Issue 737

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eUpdate

03/22/2019

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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Kansas State University Department of Agronomy
2004 Throckmorton Plant Sciences Center | Manhattan, KS 66506
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1. Optimal corn seeding rate recommendations

The optimal corn seeding rate depends on the hybrid (genotype, G) and the interaction with the environment (E), researchers term this as the G x E interaction. Producers can look back to their corn crop from the previous growing season, or wait until the current growing season is nearly complete, and evaluate whether the plant population they used was adequate. Another factor that sometimes we neglect to mention is the effect of management practices (M). Planting date, row spacing, and crop rotations can also exert some influence on the yield response to the plant population factor.

Individual hybrids can respond differently, but the following guidelines may help in deciding if current seeding rates need to be adjusted.

- If more than about 5% of the plants are barren or if most ears have fewer than 250 kernels per ear, the plant population may be too high.
- If there are consistently more than 600 kernels per ear or if most plants have a second ear contributing significantly to grain yield, the plant population may be too low. Of course the growing conditions will influence ear number and ear size as well, so it is important to factor in the growing conditions for that season when interpreting these plant responses.
- In addition to the growing conditions, nutrient status can also influence the final number of grains per ear. For example, severe nitrogen (N) deficiency will have a high impact on the final number of grains, ear size and ear number.

Don't be too concerned if a half-inch or so of the ear tip has no kernels. If kernels have formed to the tip of the ear, there may have been room in that field for more plants contributing to grain yield. Again, "tipping back" will vary with the G x E x M interaction. Potential ear size and potential number of kernel (1,000-1,200 per ear) are set before silking, but the actual final number of kernels is not determined until after pollination and early grain fill due to relative success of fertilization and degree of early abortion.

Always keep the long-term weather conditions in mind. In a drought year, almost any population is too high for the available moisture in some areas. Although it's not a good idea to make significant changes to seeding rates based only on what has happened recently, it is worthwhile taking into consideration how much moisture there is currently in the soil profile and the long-term forecasts for the upcoming growing season (see accompanying eUpdate article "Soil temperature and moisture update for late March 2019").

Making a decision on whether to keep seeding rates at your usual level, or increase somewhat this year if the soil profile is wetter-than-normal is a little like the famous line in the movie Dirty Harry: "Do I feel lucky?" If you think weather conditions will be more favorable for corn this year than the past years, stay about in the middle to upper part of the range of seeding rates in the table below. If you do not think growing conditions will improve enough to make up for dry subsoils, you might want to consider going toward the lower end of the range of recommended seeding rates, with the warning that if growing conditions improve, you will have limited your top-end yield potential.

Optimal seeding rates may need to be adjusted for irrigated corn if fertilizer or irrigation rates are sharply increased or decreased. For example, research at the Irrigation Experiment Field near Scandia has shown that if fertilizer rates are increased, seeding rates also have to be increased to realize the maximum yield benefit. Consult seed company recommendations to determine if seeding rates for specific hybrids should be at the lower or upper end of the recommended ranges for a given environment.

The recommended planting rates in the following tables attempt to factor in these types of questions for the typical corn growing environments found in Kansas. Adjust within the recommended ranges depending on the specific conditions you expect to face and the hybrid you plan to use.

Table 1. Suggested dryland corn final populations and seeding rates

Area	Environment	Final Plant Population (plants per acre)	Seeding Rate* (seeds per acre)
Northeast	100-150 bu/a potential	22,000-25,000	26,000-29,500
	150+ potential	24,000-28,000	28,000-33,000
Southeast	Short-season, upland, shallow soils	20,000-22,000	23,500-26,000
	Full-season bottom ground	24,000-26,000	28,000-30,500
North Central	All dryland environments	20,000-22,500	23,500-26,500
South Central	All dryland environments	18,000-22,000	21,000-26,000
Northwest	All dryland environments	16,000-20,000	19,000-23,500
Southwest	All dryland environments	14,000-20,000	16,500-23,500

Table 2. Suggested irrigated corn final populations and seeding rates

Environment	Hybrid Maturity	Final Plant Population (plants per acre)	Seeding Rate* (seeds per acre)
Full irrigation	Full-season	28,000-34,000	33,000-40,000
	Shorter-season	30,000-36,000	35,000-42,500
Limited irrigation	All	24,000-28,000	28,000-33,000

* Assumes high germination and that 85 percent of seeds produce plants. Seeding rates can be reduced if field germination is expected to be more than 85%.

New Research on Corn Seeding Rates

An intensive review of a large database from Corteva Agriscience (2000-2014 period) was utilized to synthesize yield response to plant population under varying yield environments (<100 bu/acre to

>200 bu/acre). Overall, yield response to plant population depended on the final yield environment (Figure 1). In yield environments below 100 bu/acre, yield response to plant population was slightly negative. Yield response to plant population tended to be flat when yield environment ranged from 100 to 150 bu/acre; positive and quadratic with the yield environment improving from 150 to 180 bu/acre; and lastly, increasing almost linearly with increasing plant populations when the yield environment was more than 200 bu/acre (Figure 1).

