Issue 536

K-STATE Research and Extension

Extension Agronomy

eUpdate

11/06/2015

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, Jim Shroyer, Crop Production Specialist 785-532-0397 jshroyer@ksu.edu, or Curtis Thompson, Extension Agronomy State Leader and Weed Management Specialist 785-532-3444 cthompso@ksu.edu.

eUpdate Table of Contents | 11/06/2015 | Issue 536

1. Factors involved in fall growth of canola

Establishing a canola stand at the optimum planting date is the most critical step to achieving plant-to-plant uniformity and consequently, high yield. Timely planting, at an even planting depth, and in good soil moisture has the greatest potential to result in rapid establishment and greatest ability to achieve the desired amount of above- and below-ground biomass for overwintering. If planting is too late, the chances of having a non-uniform stand are increased.

Figure 1. Non-uniform winter canola stand due to late planting. Photo by Ignacio Ciampitti, K-State Research and Extension.

Effect of canola size on winter survival

Canola overwinters -- and is the most tolerant to cold temperatures -- in the rosette growth stage (Fig. 2). At this stage, the crown develops at the soil surface with larger, older leaves at the base and smaller, newer leaves at the center. The stem thickens but its length remains unchanged. For optimum winter survival, a winter canola plant needs 5 to 8 true leaves, 6 to 12 inches of fall growth, a root collar diameter of ¼ to ½ inch, and an extensive root system. Hardened winter canola can withstand temperatures below 0 degrees Fahrenheit for short periods of time.

Figure 2. Winter canola at the appropriate size for overwintering. Photo by Scott Dooley, K-State Research and Extension.

On the other hand, canola that has too much top growth (typically 20 inches or more) can succumb to winterkill for a number of reasons, including overuse of available soil water and nutrients and stem elongation above the soil surface.

Causes of excessive fall stem elongation

Stem elongation in the fall -- not to be confused with bolting, i.e. stem elongation with visible flowering structures -- may occur because:

- The crop was planted too early (Fig. 3),
- The crop was seeded at higher-than-optimal plant populations (Fig. 4),
- Excessive soil fertility is present,
- An unusually warm fall persists (Fig. 3),
- Selection of an poorly adapted cultivar, or
- A combination of any of these factors.

For example, closely spaced and crowded canola plants increase early plant-to-plant competition for light (Fig. 4). This "reaching" for light may lead to an extension of the growing point above the soil surface. Any time the growing point (rosette) is elevated, the chances for winterkill are increased because overwintering plant parts are located at an unprotected position above the soil surface.

Figure 3. Winter canola plot in mid-October. Early planting and warm temperatures resulted in more than 20 inches of fall growth and an increased risk of winterkill. Photo by Mike Stamm, K-State Research and Extension.

Figure 4. High plant populations in a winter canola plot in mid-October. Competition for light places the growing point well above the soil surface. Photo by Ignacio A. Ciampitti, K-State Research and Extension.

Another factor in stem elongation and winter survival is the amount of surface residue present in the seed row. K-State research has shown that residue removal from the seed row is important for keeping the rosette, or crown, close to the soil surface, especially in no-till cropping systems. This residue management (related to quantity and evenness of distribution) greatly benefits winter survival.

Figure 5 shows the effects of residue blowing back into the seed row following planting into heavy corn residue. The canola hypocotyl is etiolated, or overextended, and thus vulnerable to freezing temperatures and other biotic stresses. Etiolation results from the cotyledons growing through the residue to the point where light is intercepted. This is where the crown is established. As a result, the crop easily succumbed to cold temperatures and the field was lost because of poor residue management.

Figures 5a and 5b. Inadequate residue management causes etiolation of the hypocotyl to an exposed position above the soil surface. Photos by Mike Stamm, K-State Research and Extension.

Planting dates in 2015

Soil moisture conditions dictated planting dates for winter canola in 2015. Through late August and early September, rainfall was sporadic throughout much of the area so some producers had to wait for rain in order to plant. Some producers planted later than they had planned. But with warm

temperatures and adequate precipitation this fall, there is less concern that the crop will be too small going into the winter months (Fig. 6).

Figure 7 shows that the high and low temperature trends for 2014 and 2015 are similar. Mid-September and mid-October were very warm in 2015. A slow decline in temperatures is occurring now. This is important as the canola crop should begin to winter harden this time of year. Low temperatures at or below 30 degrees F are essential for winter hardening.

Figure 6. Small-sized canola plants planted in late September (photo taken early November). Photo by Ignacio A. Ciampitti, K-State Research and Extension.

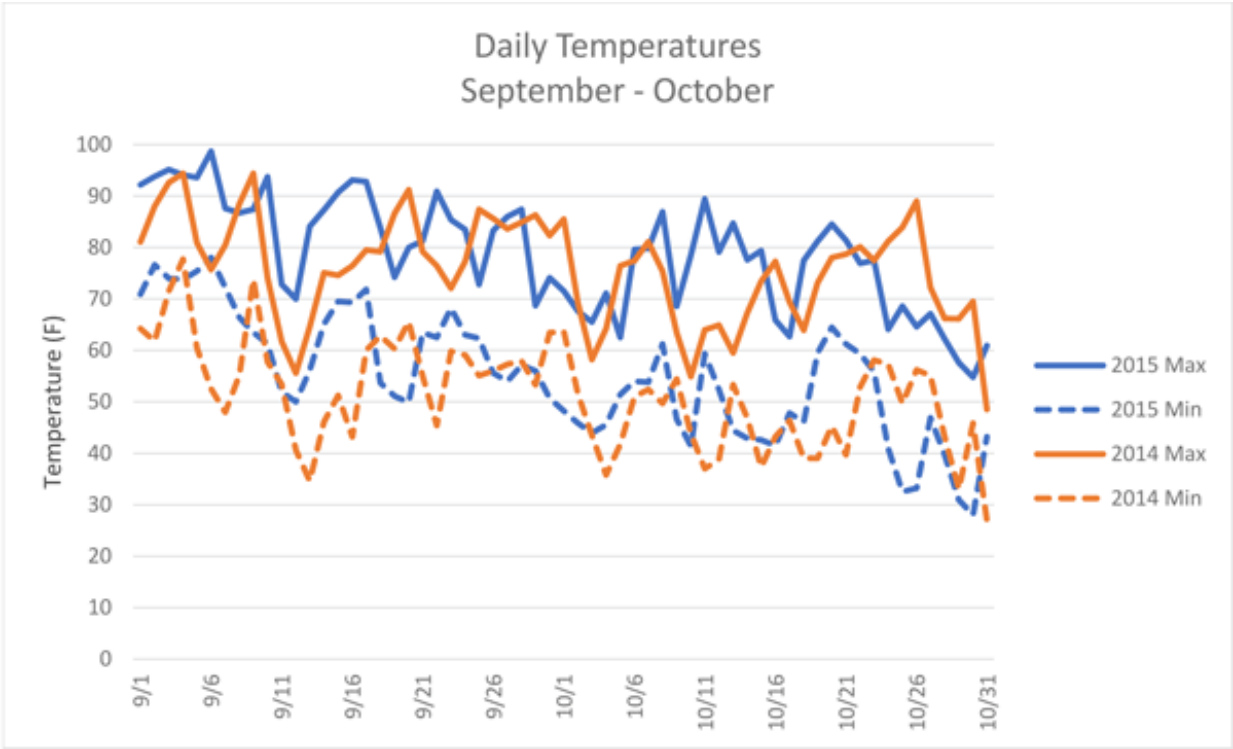


Figure 7. High and low temperatures from 2014 and 2015 at Manhattan. Mid-October temperatures were very warm in 2015. Source: Kansas Mesonet, K-State Weather Data Library.

Varietal differences

Varietal differences exist for traits such as fall vigor, the ability to avoid fall stem elongation, and winter survival. More hybrids are being grown each year and the industry will one day switch from being dominated by open-pollinated (OP) varieties to hybrids. Hybrids tend to have greater fall vigor because of larger seed size. Fall vigor is important because it results in rapid establishment and root growth. However, with hybrids and certain OP varieties, there can be a tradeoff between fall vigor and too much fall growth, and this usually has to be managed by agronomic practices such as planting date and seeding rate. Planting hybrids later to take advantage of improved vigor may present some challenges in terms of winter survival if weather conditions are not favorable for fall growth.

The K-State canola breeding program has been selecting for lines that avoid fall stem elongation regardless of the planting date or seeding rate. These lines have prostrate fall growth and this often translates into better winter survival. This trait could be especially useful in years when soil moisture conditions are ideal for planting but the calendar indicates it is too early to plant. In addition, we hope to broaden the optimum planting window by planting these lines earlier while avoiding the risk of too much fall growth.

Another tool under development by private industry and being evaluated by the K-State canola breeding program is the semi-dwarfing trait, or low-biomass-producing trait. The semi-dwarfing trait also helps to keep the crown closer to the soil surface regardless of planting date or seeding rate. We have seen enhanced winter survival in hybrids that possess this trait.

Figure 8 shows three entries from the National Winter Canola Variety Trial. The stake represents the soil surface while the red arrows point to the canola plant's growing point. The hybrid on the left was developed in the European Union (EU) and is exhibiting about 2 to 3 inches of fall stem elongation. The variety in the center is an experimental line from the K-State canola breeding program, showing no stem elongation. The hybrid on the right was developed in the EU and it possesses the semi-dwarfing trait. We would expect the hybrid on the left to be more susceptible to winterkill because of the elevated crown.

Conventional Hybrid

KSU Experimental

Semi-dwarf Hybrid

Figure 8. Varieties exhibiting differences in fall stem elongation in the National Winter Canola Variety Trial. Photo by Mike Stamm, K-State Research and Extension.

Current research

K-State agronomists are investigating production practices to help manage fall vigor and growth. We have studies evaluating seeding rate by variety (OP vs. hybrid) in narrow and wide row spacing (9-in, 20-in, and 30-in). In collaboration with private industry, we are evaluating plant growth regulators and their ability to help manage fall growth. Using plant growth regulators in winter canola is a common practice in the EU. Other questions we want to address through these studies include: How far can we reduce seeding rates and remain profitable? Does reducing the seeding rate enhance winter survival? How do varieties respond to different seeding rates? What is the optimum seeding rate for a given row spacing by variety interaction?

