



K-STATE
Research and Extension

Extension Agronomy

eUpdate

03/17/2017

These e-Updates are a regular weekly item from K-State Extension Agronomy and Steve Watson, Agronomy e-Update 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 Steve Watson, 785-532-7105 swatson@ksu.edu, or Curtis Thompson, Extension Agronomy State Leader and Weed Management Specialist 785-532-3444 cthompso@ksu.edu.

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1. Starter fertilizer rates and placement for corn

Many producers in Kansas could benefit by using starter fertilizer when planting corn. Starter fertilizer is simply the placement of some fertilizer, usually nitrogen (N) and phosphorus (P), near the seed -- which "jump starts" growth in the spring. It is not unusual for a producer to see an early season growth response to starter fertilizer application. But whether that increase in early growth translates to an economic yield response is not a sure thing in Kansas. How the crop responds to starter fertilizer depends on soil fertility levels, tillage system, soil temperature, and N placement method. Phosphorus source is not an important factor.

Soil fertility levels

The lower the fertility level, the greater the chance of an economic response to starter fertilizers. A routine soil test will reveal available P and potassium (K) levels. If soils test low or very low in P, below 20 ppm, there is a very good chance that producers will obtain an economic yield response to applying a starter fertilizer containing P, even in some low-yield environments. If the soil test shows a medium level of P, 20-30 ppm, it's still possible to obtain a yield response to P fertilizer. But the yield response will not occur as frequently, and may not be large enough to cover the full cost of the practice. If the soil test is high, above 30 ppm, economic responses to starter P fertilizers are rare. The chances of an economic return at high P soil test levels are greatest when planting corn early in cold, wet soils. In general, the same principles apply with K. If soil tests are low, below 130 ppm, the chances of a response to K in starter are good. The lower the soil test level, the greater the odds of a response.

All of the recommended P and/or K does not need to be applied as starter. If the soil test recommendation calls for high rates of P and K in order to build up or maintain soil test levels, producers will often get better results by splitting the application between a starter and a preplant broadcast application. As a general rule, starter fertilizer should be limited to the first 20-30 pounds of P or K per acre, with the balance being broadcast for best responses.

Phosphorus source

Does the type of phosphorus used as a starter make any difference? In particular, what about the ratio of orthophosphate to polyphosphate in the fertilizer product? This has been a concern for many producers.

Liquid 10-34-0 is composed of a mixture of ammonium polyphosphates and ammonium orthophosphates. The dissolved ammonium orthophosphate molecules are identical to those found in dry MAP (e.g. 11-52-0) and/or DAP (e.g. 18-46-0). Ammonium polyphosphates are simply chains of orthophosphate molecules, formed by removing a molecule of water, and are quickly converted by soil enzymes back to individual orthophosphates identical to those provided by MAP and/or DAP.

Polyphosphates were developed primarily to improve the storage characteristics of fluid phosphate products (and other fertilizers made from them) and to increase the analysis of liquid phosphate fertilizers. Ammonium polyphosphate is equal in agronomic performance to ammonium orthophosphates when applied at the same P_2O_5 rates in a similar manner. And liquid phosphate products are equal in agronomic performance to dry phosphate products if applied at equal P_2O_5

rates in a similar manner. When polyphosphate is added to soil, a process called hydrolysis breaks down the polyphosphate chains into orthophosphates. The concern of many people is the length of time it takes for this process to occur. Previous studies indicate that **although it may take a few days to complete the hydrolysis process, the majority is completed in 48 hours**. As a result, phosphorus in soil solution will typically be similar from either source shortly after application.

Tillage system

No-till corn will almost always respond to a starter fertilizer that includes N – along with other needed nutrients – regardless of soil fertility levels or yield environment. This is especially so when preplant N is applied as deep-banded anhydrous ammonia or UAN, or where most of the N is sidedressed in-season. That's because no-till soils are almost always colder and wetter at corn planting time than soils that have been tilled, and N mineralization from organic matter tends to be slower at the start of the season in no-till environments.

In general, no-till corn is less likely to respond to an N starter if more than 50 pounds of N was broadcast prior to or shortly after planting.

In reduced-till systems, the situation becomes less clear. The planting/germination zone in strip-till or ridge-till corn is typically not as cold and wet as no-till, despite the high levels of crop residue between rows. Still, N and P starter fertilizer is often beneficial for corn planted in reduced-till conditions, especially where soil test levels are very low, or low, and where the yield environment is high. As with no-till, reduced-till corn is also less likely to respond to an N starter if more than 50 pounds of N was broadcast prior to or shortly after planting.

Conventional- or clean-tilled corn is unlikely to give an economic response to an N and P starter unless the P soil test is low.

Starter fertilizer placement

Producers should be very cautious about applying starter fertilizer that includes N and/or K, or some micronutrients such as boron, in direct seed contact. It is best to have some soil separation between the starter fertilizer and the seed. The safest placement methods for starter fertilizer are either:

- A subsurface-band application 2 to 3 inches to the side and 2 to 3 inches below the seed, or
- A surface dribble-band application 2 to 3 inches to the side of the seed row at planting time, especially in conventional tillage or where farmers are using row cleaners or trash movers in no-till.

If producers apply starter fertilizer with the corn seed, they run an increased risk of seed injury when applying more than 6 to 8 pounds per acre of N and K combined in direct seed contact on a 30-inch row spacing. Nitrogen and K fertilizer can result in salt injury at high application rates if seed is in contact with the fertilizer. Furthermore, if the N source is urea or UAN, in-furrow application is not recommended regardless of fertilizer rate. Urea converts to ammonia, which is very toxic to seedlings and can significantly reduce final stands.

Work at the North Central Kansas Irrigation Experiment Field near Scandia illustrates some of these points (Table 1). In this research, former Agronomist-In-Charge Barney Gordon compared in-furrow, 2x2, and surface band placement of different starter fertilizer rates in a multi-year study on irrigated

corn. Excellent responses from up to 30 pounds of N combined with 15 pounds of P were obtained with the both the 2x2 and surface-band placement. In-furrow placement however, was not nearly as effective. This was due to stand reduction from salt injury to the germinating seedlings, likely due to the high application rate of N plus K in furrow, indicating the importance of monitoring the N+K rates for in furrow application. Where no starter, or the 2x2 and surface band placement, was used, final stands were approximately 30-31,000 plants per acre. However, with the 5-15-5 in furrow treatment, the final stand was approximately 25,000. The final stand was just over 20,000 with the in-furrow 60-15-5 treatment.

Table 1. Effect of Starter Fertilizer Placement on Corn Yield at			
North Central Irrigation Experiment Field			
Yield (bu/acre)			
Fertilizer Applied (lbs)	In-Furrow Placement	2x2 Band Placement	Surface Band Placement
Check: 159 bu	--	--	--
5-15-5	172	194	190
15-15-5	177	197	198
30-15-5	174	216	212
45-15-5	171	215	213
60-15-15	163	214	213
Average	171	207	205

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2. Management strategies for Sudden Death Syndrome in soybeans

With the prevalence of Soybean Sudden Death (SDS) in the Kansas River Valley, multiple studies involving SDS have been conducted at Kansas River Valley Experiment Field the past several years. The following is a summary of several of the studies that provide some clues on how to reduce the severity of SDS and improve the profitability of soybeans.

Soil fertility

The first step to help reduce the severity of SDS is proper fertility. Results from a long-term macronutrient fertility study at the Kansas River Valley Experiment Field with a corn/soybean rotation have shown that soil phosphorus (P) levels can have a significant influence on the severity of SDS (Table 1). During the soybean rotation phase of the study in 2014 and 2016, SDS symptoms increased significantly as P fertility decreased.

P rate on corn (lb/acre)	Soil Test P lb/acre	2014 Leaf phosphorus (ppm)	SDS severity (% foliage affected)	NDVI ¹	Height (in.)	Yield (bu/a)
0	13	0.15	40.3	0.768	32.2	40.3
30	30	0.18	27.7	0.795	37.8	52.5
60	92	0.26	16.2	0.809	39.3	61.2
LSD (0.05)	8.8	0.01	10	0.013	1.5	4.3

¹ Normalized difference vegetation index.

After more than 30 years with no P added prior to the corn crop, the P level in the top foot of soil was 13 lbs per acre, compared to 92 lbs per acre where 60 lb of P₂O₅ had been added every other year. Where no P had been applied, the percent defoliation by SDS at R6 averaged 39% in 2014 and 2016 compared to 16% with the 60-lb rate, resulting in a yield increase of 21 bu/acre or more than 50%. Nitrogen and potassium rates applied to the corn had little or no effect on SDS symptoms in soybeans. Paying attention to P levels in the soil is an important step to reduce the severity and yield loss to SDS.

Variety selection

The next step in management of SDS is the selection of soybean varieties that have tolerance or resistance to SDS, with good yield potential. Yields of soybean varieties can differ greatly when SDS is present. Entries in the Kansas Soybean Performance Variety Trials have been rated for severity of SDS at the Kansas River Valley Experiment Field over the last several years (Figure 1). Significant differences in the severity of SDS and seed yield have been observed between varieties (Figures 2 and 3). Each year over the past 3 years SDS severity and seed yield have been negatively correlated, with a yield range of more than 20 bu/acre. Proper variety selection can result in significant yield increases in the presence of SDS.



Figure 1. Sudden Death Syndrome: tolerant vs. susceptible soybean varieties at the Kansas River Valley Experiment Field, Rossville. Photo by Eric Adee, K-State Research and Extension.

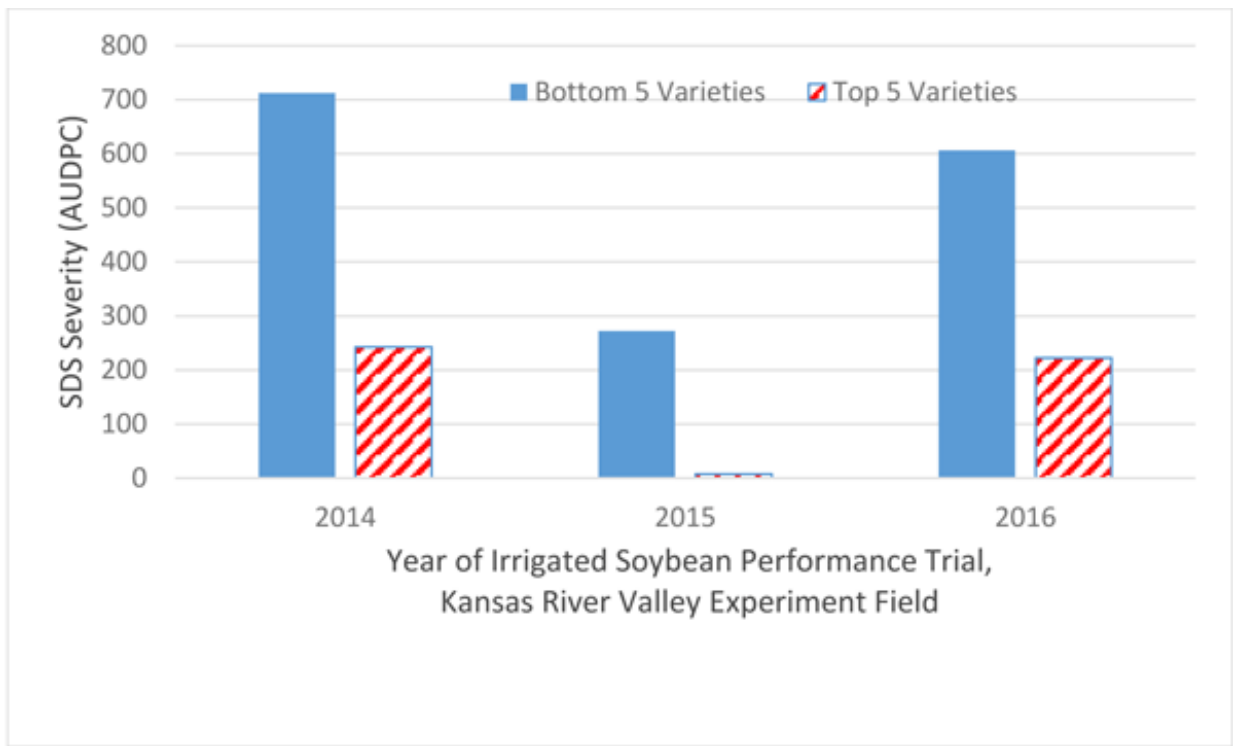


Figure 2. Average area under disease progress curve (AUDPC) for SDS for top 5 most resistant and bottom 5 most susceptible (to SDS) varieties in the irrigated soybean performance trial at the Kansas River Valley Experiment Field.