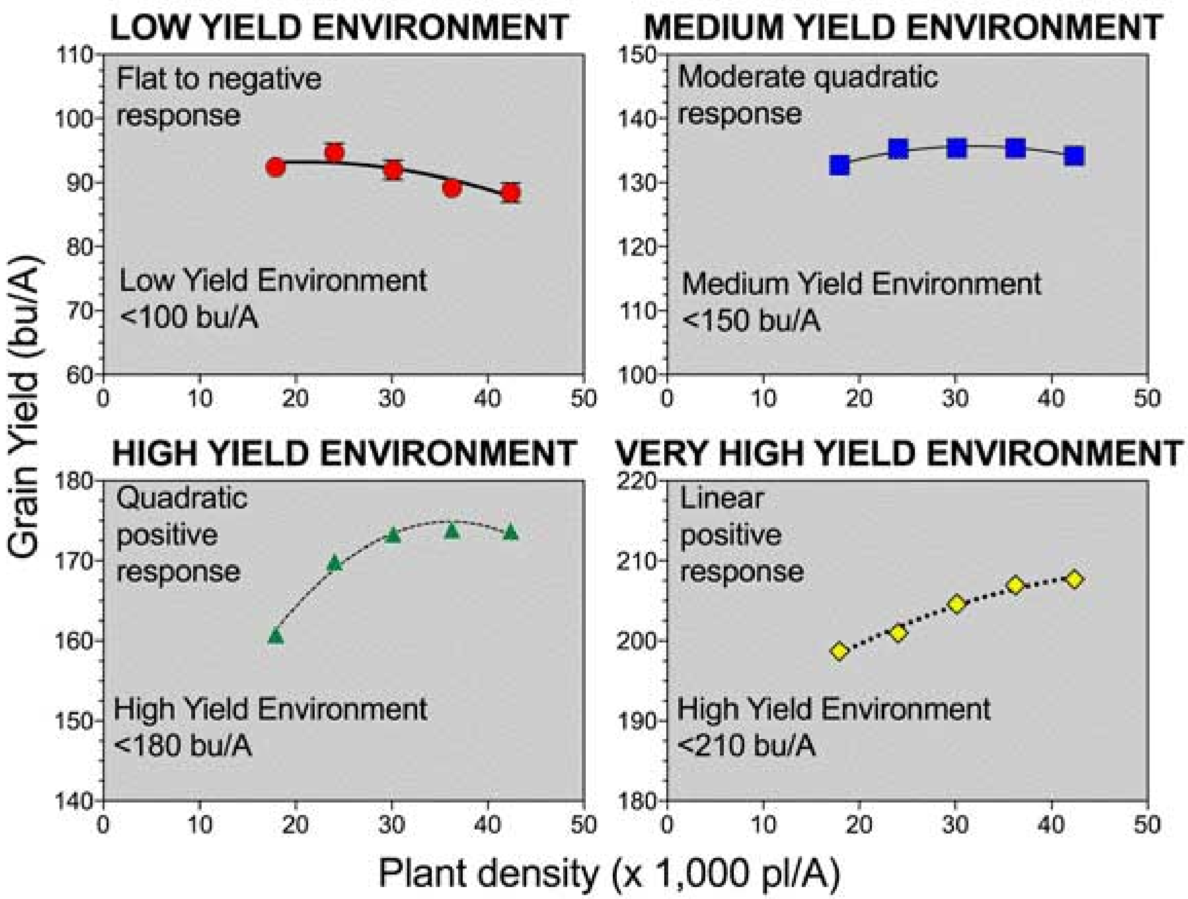

Figure 1. Corn grain yield response to plant density in four yield environments, a) <100; b) 100-150; c) 150-180; and d) > 180-210 bu/acre (Assefa, Ciampitti et al., 2016, Crop Science Journal).

As a disclaimer, "agronomically" optimum plant population does not always coincide with the "economically" optimal plant population. Thus, farmers should consider this aspect when deciding the final seeding rate for corn. In addition, final seeding rate depends on the environment, hybrid utilized, and production practices (e.g., planting date).

Ignacio Ciampitti, Crop Production and Cropping Systems Specialist, KSUCROPS Lab
ciampitti@ksu.edu

2. First hollow stem update: March 22, 2019

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 a previous 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 36 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 varieties in Table 1. As of March 18, 2019, none of the varieties had yet reached first hollow stem but all varieties had started to show minor stem elongation.

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 March 18 of 36 wheat varieties sown mid-September 2018 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).

Variety	Hollow stem length (cm)
	(3/18/2019)
AM Eastwood	0.63
Bentley	0.25
Bob Dole	0.39
Byrd	0.39
Doublestop CL Plus	0.28
EXP	0.39
EXP 40-1	0.21
Gallagher	0.44
Iba	0.35
Joe	0.29
Langin	0.35
Larry	0.29
Lonerider	0.37
NE10478-1	0.36
OK12716	0.36
OK13209	0.53
Paradise	0.44
Ruby Lee	0.39
Smith's Gold	0.37
Spirit Rider	0.51
Stardust	0.49
SY Achieve CL2	0.63
SY Benefit	0.54
SY Grit	0.54
SY Rugged	0.28
TAM 204	0.39
Tatanka	0.48
WB4269	0.30
WB4303	0.67
WB4515	0.34
WB4595	0.45
WB4699	0.39
WB4792	0.37
WB-Grainfield	0.46
Whistler	0.31
Zenda	0.49

While none of the varieties had yet reached FHS as of March 18, there were statistical differences among the varieties evaluated and these differences tend to increase over time. Thus, 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 take the decision of removing cattle from wheat pastures.

Contact author:

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

Co-authors:

Kavan Mark, Undergraduate hourly student

Marden Moraes, Visiting Assistant Scientist

Lohan Oliveira, Visiting Assistant Scientist

Nilo Fernandes Junior, Visiting Assistant Scientist

Caio Rapolla, Visiting Assistant Scientist

3. Outlook for stripe rust in the 2019 Kansas wheat crop

The days are getting longer, and temperatures are finally warming after what seemed like a long winter season. As hopes for spring rise, many growers start looking at factors that could influence the yield potential of the Kansas wheat crop.

Recent research at Kansas State University shows how weather conditions in Texas appear to play a critical role in the development of regional outbreaks of the disease. Stripe rust often survives the winter in southern Texas, and wet conditions in this region increase the risk of stripe rust problems throughout the Great Plains. Moreover, dry conditions in this region often suppress the risk of outbreaks. The research documents how the timing of this moisture is also important with moisture levels the preceding fall (primarily October to December) and early spring (February) being most influential. Maps of soil moisture conditions in November when the crop is being established throughout the southern Great Plains can help illustrate these findings (Figure 1). The map for 2019 indicates a moderate risk of severe stripe this season.

