansas. In these regions, there is still some risk of freeze damage but this would be mainly restricted to the most advanced fields (shown as moderate risk on the risk map); for example, fields that are jointed in northwest Kansas or fields that are past the boot stage in southeast Kansas.



**Figure 2. Estimated risk of freeze damage due to a combination of wheat growth stage sensitivity, lowest temperatures during April 13-17, 2020, number of hours below 24°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 on foliage should occur over the next few days across the entire state. In most cases, however, leaf burn injury by itself should not result in any long-term damage to the crop, especially if there is available moisture to help the crop recover the lost foliage. Freeze injury symptoms to the developing wheat head, such as a mushy discolored/brown head, take slightly longer to be visible (10-14 days). Thus, growers with fields at advanced growth stages should check for potential injury to the developing head within this timeframe.

For detailed information on evaluating wheat for freeze damage, see the eUpdate article from Issue 793 on April 3, 2020, [“Potential for spring freeze injury to wheat on April 3, 2020”](#).

Romulo Lollato, Wheat and Forages Specialist

[lolato@ksu.edu](mailto:lolato@ksu.edu)

Erick DeWolf, Wheat Pathologist

[dewolf1@ksu.edu](mailto:dewolf1@ksu.edu)

Chip Redmond, Kansas Mesonet Manager

[christopherredmond@ksu.edu](mailto:christopherredmond@ksu.edu)

Mary Knapp, Weather Data Library

[mknapp@ksu.edu](mailto:mknapp@ksu.edu)

Kansas State University Department of Agronomy

2004 Throckmorton Plant Sciences Center | Manhattan, KS 66506

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## 2. Time to start scouting wheat for stripe and leaf rust

There were a few more reports of stripe rust from Oklahoma this week and a twitter report of the disease in southeast Kansas bordering Missouri. Several colleagues made visits to research sites in south central Texas and reported severe leaf rust on varieties known to be susceptible to that disease. To date, extension agents, crop consultants and growers all indicate that rust is not widely active in Kansas.



**Figure 1. Adult wheat leaves with symptoms of stripe rust. Notice the characteristic rectangular shaped lesions containing yellowish-orange reproductive structures of the fungus. Photo by Erick DeWolf, K-State Research and Extension.**

With the wheat crop in south central and southeast Kansas approaching or already at the flag leaf emergence stages of growth, growers are encouraged to be on the lookout for diseases. When people think of stripe rust, they often visualize the characteristic bright yellowish-orange lesions on adult plants (Figure 1). Symptoms of stripe rust on younger leaves are often less rectangular because the fungal growth within the plant is not limited by the veins of younger leaves (Figure 2).



**Figure 2. Symptoms of stripe rust on wheat plants that are still at the tillering or jointing stages of growth. Note that the yellowish-orange reproduction of the fungus is more clustered and less rectangular than symptoms on adult leaves. Photos by Erick DeWolf, K-State Research and Extension.**

### Scouting tips

When scouting wheat, it is important to look down within middle layers of the crop canopy for symptoms of disease. Wheat puts out new leaves rapidly during the vegetative growth prior to heading. In some cases, plants may add a new leaf every 7-10 days. These new leaves at the top of the canopy are less likely to express disease symptoms simply because it takes time (10-14 days) for the disease to develop. Focus on leaves that were present over the last 2 weeks. These leaves have a higher probability of infection than the new leaves at the top of the canopy.

More in-field observations will be happening over the next week. Stay tuned for additional detailed reports on the wheat disease status soon.

Erick DeWolf, Plant Pathologist

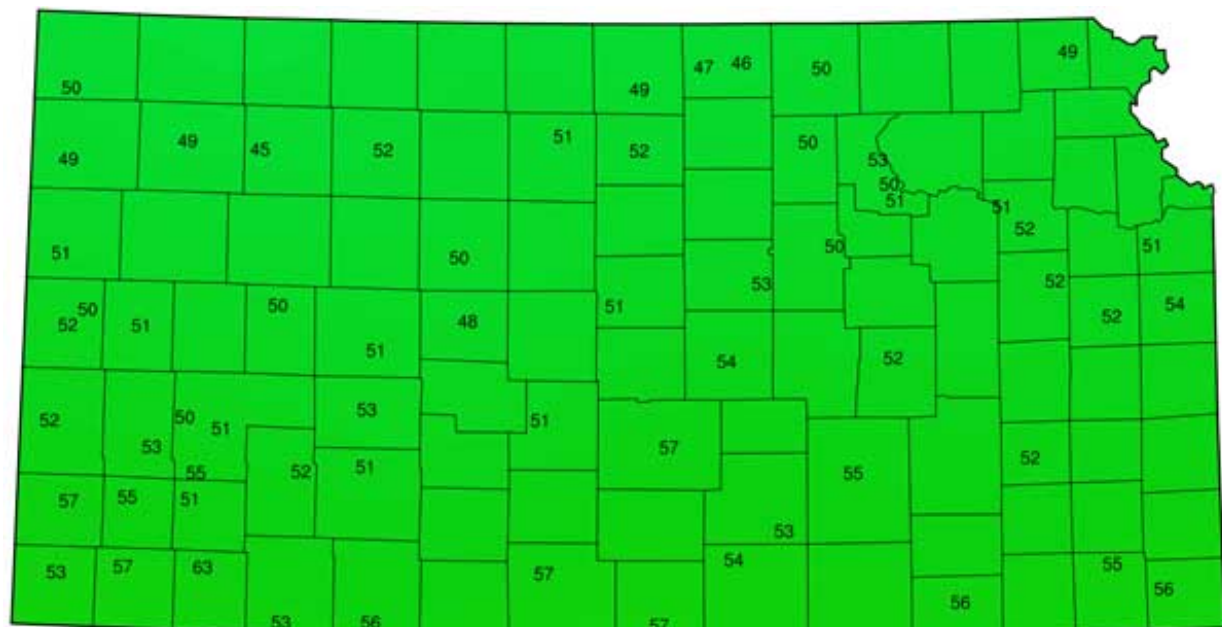
[dewolf1@ksu.edu](mailto:dewolf1@ksu.edu)