Having too much or too little fall growth in winter canola depends on an interaction of the variety chosen, management practices (primarily related to planting date, seeding rate, and row spacing), and the weather. Predicting the weather is challenging enough and this can be stressful on canola producers. Through breeding and production research at K-State, we hope to find improved ways to manage these risks.

Mike Stamm, Canola Breeder
mjstamm@ksu.edu

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

2. Current status of new herbicide-resistant crops

In the near future, producers will have access to several new crop cultivars with resistance to a wider range of herbicides than has been available until now. These technologies are tools that will help growers combat herbicide resistant weeds. Here is a brief summary of these new crop cultivars and when they are expected to reach the market.

Inzen grain sorghum. K-State released to sorghum breeding programs a line of grain sorghum that is resistant to ALS herbicides several years ago. DuPont assumed ownership of the technology and those seed companies that signed agreements with DuPont will be developing Inzen sorghum hybrids. Currently companies developing hybrids are Pioneer and Advanta. DuPont also is developing the ALS grass herbicide "Zest," which is a liquid formulation with nicosulfuron as the active ingredient, for use with these new ALS-resistant grain sorghum hybrids. When commercial Inzen hybrids are on the market producers will have new opportunities for postemergence grass weed control. DuPont intends to have herbicide registration for Zest completed in time for use on the 2016 sorghum crop. Hybrid availability for 2016 isn't known at this time.

Enlist corn, soybeans, and cotton. Enlist traits are being developed by Dow AgroSciences. These traits confer resistance to both 2,4-D and aryloxyfenoxypropionate (the "fop" grass herbicides) in corn, and 2,4-D resistance in soybeans and cotton. Dow has developed a new formulation of 2,4-D called 2,4-D choline, which is lower in volatility than 2,4-D amine. This new formulation will be marketed in a premix with glyphosate called Enlist Duo. This premix will be intended for use on Enlist crops, and has just received a full Section 3 Federal label.

Enlist soybean, corn, and cotton traits have been deregulated by the U.S. Department of Agriculture. However, certain export markets have not been approved yet, so commercial availability is not yet known. Enlist cotton likely will be commercially available in 2016 and Enlist corn and soybeans could potentially be available for the 2016 growing season if key export markets are approved. Enlist soybeans and cotton could alleviate concerns about drift onto the crop from adjacent applications of 2,4-D. Enlist cotton and soybeans will be stacked with both glyphosate- and glufosinate-resistant genes as well, which would also allow the use of glyphosate and glufosinate herbicides on those crops.

Xtend soybeans and cotton. Xtend traits are being developed by Monsanto Company. These traits confer resistance to dicamba herbicide. This would allow direct application of new formulations of dicamba to soybeans and cotton to help address glyphosate-resistant weeds, as well as alleviate concerns about dicamba drift onto Xtend crops. BASF and Monsanto are developing new formulations of dicamba with lower volatility and drift potential than Clarity, which already has lower volatility than Banvel. Monsanto will sell a premix of glyphosate and a new formulation of dicamba under the product name of Roundup Xtend. A new dicamba formulation will also be available by itself under the product name of XtendiMax for Monsanto and Engenia from BASF. Like Enlist crops, Xtend cotton and soybeans have been deregulated by USDA, but their availability for 2016 is still uncertain because of foreign market and herbicide registration approvals.

Note: Dicamba- and 2,4-D-resistant soybeans and cotton are not cross-resistant, so application of dicamba on Enlist soybeans or cotton or 2,4-D on Xtend soybeans or cotton would still result in severe injury or plant death. As mentioned above, new formulations of dicamba and 2,4-D are being developed with reduced volatility, but spray drift will still be a concern onto susceptible or non-

resistant crops.

HPPD-resistant soybeans. GMO soybeans with resistance to the HPPD-inhibiting class of herbicides are in development by both Bayer and Syngenta. No HPPD herbicides are currently available for use in soybeans, so this would provide a new mode of action and allow for greater diversification of weed control options to help manage herbicide-resistant weeds. HPPD-resistant soybeans have been deregulated by USDA, but matching herbicide and export approvals must be in place before the technologies become commercially available.

Dallas Peterson, Weed Management Specialist
dpeterso@ksu.edu

Curtis Thompson, Weed Management Specialist and Extension Agronomy State Leader
cthompso@ksu.edu

3. Grass control management in 2-gene Clearfield wheat

There are now several 2-gene Clearfield wheat varieties currently on the market in our geography, including AP503 CL2 from Syngenta/AgriPro, Brawl CL Plus from Colorado State University, and Doublestop CL Plus from Oklahoma State University.

It is important that spray applicators know whether a Clearfield wheat variety is 1-gene or 2-gene since the spray adjuvants that can be used when spraying 2-gene Clearfield varieties with Beyond herbicide can severely injure 1-gene Clearfield varieties. What exactly is the difference between 2-gene and 1-gene Clearfield varieties in terms of how they can be managed, herbicide applications, grass control, and crop injury?

There is no difference in the labeled rates of Beyond that can be applied in a single growing season to 1-gene and 2-gene Clearfield varieties. However, methylated seed oil (MSO) or crop oil concentrate (COC) can be added as an adjuvant to Beyond when it is used on 2-gene Clearfield varieties. On 1-gene Clearfield varieties, only a non-ionic surfactant (NIS) can be used as an adjuvant. In cases, a nitrogen-based fertilizer such as AMS or 28 percent UAN should also be added to the spray solution.

The adjuvant can make a significant difference in the level of feral rye and downy brome control with Beyond, especially with spring treatments. Since cheat, Japanese brome, and jointed goatgrass are usually quite susceptible to Beyond, the adjuvant usually does not make as much difference in the level of control of these grasses. A recent K-State study near Manhattan illustrates the effect.

Winter Annual Grass Control and Crop Response in 2-gene Clearfield Wheat

Treatment	Application rate (oz/acre)	Application timing	Wheat injury (%)	Japanese brome control (%)	Downy brome control (%)	Rye control (%)
Beyond + NIS + AMS	4	Fall	0	100	99	95
Beyond + MSO + AMS	4	Fall	0	100	99	100
Beyond + MSO + AMS	6	Fall	0	100	100	100
Beyond + MSO + AMS	12 (2x)	Fall	0	100	100	100
Beyond + NIS + AMS	4	Spring	0	98	75	57
Beyond + MSO + AMS	4	Spring	0	99	82	78
Beyond + MSO + AMS	6	Spring	0	100	91	93

Beyond + MSO + AMS	12 (2x)	Spring	0	100	97	100
LSD (0.05)			NS	NS	4	11

Note: The maximum single application use rate of Beyond is 6 oz/acre. The 12 oz/acre rate would simulate spray overlaps in the field and is not a labeled broadcast application rate.

For spring applications of Beyond, including MSO as an adjuvant measurably improved control of downy brome and feral rye compared to using NIS as the adjuvant. But as mentioned above, Beyond with MSO can only be used on 2-gene Clearfield varieties. MSO has been more effective than COC in these situations.

Beyond is labeled for control of many winter annual grasses (including jointed goatgrass, cheat, downy brome, and Japanese brome), but only suppression of feral rye. Control of feral rye with Beyond in K-State tests has been somewhat erratic and unpredictable. The best control will likely be achieved with fall applications, using the 6 oz rate instead of the 4 oz rate, and using MSO instead of NIS where that is allowed. In general, the best control of feral rye in 1-gene Clearfield varieties has been with fall applications. With 2-gene Clearfield varieties, producers now have more options for better rye control.

The other advantage of 2-gene Clearfield over 1-gene Clearfield wheat varieties is in the higher degree of crop safety from applications of Beyond. Occasionally, Beyond has caused some crop injury to 1-gene Clearfield wheat. This occurs most often where there is spray overlap (2x rates), when stress conditions prevail, or where wheat was not at the recommended treatment stages at the time of application. In K-State tests, 2-gene Clearfield wheat varieties have demonstrated much less potential for crop injury than 1-gene varieties in these situations.

Dallas Peterson, Weed Management Specialist
dpeterso@ksu.edu

4. Management adjustments when planting wheat late

Most of Kansas wheat has been planted by this time of the year. However, some producers may have delayed planting for different reasons, including harvesting a summer crop during late October, or waiting for significant precipitation to occur. Planting wheat in early November is within the acceptable range in southeast and far south central Kansas. In other areas of the state, this is later than desirable, and later than the cutoff date for full crop insurance benefits.

Although good yields may still be achieved if wheat is planted outside the optimal planting window, late-planted wheat is often subjected to colder fall temperatures and has less time to tiller prior to winter dormancy, which can reduce wheat yield potential and increase the risks of winter injury. Under these circumstances, some management adjustments can be made to try to compensate for the consequences of late planting:

Increase seeding rate

As mentioned above, late-planted wheat tends to produce fewer tillers during the fall than wheat planted at the optimal time. Fall tillers are generally more productive than spring tillers, contributing more to the crop's yield potential. Therefore there is a need to compensate for the reduced tillering by increasing seeding rates to get more seed per row foot. Wheat seeding rates for Kansas vary depending on the precipitation zone, and increase from west to east (Table 1). Likewise, seeding rates should be increased every week that planting is delayed after the end of the optimal planting date range by about 150,000 – 225,000 seeds per acre (or 10 to 15 lb/acre) in western Kansas, or 225,000 – 300,000 seeds per acre (15 – 20 lb/acre) in eastern Kansas. Final seeding rates should not be above 90 pounds per acre in western Kansas and 120 pounds in eastern and central Kansas.

Table 1. Seeding rates for different Kansas regions for optimum planting date. Upward adjustments to these rates are needed when planting wheat late.

Region within Kansas	Seeding rate for Optimum planting date			
	seeds/acre		seeds/sq. ft.*	
	Min.	Max.	Min.	Max.
Western	750,000	900,000	17	21
Central	900,000	1,125,000	21	26
Eastern	1,125,000	1,350,000	26	31
Irrigated	1,200,000	1,500,000	28	34

* To determine row length needed for one square foot based on row spacing, divide 12 by the row spacing of your field. For example, if row spacing is 7.5 inches, 12/7.5 = 1.6 feet, or 19.2 inches of row are needed to be equivalent to one square foot.