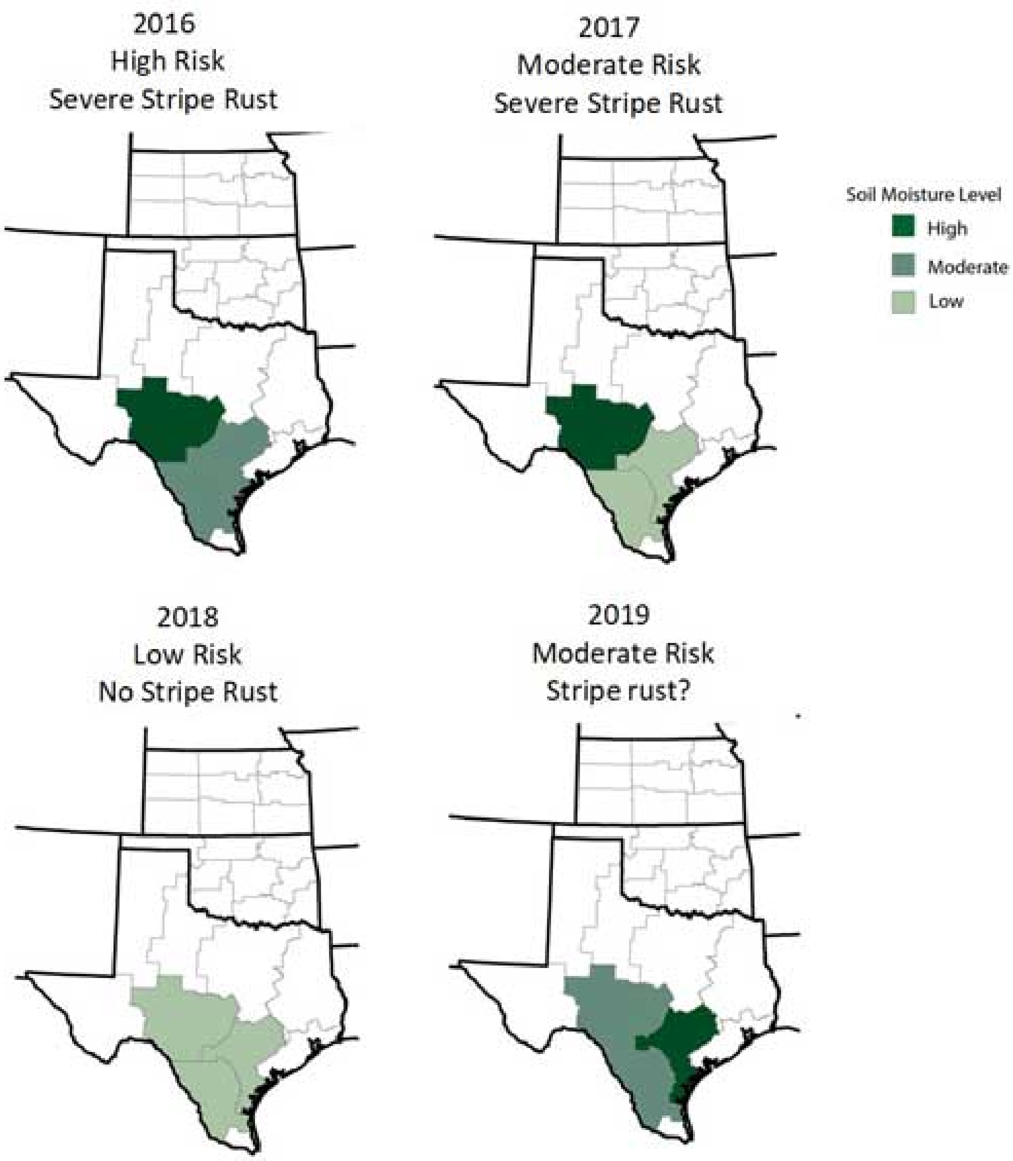

Figure 1. Soil moisture levels in southern Texas when the wheat crop was established for the 2016-2019 growing seasons. In the low disease years, dry conditions (lightest green colors on the maps) dominate southern Texas. In years with severe stripe rust, moderate or high soil moisture conditions are prevalent in these same regions. These maps show soil moisture levels based on November "Palmer Z-Index" provided by NOAA-National Centers for Environmental Information.

This is consistent with observations from Dr. Amir Ibrahim and Dr. Clark Neely, researchers from Texas A&M University, who reported active stripe rust and leaf rust in Texas this year. The last report (March 18, 2019) indicated that stripe rust was slowing some with lesions caused by the fungus "drying up" in research plots just west of San Antonio. They noted that leaf rust was still very active at this same location. Let's keep an eye on the disease situation and see what develops this year.

Erick De Wolf, Extension Plant Pathologist
dewolf1@ksu.edu

4. Recommendations for topdressing wheat with sulfur

Traditionally, sulfur (S) deficiency was most common on high-yielding crops grown on irrigated sandy soils that are low in organic matter and subject to leaching. However, due to reduced S additions from the atmosphere (there is less S in the air now) and continued crop removal, an increasing number of finer-textured soils have shown S deficiency.

In recent years, sulfur deficiency in wheat has become common in many areas of Kansas, particularly in no-till wheat where cooler soil temperatures can slow S mineralization in the soil. Classic S deficiency symptoms, confirmed by soil and plant analysis, have been observed in many no-till wheat fields during periods of rapid growth in the spring. These observed deficiencies generally occur during periods of rapid growth prior to jointing or during stem elongation.

The photos below are a good representation of the problem. Generally, the S-deficient wheat is yellow and stunted (Figure 1-top photo), and the problem is found in patches in the field (Figure 1-bottom photo), especially in areas where there has been previous soil erosion or soil movement. Sulfur deficiency in growing crops is often mistaken for nitrogen (N) deficiency. However, unlike N deficiency where the older leaves show firing and yellowing, with S deficiency, the pale yellow symptoms of S deficiency often appear first on the younger or uppermost leaves. Wheat plants with S deficiency often eventually become uniformly chlorotic. The patchy S-deficient areas of the field are often found on hilltops or sideslopes where erosion has occurred and soil organic matter is reduced, or where leaching is more pronounced. In terraced or leveled fields, wheat in areas where topsoil was removed or significant cuts were made, also commonly shows symptoms.

Figure 1. Sulfur deficiency in wheat. Photos by Dorivar Ruiz Diaz, K-State Research and Extension.

The majority of S in soil is present in organic forms (requires mineralization to become plant available) in surface soils and as sulfate (SO_4^{2-}), an inorganic form and plant available. Sulfate is relatively soluble, so it tends to leach down from the surface soil into the subsoil. In many of our Kansas soils it will accumulate in the B horizon (subsoil) in two forms:

- Some sulfate will be sorbed to clay surfaces and coatings similar to the processes whereby phosphates are sorbed, though sulfate will not be sorbed as strongly.
- Sulfate will also be present in the subsoil of many Kansas soils as gypsum.

A soil test for available sulfate in the soil profile is available. For proper interpretation of this test, soil organic matter, soil texture, the crop to be grown, and the expected yield level all need to be considered. Since sulfate is mobile, sampling to a 24-inch depth is important. Accurate estimates of S needs cannot be made from a surface sample alone. However, due to the relatively high demand for S during the rapid vegetative growth phase of wheat and relatively shallow rooting by the wheat crop at this time, the S measured in the deeper subsoil by the test may not be available to wheat in the early spring, especially where soils are still cold.

Sulfur deficiency in wheat has been showing up early in the spring, shortly after green-up, before organic S is mineralized from soil organic matter, and before wheat roots can grow into the subsoil to utilize sulfate accumulated there. Deficiencies of S are often difficult to identify because the paling in crop color is not always obvious. Wheat plants lacking S also may be stunted, thin-stemmed, and spindly. In the case of wheat and other cereal grains, maturity is delayed. Due to the slower growth and lack of good tillering, winter annual weed competition is also enhanced.

Many fields in north central and northeast Kansas now have an established history of S deficiency for wheat. In this situation, rather than waiting for symptoms to appear in the spring, farmers may want to consider a winter topdress application of S as a preventive measure.

There are many S-containing fertilizer materials. Several dry materials are available that can be blended with dry phosphorus or nitrogen fertilizers for winter/spring topdressing. Some of these products are best used in preplant applications, however.

- **Elemental S** (typically 90-95 percent S) is a dry material marketed by several manufacturers. Before it becomes available for plant uptake, elemental S must first be oxidized by soil microorganisms to sulfate-S and this can be a slow process when surface-applied. As a result, this material is well suited for preplant applications only. Elemental S is not suited for corrective applications to S-deficient wheat in the spring.
- **Ammonium sulfate**, (21-0-0-24S) is a dry material that is a good source of both N and available S. It has high acid-forming potential, however, and soil pH should be monitored. Ammonium sulfate is a good source to consider for both preplant or topdressing to correct existing sulfur deficiencies.