### 3. Cold soils can lead to chilling injury for newly planted corn

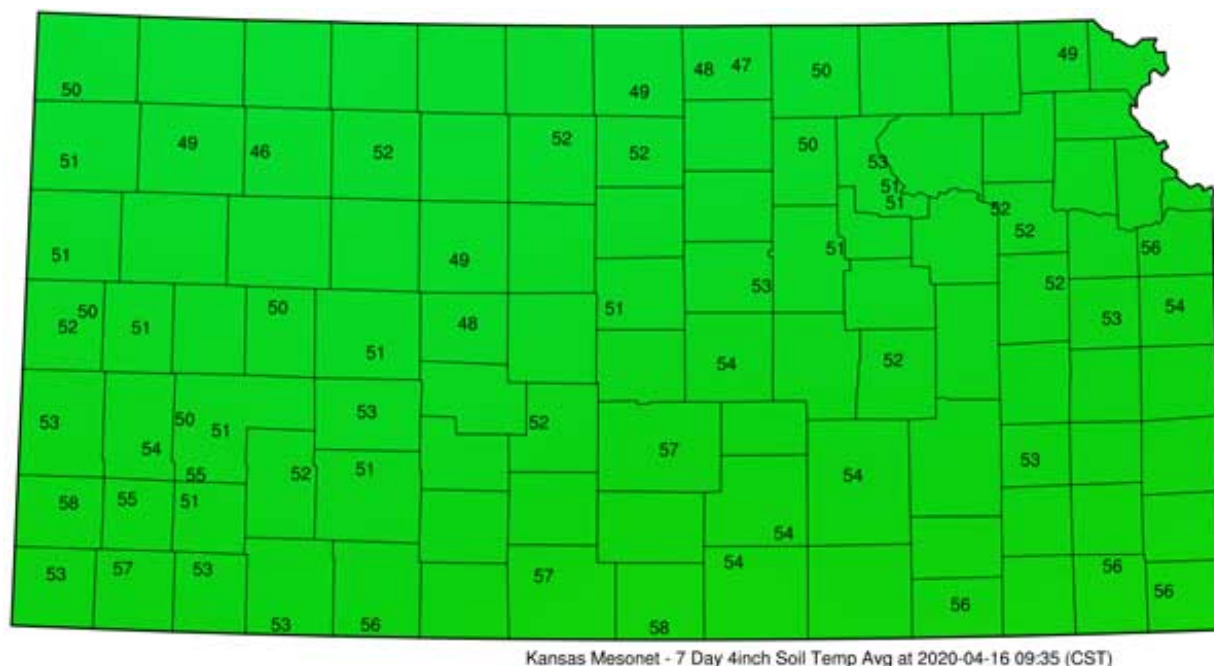
Corn planting has begun in some parts of Kansas. Statewide, only 6% of the crop is in the ground, but by district, the Southeast is leading at 21%. A recent drop in air temperatures, and subsequent soil temperatures, has put some risk of chilling injury to newly planted corn. This article gives an update on soil temperatures across the state and discusses factors that influence chilling injury to corn.

## Soil Temperature Update

For this week (April 10-16), the average soil temperature at 2 inches ranged from 45°F in northwest Kansas to 63°F in the southwest. Temperatures at the 4-inch depth are not much different. Weekly average soil temperatures at the 4-inch depth ranged from 46°F in the northwest to 58°F in south central Kansas (Figure 1).