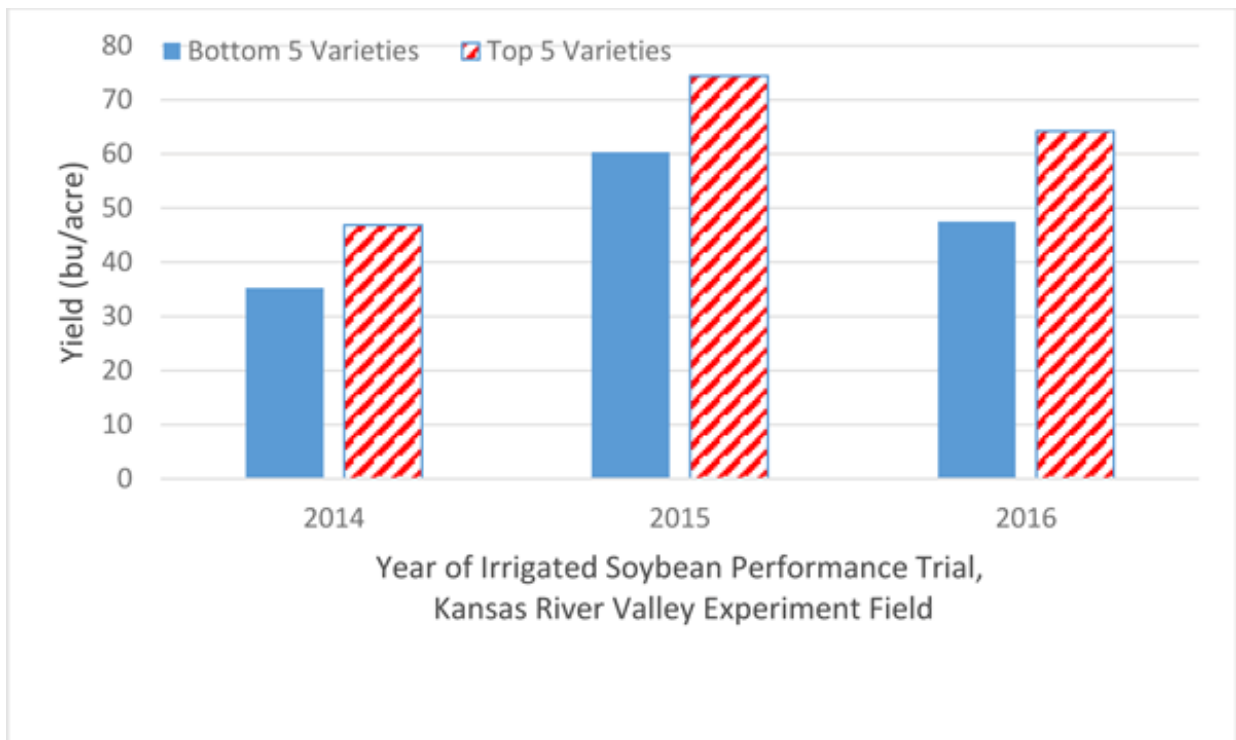


Figure 3. Average yield of top 5 most resistant and bottom 5 most susceptible (to SDS) varieties in irrigated soybean performance trial at the Kansas River Valley Experiment Field.

Seed treatment

A number of compounds have been tested at the Kansas River Valley Experiment Field for their effectiveness in reducing the severity and yield loss to SDS, including seed treatments, and in-furrow and foliar-applied products. Some of the more promising products have been seed treatment and in-furrow products. However, currently only one product, ILeVO (Bayer), has successfully made it to market. Over several years of data at the Kansas River Valley Experiment Field, the seed treatment, ILeVO (fluopyram), has increased soybean yields by more than 30%, or 12 bu/acre, in soybeans with high levels of SDS (Tables 2 and 3), and more than 2.6%, or 2 bu/acre, when the severity of SDS was low (Table 4).

Soybean varieties	Most resistant	Moderately resistant	Susceptible	Most resistant	Moderately resistant	Susceptible
Seed treatments	Yield (bu/acre)			% leaf area with SDS at R6		
Check	28.6	29.2	21.3	18	44	63
ILeVO ¹ at higher rate	41.6	39.7	37.4	4	28	45
ILeVO at lower rate	42.9	41.0	26.2	5	28	72
LSD 0.05	8.3 bu/A			17.4%		

¹ Bayer CropScience (Research Triangle Park, NC).

Seed treatments	Yield (bu/acre)	SDS Severity (% leaf area at R6)	SDS Severity (AUDPC)	NDVI
Check	47.4 g	52 a	696 ab	0.834 bc
ILeVO ¹ (0.15 mg)	59.6 a	16 bc	146 c	0.846 ab
ILeVO (0.075 mg)	57.0 d	31 ab	443 bc	0.835 bc
LSD 0.05	0.06	22.9	354	0.021

¹ Bayer CropScience (Research Triangle Park, NC).

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Variety (in order of resistance)	Yield (bu/acre)		SDS Severity (% leaf area @R6)		SDS Severity (AUDPC)	
	Without ILeVO ¹	With ILeVO	Without ILeVO	With ILeVO	Without ILeVO	With ILeVO
A (most resistant)	67.7	69.5	1.2	1.2	17	13
B	58.0	58.6	2.3	2.3	56	34
C	57.1	59.2	4.7	1.2	45	16
D	60.7	64.5	20.0	11.2	518	102
E (least resistant)	55.4	61.1	21.1	4.7	345	94
LSD 0.10	4.2		8.1		94	

¹ Bayer CropScience (Research Triangle Park, NC).

Planting date

Traditionally, soybean planting dates in the Kansas River Valley have been delayed until after mid-May to help avoid the development of SDS. For the last two years in planting date studies at the Kansas River Valley Experiment Field, SDS symptoms have been more severe in earlier plantings (first of May). As the planting dates progressed later the severity of SDS decreased. However, the highest yields in these studies occurred with the earlier planting dates, in spite of the increase in SDS. Yields decreased by an average of almost 0.5 bu per day for more tolerant varieties when planting was delayed after the end of April/first of May, and 0.3 bu per day for the more susceptible varieties. In both years of these studies, the severity of SDS was not as high as previously observed at the Kansas River Valley Experiment Field.

Summary

Based on research over several years at the Kansas River Valley Experiment Field there are several management practices that can help reduce the yield loss to SDS. Those measures include proper soil P levels and planting the best variety with fluopyram seed treatment applied as early as agronomically practical.

These practices have significantly increased soybean yields in fields in the Kansas River Valley that regularly have SDS. Research continues to help fine-tune and improve the management of growing soybeans with the risk of SDS.

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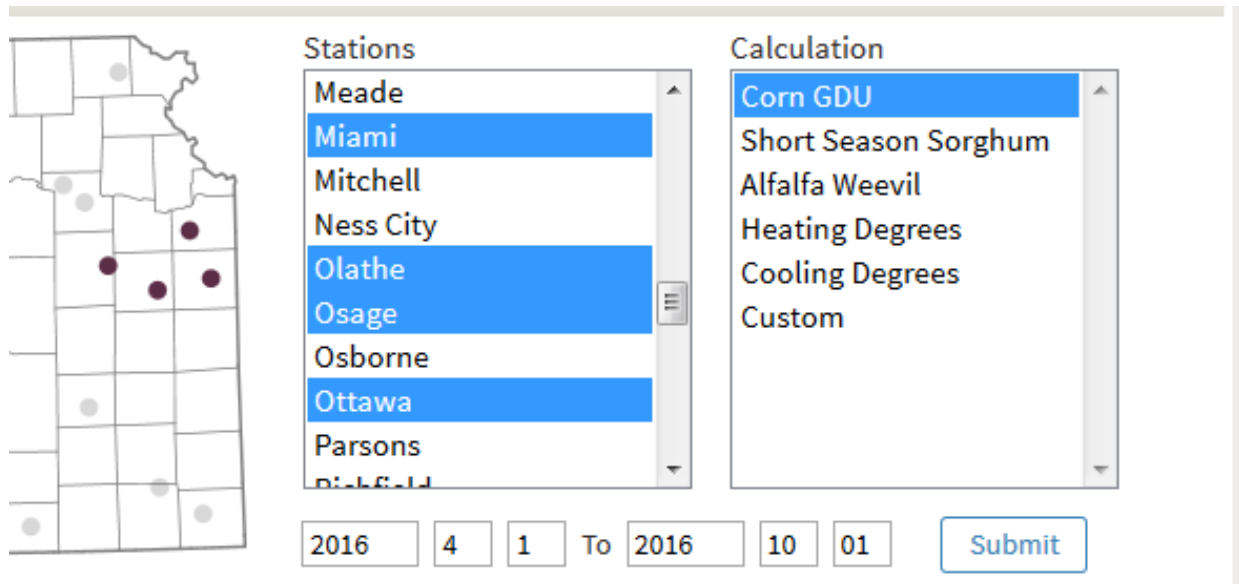
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3. New Mesonet Growing Degree Day calculation web page

Degree days have been featured on the Kansas Mesonet page since the beginning. However, the reports were limited to the growing season (April-October) and to corn and sorghum. The new [Degree Days page](#) is designed to provide greater flexibility for our users, including options to select the time period and more built-in calculations. Because of the flexibility, it is somewhat more complicated than the old version. Here's a run-down of the new features.

Inputs



The screenshot displays the web interface for calculating degree days. On the left is a map of Kansas with several station locations marked by dots. The central part of the interface features a 'Stations' dropdown menu with the following options: Meade, Miami, Mitchell, Ness City, Olathe, Osage, Osborne, Ottawa, and Parsons. To the right is a 'Calculation' dropdown menu with options: Corn GDU, Short Season Sorghum, Alfalfa Weevil, Heating Degrees, Cooling Degrees, and Custom. Below these menus are two date input fields: the first shows '2016' followed by '4' and '1', and the second shows '2016' followed by '10' and '01'. A 'Submit' button is located to the right of the date fields.

- **Station selection:** Instead of the old “select by region” scheme, stations can now be selected by name from the selection menu. On desktop computers, a map is also displayed and can be used to select stations. From this menu, the option is also available to select multiple stations. On desktop computers, use ctrl-click to highlight the stations wanted.
- **Calculation selection:** We have expanded the list of possible degree days or growing degree units users can calculate. If none of these quite fit your need, you can select “Custom” to enter your own parameters for the equation (more on that later). We are accepting additional equations/considerations to add to this menu.
- **Beginning/Ending dates:** Producers can now enter the exact day of interest as the beginning date. The end date defaults to the current date. Dates from previous years can also be selected.
- **Submit Button:** click to request data for the given time period.

The Custom equation allows the user to enter a formula based on their specific needs:

Custom Equation ◀

$$GDU = \frac{\text{Daily Max Air Temp} + \text{Daily Min Air Temp}}{2} - \text{Base Temp}$$

Temperatures above Tmax will be set to Tmax Tmax:

Temperatures below Tmin will be set to Tmin Tmin:

2016-04-01 — 2016-10-01

Custom Equation

- **Equation:** View the equation used to calculate the degree days. If using the “Custom” Calculation option the equation will additionally allow you to set the base, maximum, and minimum temperatures. Click “Apply” to view the results in the table. The “References” section at the bottom of the page provides the publications from which the equations are drawn.