- **Gypsum** (analysis varies) is calcium sulfate, and is commonly available in a hydrated form containing 18.6 percent S. This material is commonly available in a granulated form that can be blended with other materials. Since it is a sulfate source, it would be immediately available, and is another good source for spring topdressing.

- **New N-P-S products,** such as Microessentials, 40-Rock, and others, are ammonium phosphate materials formulated with sulfur, and in some cases micronutrients such as zinc. In most of these products the sulfur is present as a combination of elemental-S and sulfate-S.

There are also liquid sources of sulfur fertilizers available.

- **Ammonium thiosulfate**, (12-0-0-26S) is the most popular S-containing product used in the fluid fertilizer industry, as it is compatible with N solutions and other complete liquid products.
- **Potassium thiosulfate**, (0-0-25-17S) is a clear liquid product that can be mixed with other liquid fertilizers.

Liquid and dry fertilizer sources can be applied in combination with N at topdressing this spring. However, is important to consider the potential plant availability of each S fertilizer source for this wheat growing season.

For more information see K-State publication MF 2264 "*Sulfur in Kansas*" at
http://www.ksre.ksu.edu/bookstore/pubs/MF2264.pdf

For estimations of required application rates of S see K-State publication MF-2586 "*Soil Test Interpretation and Fertilizer Recommendations" at*
http://www.ksre.ksu.edu/bookstore/pubs/mf2586.pdf

Dorivar Ruiz Diaz, Nutrient Management Specialist
ruizdiaz@ksu.edu

5. Chloride as a topdressing nutrient for wheat

Chloride (Cl) is a highly mobile nutrient in soils and topdressing is typically a good time for application, especially in regions with sufficient precipitation or with coarse-textured soils are prone to leaching.

One of the main benefits from good Cl nutrition is the improvement in overall disease resistance in wheat. Wheat response to Cl is usually expressed in improved color, suppression of fungal diseases, and increased yield. It is difficult to predict whether Cl would significantly increase wheat yields unless there has been a recent soil test analysis for this nutrient. Chloride fertilization based on soil testing is becoming more common in Kansas.

As with nitrate and sulfate, Cl soil testing is recommended using a 0-24 inch profile sample. Based on current data, the probability of a response to Cl in dryland wheat production in northeast and central Kansas seems higher than in western Kansas.

The interpretation of the Cl test and corresponding fertilizer recommendations for wheat are given in the table below. Chloride fertilizer is recommended when the soil test is below 6 ppm, or 45 pounds soil chloride in the 24-inch sample depth. Dry or liquid fertilizer sources are all plant available immediately. Potassium chloride (potash) and ammonium chloride are commonly available and widely used fertilizer products, though other products such as calcium, magnesium, and sodium chloride can also be used and are equal in terms of plant availability.

Table 1. Soil test chloride interpretations for wheat in Kansas

	Soil Chloride in a 0-24 inch sample		**Chloride Recommended**
Category	(lbs/acre)	(ppm)	(lbs Cl/acre)
Low	<30	<4	20
Medium	30-45	4-6	10
High	>45	>6	0

Chloride deficiency symptoms appear as leaf spotting and are referred to as physiological leaf spot.

Figure 1. Upper and lower photos both depict chloride deficiency symptoms (physiological leaf spotting) in wheat. Photos by Dorivar Ruiz Diaz, K-State Research and Extension.

K-State has done considerable research on Cl applications to wheat since the early 1980's, mostly in the eastern half of the state. Results have been varied, but there have been economic yield responses in almost all cases where soil test Cl levels have been less than 30 lbs per acre (Figure 2).

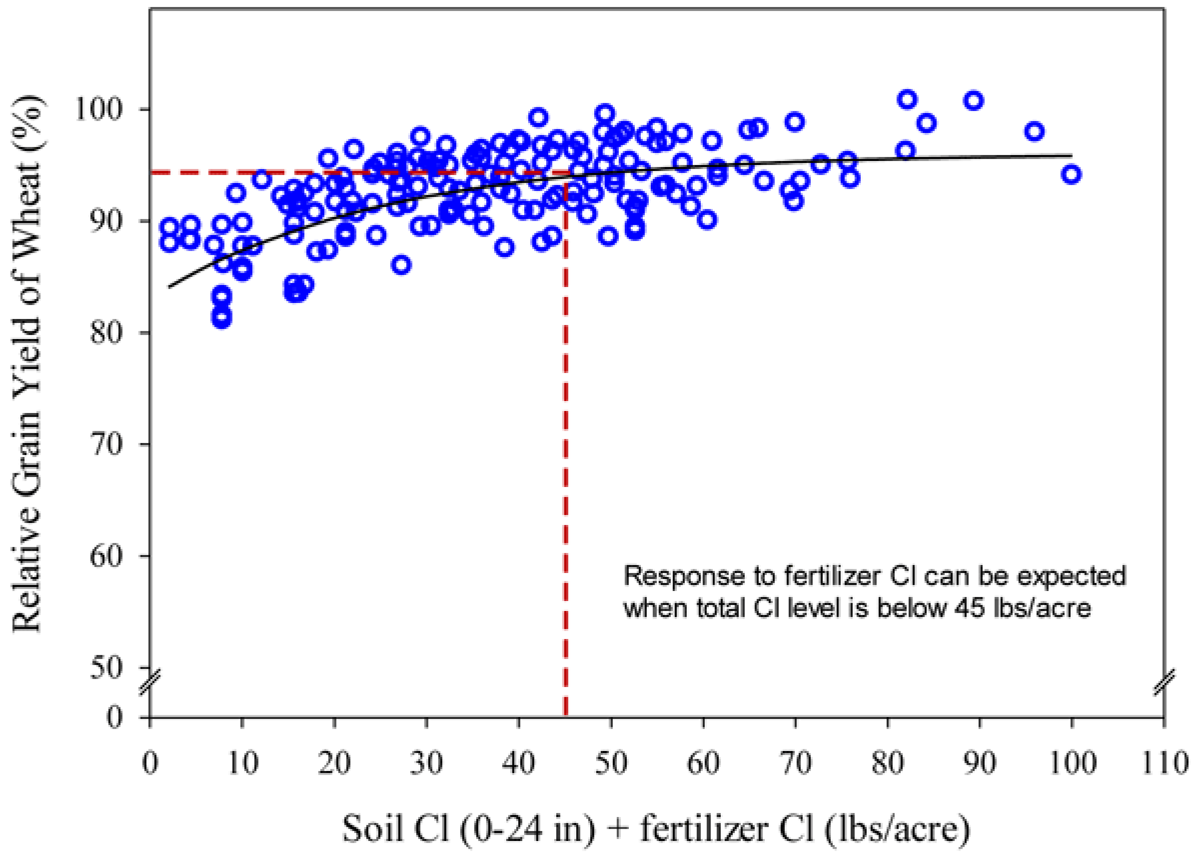

Figure 2. Relative wheat grain yield as affected by total chloride supply (soil + fertilizer) in Kansas.