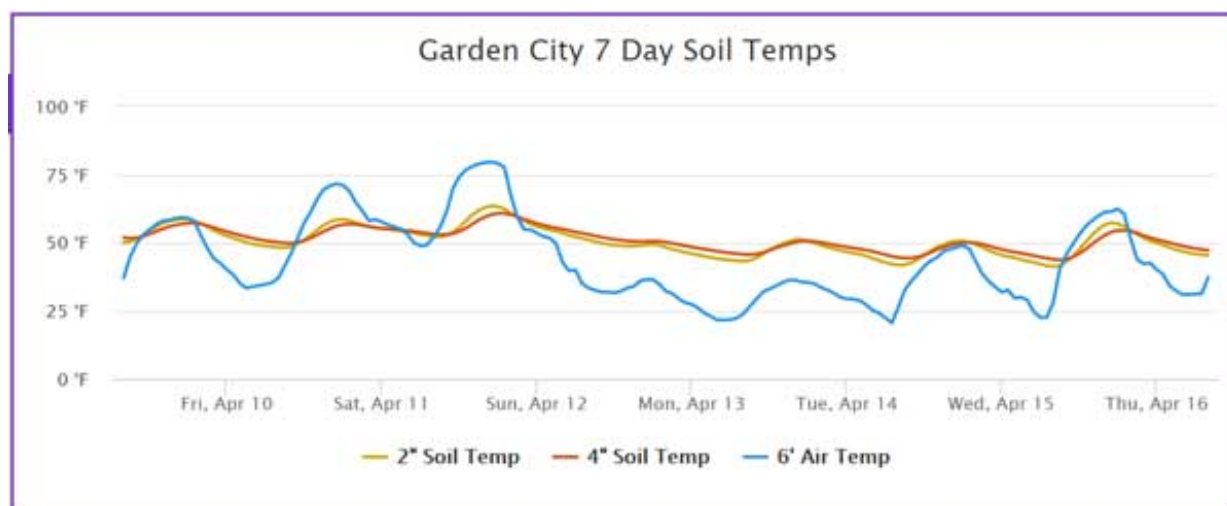


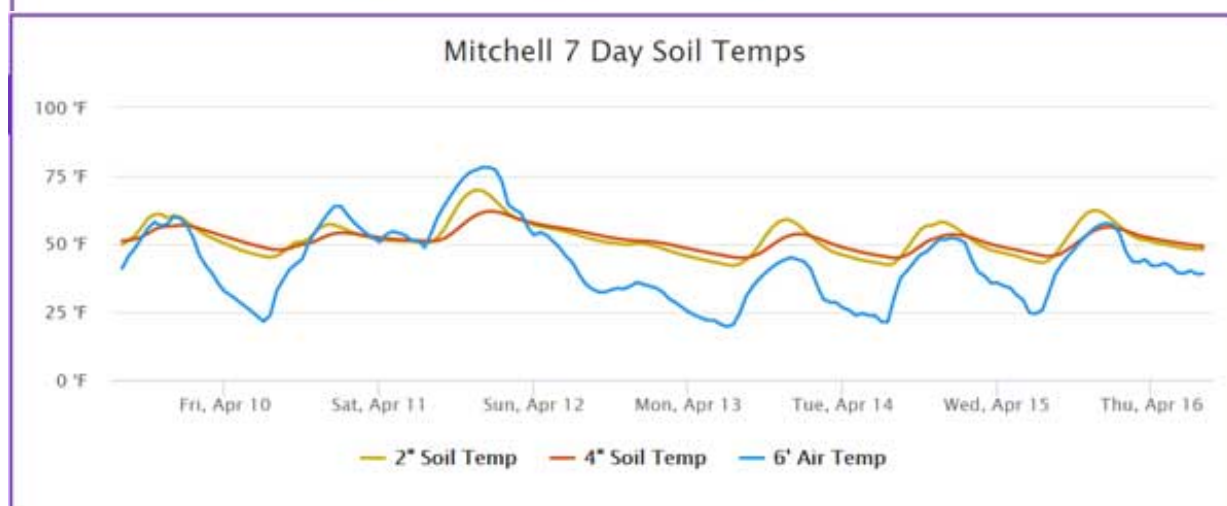
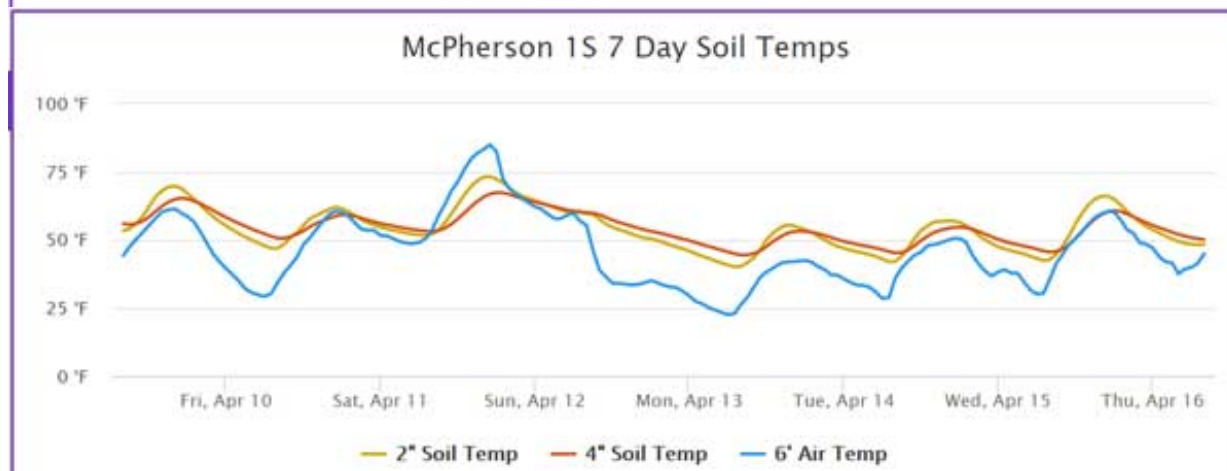
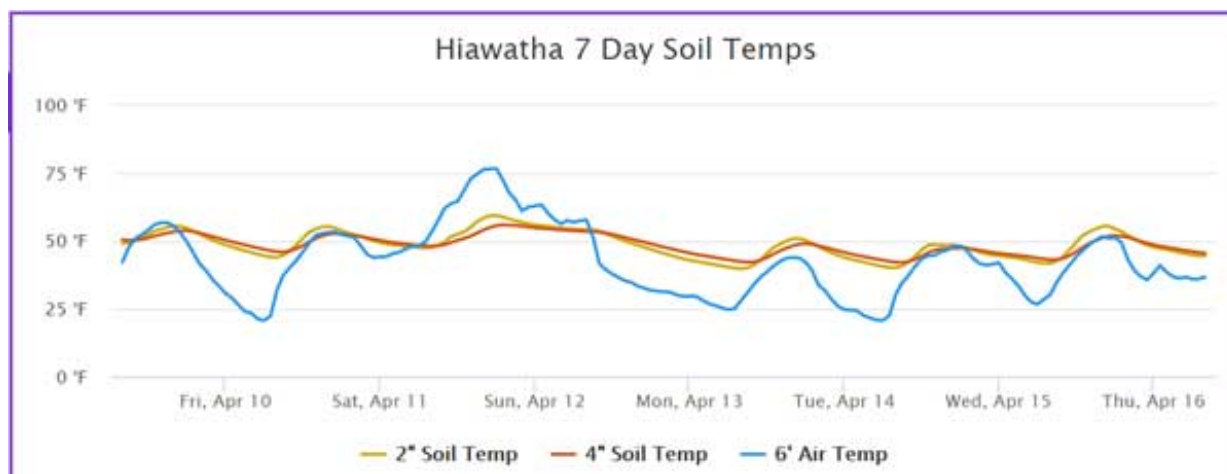
Kansas Mesonet - 7 Day 2inch Soil Temp Avg at 2020-04-16 09:35 (CST)