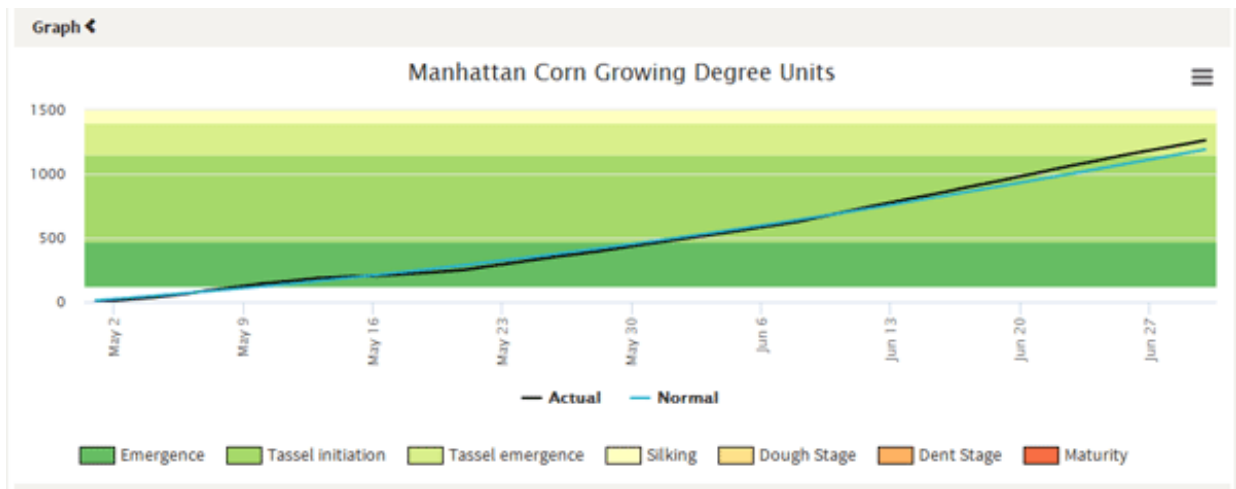
Outputs

2016-04-01 — 2016-10-01			
Station	Actual	Custom Equation	
		Normal	Departure
Miami	4137	3711	426
Olathe	3992	3657	336
Osage*	3828	3641	194
Ottawa	Osage is missing 3 value(s) 3984	3693	291

*Calculated with missing data. See CSV Data :: Full Data Set for details

- **Table:** As before, the table displays the actual degree units, the normal degree units and the departure from normal, but adds some new features:
 - **Sorting data:** When pulling data for several stations, clicking on the Actual/Normal/Departure headers will sort records according to the header.
 - **Missing data:** An asterisk (*) beside a station name indicates that the station had an incomplete data set for the requested time period. Hovering the mouse over the station name will display how many records are missing. To examine the data more

closely, see "CSV" below.



- **Graph:** Day-by-day data can be graphed for each station as well, by clicking the "Graph" button. The graph is fully interactive and can be saved or printed (see menu in upper right corner of graph). Clicking and dragging across the graph allows the user to zoom in on a time period.
- **CSV Data:** All data is available for download in Comma Separated Value (CSV) format. The CSV data section gives users the option of downloading the Summary Data (shown in the table) or the Full Data Set (including normal and max/min temperatures for each day). Clicking "Display" will show the data in a new browser window. Clicking "Download" will download the CSV file.
- **References:** Shows a list of publications from which the equations are drawn.

If you have questions about the product, please don't hesitate to contact us.

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4. Soil temperatures: Current as of mid-March and projected

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 warm start to March, air temperatures across Kansas declined this past week.

For the week of March 8-14, average weekly soil temperatures at 2 inches varied greatly among crop reporting districts, overall ranging from 39 to 53 degrees F (Fig. 1). For example, in the NE region, soil temperatures ranged from 45 to 46 F; while in the SW region, soil temperatures varied from 46 to 49 F, and even a bit warmer in a small area in the southernmost portion of the SC district (Fig. 1). Soil temperatures were below 45 F for the NW region.

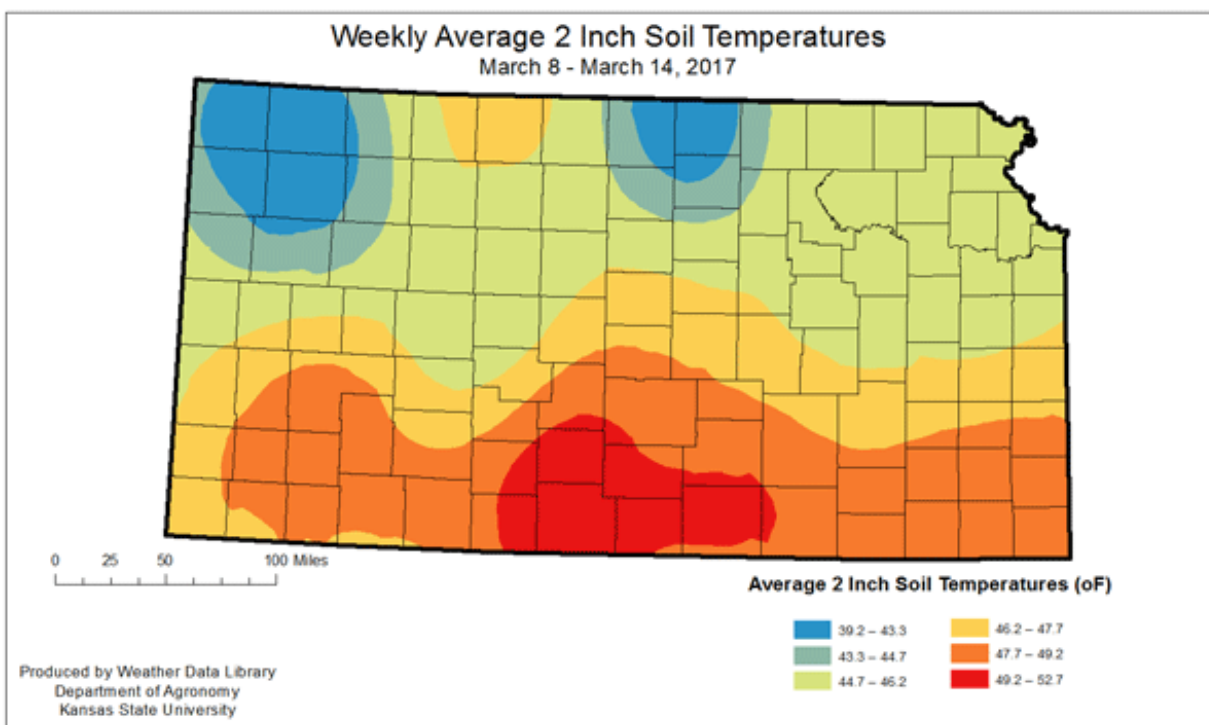


Figure 1. Average soil temperatures at 2-inch depth for the week of March 8-14, 2017.

Differences in soil temperature were primarily related to the large variations in air temperatures, from 33 F north of the state to 50 F for the SE portion of Kansas, experienced last week (Fig. 2).

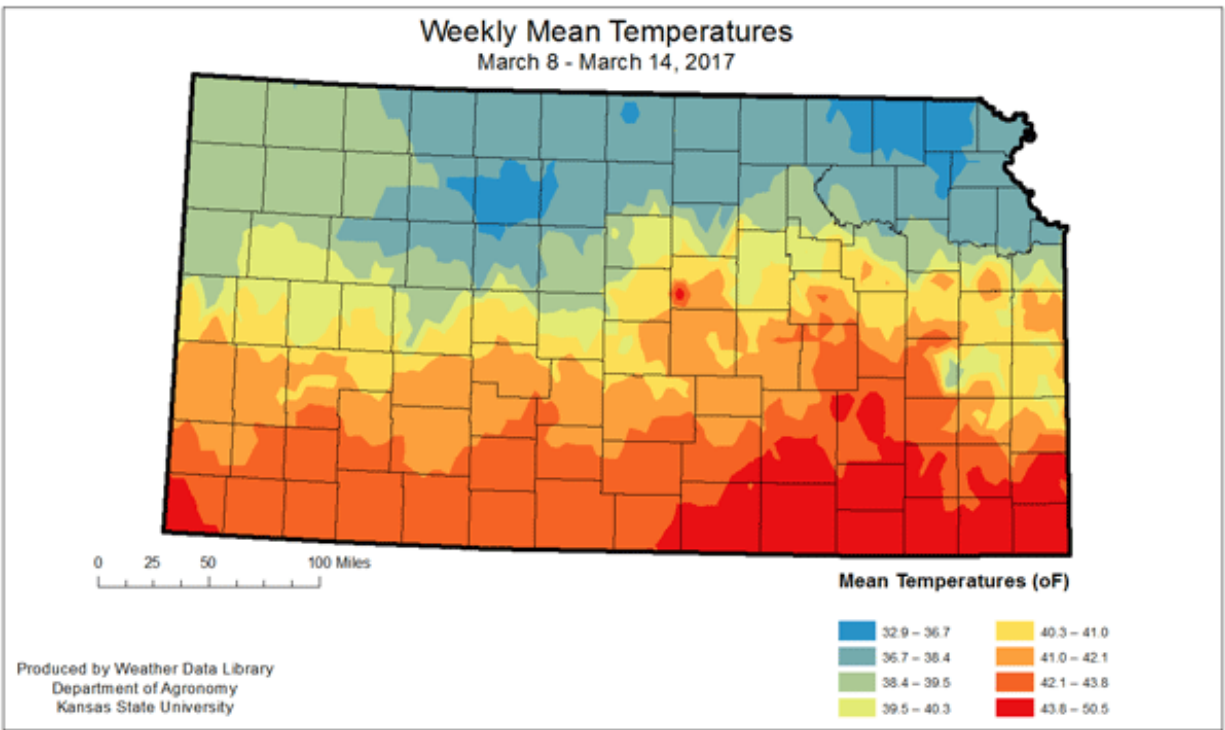


Figure 2. Weekly mean air temperatures for the week of March 8-14, 2017.

Projections for the coming weeks are for increasing air temperatures – warmer than normal for the southern part of the state, which can increase soil temperatures (Fig. 3). The actual change in soil temperatures in any given field will be affected by amount of residue cover, amount of soil moisture, and landscape position. Wet soils in a no-till situation will be slower to warm. Dry soils will vary more rapidly, matching air temperatures.

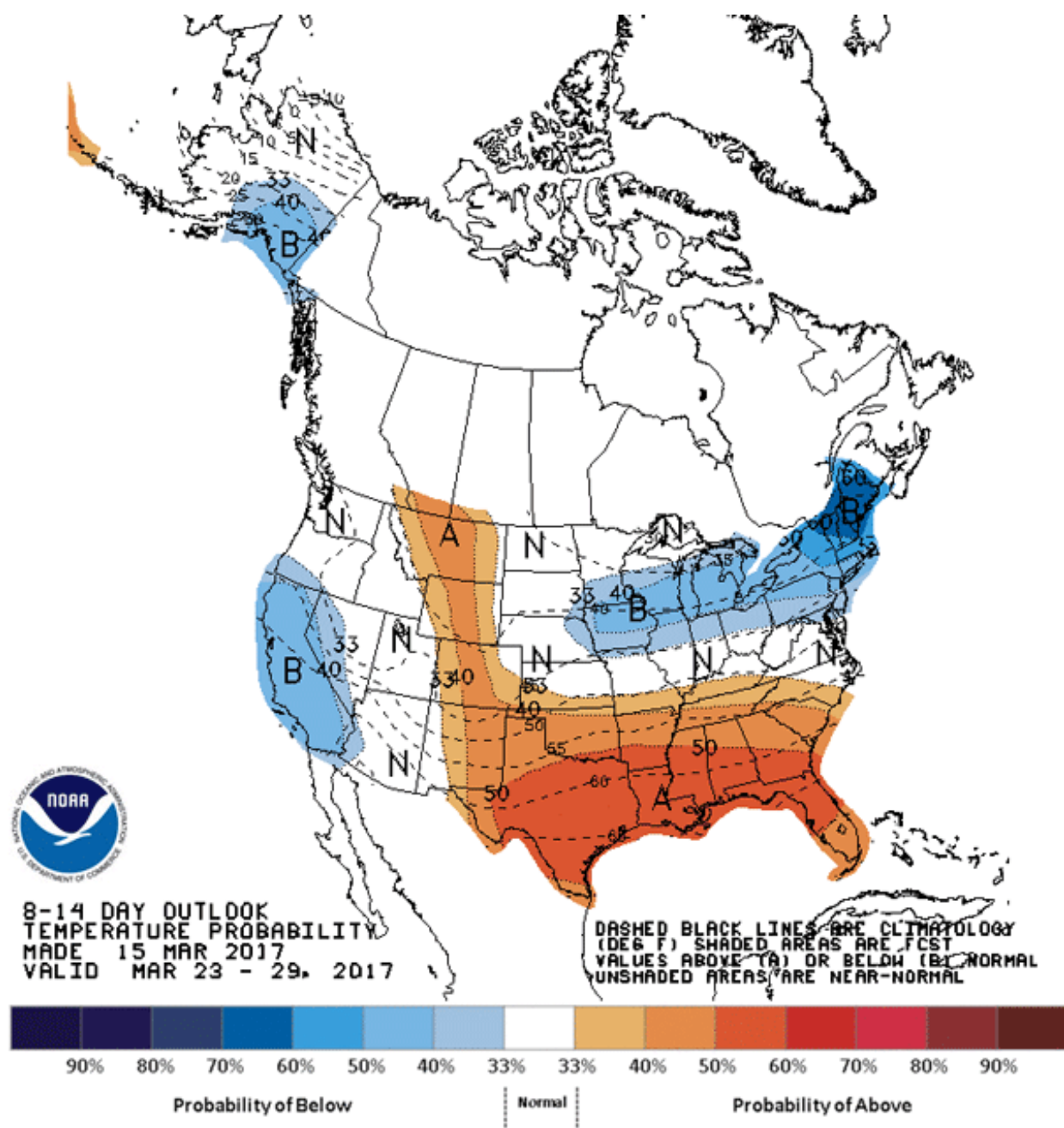


Figure 3. 8-14 Day outlook temperature probability for March 23-29, NOAA.