Deficiencies were most likely to be found on fields with no history of potash (KCl) applications. Recent studies showed that there are variety differences in response to Cl and are likely associated with the tolerance of that variety to fungal diseases.

For more information, see the recently updated KSRE publication *Chloride in Kansas: Plant, Soil, and Fertilizer Considerations*, MF2570: www.ksre.ksu.edu/bookstore/pubs/MF2570.pdf

Dorivar Ruiz Diaz, Nutrient Management Specialist
ruizdiaz@ksu.edu

6. Soil temperature and moisture update for late March 2019

Selection of the optimal planting date is one of the most critical factors in the farming decision-making process. In making this decision, producers should consider soil temperatures rather than just calendar dates. After a very cold start to March, air temperatures across Kansas warmed this past week.

For the week of March 15-March 21, average weekly soil temperatures at 2 inches among crop reporting districts ranged from 37 to 47 degrees F (Figure 1). For example, in the northeast region, soil temperatures ranged from 38 to 44 degrees F; while in the southwest region, soil temperatures varied from 43 to 47 degrees F. Soil temperatures were around 35-41 degrees F for the northwest region.

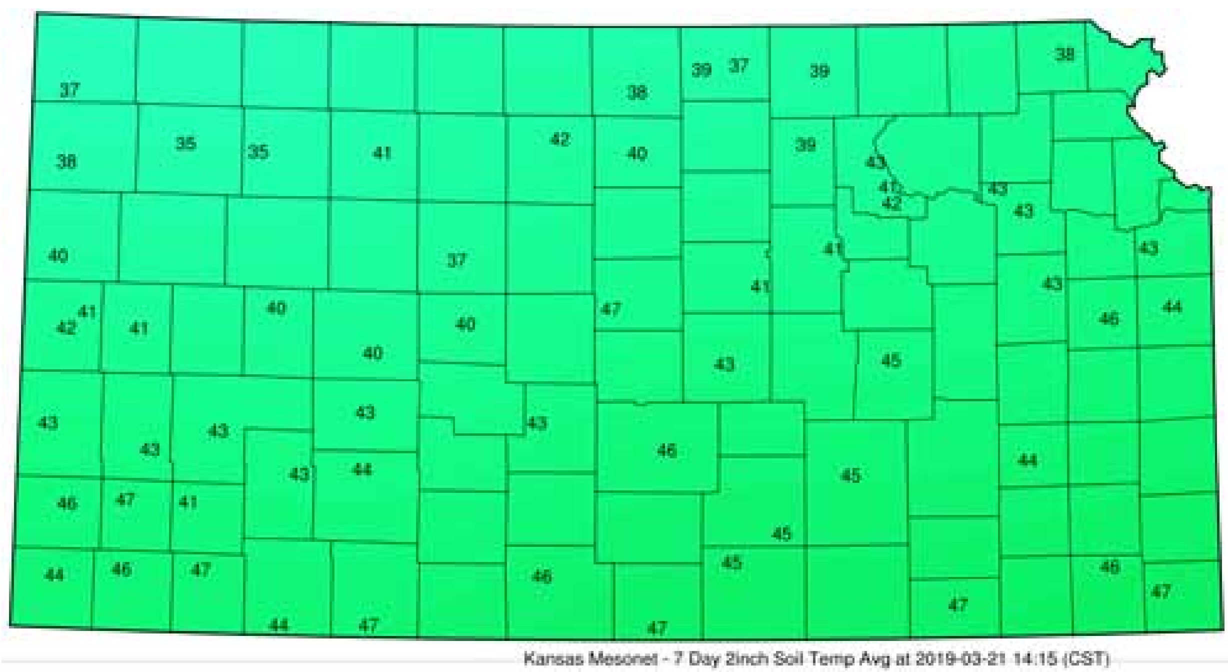

Figure 1. Average soil temperatures at 2-inch soil depth for the week of March 15 – March 21, 2019. (http://mesonet.k-state.edu/)

Differences in soil temperature were related to the large variations in air temperatures experienced last week, from 37 degrees F in northern portions of the state to 51 degrees F for areas in southeast Kansas (Figure 2).

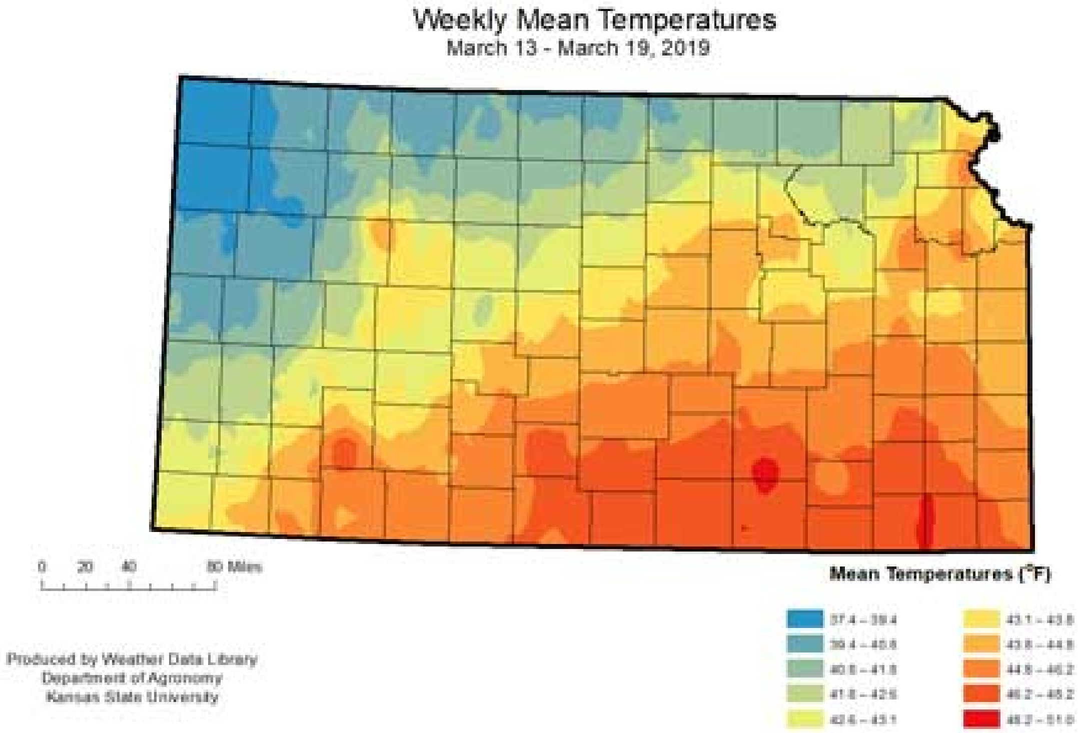

Figure 2. Weekly mean air temperatures for the week of March 13-March 19, 2018.

Projections for the coming weeks call for increasing air temperatures, but remaining cooler-than-normal statewide, which will slow soil warming (Figure 3).