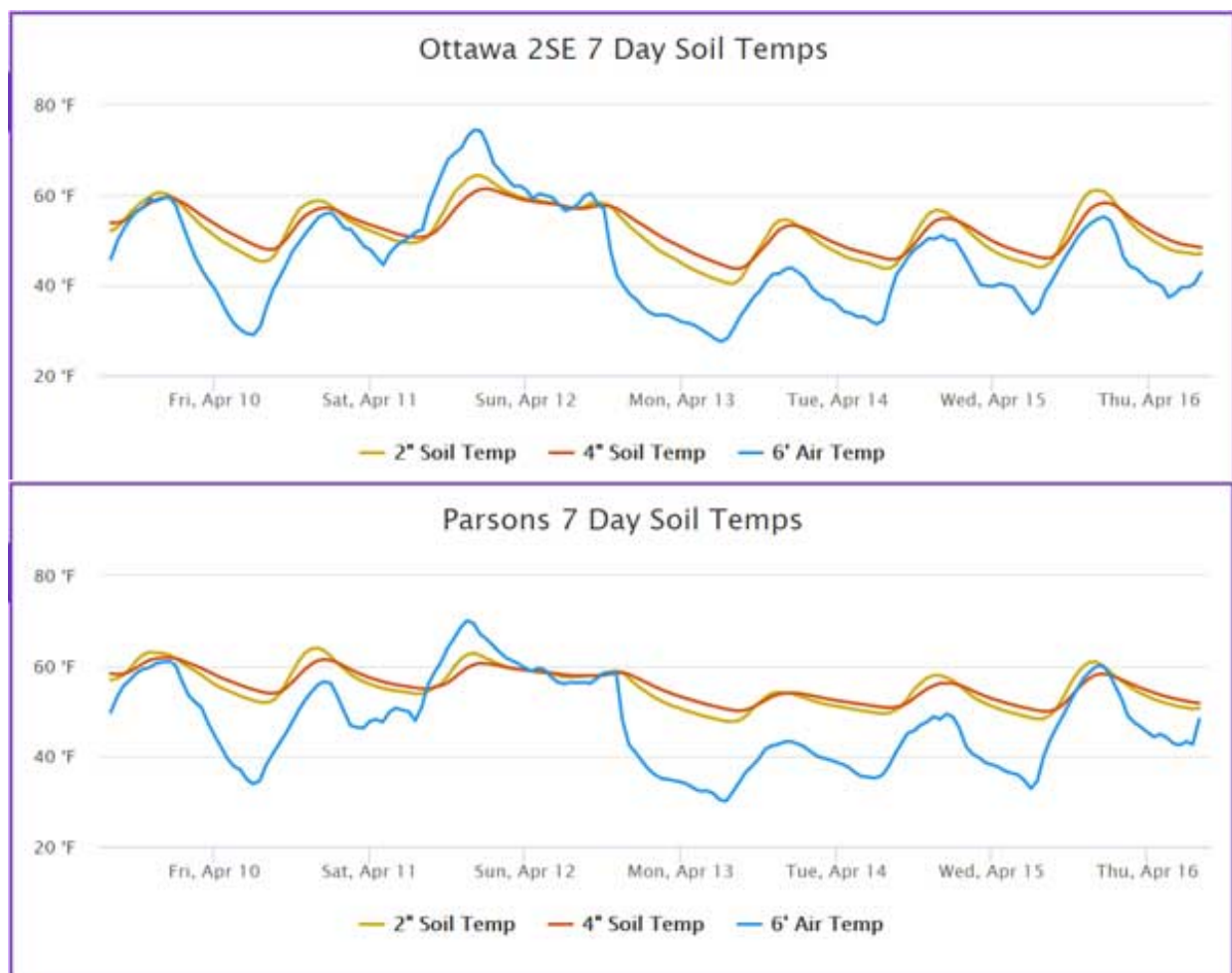


**Figure 1. Average soil temperatures at 2-inch (upper panel) and 4-inch (lower panel) soil depth for the week of April 10 – 16, 2020.**

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. There has been a fairly steady pattern across the state, with the steepest change visible in northcentral Kansas at the Mitchell station. Soil temperatures were above 70°F by Saturday, April 11, in several locations, before dropping to at or less than 45°F on Thursday, April 16 (Figure 2).







**Figure 2. 7-day soil temperatures (2- and 4-inch soil depth) for Hiawatha, Ottawa, Parsons, Mitchell, McPherson, and Garden City. 2-inch depth represented by yellow line; 4-inch depth represented by orange line; air temperature by blue 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 since 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!

Ignacio Ciampitti, Crop Production and Cropping Systems Specialist  
[ciampitti@ksu.edu](mailto:ciampitti@ksu.edu)

Mary Knapp, Weather Data Library  
[mknapp@ksu.edu](mailto:mknapp@ksu.edu)

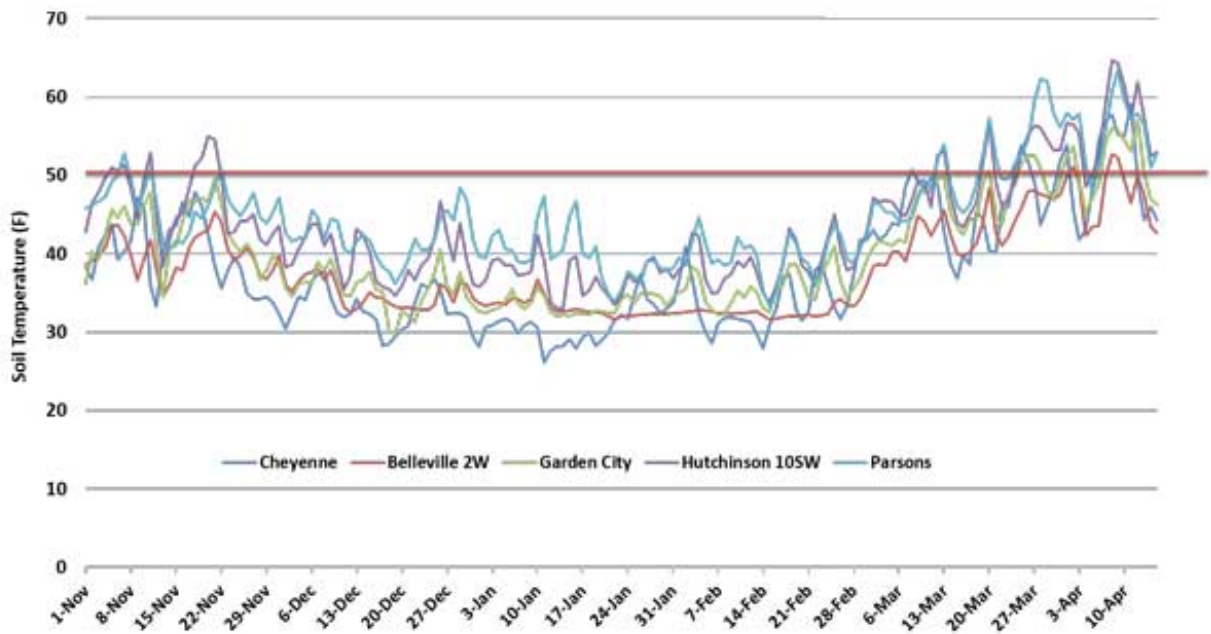
#### 4. Nitrogen loss potential during the winter and early spring

When field conditions allow, fall application of nitrogen (N) is a common practice for Kansas producers. Once spring arrives, a question arises about the level of residual profile N in soil due to the potential for N loss since application. Knowing if the N loss potential was high is important when deciding on the appropriate nitrogen management plan for the growing season.