Maintain the optimal planting depth (1 to 1.5 inch deep)

Wheat needs at least 4-5 leaves and 1-2 tillers prior to winter dormancy for maximum cold tolerance. Late-planted wheat will most likely have fewer tillers and leaves than wheat planted at the optimal timing, and therefore will be more susceptible to winterkill. To increase the chances of winter survival, it is important to plant wheat at the normal planting depth (1 to 1.5 inches below the soil surface). This will ensure good root development and anchorage, as well as good soil insulation during the winter. Shallow-planted wheat is at greater risk of winter injury. If the seed is placed too deeply, it may not have enough vigor in cold soils to emerge well.

Place starter phosphorus (P) fertilizer with the seed

Phosphate-based starter fertilizer promotes early-season wheat growth and tillering. Additionally, P is less available under colder temperatures, which can result in P deficiency under cold weather conditions. When planting late, producers should strongly consider using about 20 lbs/acre of P fertilizer directly with the seed, regardless of soil P levels. This placement method is more effective at that time of year than other application methods. The later the planting date, the more fall root development is slowed. The closer the fertilizer is to the seed, the sooner the plant roots can get to it.

Use fungicide seed treatment or plant certified seed

Late-planted wheat is typically sown into colder soils, which generally increases the time needed for germination and emergence to occur. As a consequence, there is increased potential for seed- and soil-borne diseases that affect seedlings and early-season wheat development. Fungicide seed treatments can protect the seed and seedling during the extended time it is subjected to potential seedling diseases, improving stand establishment under poor growing conditions. It is important that the seed treatment thoroughly coat the seeds to ensure good protection. For fungicide seed treatment options, please refer to the most current version of the K-State fungicide seed treatment chart available at: https://www.bookstore.ksre.ksu.edu/pubs/MF2955.pdf

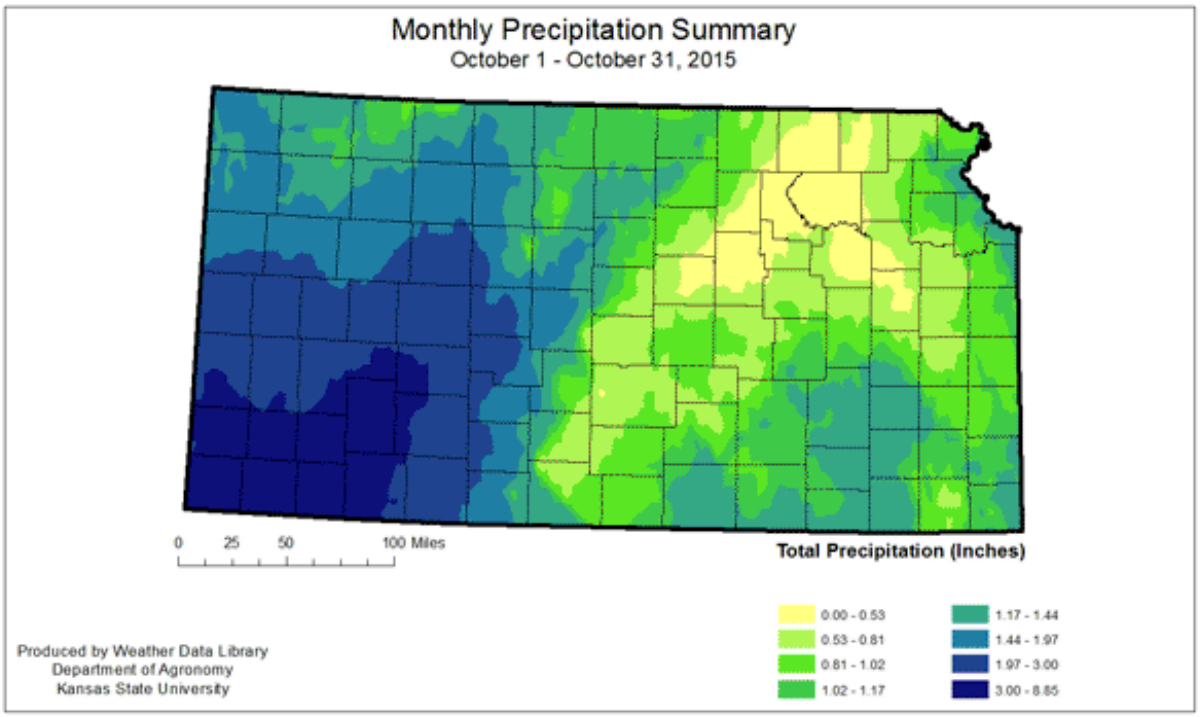
Consider variety selection

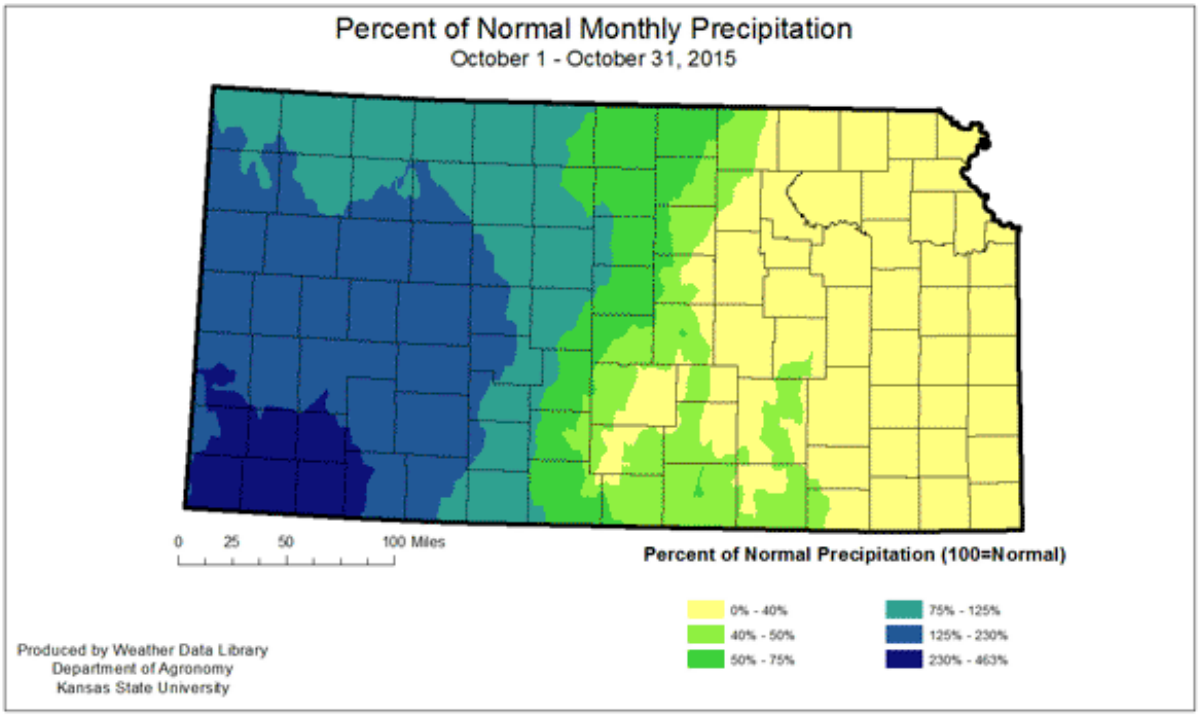
It is probably too late to make any changes in varieties this fall. However, a few points to consider in variety selection when it is known that wheat will be planted late (e.g. when planning to sow wheat following soybeans) are tillering ability and maturity. A variety that has good tillering ability may offset some of the consequences of late planting, as it might produce one or two tillers during the fall when planted late whereas a low tillering variety may produce none. Also, late-planted wheat is typically behind in development going into the winter, which might translate into slower development in the spring. This delay can result in plants being exposed to drought and especially heat stress during grain filling, reducing the duration of the grain filling period. Thus, selecting an early-maturity variety with good yield potential may offset to some extent the consequences of late planting by decreasing the chances of having a grain filling period subject to drought and heat stress.

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

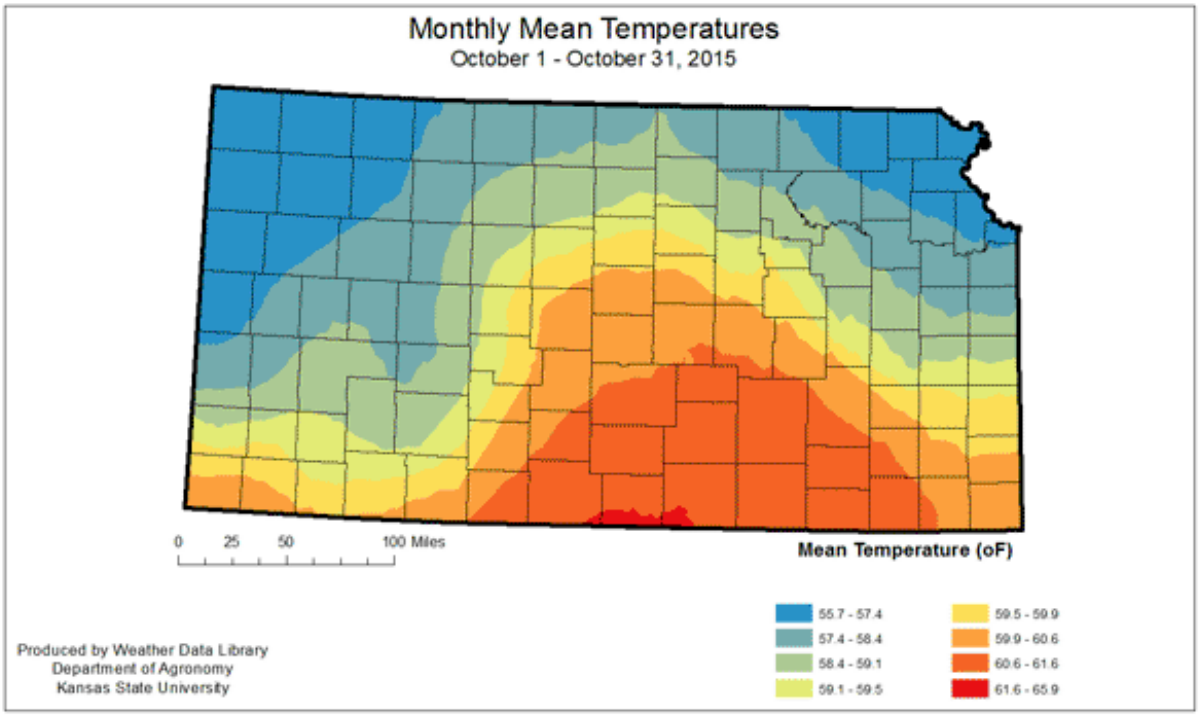
5. October weather summary for Kansas: Lopsided rains