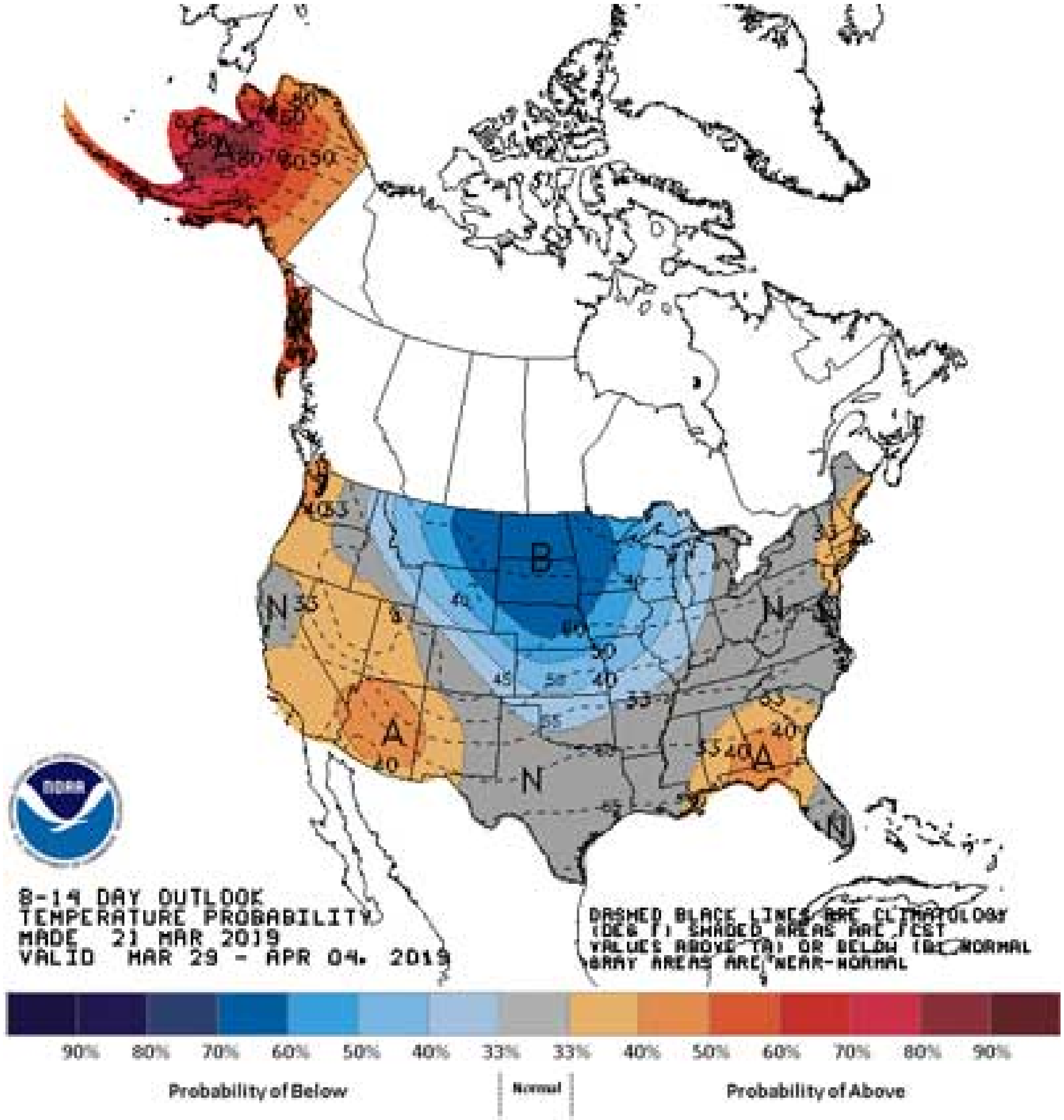

Figure 3. 8 to 14-day outlook temperature probability for March 29 - April 4, 2019. (NOAA)

The actual change in soil temperatures in any given field will be affected by amount of residue cover, soil moisture, and landscape position. Wet soils in a no-till situation will be slower to warm. Dry soils will fluctuate more rapidly, matching air temperatures, particularly if skies are clear. (Figure 4).

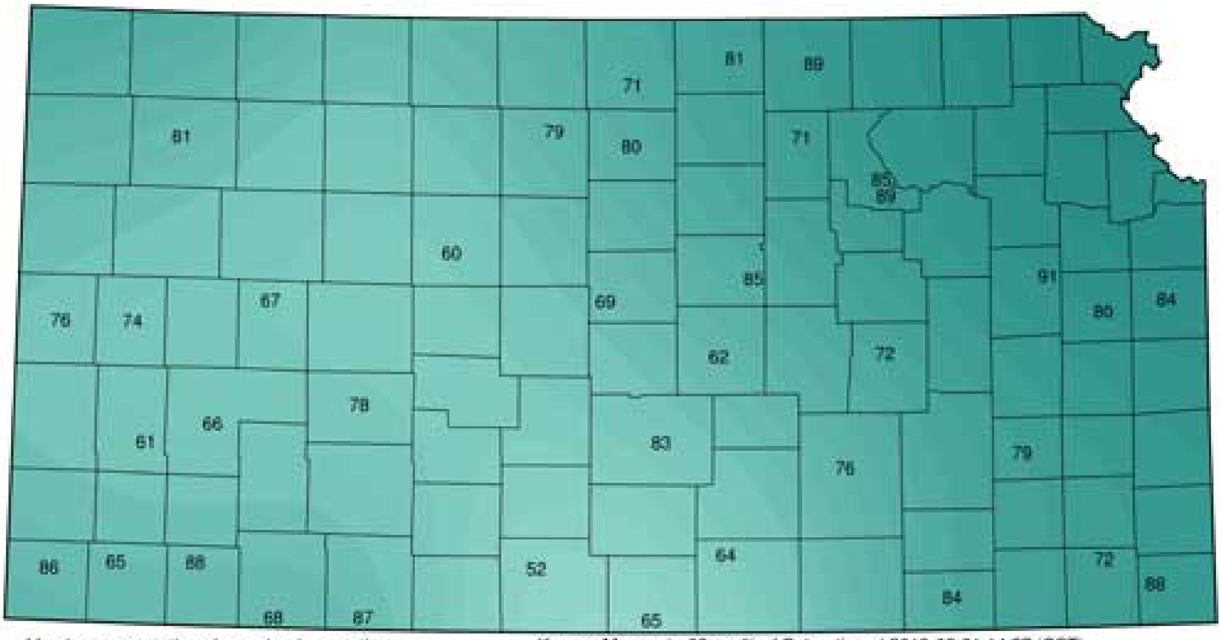

Figure 4. Soil moisture as of March 21, 2019 (Kansas Mesonet).

Current moisture status across Kansas is quite wet, with the largest weekly departure in precipitation in the southeast corner (Figure 5). Projections for coming weeks are for precipitation to be above-normal for the eastern parts of Kansas and drier for the west (Figure 6), slowing down soil warming and any potential plans for an early start to planting.