##### Potential for N loss from fall-applied N

Nitrogen loss processes are associated with the nitrate-N ( $\text{NO}_3^-$ ) form of nitrogen. Nitrification is the conversion from ammonium ( $\text{NH}_4^+$ ) to nitrate. Nitrification is a biological process (involves soil bacteria) and is driven by soil oxygen content, soil temperature, pH, how the N was applied, and some characteristics of the fertilizer. Nitrification is an aerobic process, thus requiring high levels of soil oxygen. Conditions that reduce oxygen supplies, such as wet soils, will inhibit nitrification and keep N in the ammonium form.

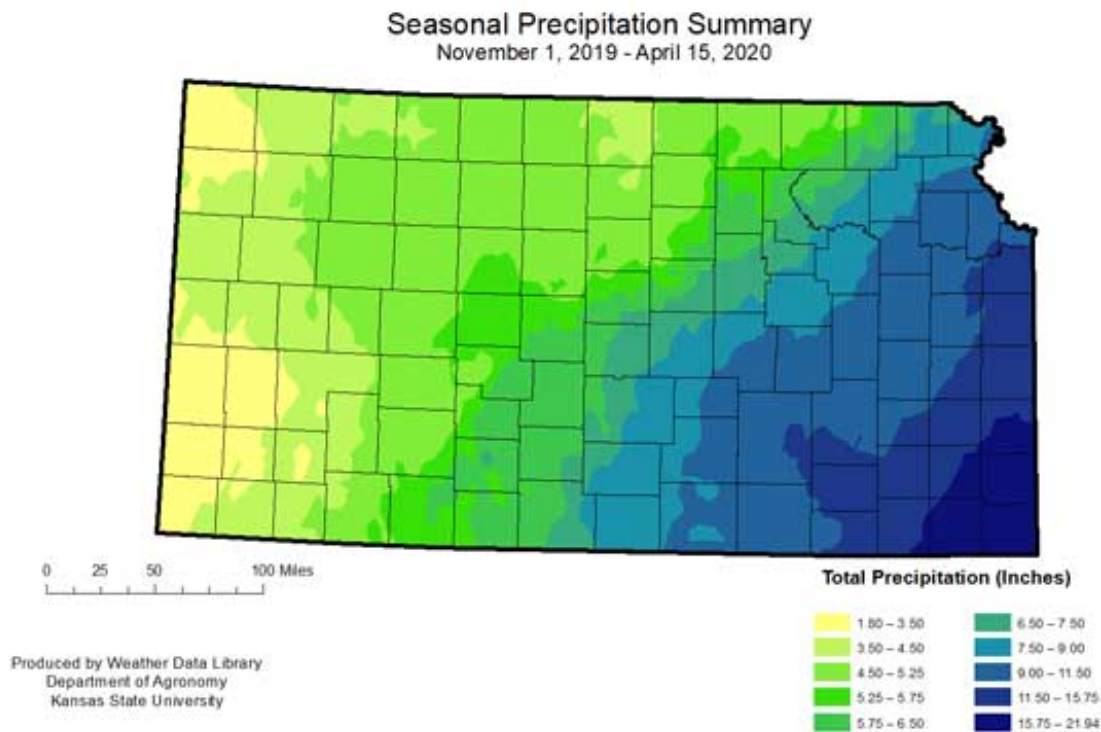
Nitrification is also a temperature-driven process. Fall applications of ammonia-based fertilizers are most effective when soil temperatures remain below 50°F, inhibiting nitrification. The cold soils in recent months minimized any microbial activity and the conversion of ammonium to the nitrate-N form (Figure 1). Thus, up to this point, the ammonium-based N fertilizers applied last fall will not be subject to loss given the recent conditions of cold soils across the state. Fertilizer applied as ammonia or urea, and the 75% of UAN that is in ammonium/ammonium-producing forms, will remain in the soil in the ammonium form until soils warm up and dry out later in the spring.



**Figure 1. Average 4-inch soil temperatures from November 1, 2019 to April 15, 2020 for five locations across Kansas. Source: Kansas Mesonet.**

##### Residual profile N

The amount of nitrogen in the profile can be hard to predict. The good news is that it is not too late to collect 24-inch profile soil samples to determine how much N is available for the upcoming crop. Due to the wet fall and winter on the eastern side of that state again this year (Figure 2), it is possible that some of last year's N was lost due to leaching and denitrification. However, the potential exists for a significant amount to still be retained in the soil profile. Taking profile N samples this spring will allow producers to account for and take advantage of unutilized N and could represent a savings on N inputs this year. For more information on collecting and submitting profile N soil samples, please see KSRE publication [MF734, "Soil Testing Laboratory"](#).



**Figure 2. Fall and winter precipitation (November 1, 2019 to April 15, 2020). Map by K-State Weather Data Library.**

Dorivar Ruiz Diaz, Soil Fertility and Nutrient Management Specialist  
[ruizdiaz@ksu.edu](mailto:ruizdiaz@ksu.edu)

Peter Tomlinson, Environmental Quality Specialist  
[ptomlin@ksu.edu](mailto:ptomlin@ksu.edu)

Mary Knapp, Weather Data Library  
[mknapp@ksu.edu](mailto:mknapp@ksu.edu)

## 5. Key nutrients for soybean production in Kansas

Compared to corn, wheat, and sorghum, soybeans remove significant amounts of nutrients per bushel of grain harvested. Nutrient uptake in soybeans early in the season is relatively small. However, as they grow and develop, the daily rate of nutrient uptake increases. Soybeans need an adequate nutrient supply at each developmental stage for optimum growth. High-yielding soybeans remove substantial amounts of nutrients from the soil (for example, approximately 0.8 lbs of  $P_2O_5$  and 1.4 lbs of  $K_2O$  is removed per bushel of soybean). This should be taken into account in an overall nutrient management plan.