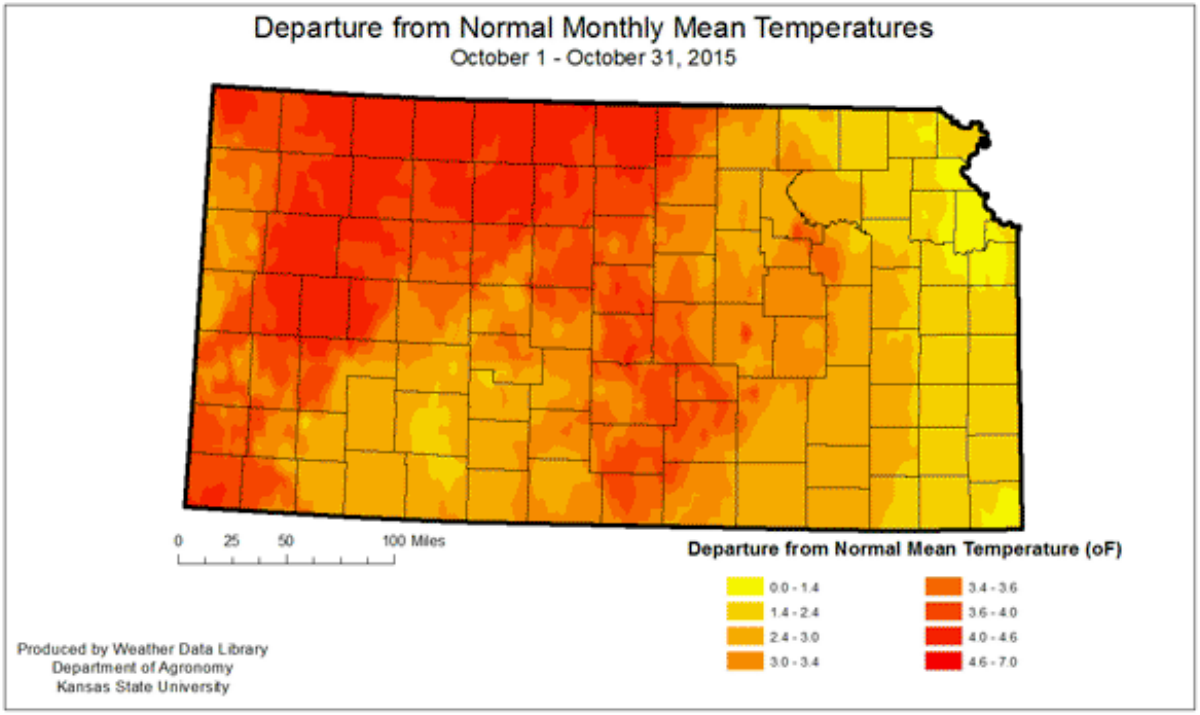
Statewide average precipitation in October was 1.71 inches, which was 91 percent of normal. Unfortunately, the distribution wasn't very even. The western third of the state fared the best, with the Southwest Division as the wettest. The divisional average was 4.05 inches, or 265 percent of normal. In contrast, the Southeastern Division averaged only 0.81 inches, or 26 percent of normal. Another factor was the distribution of events across the month. The western areas of the state had several events of more than a quarter of an inch. For most of the eastern areas of the state, rainfall above a tenth of an inch fell only on the last day of the month. The greatest monthly precipitation totals reported were 8.85 inches at Liberal, Seward County (NWS) and 5.00 inches at Hugoton, Stevens County, (CoCoRaHS). Still, 12 daily precipitation records were set in October. Nine of those records were established in western locations.

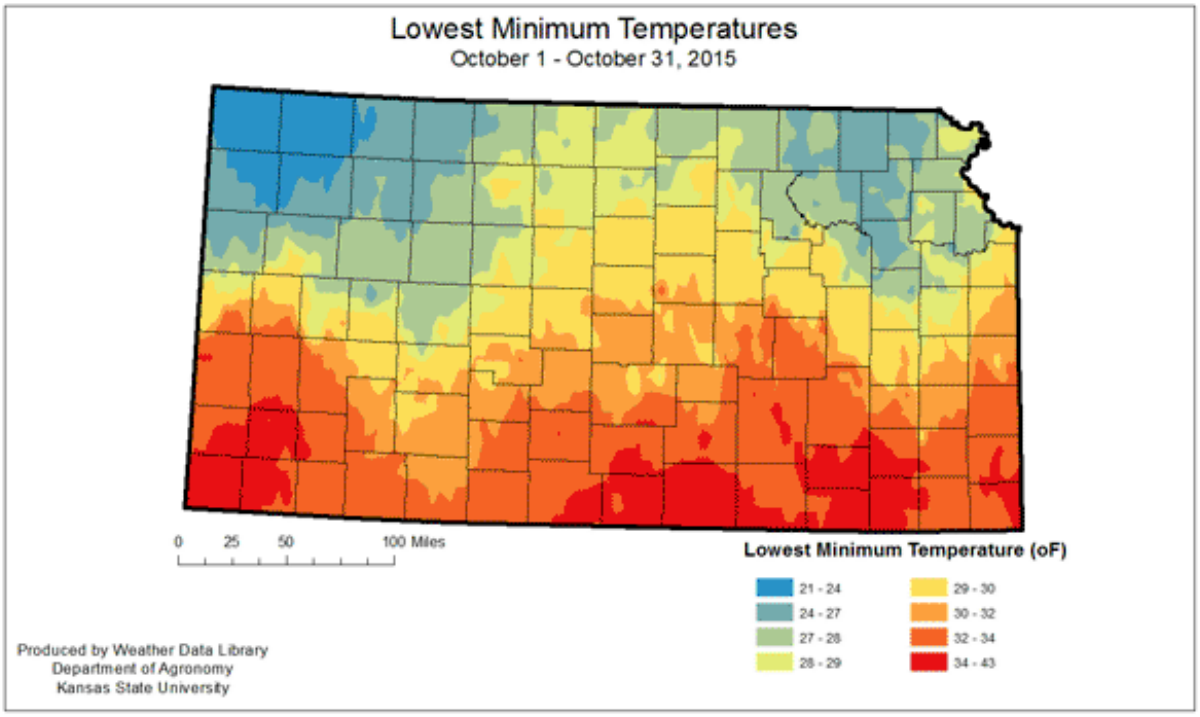




Temperatures were warmer than normal across the state, although not as warm as in September. The statewide average temperature was 58.6 degrees F, or 3 degrees warmer than normal for the month. There was only one new record daily high temperature set during the month, and 3 records tied. No new daily highs were set for the month. In contrast, there were 3 record cold high temperatures. Most of the warmth showed in the minimum temperature side. There were 18 new record warm minimum temperatures and 13 records tied. None of these set new records for the month. No new daily cold minimum temperatures were set for either a day or for the month. The Northeast and Southeast Divisions were the closest to normal, with the Northeast Division averaging just 1.2 degrees F warmer than normal and the Southeast Division averaging 1.9 degrees F warmer than normal. The Northwest Division was the warmest averaging 56.4 degrees F, or 4.2 degrees warmer than normal. The warmest reading was 98 degrees F, reported at Lakin in Kearny County on the 12th. The coolest reading for the state was 21 degrees F at Atwood in Rawlins County on the 30th. The warmer-than-average temperatures allowed late-planted spring crops such as corn and soybeans to finish development. Concerns now are for the dry conditions, with winter planted crops needing moisture to complete establishment before winter.


Monthly Mean Temperatures
October 1 - October 31, 2015
0 25 50 100 Miles
Mean Temperature (oF)
55.7 - 57.4
57.4 - 58.4
58.4 - 59.1
59.1 - 59.5
59.5 - 59.9
59.9 - 60.6
60.6 - 61.6
61.6 - 65.9
Produced by Weather Data Library
Department of Agronomy
Kansas State University


Departure from Normal Monthly Mean Temperatures
October 1 - October 31, 2015
0 25 50 100 Miles
Departure from Normal Mean Temperature (oF)
0.0 - 1.4
1.4 - 2.4
2.4 - 3.0
3.0 - 3.4
3.4 - 3.6
3.6 - 4.0
4.0 - 4.6
4.6 - 7.0
Produced by Weather Data Library
Department of Agronomy
Kansas State University

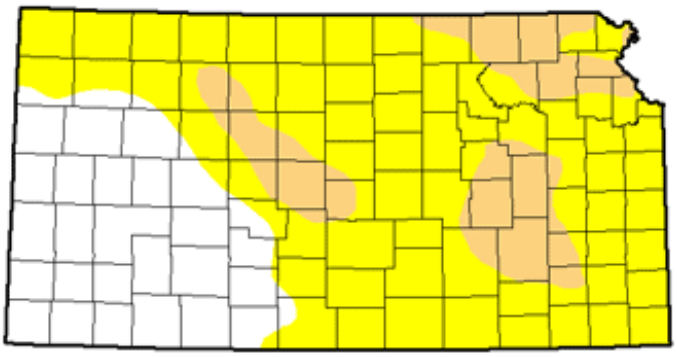


With the limited rainfall, severe weather was also limited. Preliminary data indicates there were no tornadoes reported, nor any hail reports. There were 5 reports of damaging wind, mostly in the Southwest Division.