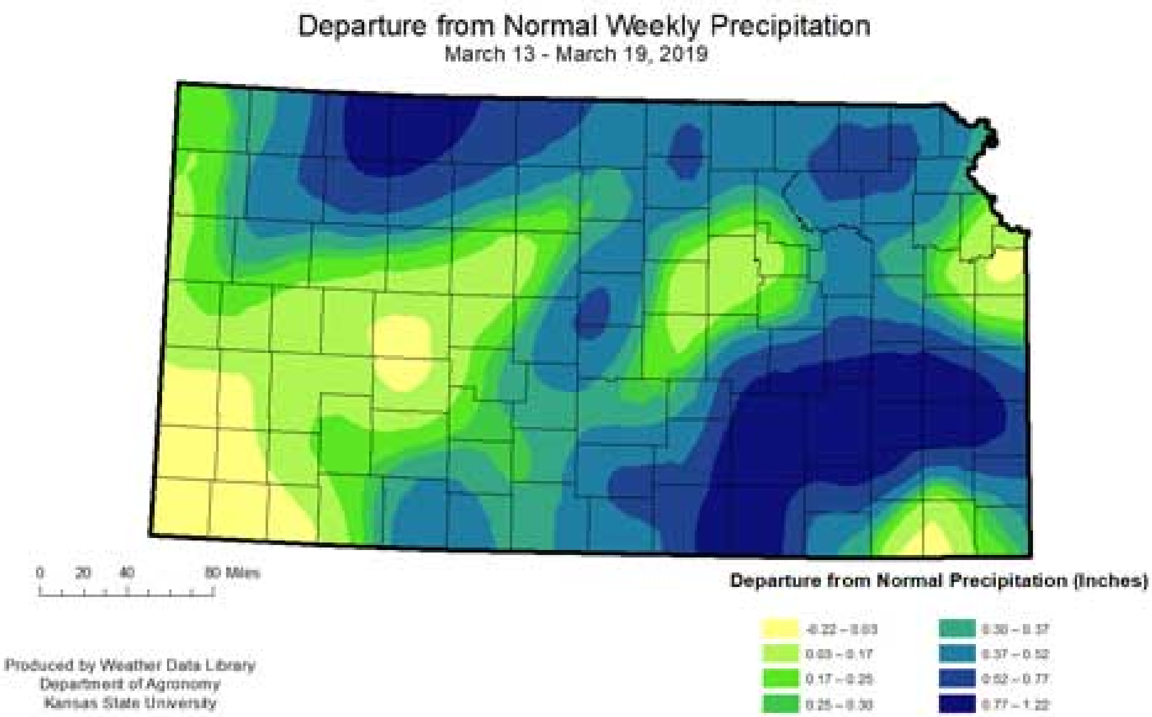

Figure 5. Departure from normal precipitation for the week of March 13 – March 19, 2019

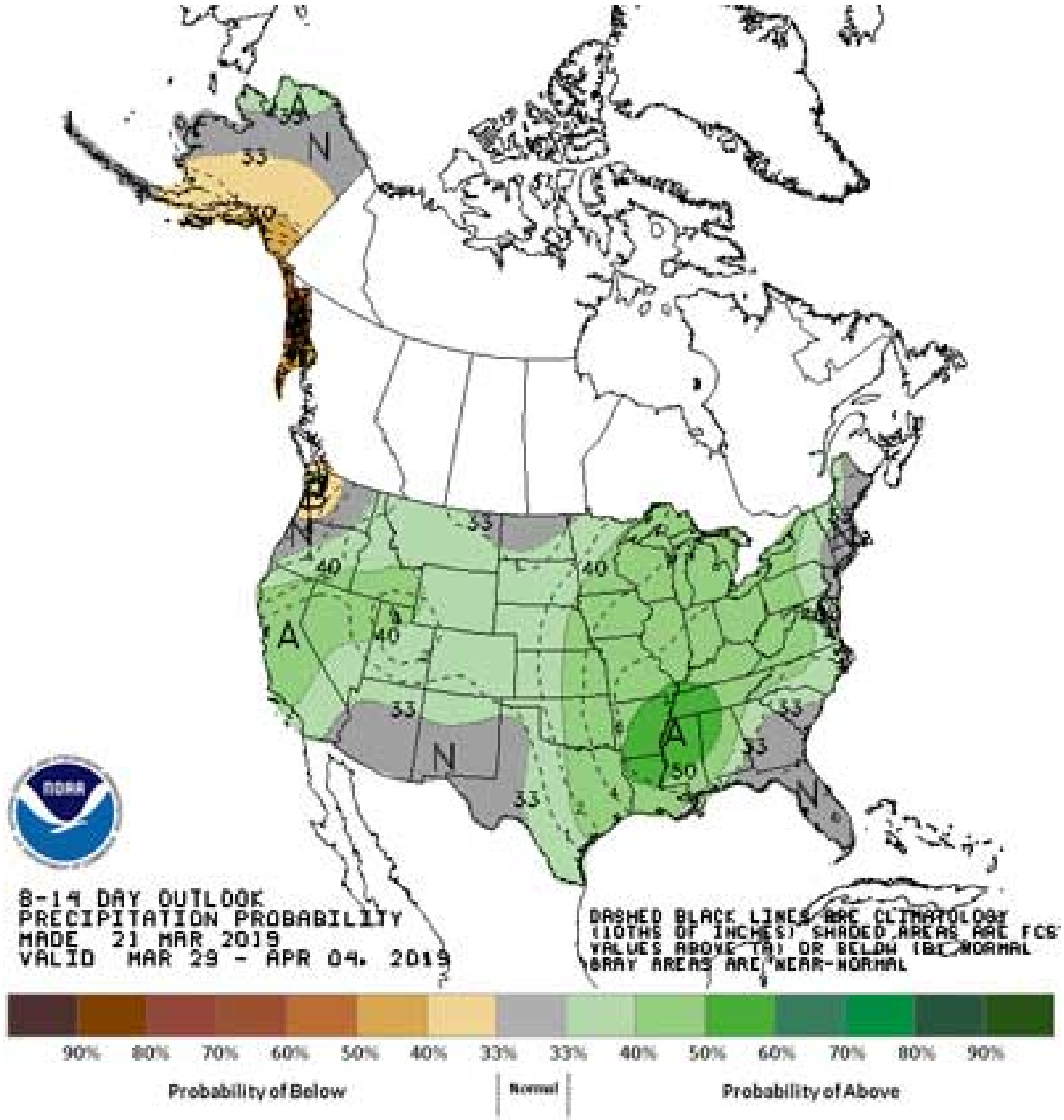

Figure 6. 8 to 14-day outlook precipitation probability for March 29 – April 4. (NOAA)

Optimal soil temperature for emergence

Every summer row crop has an optimal soil temperature for emergence. A minimum for corn is 50 degrees F for germination and early growth. However, uniformity and synchrony in emergence is primarily achieved when soil temperatures are above 55 degrees 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. This is particularly true for corn, since it is the earliest summer row crop planted. When soil temperatures remain at or below 50 degrees F after planting, the damage to germinating seed can be particularly severe.