Current moisture status across the state is quite dry, with the largest weekly departure in precipitation in the NE corner of the state (Fig. 4). Projections for coming weeks are for precipitation to be above normal for the entire state (Fig. 5), which can also slow down soil warming conditions and potential plans for an early start to planting.

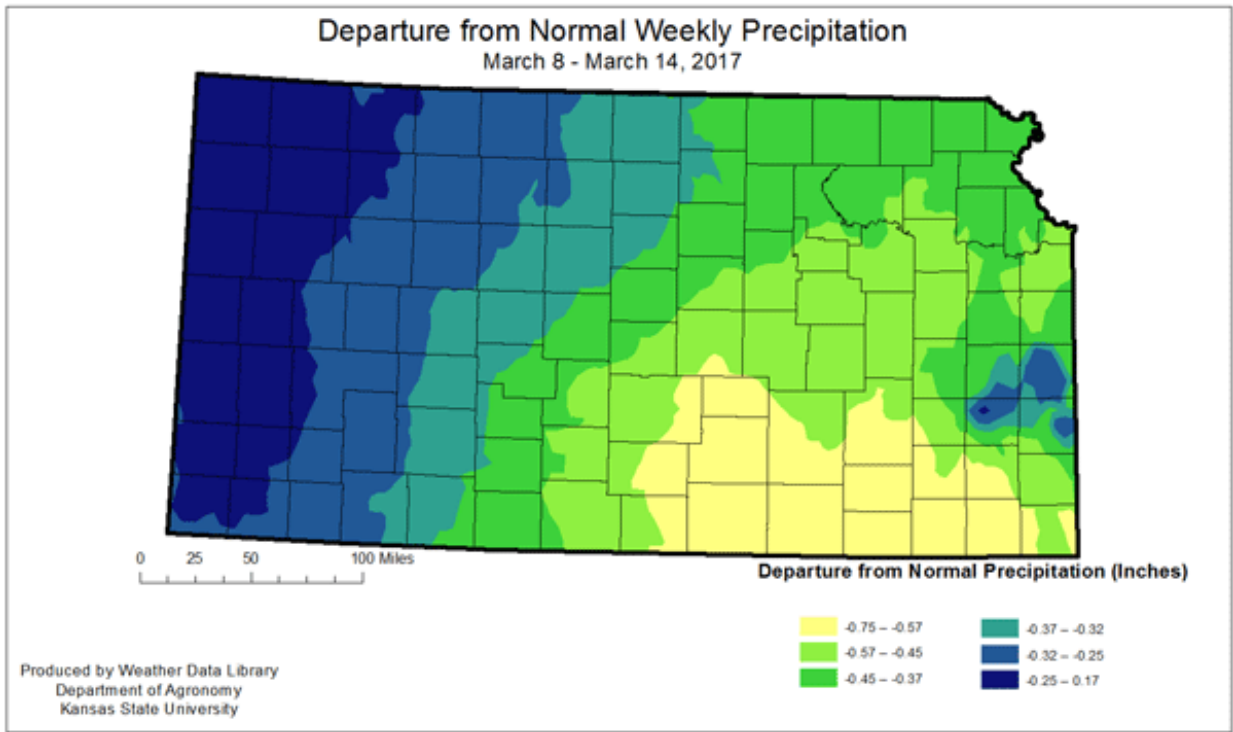


Figure 4. Departure from normal precipitation for the week of March 8-14, 2017.

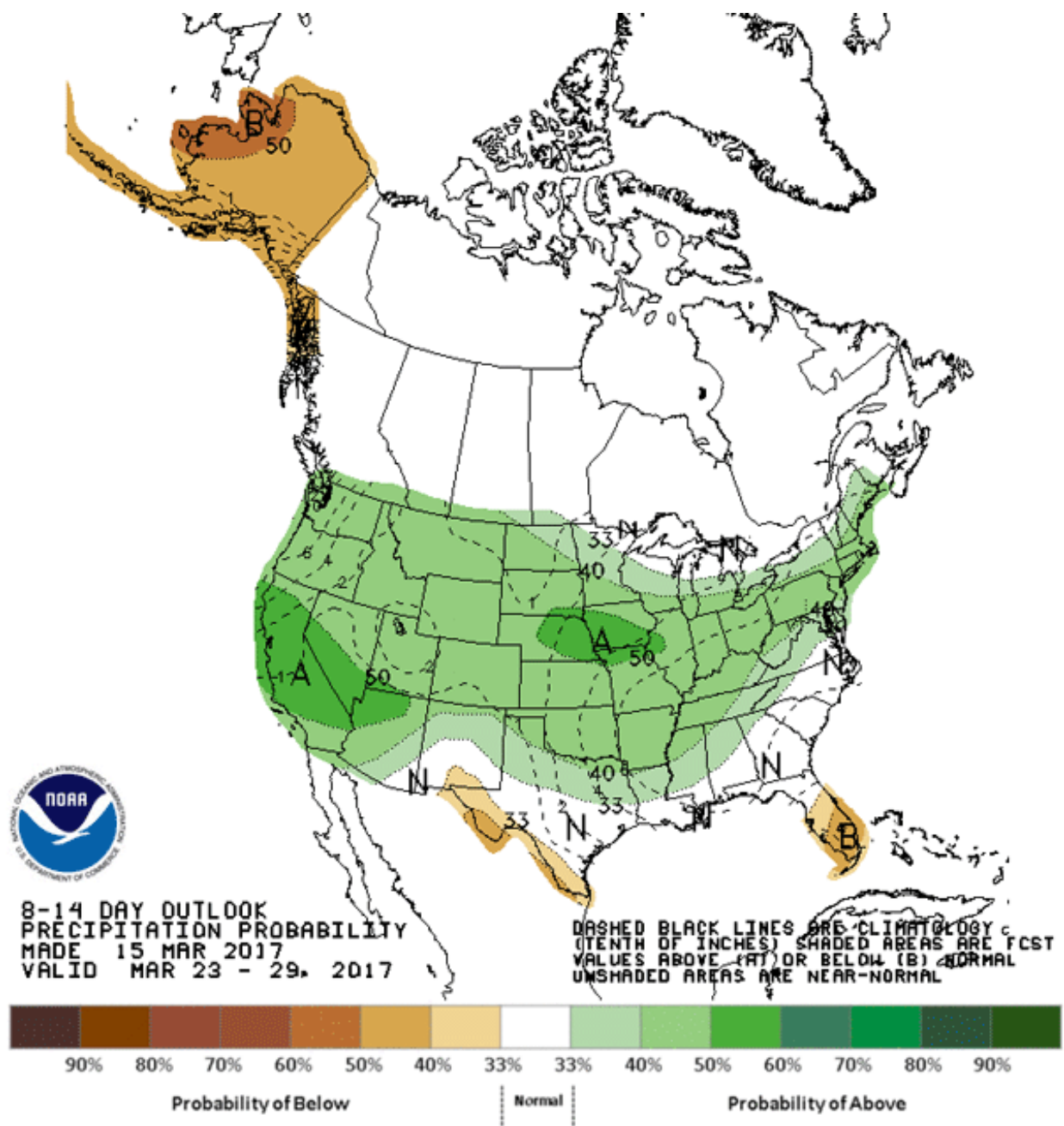


Figure 5. 8-14 Day outlook precipitation probability for March 23-29, NOAA.

Each summer row crop has an optimal soil temperature for emergence. A minimum for corn is 50 F for germination and early growth. However, uniformity and synchrony in emergence is primarily achieved when soil temperatures are above 55 F. Uneven soil temperatures around the seed zone can produce non-uniform crop germination and emergence. Lack of uniformity in emergence can greatly impact corn potential yields.

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.

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 (Fig. 6). The largest variability is from SE to NW Kansas; with the earliest last spring freeze date for the SE region (April 5-15) and latest for the NW area (>May 3). Corn planting dates before April 15 in the SE region would increase the likelihood of the crop suffering from a late spring freeze. Similar conditions can be projected for NW Kansas if corn is planted before May 3.

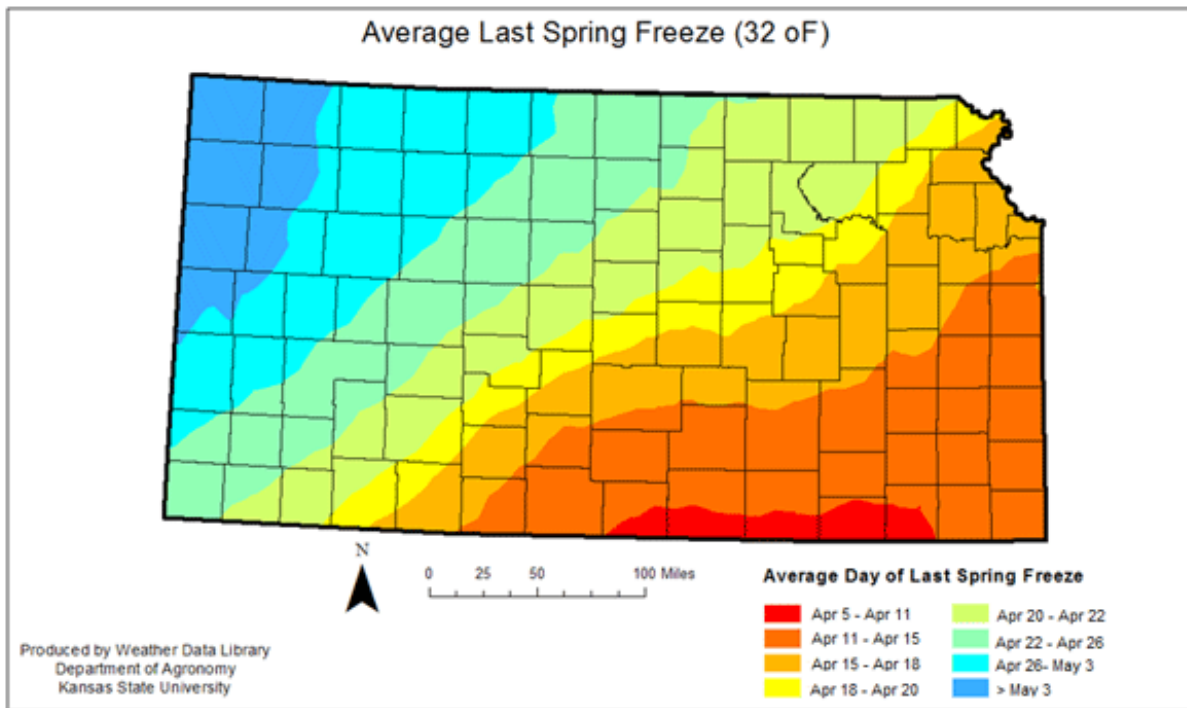


Figure 6. Average last spring freeze (32 F) for Kansas.

Think about all these factors when deciding on the optimal planting time. More information about planting status of summer row crops will be provided in upcoming issues of the Agronomy eUpdate. Stay tuned!