Drought conditions continued to deteriorate, particularly in the eastern third of the state. This was not unexpected, given the lower-than-average precipitation in the area. Moderate drought conditions shifted eastward, and the area of abnormal dry conditions expanded. The moderate drought ranges from northwest Kansas through parts of central Kansas. Thirty seven counties in western Kansas remain in drought watch status according to the latest advisory from the Kansas Water Office. A return to normal or above-normal precipitation is needed to sustain improvements. Some long-term hydrological deficits are in place affecting some water supplies and reservoirs. The drought outlook is for improving conditions, and the precipitation outlook for November is positive. However, we are moving into a drier period of the year, so even above-normal precipitation will be slow to erase the dry conditions.

U.S. Drought Monitor
Kansas

November 3, 2015
(Released Thursday, Nov. 5, 2015)
Valid 7 a.m. EST



Drought Conditions (Percent Area)

	None	D0	D1	D2	D3	D4
Current	26.86	58.04	15.10	0.00	0.00	0.00
Last Week 10/27/2015	25.31	60.40	14.29	0.00	0.00	0.00
3 Months Ago 8/4/2015	68.33	28.19	3.49	0.00	0.00	0.00
Start of Calendar Year 12/30/2014	19.49	43.02	19.18	16.05	2.25	0.00
Start of Water Year 9/29/2015	80.79	14.72	4.48	0.00	0.00	0.00
One Year Ago 11/4/2014	34.55	26.75	19.37	17.08	2.25	0.00

Intensity:
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

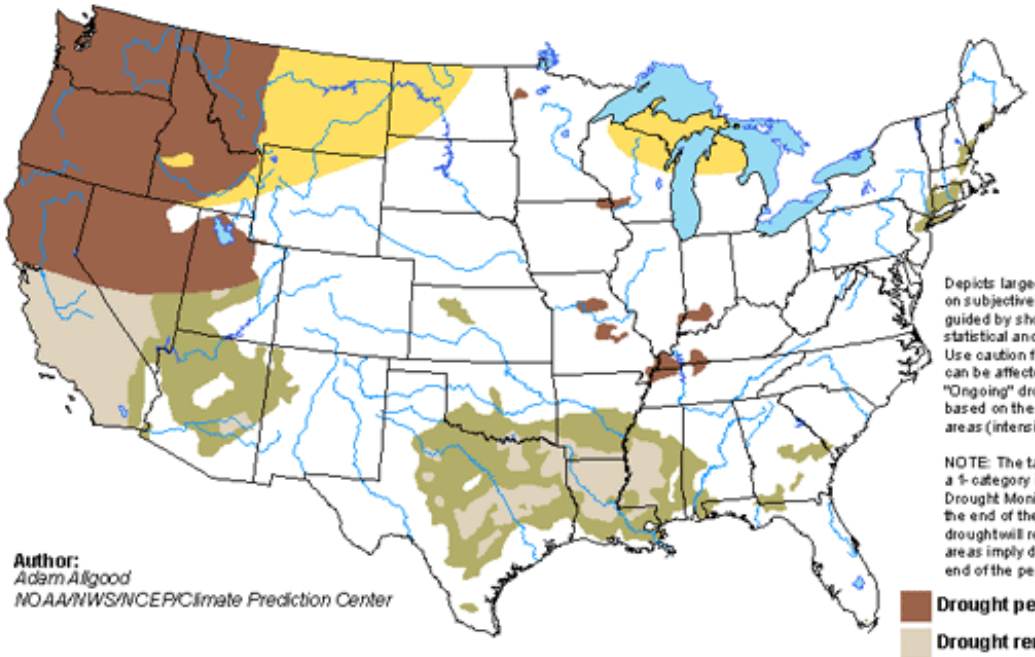
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
David Miskus
NOAA/NWS/NCEP/CPC

http://droughtmonitor.unl.edu/

U.S. Seasonal Drought Outlook
Drought Tendency During the Valid Period

Valid for October 15 - January 31, 2016
Released October 15, 2015



Author:
Adam Allgood
NOAA/NWS/NCEP/Climate Prediction Center

Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Use caution for applications that can be affected by short lived events. "Ongoing" drought areas are based on the U.S. Drought Monitor areas (intensities of D1 to D4).

NOTE: The tan areas imply at least a 1-category improvement in the Drought Monitor intensity levels by the end of the period, although drought will remain. The green areas imply drought removal by the end of the period (D0 or none).

- **Drought persists/intensifies**
- **Drought remains but improves**
- **Drought removal likely**
- **Drought development likely**

http://go.usa.gov/3eZ73

October 2015

Kansas Climate Division Summary

	Precipitation (inches)						Temperature (°F)			
	October 2015			2015 Jan through Oct					Monthly Extremes	
Division	**Total**	**Dep.** [1]	**% Normal**	**Total**	**Dep.** [1]	**% Normal**	**Ave**	**Dep.** [1]	**Max**	**Min**
Northwest	1.48	-0.08	94	17.97	-1.99	90	56.4	4.2	96	21
West Central	2.05	0.59	138	19.08	-0.27	98	57.3	3.8	97	25
Southwest	4.05	2.53	265	25.88	7.30	138	59.6	3.6	98	30
North Central	1.11	-0.87	57	22.62	-3.28	86	58.5	3.4	96	25
Central	1.22	-0.91	62	23.16	-3.97	84	59.6	3.3	96	26
South Central	1.48	-1.16	57	28.85	0.14	100	61.2	3.5	93	30
Northeast	0.82	-1.91	32	31.58	-0.42	98	56.6	1.2	91	23
East Central	0.83	-2.26	26	30.41	-3.94	87	58.5	2.2	91	26
Southeast	1.45	-2.22	39	32.00	-5.09	85	59.8	1.9	90	29
STATE	1.71	-0.61	91	25.91	-1.02	97	58.6	3.0	98	21

1. Departure from 1981-2010 normal value

Source: KSU Weather Data Library

Mary Knapp, Weather Data Library
mknapp@ksu.edu

6. Comparative Vegetation Condition Report: October 20 - November 2

K-State's Ecology and Agriculture Spatial Analysis Laboratory (EASAL) produces weekly Vegetation Condition Report maps. These maps can be a valuable tool for making crop selection and marketing decisions.

Two short videos of Dr. Kevin Price explaining the development of these maps can be viewed on YouTube at:
http://www.youtube.com/watch?v=CRP3Y5NIggw
http://www.youtube.com/watch?v=tUdOK94efxc

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 26-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.

NOTE TO READERS: The maps below represent a subset of the maps available from the EASAL group. If you'd like digital copies of the entire map series please contact Nan An at an_198317@hotmail.com and we can place you on our email list to receive the entire dataset each week as they are produced. The maps are normally first available on Wednesday of each week, unless there is a delay in the posting of the data by EROS Data Center where we obtain the raw data used to make the maps. These maps are provided for free as a service of the Department of Agronomy and K-State Research and Extension.

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

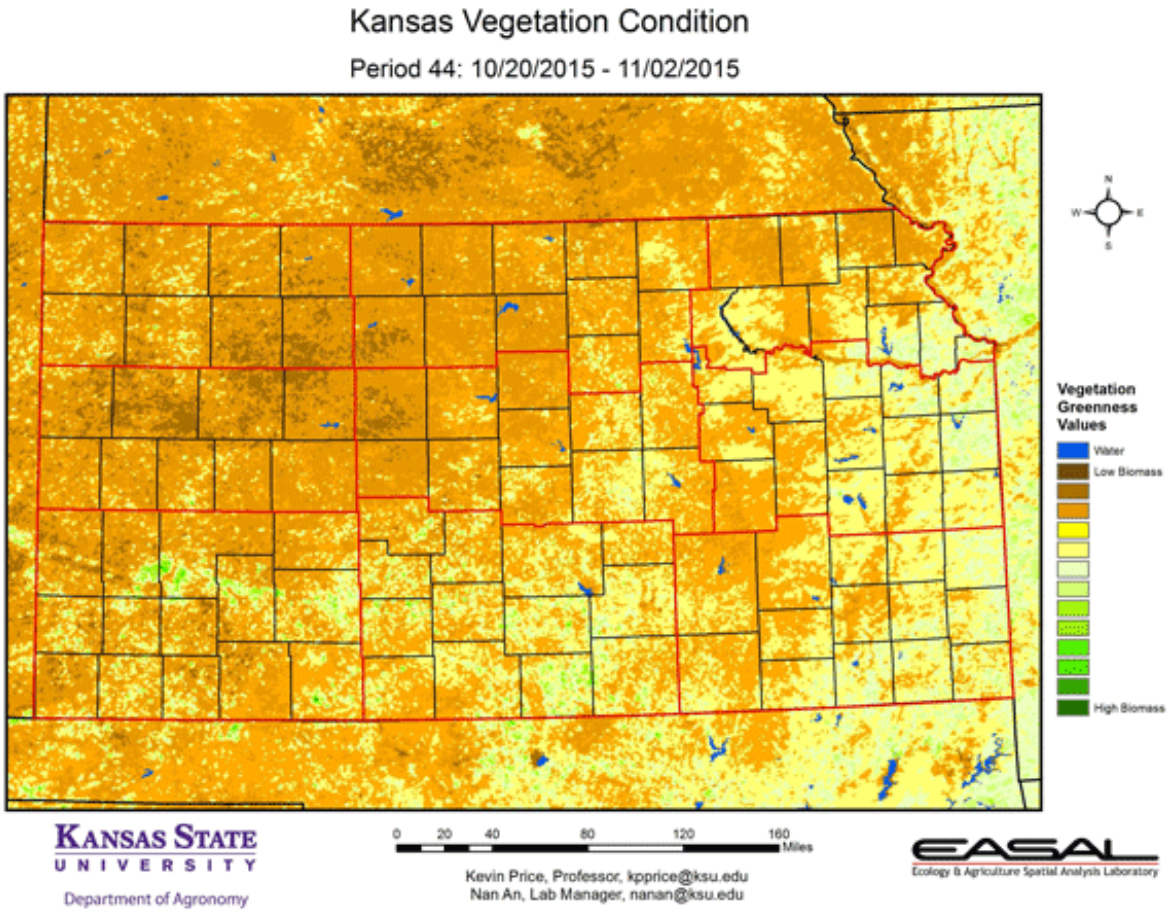


Figure 1. The Vegetation Condition Report for Kansas for October 20 – November 2 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that the highest biomass production continues to be a small pocket of activity along the Arkansas River in southwest Kansas. Irrigated alfalfa is a major product in the region. There is a small area of moderate photosynthetic activity in south central Kansas. Freezing temperatures have yet to reach this far south. Very low NDVI values are visible in Trego, Ellis, Rush, and Ness counties, where moderate drought conditions persist.