### Nitrogen (N)

Nitrogen is supplied to soybeans mainly by nitrogen fixation, and fertilizer nitrogen application is not recommended if the plants are well-nodulated (Figure 1). Soybeans are heavy users of N, removing a total of 130 pounds per acre, and about 44 pounds with the stover, for a 40-bushel-per-acre soybean crop. Soybeans use all the N they can fix, plus N from the pool of available N in the soil. Nitrogen fertilizer application to soybean seldom results in any yield benefit. Instead, efforts should focus on ensuring proper inoculation.



**Figure 1. Nodulated soybeans (left) compared to soybeans without adequate nodulation (right). Photo by Dorivar Ruiz Diaz, K-State Research and Extension.**

### **Phosphorus (P)**

Phosphorus applications should be based on a soil test. Responses to direct P fertilization is generally consistent in soils testing very low or low in soil test P. Response to starter P fertilizer application in soybeans can occur, but it depends on several factors. The most important factor is the soil test level. Generally, warmer soils at soybean planting, compared to corn, also may contribute to typically lower response to starter fertilizers in soybeans. However, starter fertilizer in soybeans can be a good way to complement nutrients that may have been removed by high-yielding crops in the rotation like corn. Banding fertilizer at planting is an efficient application method for soybeans. Keep in mind that soybean seeds are easily injured by fertilizer, therefore, no direct seed contact with fertilizer is advised.

### **Potassium (K)**

Soybean seeds are relatively high in K and removal of K by soybeans is greater than for other crops on a per-bushel basis when only the grain is removed. As with P, a soil test is the best index of K needs. Soils testing very low or low should be fertilized with K, either as a banded starter at planting or broadcast and incorporated. Potassium should not be placed in contact with the soybean seed because of possible salt injury. Yield increases from K can be significant, and in some cases, more than yield responses to P for soils testing low or very low.

### **Sulfur (S)**

Sulfur is a mobile nutrient in the soil (leaching is common), but fairly immobile in the plant. High soil test variability, along with significant uptake by crops, generates the need for proper S management, especially in sandier soils and fields with several different soil types. Recent studies in Kansas suggest a low probability of soybean response to S application. However, S removal with soybeans can be significant, and more sensitive crops in the rotation, such as wheat, may require S fertilization.

### **Iron**

Iron deficiency symptoms appear in irregularly-shaped spots randomly distributed across a field, primarily in fields with a previous history of iron deficiency. Different annual weather patterns can make iron chlorosis (yellowing of leaves) more or less prevalent. Iron chlorosis also differs under different soil conditions. In general, high soil pH and high carbonates (free lime) can increase the incidence of iron deficiency. Iron chlorosis can be a big limitation in some regions of western Kansas. Iron fertilizer using chelated sources, and in direct contact with the seed (in-furrow), has shown significant yield responses in soils with a history of iron deficiency. If iron chlorosis has been a common problem in the past, producers should select a soybean variety tolerant to iron deficiency. It may be beneficial to use a chelated iron in-furrow application. Foliar iron treatments seldom result in a yield increase.

### **Other nutrients**

Zinc, manganese, and boron are other nutrients that can be limiting in soybeans. The need for zinc should be determined by soil tests. Zinc fertilizer can be either banded at planting or broadcast pre-

plant with little difference in response when applied at an adequate rate. Both organic and inorganic zinc sources (chelates and non-chelates) can be used, but chelates are considered more effective than the inorganic sources.

Manure applications also are effective at eliminating micronutrient deficiency problems, including iron. Monitoring nutrient levels with tissue analysis along with soil tests conducted during the crop season should be used to diagnose potential nutrient deficiencies. Stresses such as drought, heat, and pest pressure can all influence tissue test results.

Some micronutrients also can cause phytotoxicity if prevalent in large quantities. Nutrient removal by soybean is very high in high-yielding environments, thus fertilizer application rates should be high or soil test levels will drop. Regular soil testing (every 2 to 3 years) is essential for optimum nutrient management. Soybeans take advantage of residual phosphorus and potassium, but keep in mind the total nutrient needs in the rotation.

See K-State Research and Extension publication *Soil Test Interpretations and Fertilizer Recommendations*, MF2586 for more complete soybean fertilizer recommendations:  
<http://www.ksre.ksu.edu/bookstore/pubs/MF2586.pdf>

For more information, see *Kansas Soybean Management 2020*, K-State Research and Extension publication MF3154: <http://www.ksre.ksu.edu/bookstore/pubs/MF3154.pdf>

Dorivar Ruiz Diaz, Nutrient Management Specialist  
[ruizdiaz@ksu.edu](mailto:ruizdiaz@ksu.edu)

## 6. Herbicide applications and cold temperatures

Recent drops in temperature have prompted concerns about the effectiveness of herbicide applications made during cold weather. The general recommendation for this situation is to wait for warmer weather to make herbicide applications. There are a couple of key factors that lead to this recommendation.

**Herbicides are most effective when plants are actively growing.** This is especially important for systemic herbicides such as glyphosate and 2,4-D. There is a theory that contact herbicides, such as paraquat (Gramoxone), may be less effected by cold temperatures because they do not have to be translocated throughout the plant to be effective. In general, weeds grow best with temperatures greater than 60°F.



**Figure 1. Weeds commonly found in fields during early spring, such as shepardspurse (left), henbit (center) and marestail (right) grow best in temperatures greater than 60°F, which means herbicide activity on these weeds will be reduced in colder weather.**

**Crops are more susceptible to herbicide injury in adverse growing conditions.** When applying pre-emergence herbicides to corn, be aware that corn stressed by cold soil will not metabolize herbicides well. Herbicide applications of Group 15 (acetamide) herbicides such as S-metolachlor may result in crop injury during extended periods with cold, wet soil conditions.