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5. Wheat condition after recent cold snap

The week of March 8 - 14 brought to most of the wheat in Kansas some colder temperatures to help slow down crop development, to a certain extent. Mean temperatures during that period ranged from slightly above 32° in the northern tier of counties, to as high as about 50° F in the southeast portion of the state (Fig. 1). Compared to the long-term normal, weekly temperatures were below average for most of the central portion of the state, but above normal in western Kansas.

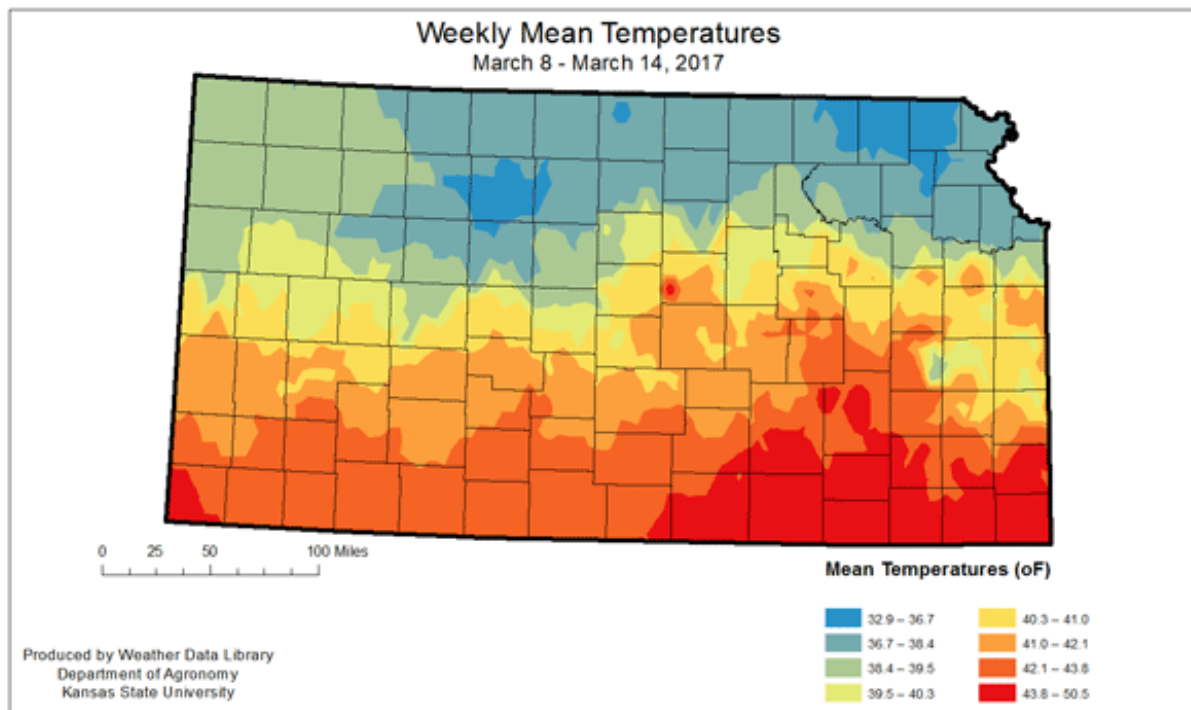


Figure 1. Weekly mean (upper panel) and departure from mean (lower panel) normal temperatures for the week of March 8 – March 14.

While these cooler temperatures helped hold crop development back to a certain extent, producers are concerned with possible winterkill, as coldest air temperatures were below 20° F for most of the western third of the state, reaching values as low as 9° F near Tribune (Fig. 2). These temperatures are enough to cause damage to developing wheat, provided that the growing point is above ground (jointing or later stages).

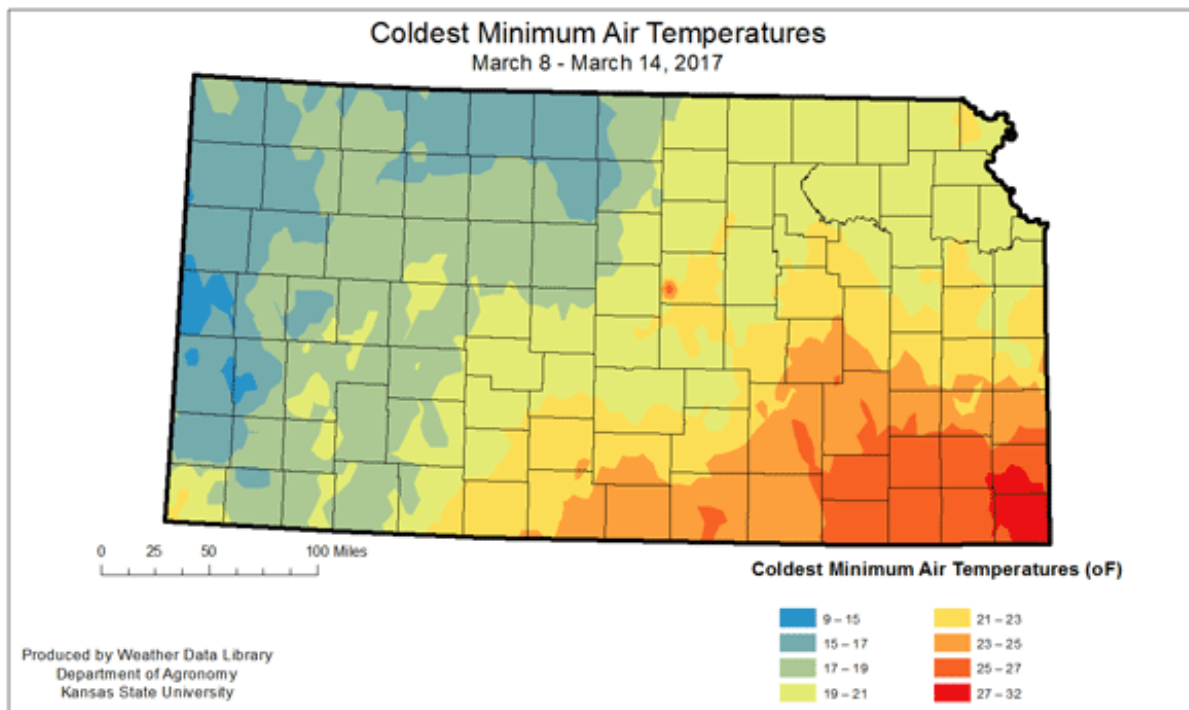


Figure 2. Coldest minimum air temperatures during the March 8-14 period.

While the western third of the state had temperatures lower than the damage threshold for jointed wheat, the majority of the fields in that region are not yet at that stage. They are just now greening up and the growing point is well protected below ground. In regions where the crop is further along in development, such as south central and southeast Kansas, temperatures did not reach critical limits to damage the growing point. Additionally, soil temperatures were consistently above freezing, with exception of a few isolated pockets in north central Kansas (Fig. 3), which should also help insulate the growing point and protect the crop in most areas of the state. Thus, we don't expect to see serious damage from the latest cold spell to the wheat crop.

Air temperatures were cold enough to cause leaf tissue damage, though. Many fields between Sedgwick and Saline Counties reported yellowing of the fields (Fig. 4), which is caused by leaf tip dieback from cold damage. As long as the growing point is intact, this damage should be mostly cosmetic and should not hurt yields. Thus, we believe that this cold spell will, if anything, be good for the crop by slowing its development for the time being. For a more detailed crop development by variety, please see the accompanying article on first hollow stem in this issue of the Agronomy eUpdate.

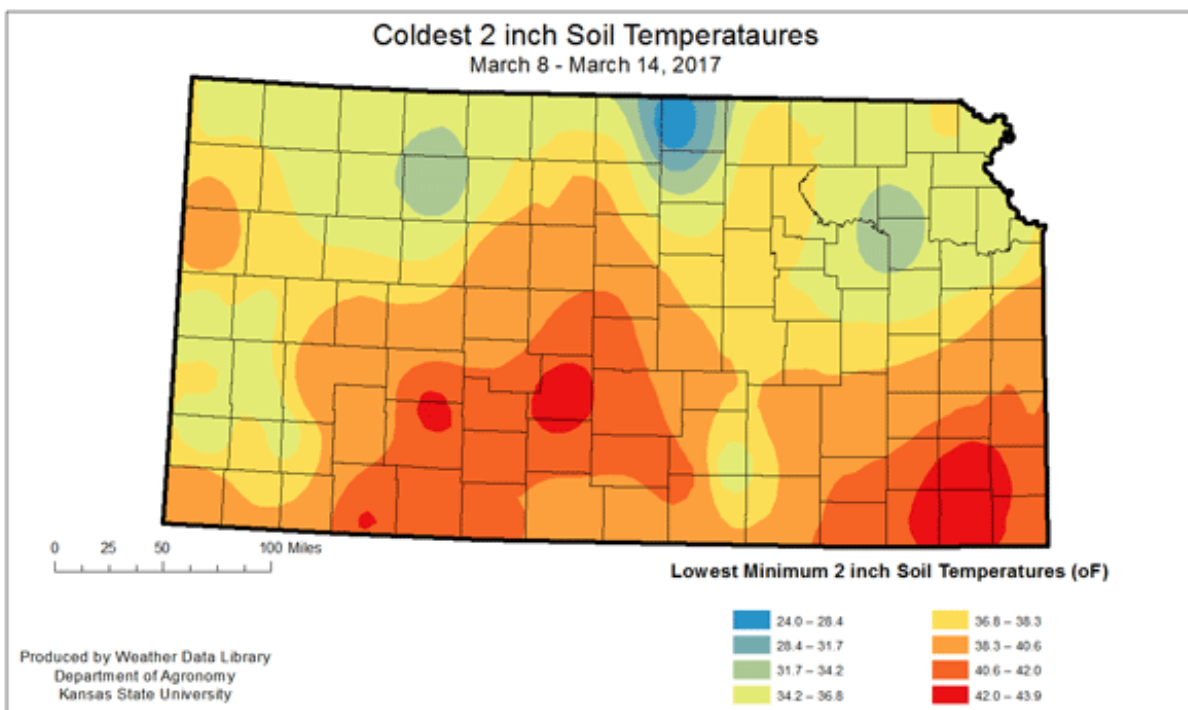
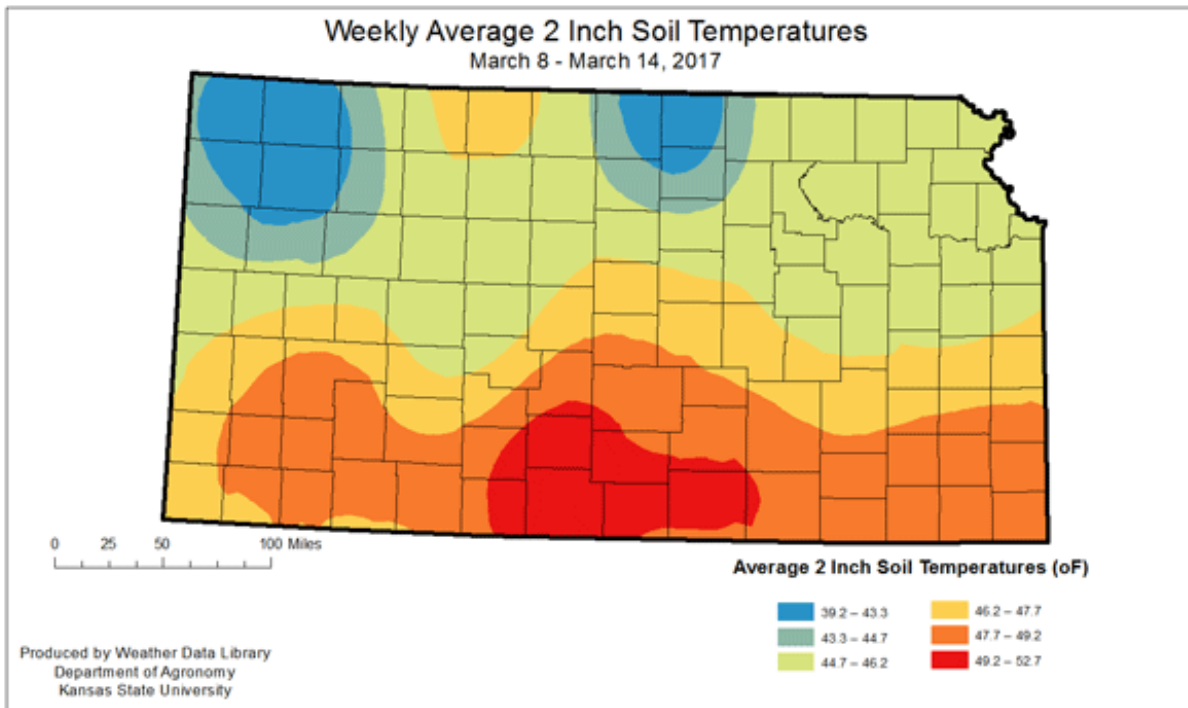