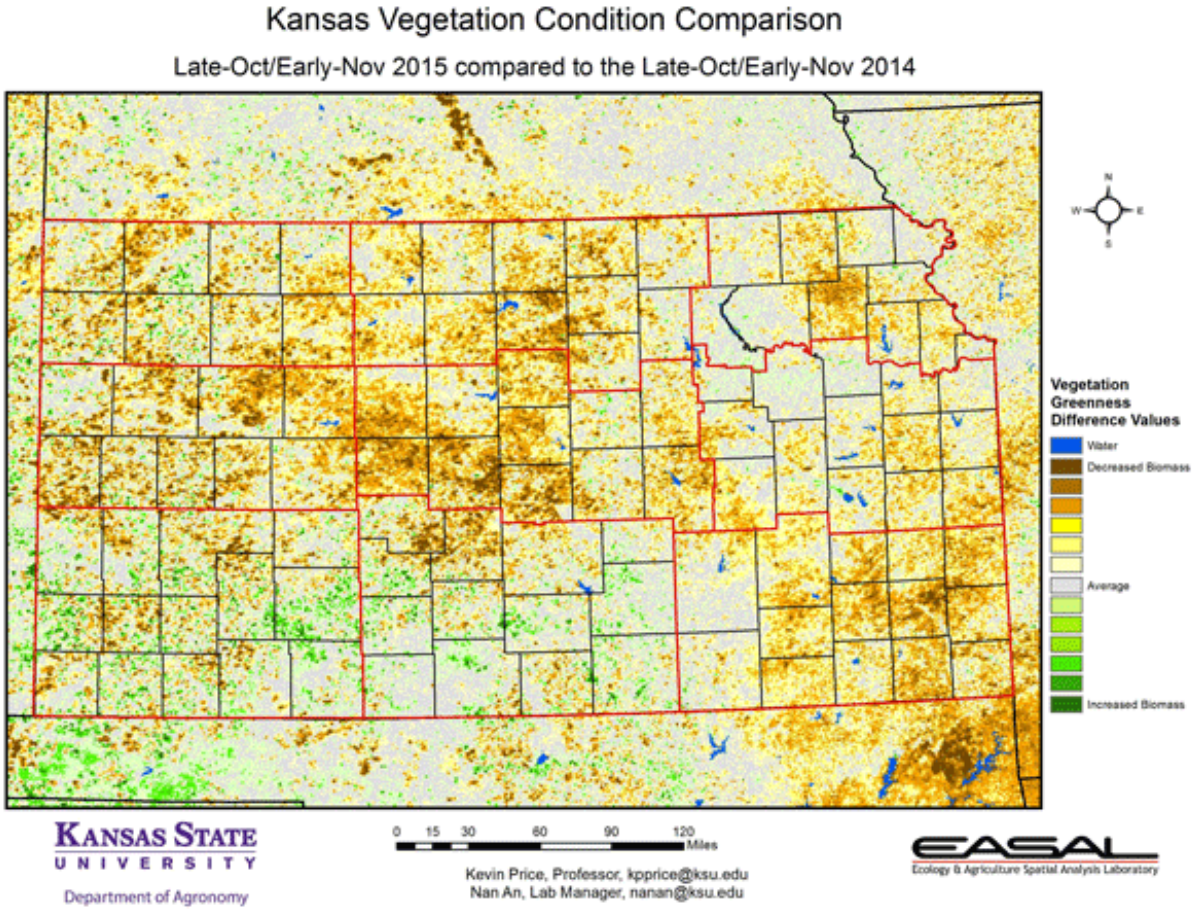
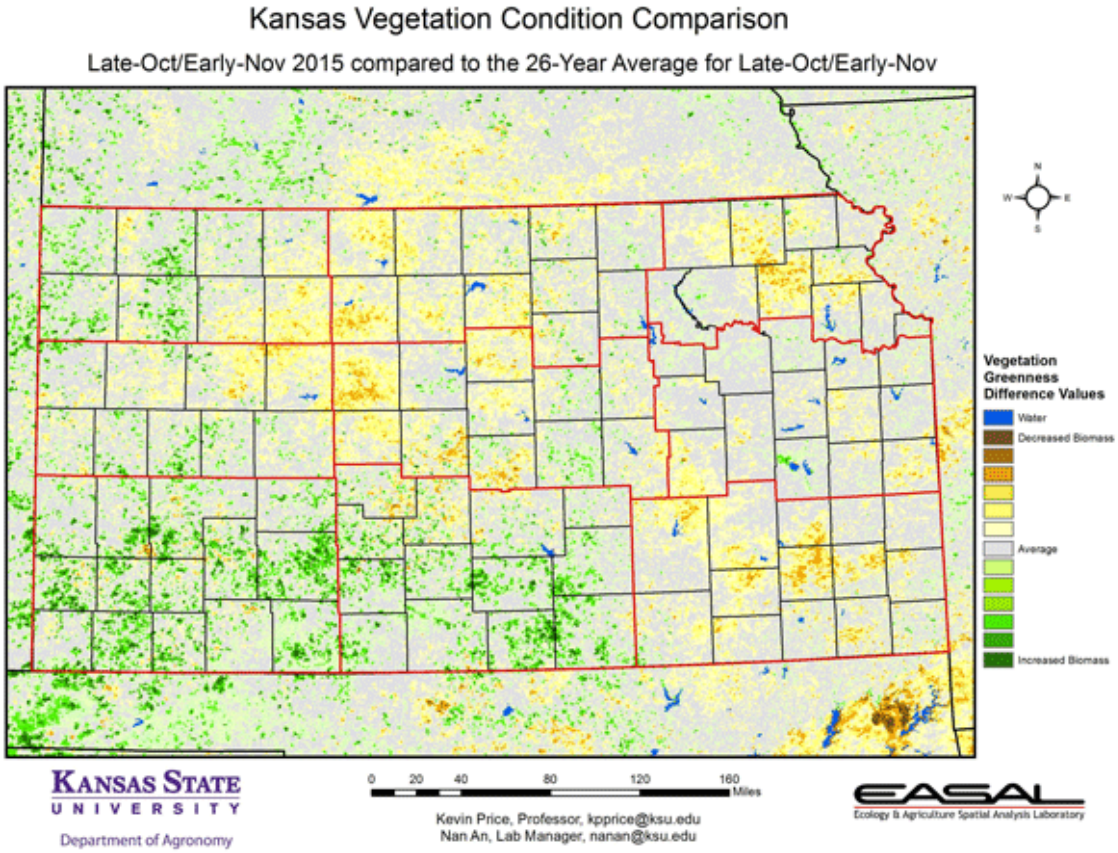


Figure 2. Compared to the previous year at this time for Kansas, the current Vegetation Condition Report for October 20 – November 2 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows much of the state with lower photosynthetic activity. Only the Southwest and South Central Divisions have higher photosynthetic activity. These areas continue have beneficial moisture, while the rest of the state has been dry. Moderate drought conditions persist in areas of the state, while abnormally dry conditions cover over half the



state.

Figure 3. Compared to the 26-year average at this time for Kansas, this year's Vegetation Condition Report for October 20 – November 2 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that most of the state continues to show near-average photosynthetic activity. The Southwest and South Central Divisions have the largest areas of above-average photosynthetic activity as moisture continues to be above average. From central through southeast Kansas, lower NDVI values continue. These areas continue to miss most of the storm systems, and moderate drought and abnormal dry conditions continue to expand.