Another factor to consider is that sprayers that are not drained and/or protected from cold temperatures can be damaged if water freezes in the system. This could lead to damage the sprayer equipment (valves, pumps, etc.) that results in lost time and/or costly repairs.

Even though pressures to complete field work are extreme this time of year, the best plan for maximum herbicide effectiveness is to wait. Warmer temperatures are forecast in the near future. If waiting is not possible, consider increasing herbicide rates to the maximum allowed by the label and utilize adjuvants that might be optional under normal temperature conditions.

Sarah Lancaster, Extension Weed Science Specialist  
[slancaster@ksu.edu](mailto:slancaster@ksu.edu)

## 7. Spring freeze effects on winter canola

Over the years we have observed the effects of spring freezes on canola at the bolting and flowering stages. We can draw on these experiences to speculate on how the recent freezes might impact the crop. The extent of the damage will ultimately depend on a number of factors including the low temperature reached, the amount of time below freezing, the growth stage of the crop, and other environmental factors such as soil moisture and exposure to the wind.

Some of the common damages include leaf burn and loss; stem cracking and splitting; bud, flower, and pod loss; and plant lodging. In some instances, the crop will suffer a yield penalty because the extent of the damage was too severe. In other instances, ideal growing conditions returned shortly after and allowed the crop to produce more flower buds, flowers, and seed pods, thus, a yield penalty was not observed. Canola is indeterminate (continues to flower and produce seed pods for an extended period) and because of this has numerous growing points on the plant. These growing points can develop new flowering sites that will compensate for damaged ones when stresses like spring freezes occur.

Growth stage can affect the extent of crop damage depending on how low and how long temperatures were below freezing. Canola is most tolerant to freezing temperatures in the rosette and bolting stages and more susceptible in the flowering and pod filling stages. This year, canola was in the early bolting to mid-flowering stages across the state. We have seen canola recover from freezes in the mid-20s over a 3 to 7-hour time period with little substantive damage at these stages. Temperatures below 20 for any extended period of time can be very damaging.

### **What are the indicators of injury to canola?**

Cosmetic injury will be observed immediately but canola should begin to recover as soon as temperatures warm up. The time it will take to allow a more realistic estimate of the potential damage and recovery will depend on temperatures and moisture conditions, but should become apparent within 7 to 10 days.

- At any growth stage, leaf discoloration, or bleaching, will likely be observed (Figure 1). The plant can easily tolerate some leaf discoloration and will continue to develop normally. However, if the crop does not show any improvement in color as temperatures warm up, turning pale green, white, and eventually brown, then the damage was likely severe and a yield reduction can be expected.



**Figure 1. Leaf discoloration was present in winter canola plots near Manhattan, KS after the recent spring freezes. The damage observed here is likely cosmetic in nature. Photo by Mike Stamm, K-State Research and Extension.**

- One observation is that canola varieties with weakened stems were severely impacted by the recent freezes (Figure 2). Initially, these plants were physically damaged (cracked) by fluctuating winter temperatures, which allows fungi to enter the plant, causing decay of vascular tissues. We often call this winter decline syndrome. The freezes are impacting these plants more because there is insufficient vascular tissue for normal plant development.



**Figure 2. This variety is extremely susceptible to winterkill and winter decline syndrome, and is showing severe effects from the spring freezes. Photo by Mike Stamm, K-State Research and Extension.**

- At the bolting stage, some discoloration will be evident on leaf or stem tissues. The main stem and flower buds may turn pale green or purple, which is a symptom of cold temperatures and does not necessarily indicate tissue damage. Again, if stem and leaf tissues eventually turn brown and flowering does not follow, then damage was likely severe and a yield reduction

can be expected.

- Cracking or stem splitting may be observed. If the stem only cracks, then the canola plant should continue to grow normally. Splitting (Figure 3) occurs when the stem fills up with ice and ruptures. If the stem splits completely open, a major entry point for fungal decay now exists. Also, the weakened stem may result in the plant eventually falling over. Some plants with translucent, mushy stems were observed the morning of April 14. It is too early to determine if this was severe enough to cause a reduction in yield potential. Stem splitting was not a widespread problem in the canola plots near Manhattan.



**Figure 3. Stem splitting can occur after spring freeze events. This becomes an entry point for fungi and future stem decay. Photo by Mike Stamm, K-State Research and Extension.**

- At the flowering stage, we often see bleaching of leaves and a bend or crook in the stem and flowering racemes. Often, these bends may take the flowering racemes to the ground; however, we have seen plants straighten and continue flowering normally. The only problem may be the racemes set seed below the main canopy of pods, potentially creating problems

at harvest.

- Unopened buds should produce flowers and growing pods should produce viable seed. After any freeze event, blank areas will likely be observed on flowering racemes. In severe cases, we have seen the main raceme and some secondary branches completely freeze off and die (Figure 4). The crop can compensate for the losses with secondary branching.



**Figure 4. Flowering racemes are bent over following freeze events near Manhattan, KS. The red arrow is pointing to a wilted flower cluster that will likely dry up. Photo by Mike Stamm, K-State Research and Extension.**

- Genotypic differences in tolerance to spring freezes exist (Fig. 5). Plants having later flowering are typically able to overcome spring freeze events because they are in a more tolerant plant growth stage, i.e., bolting. Axillary buds are still being developed. Earlier flowering varieties are more susceptible because they may be too far along to develop any new flowering clusters. Generally, varieties with greater winter hardiness and tolerance to winter decline syndrome are also more tolerant to spring freezes. This is because their vascular tissues have not been compromised before the freeze events occurred.



**Figure 5. Canola varieties with greater winter hardiness, tolerance to winter decline syndrome, and later maturity tend to see less negative effects from spring freezes. This particular variety, KS4719, is a potential new release from the canola breeding program.**

Longer durations of temperatures in the mid-20s may increase the severity of damage. The extent of

damage and potential yield loss relative to how long it stays this cold is somewhat of an unknown. But as long as the plants show normal growth in the upcoming days and weeks, reasonable yields can be expected.