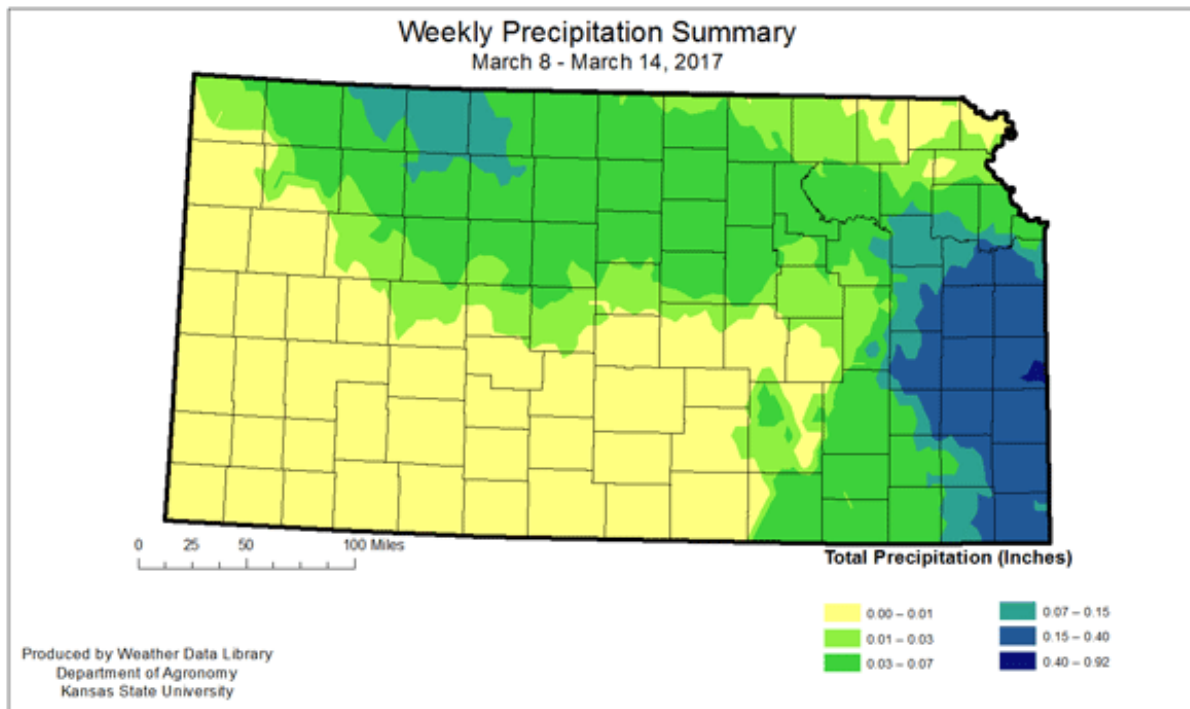
Figure 3. Weekly average (upper panel) and coldest (lower panel) soil temperatures at 2" depth.



Figure 4. Yellowing of bottom parts of the field (upper panel) caused by leaf tip dieback (bottom panel) resultant from cold temperatures. Photos by Romulo Lollato, K-State Research

and Extension.

In addition to cold temperatures, moisture also remains a concern throughout the state. While the northwest and the eastern portions of Kansas received precipitation either as rainfall or snowfall during this last week (Fig. 5), totals were very limited (less than 0.15" for most of the state) and should not benefit the crop a great amount, except in far eastern Kansas. The majority of the state is still in need of more significant precipitation, which would help both relief drought stress and, in many regions, ensure the fertilizer is in the root zone.



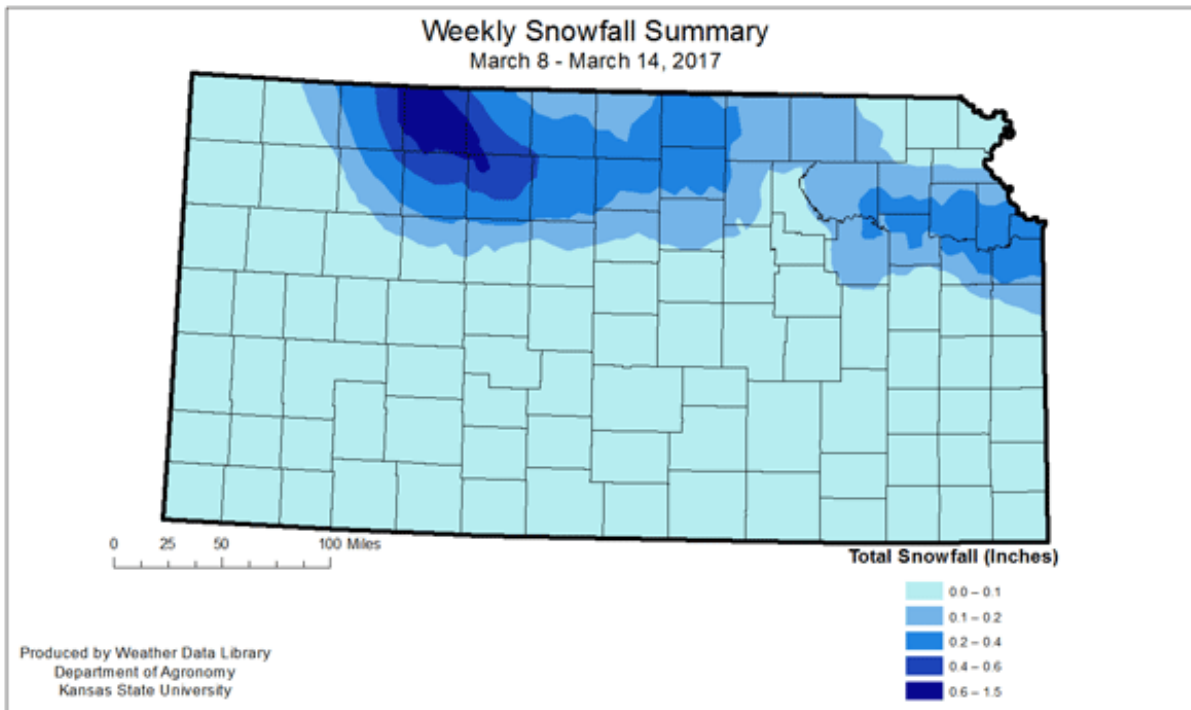


Figure 5. Weekly precipitation (upper panel) and snowfall (lower panel) totals for the period of March 8 – 14.

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6. First hollow stem update: March 17, 2017

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 [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 of 20 different commonly grown wheat varieties and experimental lines in Kansas. The varieties are in a September-sown replicated trial at the South Central Experiment Field near Hutchinson, in cooperation with Gary Cramer, Agronomist-in-Charge of the Field.

Ten stems are split open per variety per replication, for a total of 40 stems monitored per variety. The average length of hollow stem is reported for each varieties in Table 1.

Variety	Hollow stem length (cm)						
	2/17/17	2/22/17	3/3/17	3/5/17	3/19/17	3/13/17	3/16/17
1863	0.02	0.26	0.42	0.95	1.58	-	-
Bentley	0.03	0.17	0.25	0.44	0.44	0.59	0.71
Doublestop	0.02	0.16	0.20	0.51	0.59	0.77	0.99
Everest	0.04	0.23	0.38	0.83	1.30	2.20	-
Gallagher	0.05	0.33	0.58	0.97	1.53	-	-
IBA	0.03	0.31	0.38	0.72	1.01	1.57	-
KanMark	0.04	0.22	0.34	1.00	0.87	1.39	2.01
KS061193K- 2	0.03	0.33	0.34	1.02	1.04	1.30	1.67
KS080448C* 102	0.01	0.06	0.33	0.51	0.57	0.77	0.62
Larry	0.03	0.16	0.18	0.57	0.56	0.70	0.76
OK11D2505 6 ¹	0.02	0.18	0.44	0.76	0.99	1.74	-
OK12716	0.03	0.20	0.27	0.66	0.77	1.11	1.29
OK12DP220 02-042	0.03	0.19	0.40	0.89	1.30	1.56	-
Ruby Lee	0.02	0.20	0.27	0.82	1.16	2.02	-
Stardust	0.02	0.34	0.53	1.01	1.13	1.57	-
SY Flint	0.03	0.30	0.46	0.96	1.12	1.48	1.58
SY Grit	0.02	0.22	0.48	1.06	1.53	-	-
SY Llano	0.01	0.38	0.60	1.39	2.67	-	-
Tatanka	0.03	0.18	0.35	0.50	0.51	0.95	1.07

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Zenda	0.04	0.30	0.36	1.02	0.93	1.90	-
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Table 1. Length of hollow stem measured March. 16, 2017 of 20 wheat varieties sown mid-September 2016 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).

¹ OK11D25056 will be released as “Smith’s Gold”

Three varieties reached first hollow stem between March 13 and March 16 (Table 1), demonstrating how fast this stage can be reached -- within only a few days. Varieties that reached first hollow stem within the last few days include KanMark, KS061193K-2, and SY Flint. Only six varieties have not yet reached this stage, but two of them are rapidly approaching (Tatanka and OK12716). Producers growing these varieties in south central Kansas should have already removed cattle by now, unless intending to graze out the crop (please see article on wheat grazeout decision [here](#)). First hollow stem will be achieved within a few days for all of the varieties being evaluated. Thus, producers should closely monitor first hollow stem development in their wheat pastures at this time.

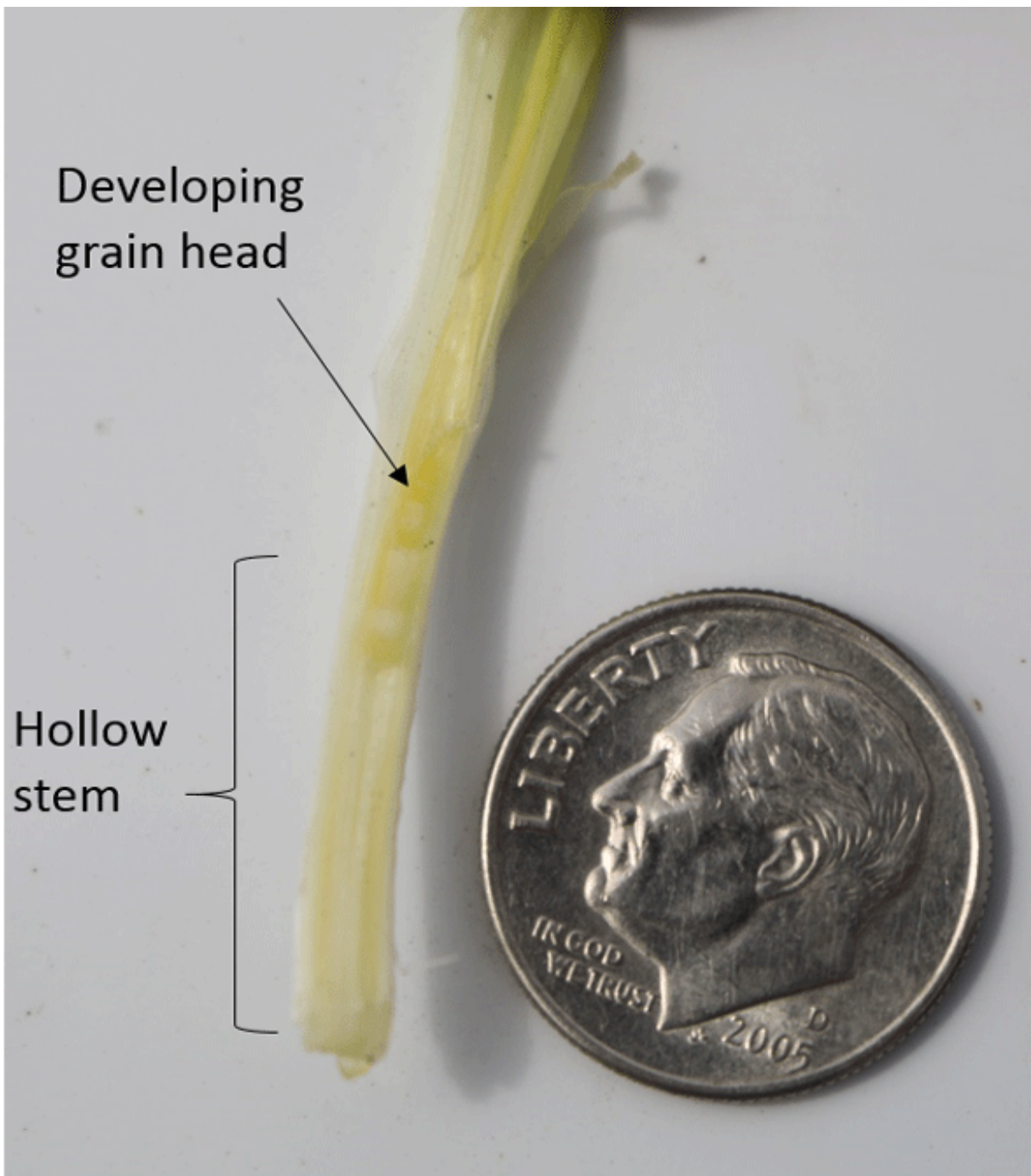


Figure 1. Depiction of the first hollow stem stage or growth in wheat. Photo by Romulo Lollato, K-State Research and Extension.

