



Extension Agronomy

eUpdate

07/02/2015

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.

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1. Using wheat damaged by Fusarium head blight for seed

Reports of wheat damaged by Fusarium head blight (head scab) have continued this week. Fusarium infections have important implications for farmers who are considering saving their wheat for seed.

Fusarium head blight infects the developing wheat heads during flowering or early stages of grain development. The disease continues to spread within the head as the fungus grows through the central stem of the head called the “rachis.” The grain is directly affected by the infection, resulting in shriveled, light-weight kernels. The diseased kernels will often have a white, chalky appearance or a pink discoloration.

These diseased kernels will reduce the test weight of the grain and can cause problems if the grain is used as seed. The Fusarium fungus can reduce germination and cause seedling blights in seed lots with severe infections. Fortunately, there are a few options that can greatly improve the prospects of using this grain as seed.

Clean the wheat to remove mostly severely diseased kernels. Many of the Fusarium-damaged kernels can be removed from a seed lot with cleaning equipment that removes the diseased kernels from the healthy seed.

Check the germination of the seed lot and use a fungicide seed treatment. It is not uncommon for seed lots with large amounts of Fusarium-damaged kernels to have a germination rate less than 85% in germination tests. The poor performance in germination tests is due in part to ideal conditions for fungal growth during the germination test. In most cases, a fungicide seed treatment can improve the germination rate to 95% or better. The fungicide seed treatment will help reduce the risk of a severe problem with seedling diseases caused by Fusarium during stand establishment.

For more information on fungicide seed treatment product options see the publication: *Seed Treatment Fungicides for Wheat Disease Management* at:
<http://www.bookstore.ksre.ksu.edu/pubs/MF2955.pdf>

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2. Germination testing of wheat seed

Fusarium head scab on the 2015 wheat crop is being reported from the field in many parts of Kansas. This disease can reduce germination dramatically in some cases, as well as makes reading and understanding a germination test much more difficult. Having your seed professionally tested for germination is always a good practice, but in this instance, it is highly recommended.

To have an official germination test on the seed, send a two-pound sample to:
Kansas Crop Improvement Association
2000 Kimball Ave.
Manhattan, KS 66502

A germination test will cost \$17.00 and a sample submittal form can be printed off from the KCIA website: www.kscrop.org/labservices.aspx

If producers want to test their seed for germination at home, it needs to be done correctly to be of value. The following detailed procedure is taken (and slightly modified) from K-State Extension publication AF-82, "Seed Germination Test Methods."

- Place two moistened paper towels (on top of each other) on a flat surface. The towels should not have free water in them.
- Arrange fifty (50) seeds on the towels leaving approximately an inch border around the edges.
- Place two more moistened towels over the seeds.
- Make a ½ to ¾ inch fold at the bottom of the four paper towels. This will keep the seed from falling out.
- Starting on one side, loosely roll the paper towels toward the other side (like rolling up a rug) and place a rubber band around the roll(s).

Place the roll in a plastic bag. Seal, but not completely, so as to keep moisture in but still allow some air into the bag.

For newly harvested seed:

- Place the bag upright in the refrigerator for 5 days and then remove and place upright at room temperature for an additional 5 to 7 days.
- Remove the sample from the bag and unroll the towels.
- Count and record the number of healthy seedlings (adequate root and shoot development and NOT overtaken by disease.)

For carryover seed, or after September 1:

- Place the bag upright at room temperature for 5 to 7 days.
- Remove the sample from the bag and unroll the towels.
- Count and record the number of healthy seedlings (adequate root and shoot development and NOT overtaken by disease).

To calculate the germination percentage: divide the number of healthy seedlings by the number of

seed tested and multiply by 100.

Example: 42 healthy seedlings X 100 = 84% germination

50 seed tested

This may be repeated more times for each sample in order to obtain more accurate results, testing up to 400 seed.

The goal is to have at least 85 percent germination for wheat seed.

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3. Factors to consider before baling or burning wheat residue

Following wheat harvest there are some producers that might be thinking about baling or burning their wheat stubble. Producers may consider burning for several reasons: to control pests such as plant diseases or weeds, to improve the seedbed for the subsequent crop, and possibly other reasons. While burning is inexpensive, and baling provides additional income, producers should understand the true value of leaving crop residue in the field. Some of the information below comes from K-State Extension publication MF-2604, *The Value of Crop Residue*.

There are four main factors to consider.