### **Long-term impact of freeze damage**

Longer term effects on the crop include differential maturity, delayed maturity, and reduced plant height. Differential maturity may occur if the freeze wasn't quite severe enough to completely kill the plant, and favorable conditions cause a secondary bloom to occur. Delayed crop maturity results in flowering and grain filling during a warmer period which can reduce yield if temperatures are above 90. If temperatures remain cool during flowering and early grain fill, yield reductions should be minimized. Reduced plant height doesn't necessarily result in reduced yield.

The indeterminate growth habit still gives canola an opportunity to compensate for lost yield. How well the crop yields will be a function of the weather over the next few weeks.

Mike Stamm, Canola Breeder  
[mjstamm@ksu.edu](mailto:mjstamm@ksu.edu)

## 8. Insect update on alfalfa weevils and pea aphids - April 17, 2020

The latest update from K-State Extension Entomology on insect activity across Kansas includes alfalfa weevils and pea/cowpea aphids. What effect, if any, has the recent cold temperatures had on these insects?

### **Alfalfa weevils**

Alfalfa weevils have been, and are still, very active throughout south central and north central Kansas during the last few days, even during the cold weather. However, just as the alfalfa plants have been variously affected by the recent cold weather, so have the alfalfa weevil larvae. The plants shown towards the middle of this picture (Figure 1) had the upper part of the foliage killed by the recent cold temperatures, as were the larvae in that foliage (Figure 2). The adjacent plants were not as seriously affected and thus, neither were the larvae in those plants.



**Figure 1. Alfalfa freeze damage (center portion of the photo). Photo by Cayden Wyckoff, K-State Research and Extension.**



**Figure 2. Dead alfalfa weevil larvae (top left) and live alfalfa weevil larvae. Photo by K-State Extension Entomology.**

Therefore, each field needs to be monitored at least weekly, even those fields already treated. Please - always remember to follow all label directions for whatever product applied, especially as far as re-entry, PHI, etc.

### **Pea aphids/cowpea aphids**

The recent cold weather also played havoc with these aphids (Figure 3). However, many aphids in untreated fields were just "knocked off" or left the plants and are still alive, but in the leaf litter or residue under the foliage. There are also lady beetle larvae feeding on these aphids, so hopefully these aphid populations won't come back as dense as they were previous to the cold weather.



**Figure 3. Pea and Cowpea aphids. Photo by Cayden Wyckoff, K-State Research and Extension.**

Jeff Whitworth, Extension Entomology Specialist  
[jwhitwor@ksu.edu](mailto:jwhitwor@ksu.edu)

## 9. K-State's Soil Testing Lab and Plant Disease Diagnostic Lab are OPEN!

During this time of reduced operations at K-State due to COVID-19, there have been questions on the operational status of the Soil Testing and Plant Disease Diagnostic Labs on the Manhattan campus. Both of these labs are open and accepting samples, however submission of samples has been modified to accommodate new distancing guidelines. Please read below for specific instructions on how to submit samples (each lab has their own instructions).

### **KSU Soil Testing Lab**

The Soil Testing Lab is fully staffed and operational. Given that we are able to operate with a full staff, the turnaround time for sample analysis is not expected to change. However, sample submission procedures have been modified and are outlined below.

- **No in-person sample delivery to lab.** However, samples can be left in the **Soil Drop Box** located on the NW side of Throckmorton (1712 Claflin Rd.) There is map on the door of the building or on the Lab website at <https://www.agronomy.k-state.edu/services/soiltesting/> (Figure 1). Samples will be picked up at least twice a day.
- **Samples can be mailed via USPS or UPS.** To create a UPS shipping label, please visit our website and input your mailing address: [https://ksusoiltesting.com/ups\\_form.php](https://ksusoiltesting.com/ups_form.php). If using the U.S. Postal Service, the mailing address for the lab is:

**KSU Soil Testing Lab**  
**2308 Throckmorton Plant Science Center**  
**1712 Claflin Road**  
**Manhattan, KS 66506-5503**

- **Samples can be submitted to your local county Extension office.** County offices will forward samples to the lab (postage and handling may be charged). Contact your local office for samples bags, instructions, and if you have questions.



**Figure 1. Location of the Soil Sample Drop Box located on the NW side of Throckmorton Plant Sciences Center in Manhattan.**

Homeowners and producers are encouraged to contact the lab with any questions. The Soil Testing Lab is working hard to best accommodate the soil testing needs for everyone during this critical time of the year. **Please reach out by phone at 785-532-7897 or by email at [soiltesting@ksu.edu](mailto:soiltesting@ksu.edu).**

Dorivar Ruiz Diaz, Extension Agronomy State Leader and Soil Testing Lab Director  
[ruizdiaz@ksu.edu](mailto:ruizdiaz@ksu.edu)

### **KSU Plant Disease Diagnostic Lab Update**

The KSU Plant Disease Diagnostic Lab continues to remain open at this time. However, we are working under limited operations and staff, so turn around may take a little longer than usual. There have been a few changes to our submission procedures. Please read the information below:

- **No in-person sample delivery to lab.** Instead, if you are in **Manhattan** please use the **soil drop box** located on the Northwest side of Throckmorton PSC (Figure 1).
- **USPS sample delivery to 4032 Throckmorton PSC 1712 Claflin Rd Manhattan, KS 66506 is still available**, but will be checked at a minimum of twice a week. Time sensitive samples such as **Wheat** should **NOT** use **USPS** and instead use the new temporary address below.

- **The best mailing option for samples to the plant disease diagnostic lab** is BELOW.

Please email us the tracking # so we know that a sample is coming to the lab.

Our NEW TEMPORARY SHIPPING ADDRESS for UPS/FEDEX packages

**KSU Plant Disease Diagnostic Lab**  
**1310A Westloop PI #351**  
**Manhattan, KS 66502**

The growing season is about to kick off and we want to support Kansas growers and county extension offices. If you have questions, please contact us at [clinic@ksu.edu](mailto:clinic@ksu.edu)

Judy O'Mara  
Extension Plant Pathology, State Leader  
K-State Plant Disease Diagnostic Lab, Director  
[jomara@ksu.edu](mailto:jomara@ksu.edu)

Chandler Day (wheat diagnostics)  
GPDN/KSU Regional Plant Disease Diagnostician  
[chandlerday@ksu.edu](mailto:chandlerday@ksu.edu)