How do these values compare to other growing seasons for Kansas?

Unfortunately, we do not have a history of first hollow stem measurements in Kansas to which we can compare these averages. Our best benchmark is the 2015-16 growing season, which was the first year of these measurements in Hutchinson. That season was also characterized by a mild winter and

the wheat was approximately 2 weeks ahead of its normal growing cycle at this point. During the 2015-16 growing season, all varieties evaluated reached first hollow stem between March 5th and 9th. In the current season, only the very early varieties reached this threshold by the same day of the year. Thus, the wheat during the 2016-17 growing season seems to be slightly behind in development as compared to the previous year, but still ahead of what would be normal.

The intention of this report is to provide producers a weekly 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.

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7. Comparative Vegetation Condition Report: March 7 - 13

The weekly Vegetation Condition Report maps below can be a valuable tool for making crop selection and marketing decisions.

The objective of these reports is to provide users with a means of assessing the relative condition of crops and grassland. The maps can be used to assess current plant growth rates, as well as comparisons to the previous year and relative to the 27-year average. The report is used by individual farmers and ranchers, the commodities market, and political leaders for assessing factors such as production potential and drought impact across their state.

The Vegetation Condition Report (VCR) maps were originally developed by Dr. Kevin Price, K-State professor emeritus of agronomy and geography, and his pioneering work in this area is gratefully acknowledged.

The maps have recently been revised, using newer technology and enhanced sources of data. Dr. Nan An, Imaging Scientist, collaborated with Dr. Antonio Ray Asebedo, assistant professor and lab director of the Precision Agriculture Lab in the Department of Agronomy at Kansas State University, on the new VCR development. Multiple improvements have been made, such as new image processing algorithms with new remotely sensed data from EROS Data Center.

These improvements increase sensitivity for capturing more variability in plant biomass and photosynthetic capacity. However, the same format as the previous versions of the VCR maps was retained, thus allowing the transition to be as seamless as possible for the end user. For this spring, it was decided not to incorporate the snow cover data, which had been used in past years. However, this feature will be added back at a later date. In addition, production of the Corn Belt maps has been stopped, as the continental U.S. maps will provide the same data for these areas. Dr. Asebedo and Dr. An will continue development and improvement of the VCRs and other advanced maps.

The maps in this issue of the newsletter show the current state of photosynthetic activity in Kansas, and the continental U.S., with comments from Mary Knapp, assistant state climatologist:

Kansas Vegetation Condition

Period 11: 03/07/2017 - 03/13/2017

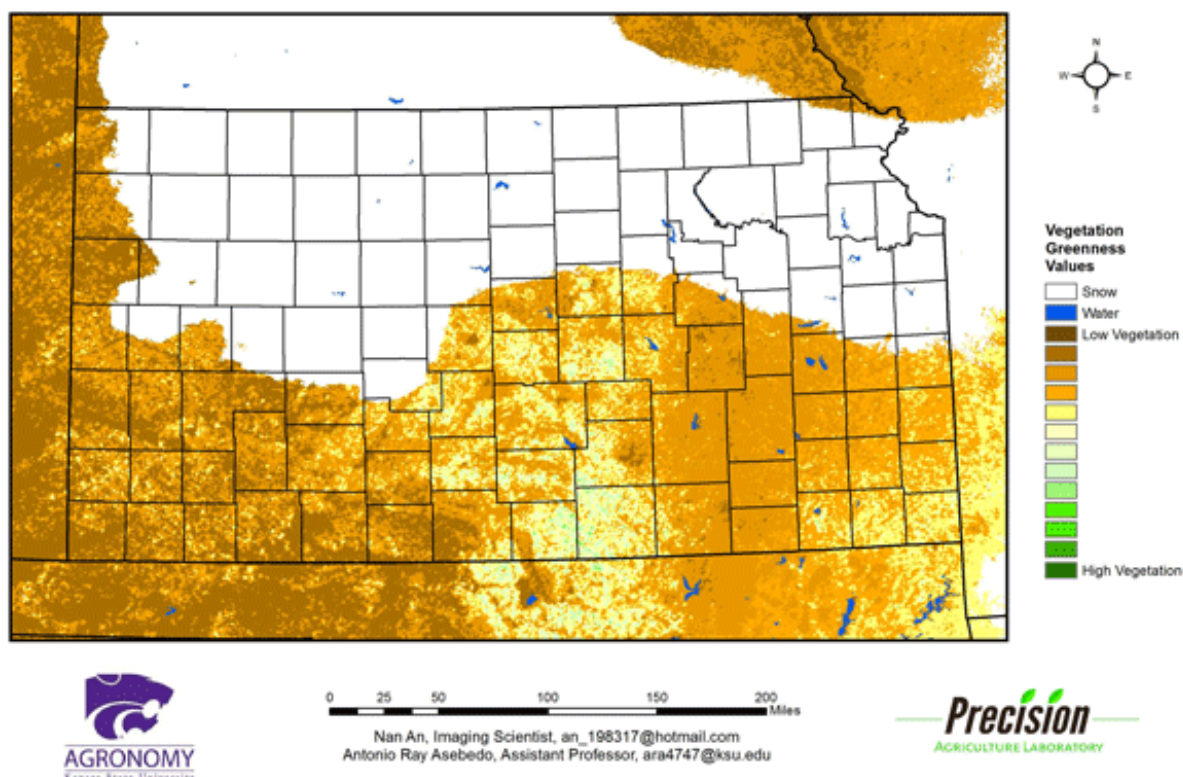


Figure 1. The Vegetation Condition Report for Kansas for March 7 – March 13, 2017 from K-State’s Precision Agriculture Laboratory shows the light snow that fell during the period. Amounts were generally less than an inch and melted quickly. The little vegetative production is mainly in south central Kansas, although it continues to expand northward. This is not unexpected even with the generally warmer-than-normal temperatures in February and early March. Low temperatures are still falling below freezing and average soil temperatures haven’t warmed much this week.

Kansas Vegetation Condition Comparison Early-March 2017 compared to the Early-March 2016

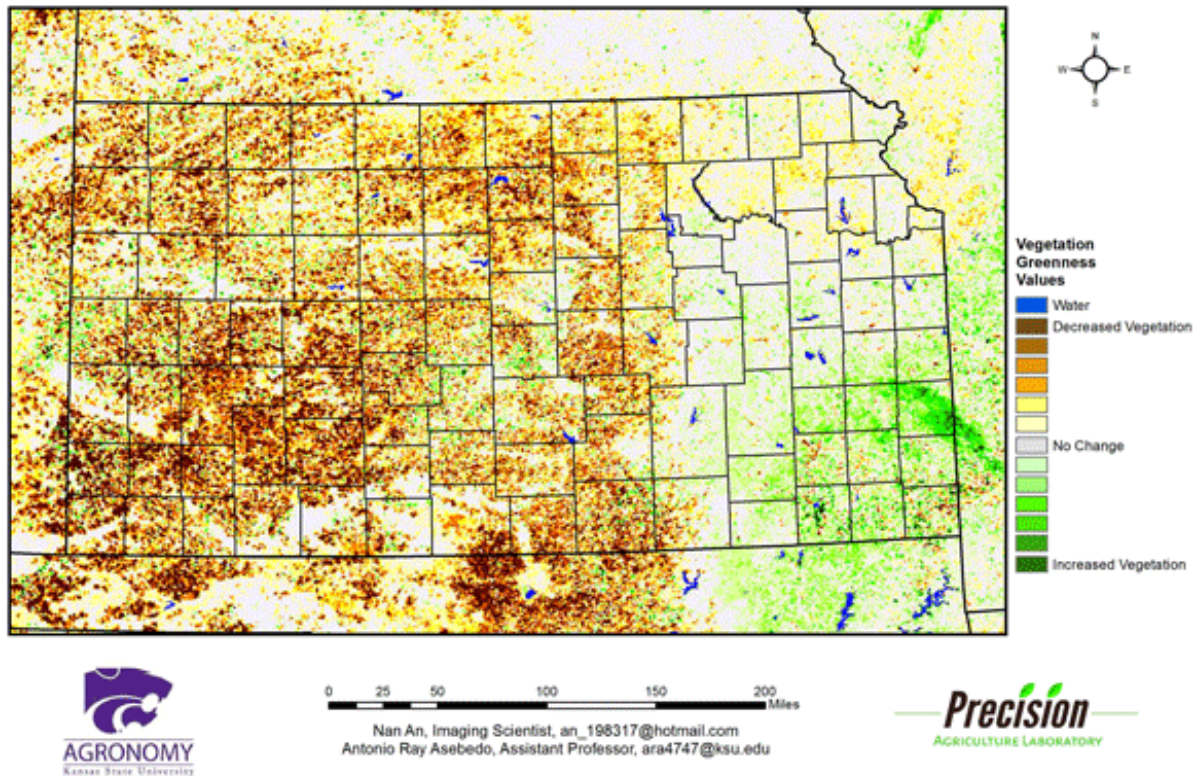


Figure 2. Compared to the previous year at this time for Kansas, the current Vegetation Condition Report for March 6 – March 13, 2017 from K-State’s Precision Agriculture Laboratory shows much lower NDVI values across the western two thirds of Kansas. The winter wheat is less advanced this year than last, particularly in western Kansas, where dry fall conditions hampered establishment.