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 quite variable around the state (Figure 7). The largest variability is from southeast to northwest Kansas; with the earliest last spring freeze date for the southeast region (April 5-15) and latest for the northwest area (>May 3). Corn planting dates before April 15 in the southeast region would increase the likelihood of the crop suffering from a late spring freeze. Similar conditions can be projected for northwest Kansas if corn is planted before May 3.

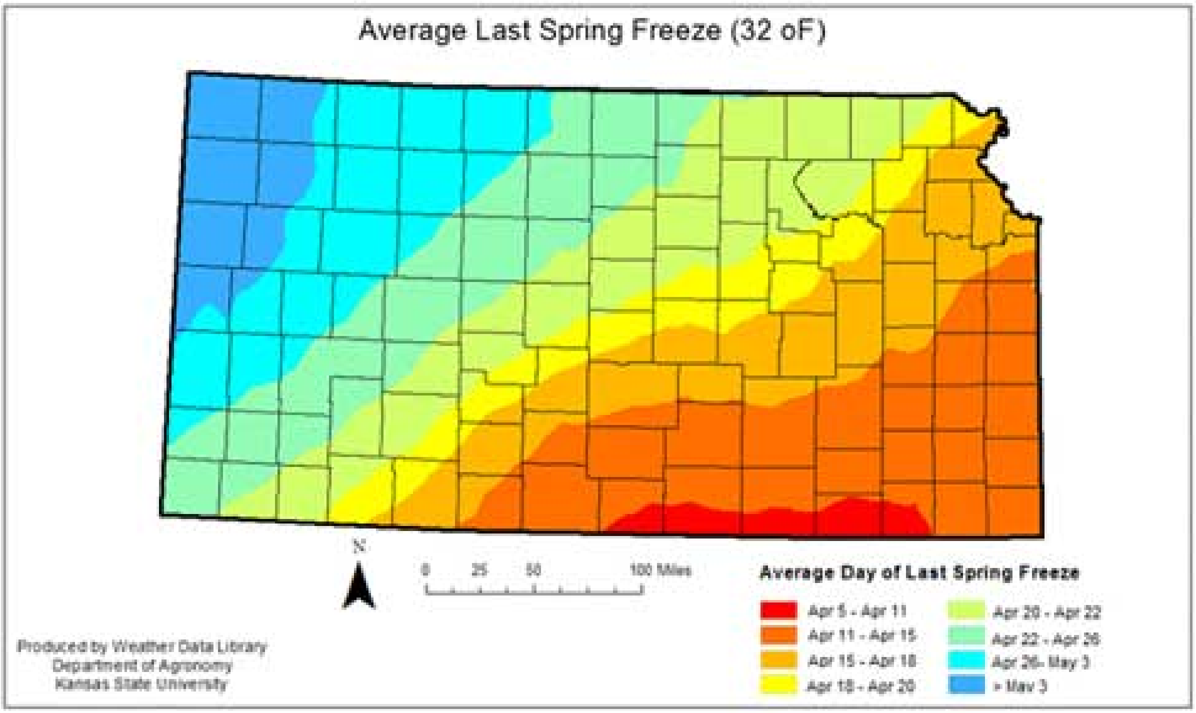

Figure 7. Average last spring freeze (32 degrees F) for Kansas.

Think about all these factors when deciding on the optimal 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

Mary Knapp, Weather Data Library

mknapp@ksu.edu

Christopher "Chip" Redmond, Kansas Mesonet Network Manager
christopherredomond@ksu.edu

7. Noted soil fertility professor to speak on the critical role of extension on March 25

Nationally recognized soil scientist Deanna Osmond will present the 37th annual Roscoe Ellis, Jr. Lectureship in Soil Science at 4 p.m., March 25, 2019 in 1018 Throckmorton Hall on the campus of Kansas State University. The title of the lecture is "Extension made my career fun and relevant: Nutrient management, conservation practices, and water quality."

The lecture is open to the campus community and public.

Osmond is a professor of soil fertility, associate department head, and extension leader in the North Carolina State University Department of Crop and Soil Science. She earned a bachelor's degree in agronomy and anthropology from K-State, master's in soil science from North Carolina State University, and Ph.D. in agronomy from Cornell University.

Osmond works at the interface of nutrient management, conservation practices, and water quality. Her research is focused on agricultural production, reduction of agricultural pollutants through the use of conservation practices including riparian buffers, and the development of decision support systems that function both at the watershed-scale and are applicable to field-scale soil fertility issues. These systems are designed to allow for maximum user flexibility, yet provide reliable information and answers.

For the past 25 years, she has conducted field- and watershed-scale experiments to find conservation practices, including nutrient management, that reduce nutrient loading, especially in impaired watersheds. As an extension specialist, she provides these research results to farmers, agency personnel, and citizens. She has led several national and regional projects to determine the effectiveness of conservation efforts at the watershed scale and transferred the lessons learned to multiple stakeholders.

Osmond is a fellow of the American Society of Agronomy (ASA) and the Soil Science Society of America. She is a recipient of the ASA Distinguished Service Award. Other notable awards include the ASA Agronomic Extension Education Award, Distinguished Service Award from the Corn Growers Association of North Carolina, and the Professional Achievement Award in Water Quality from the Hugh Hammond Bennet Chapter of the Soil and Water Conservation Society.

Osmond will also be presenting a technical seminar on Tuesday, March 26, at 9:30 a.m. in 2002 Throckmorton. The title of this seminar is "Chasing nitrogen from beginning to end: Current nitrogen rate recommendations".

8. 2019 Kansas Leopold Conservation Award Call of Nominations

Since 2015, the Sand County Foundation, in partnership with the Ranchland Trust of Kansas (RTK) and the Kansas Association of Conservation Districts, has recognized a private land owner and/or family in Kansas who exemplifies the land ethic that Aldo Leopold framed in his book, *A Sand County Almanac*. Information and a short video about past recipients can be found on the Sand County Foundation website at https://sandcountyfoundation.org/our-work/leopold-conservation-award-program/state/kansas.

The Leopold Conservation Award honors Kansas farmers, ranchers, and other private landowners who are conservation leaders in the state. Ranchland Trust of Kansas, the Sand County Foundation, and the Kansas Association of Conservation Districts are accepting applications for the 2019 award. Applications for the award must be postmarked by June 1, 2019.

How to apply

Nominations may be submitted on behalf of a landowner or landowners may nominate themselves. Nominators are asked to address five key areas in the application. The key areas include:

- Conservation Ethic
- Resilience
- Leadership and Communication
- Innovation and Adaptability
- Ecological Community

Additionally, three letters of recommendation should be included with the application. The application can be found online at: https://sandcountyfoundation.org/uploads/KANSAS-CFN-19.pdf

Peter Tomlinson, Environmental Quality Specialist
ptomlin@ksu.edu