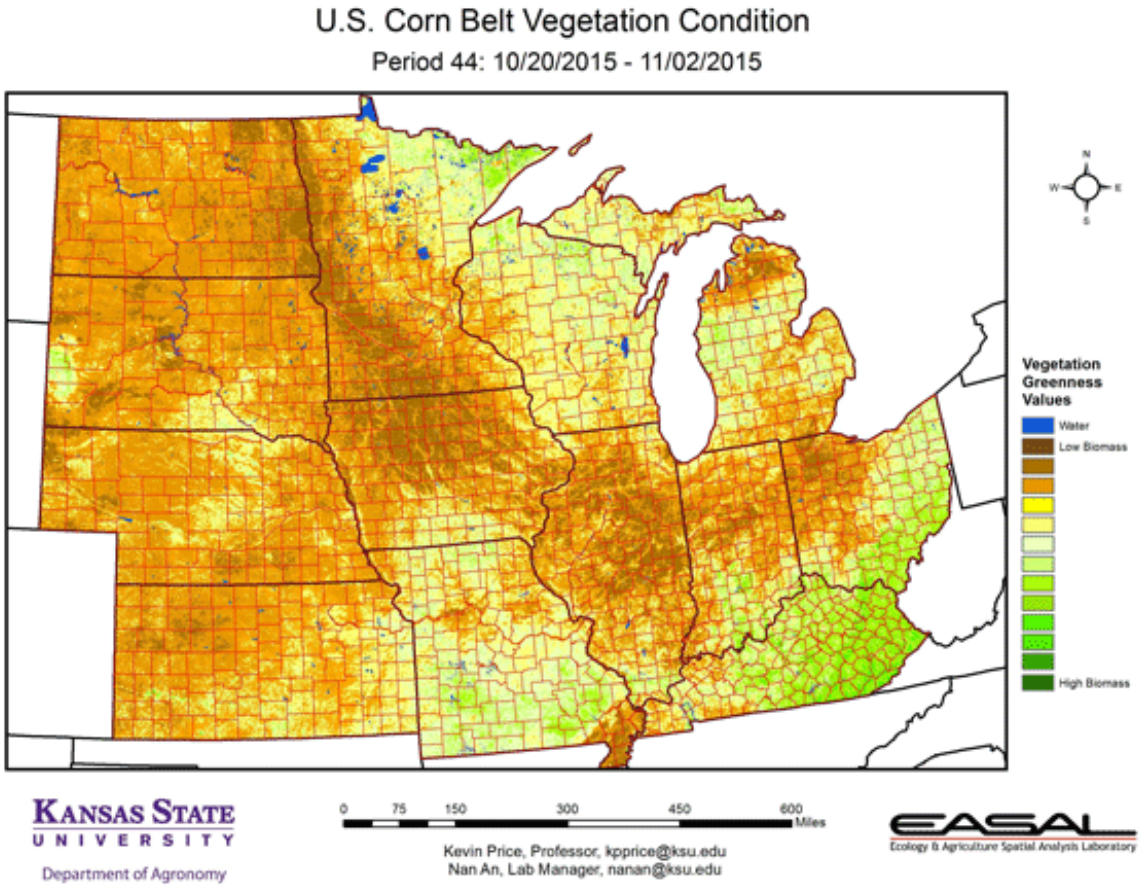


Figure 4. The Vegetation Condition Report for the Corn Belt for October 20 – November 2 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that the greatest photosynthetic activity is concentrated in the southern parts of the region, although there is a band of high activity in the Upper Peninsula of Michigan. Favorable moisture conditions in these areas have resulted in high photosynthetic activity. Low NDVI values are present from North Dakota through Iowa to Illinois and Ohio, as crops mature and freezing temperatures end the growing season.

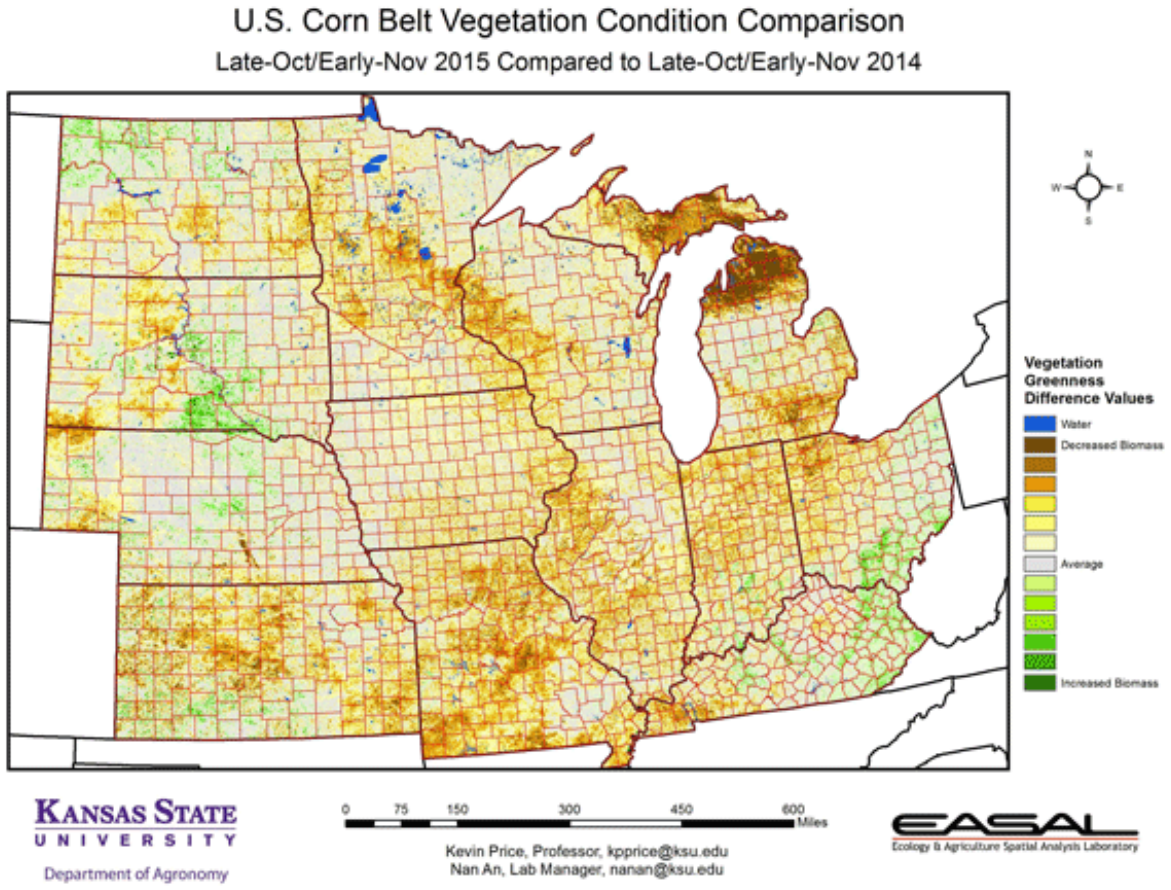


Figure 5. The comparison to last year in the Corn Belt for the period for October 20 – November 2 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows lower photosynthetic activity centered in the Central Plains, as an extended dry period has increased drought impacts, particularly with winter grains. Drought conditions continue to expand in this area. There is a small area of higher NDVI values in central South Dakota and eastern Ohio where moisture has been more favorable this year than last.

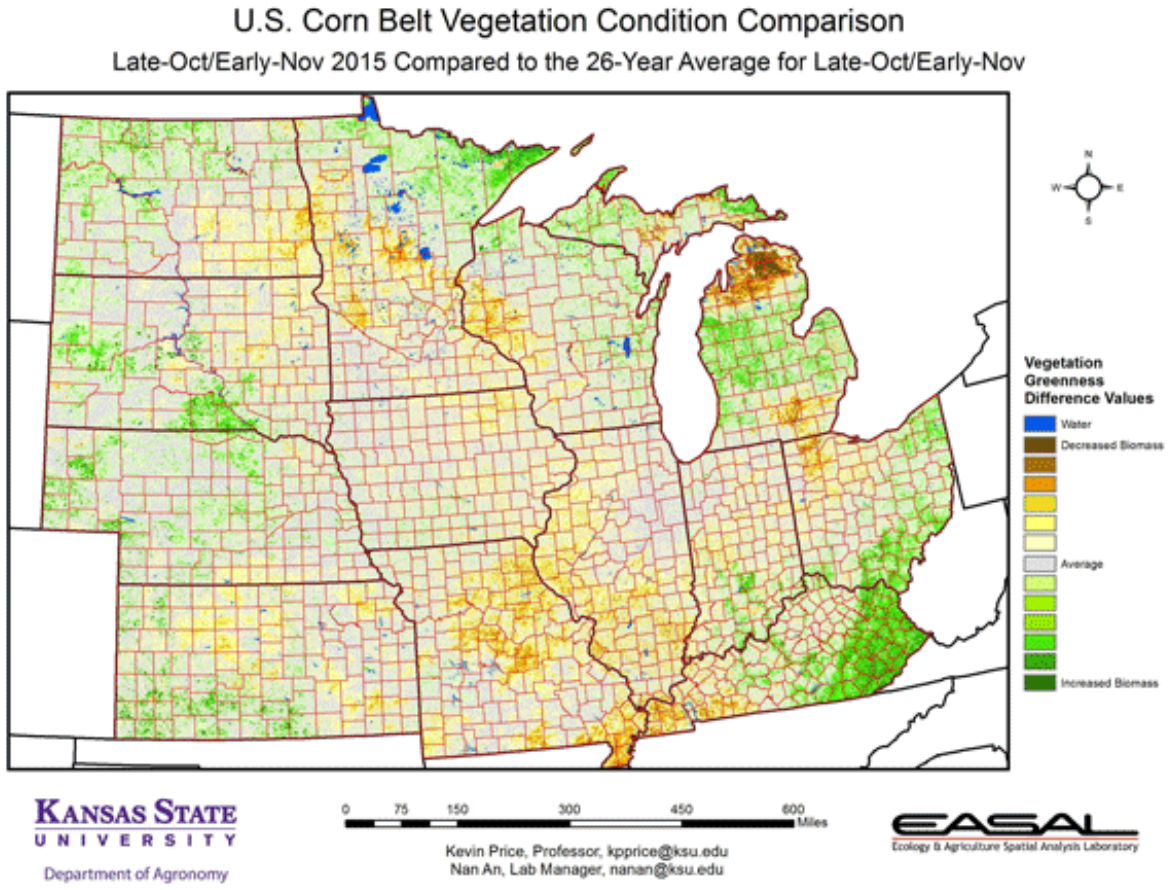


Figure 6. Compared to the 26-year average at this time for the Corn Belt, this year's Vegetation Condition Report for October 20 – November 2 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows most of the region has average biomass production. Above-average photosynthetic activity can be seen in the Western Plains, where temperatures have continued mild and moisture has been favorable. Parts of Kansas and Missouri stand out with lower NDVI values as warmer-than-average temperatures and low precipitation stress vegetation. Cloudy, wet weather in Northern Michigan has increased disease pressure and slowed harvest.