Loss of nutrients

The products of burned wheat stubble are gases and ash. Nutrients such as nitrogen (N) and sulfur (S) are largely combustion products, while phosphorus (P) and potassium (K) remain in the ash. When residue is burned, about one-third to one-half of the N and S will combust. The nutrients in the ash may remain for use by the plants, if it doesn't blow or wash away first (more on that below). Therefore, instead of cycling these important plant nutrients back into the soil, they can essentially become air pollutants when the residue is burned.

Amounts of nutrients remaining in wheat stubble (assuming 50 bu/ac yield)	
Nutrient	Pounds present in 5,000 lbs of wheat straw
N	27.0
P ₂ O ₅	7.5
K ₂ O	37.5
S	5.0

Protection from soil erosion

Bare soil is subject to wind and water erosion. Without residue, the soil will receive the full impact of raindrops, thus increasing the amount of soil particles that may become detached during a rainfall event. Bare, tilled soils can lose up to 30 tons per acre topsoil annually. In no-till or CRP systems where residue is left, annual soil losses are often less than 1 ton per acre. The detachment of soil particles can lead to crusting of the soil surface, which then contributes to greater amounts of sediment-laden runoff, and thus, reduced water infiltration and drier soils.

Leaving residue on the field also increases surface roughness, which decreases the risk of both wind and water erosion. Most agricultural soils in Kansas have a "T" value, or tolerable amount of soil loss, of between 4 and 5 tons per acre per year, which is about equal to the thickness of a dime. To prevent water erosion, 30% ground cover or greater may be needed to reduce water erosion to "T" or less, especially in fields without erosion-control structures such as terraces.

Standing stubble is more effective at preventing wind erosion than flat stubble. On occasion, accidental residue burns have resulted in devastating wind erosion events that happen over and over again until a new ground cover is established. Once a field begins to erode from wind, it is

extremely difficult to stop. During extended droughts the soil profile gets dried out and not even emergency tillage is effective at stopping the wind erosion. Losing topsoil degrades soil productivity, and the long-term effect of this loss is not easy to quantify.

The figure below shows research results from six locations in western Kansas, conducted by Yuxin He, agronomy graduate student. In this experiment He removed crop residue at different levels, accomplished by cutting the crop residue at different heights. For example, if the residue was 10" after it was combined, the residue would be cut to 5" and removed from the plot, and that would equal 50% removal. The wind erodible fraction is the part of the soil less than 0.84 mm in size.