Kansas Vegetation Condition Comparison

Early-March 2017 compared to the 28-Year Average for Early-March

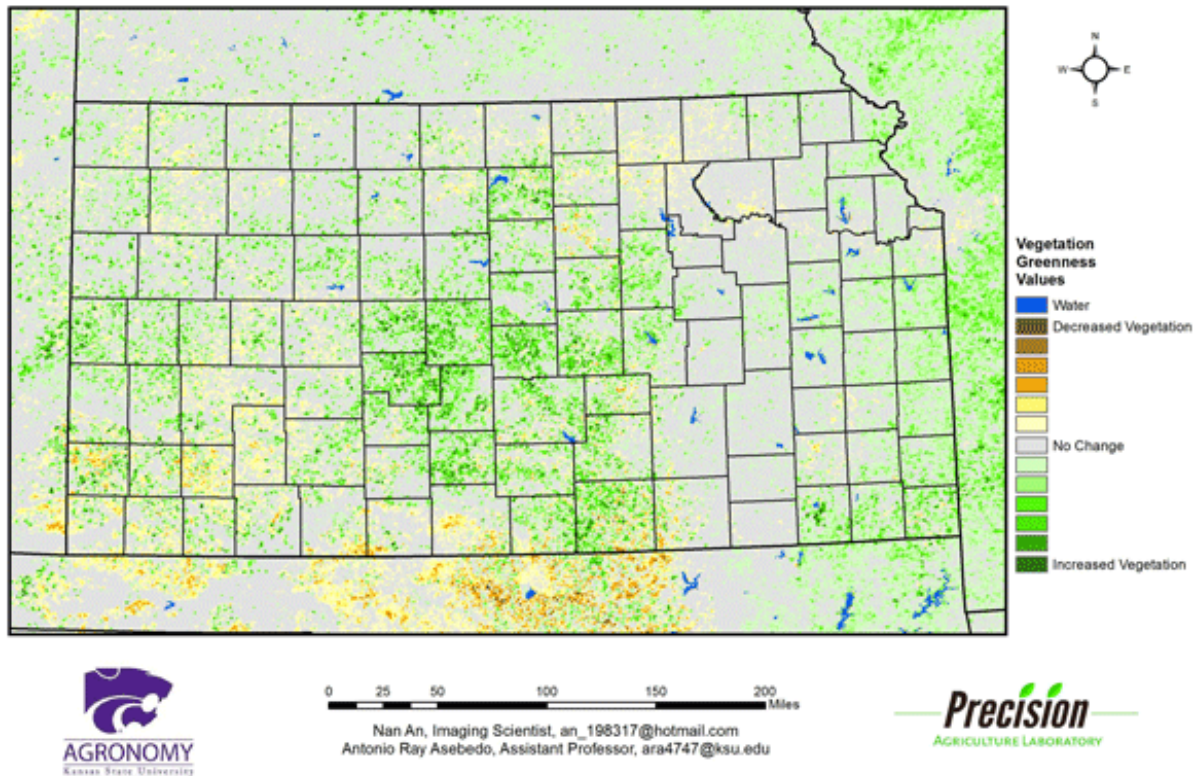
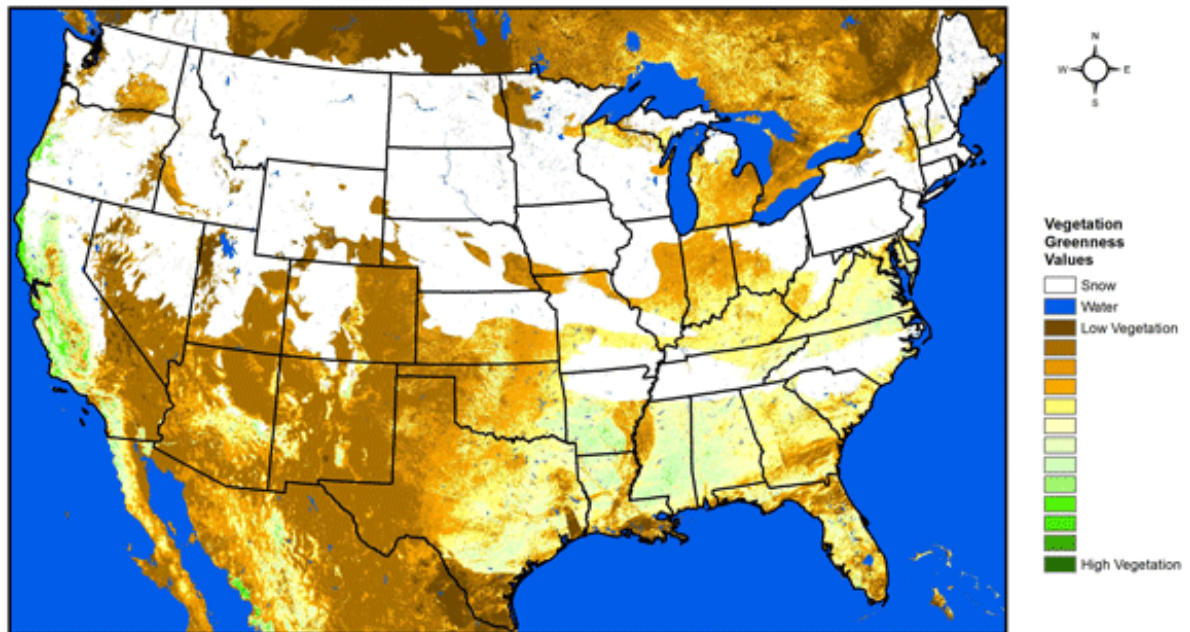


Figure 3. Compared to the 27-year average at this time for Kansas, this year's Vegetation Condition Report for March 7 – March 13, 2017 from K-State's Precision Agriculture Laboratory much of the state has normal to above-normal vegetative activity. The highest NDVI values are in the central and south central parts of the state, where precipitation has been more favorable.

Continental U.S. Vegetation Condition

Period 11: 03/07/2017 - 03/13/2017



0 180 360 720 1,080 1,440 Miles

Nan An, Imaging Scientist, an_198317@hotmail.com
Antonio Ray Asebedo, Assistant Professor, ara4747@ksu.edu



Figure 4. The Vegetation Condition Report for the U.S for March 7 – March 13, 2017 from K-State’s Precision Agriculture Laboratory shows an area of high NDVI in the South, particularly in east Texas and Louisiana. Snow coverage expanded into the Central Plains and parts of the Atlantic Seaboard. The Sierra Nevada of California continues with record snowpack, and snow returned to the Great Lakes and Upper New England regions.

Continental U.S. Vegetation Condition Comparison
Early-March 2017 Compared to Early-March 2016

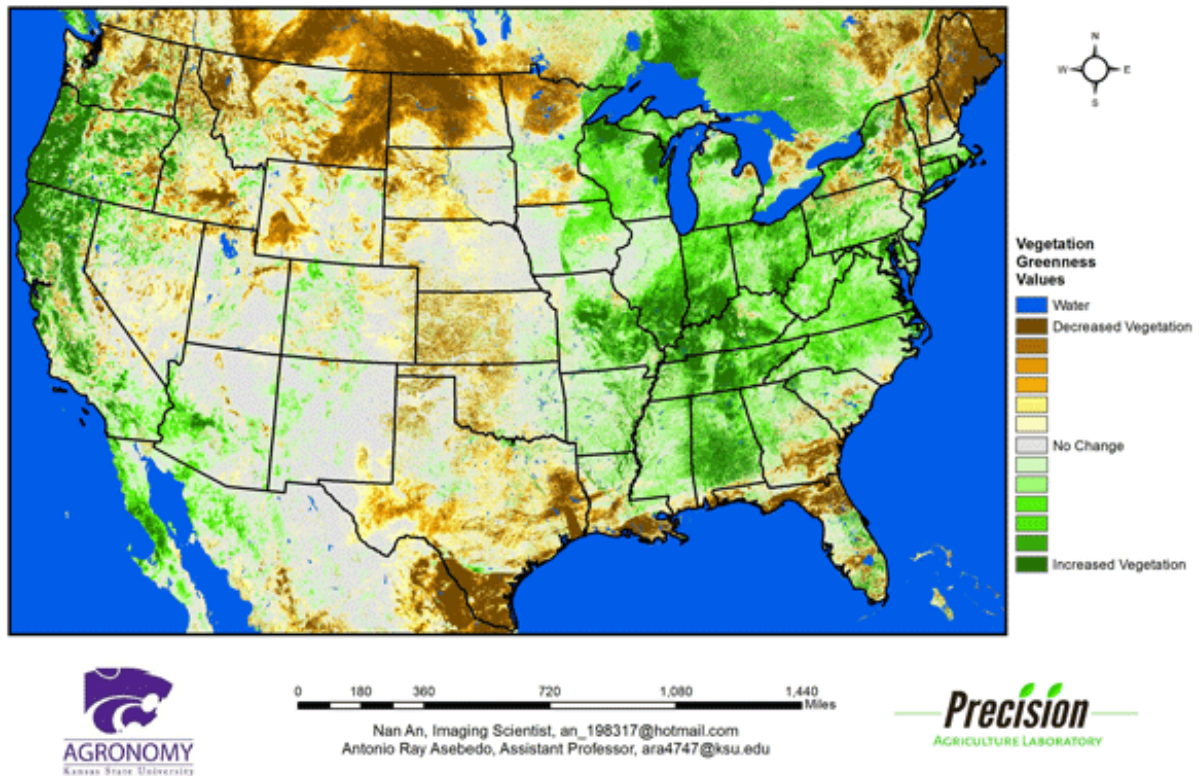


Figure 5. The U.S. comparison to last year at this time for March 7 – March 13, 2017 from K-State’s Precision Agriculture Laboratory shows the impact that split in the snow cover has caused. Much lower NDVI values prevail from the Pacific Northwest through the Northern Plains, where snow coverage continues to be much higher this year. In contrast, the region along the Great Lakes has had much lower snowfall. This, coupled with warmer-than-average temperatures, has favored early vegetative growth.

Continental U.S. Vegetation Condition Comparison
Early-March 2017 Compared to 28-year Average for Early-March

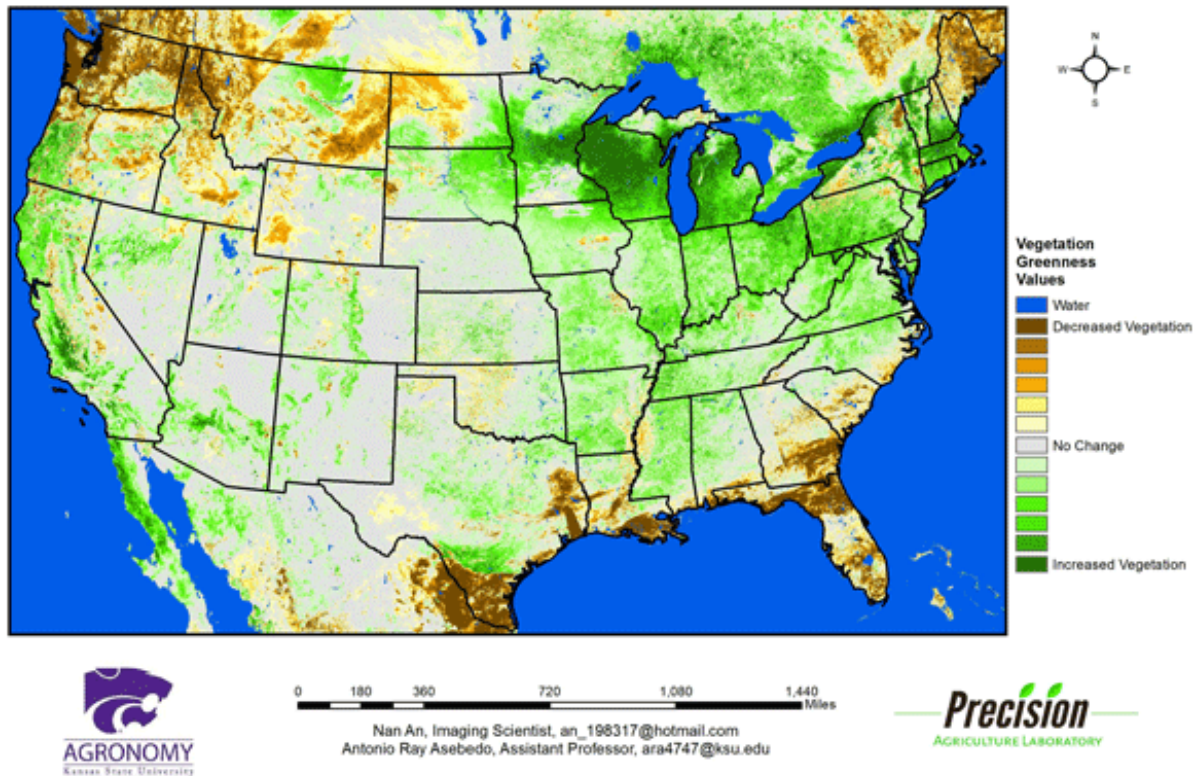


Figure 6. The U.S. comparison to the 27-year average for the period of March 7 – March 13, 2017 from K-State’s Precision Agriculture Laboratory shows an area of below-average photosynthetic activity in the Intermountain West, where snow cover is greatest. Above-average NDVI values are visible in the Midwest from Iowa through Pennsylvania and northward. This is particularly true in central Minnesota and Wisconsin. Warmer-than-normal temperatures and little snow cover have favored early vegetative growth with increased risk of freeze damage.

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