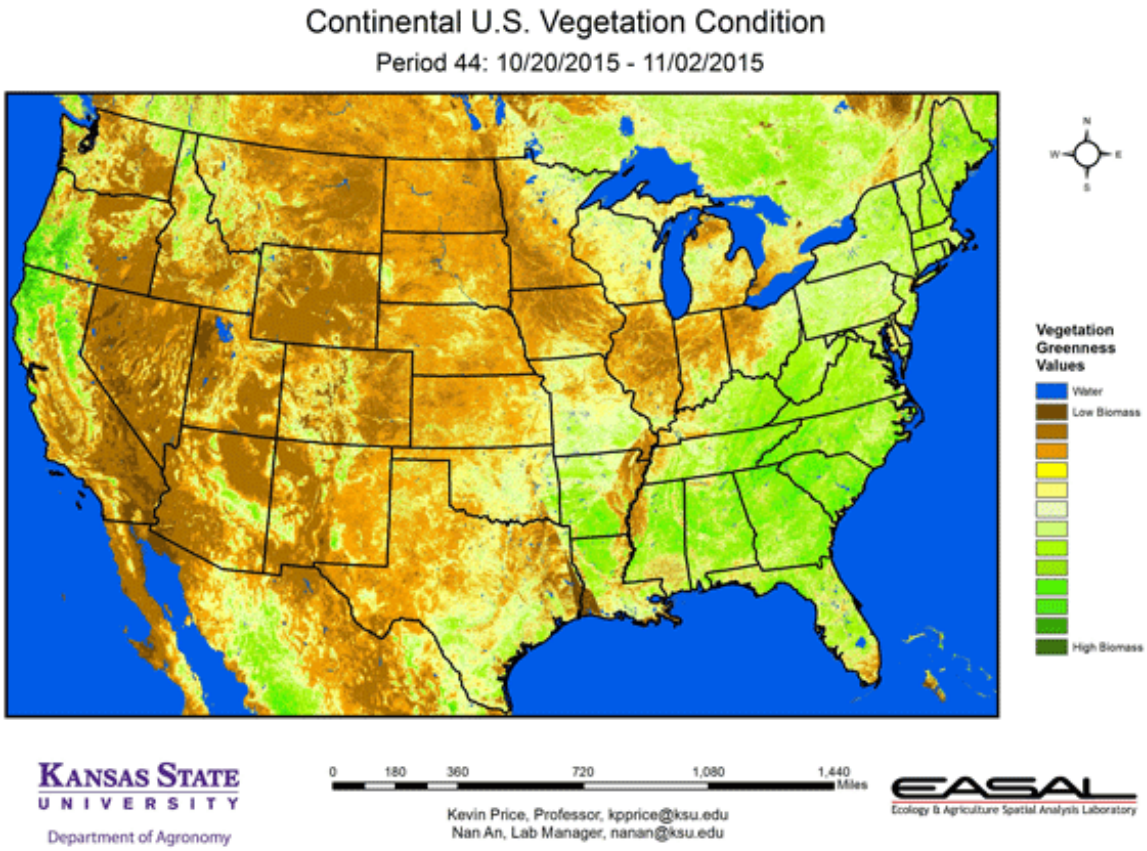


Figure 7. The Vegetation Condition Report for the U.S for October 20 – November 2 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that the highest photosynthetic activity is east of the Mississippi River, where favorable temperatures have extended the growing season. Lower NDVI values are noticeable in the Ohio River Valley and along the Mississippi River, where crops have matured early. Low NDVI values are also notable in the Inner Mountain West, as the colder temperatures begin to be felt. Low NDVI values are also notable along the lower Mississippi River and into east Texas. Heavy rains have caused flooding issues in these areas.

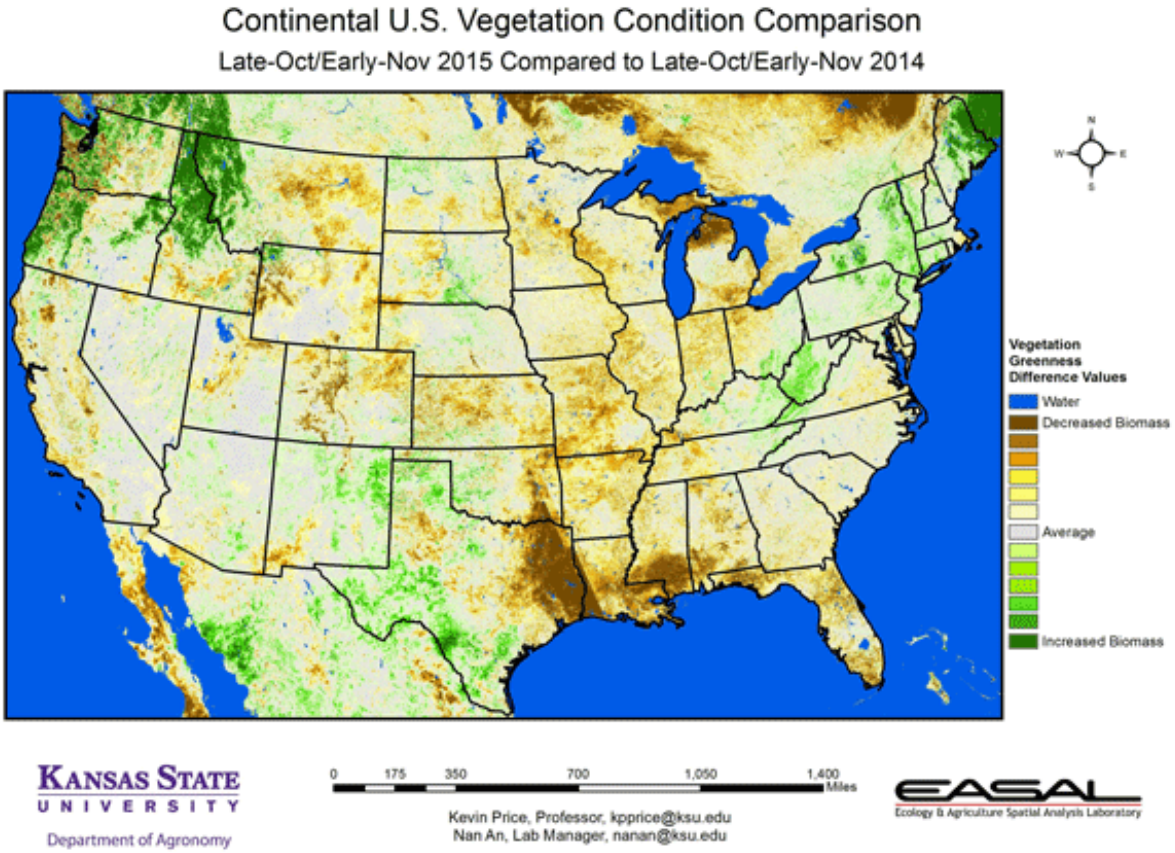


Figure 8. The U.S. comparison to last year at this time for the period October 20 – November 2 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that lower NDVI values are most evident from southern Oklahoma to the Gulf Coast. Heavy rains from the remnants of Hurricane Patricia have had a negative impact on vegetation in the region. Across the Central Plains, the more moderate reduction in photosynthetic activity is due to continued drought pressure. In the Northwest, lower NDVI values are visible in eastern Montana, which had more favorable precipitation last year. Much higher NDVI values are visible west of the Cascades and in northern Idaho, thanks to recent rains. Transition of this rainy pattern into a snowy pattern will be essential for significant drought relief.

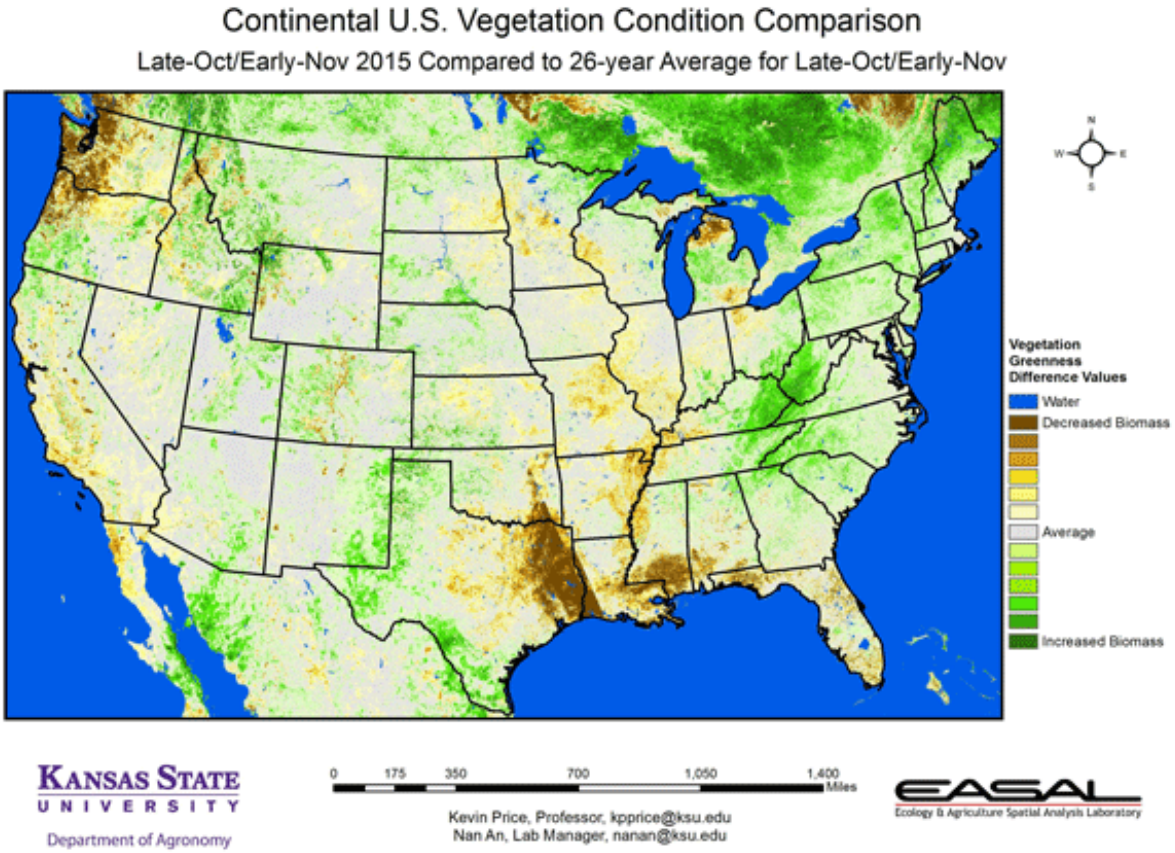


Figure 9. The U.S. comparison to the 26-year average for the period October 20 – November 2 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows much below-average photosynthetic activity in east Texas and western Washington. Decreases in NDVI readings in both of these areas are due largely to a very wet pattern over the last two weeks. Mild temperatures in the New England region have extended the growing season.

Mary Knapp, Weather Data Library
mknapp@ksu.edu

Kevin Price, Professor Emeritus, Agronomy and Geography
kpprice@ksu.edu

Nan An, former Graduate Research Assistant, Agronomy

an_198317@hotmail.com