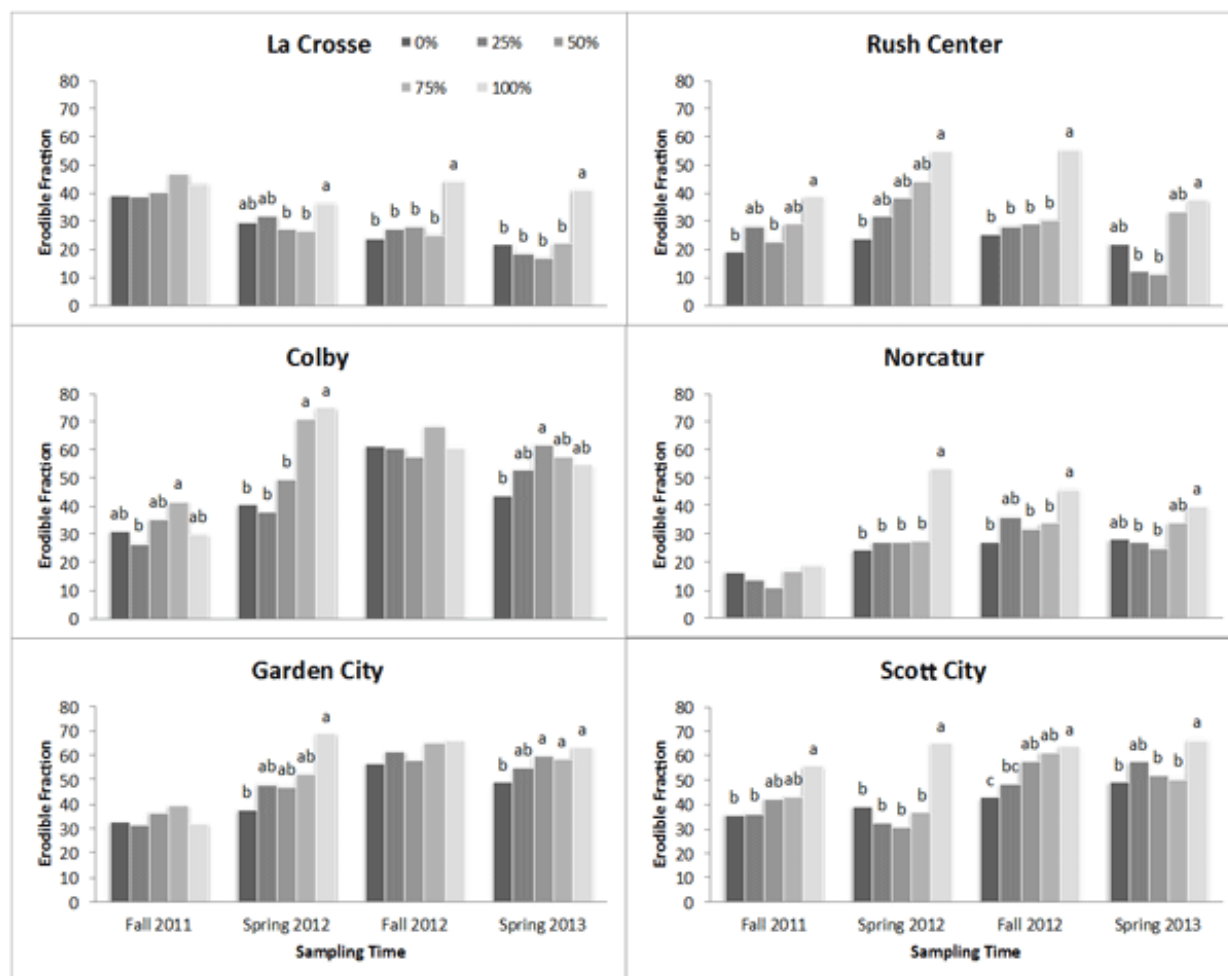


Figure 1. Effects of crop residue removal on the wind erodible fraction of soil, defined as <0.84 mm. Values on the x-axis (different shadings of the bars) refer to the percent residue removed. For example 0% means no residue was removed, while 100% means that all residue was removed. Lowercase letters indicate treatment differences at p<0.05. Ph.D. dissertation, Yuxin He, 2015, available at:

<http://krex.k-state.edu/dspace/bitstream/handle/2097/19043/YuxinHe2015.pdf?sequence=1>

Moisture infiltration rates and conservation

Wheat residue enhances soil moisture by increasing rainfall infiltration into the soil and by reducing evaporation. Residues physically protect the soil surface and keep it receptive to water movement into and through the soil surface. Without physical protection, water and soil will run off the surface more quickly.

Ponded infiltration rates were measured at Hesston in September 2007. Very low infiltration rates (1.9 mm/hour) were observed for continuous winter wheat in which the residue was burned each year prior to disking and planting the following crop. In contrast, high infiltration rates (13.3 mm/hour) were observed for a no-till wheat/grain sorghum rotation (Presley, unpublished data).

Another way residue increases soil moisture is by reducing evaporation rates. Residue blocks solar radiation from the sun and keeps the soil surface cooler by several degrees in the summer. Evaporation rates can decline dramatically when the soil is protected with residue. Research from dryland experiments has shown that crop residues are worth 2 to 4 inches of water annually in the central Great Plains states (Presley, 2012).

Soil quality concerns

Over time, the continued burning of cropland could significantly degrade soil organic matter levels. By continually burning residue, soil organic matter is not allowed to rebuild. Soil organic matter is beneficial for plant growth as it contributes to water holding capacity and cation exchange capacity. Soil organic matter binds soil particles into aggregates, which increases porosity and soil structure and thus, increases water infiltration and decreases the potential for soil erosion. One burn, however, will not significantly reduce the organic matter content of a soil (unless the field erodes, as discussed above).

If producers do choose to burn or harvest their wheat stubble, timing is important. It's best to burn as late as possible, close to the time when the next crop is planted. This minimizes the time that the field will be without residue cover and vulnerable to erosion. Before choosing to burn residue, producers should check with the USDA Natural Resources Conservation Service and/or the Farm Service Agency to find out if this will affect their compliance in any conservation programs.

For more information, see:

* *Efficient crop water use in Kansas*, MF3066, available at:
<http://www.ksre.ksu.edu/bookstore/pubs/mf3066.pdf>

* *Emergency wind erosion control*, MF2206, available at:
<http://www.ksre.ksu.edu/bookstore/pubs/MF2206.pdf>

* *Crop residue management strategies in Kansas*. 2015. Yuxin He. Ph.D. dissertation, Kansas State University,
<http://krex.k-state.edu/dspace/bitstream/handle/2097/19043/YuxinHe2015.pdf?sequence=1>

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4. Drought stress in corn

In many areas of the state, dryland corn has received plenty of rain and the crop is in good condition. But over the last few weeks some locations have not received any rain and drought conditions are starting to show up. Since the growing season is progressing very fast, it is best to be prepared to take a close look for symptoms of potential drought stress.

Early vegetative

One of the first visible corn responses to insufficient water availability is leaf rolling. If the stress is severe, the leaf rolling process can be detected even very early in the morning. Leaf rolling is just a plant defense mechanism to reduce transpiration and plant canopy temperature, and with an overall improvement in water use efficiency. Under continuous drought for several days, reductions in leaf elongation and in plant height should be expected.





Figure 1. Leaf rolling in corn under drought stress. Photos by Ignacio Ciampitti, K-State Research and Extension.

Shorter, less leafy plants are also among the most visible symptoms of drought stress conditions. Plants may not be as green as usual if chlorophyll production is affected. In addition, root systems will be smaller under drought conditions since all below- and above-ground plant growth will be affected. Those symptoms are the outcome of plants that are less efficient in growing as photosynthesis is slowing down.



Figure 2. Effect of drought stress on root systems. On the left is a plant with a smaller root system and stalk diameter caused by drought stress. On the right is an unstressed corn plant, with greater root system, more nodal roots, and greater stalk diameter.

Overall reductions in potential yield can be expected even if the stress is occurring early (10-leaf to 15-leaf stages) or late (dough and dent stages) in the crop growing season.

Critical period bracketing silking

At what stage of growth is corn most sensitive to drought stress? To answer the question, we need to know the most important growth stages for grain determination. The final number of kernels for corn is determined around the pollination period (2 weeks before and 2 weeks after flowering). Thus, corn is extremely sensitive to drought stress during that period. Drought stress directly affects the final number of kernels through different processes, such as:

1. Potential delays in silking (asynchrony between the development of male and female reproductive parts). This happens when the tassel is shedding pollen but the ear is not yet receptive (silks are not yet out of the husk).
2. Potential reductions in ear size (smaller ears with less physical space for bearing grains).
3. Shorter time for pollen receptivity. This occurs when the silks dry out very fast under warm temperatures, impeding a successful pollination.

4. Pollination is concentrated in just a few days. In general, pollination takes place earlier and with a short duration under drought stress. High temperatures can also potentially impact pollen viability.
5. Even when pollination is effective, kernel abortion or cessation can occur right after flowering, in the blister and milk stages, if drought stress continues.

Under extreme drought and heat stress, plants may be barren, with no ears being formed at all, but that is unlikely to occur in Kansas this year.





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Figure 3. Leaf rolling in corn under drought stress during early reproductive stages.

Management practices and other factors

From a management practice perspective, situations that tend to make corn more susceptible to drought stress include high plant densities, narrow row spacing, and excessive applications of fertilizer or manure. Also, sandy soils are prone to the drought stress due to reduced water holding capacity.

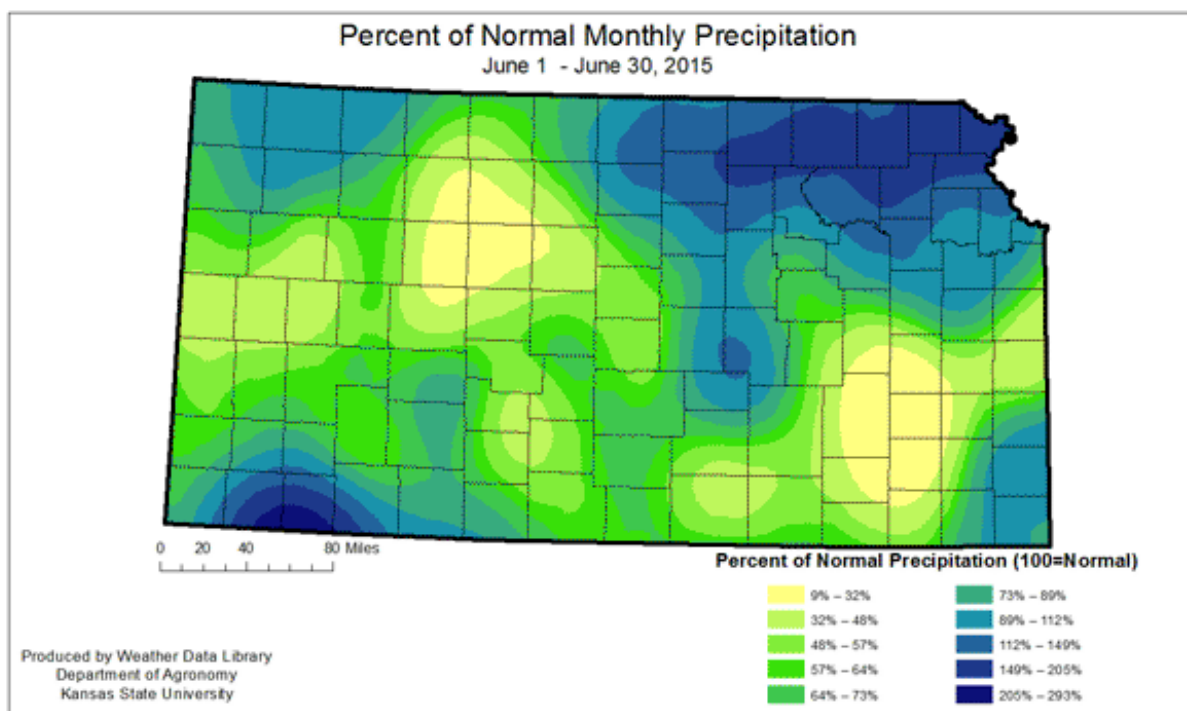
Summary

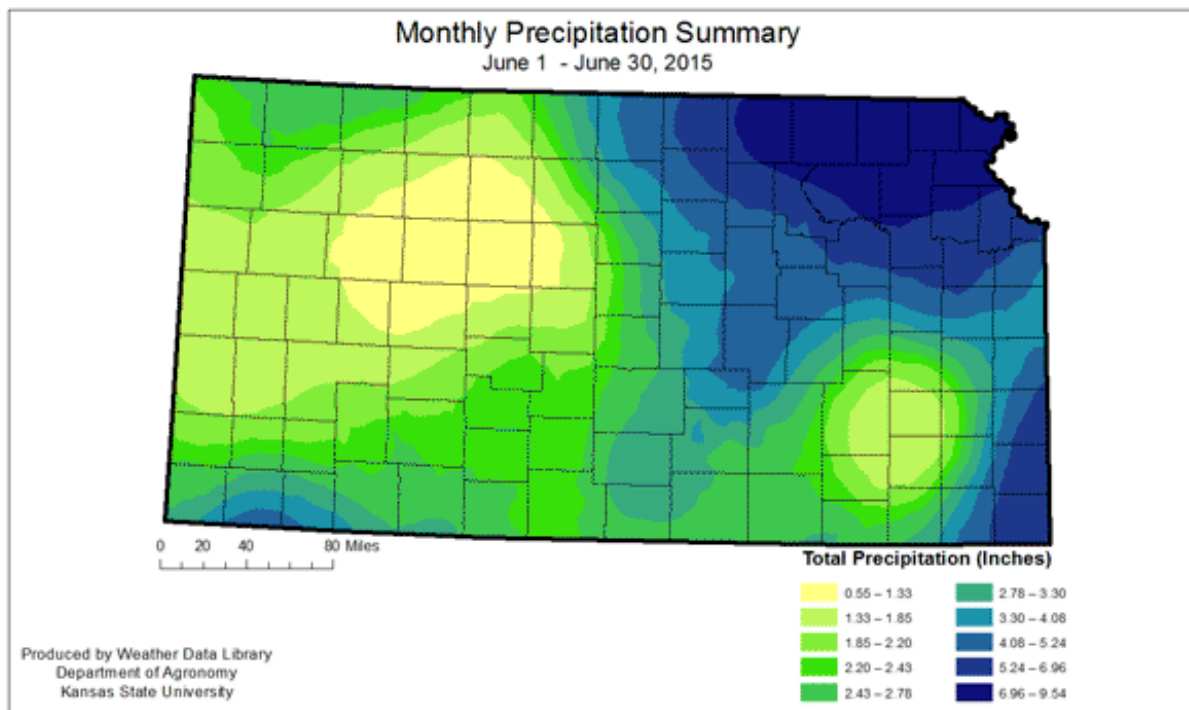
Scout your acres for drought symptoms. The impacts of the drought stress on grain yield can be known with more precision right after flowering. If stress is impacting the potential kernel number, and if conditions for the coming weeks continue to be on the dry side, yield reductions can be expected. Continuing drought stress could potentially reduce yields further by lowering seed weight, on top of a reduction in kernel numbers.

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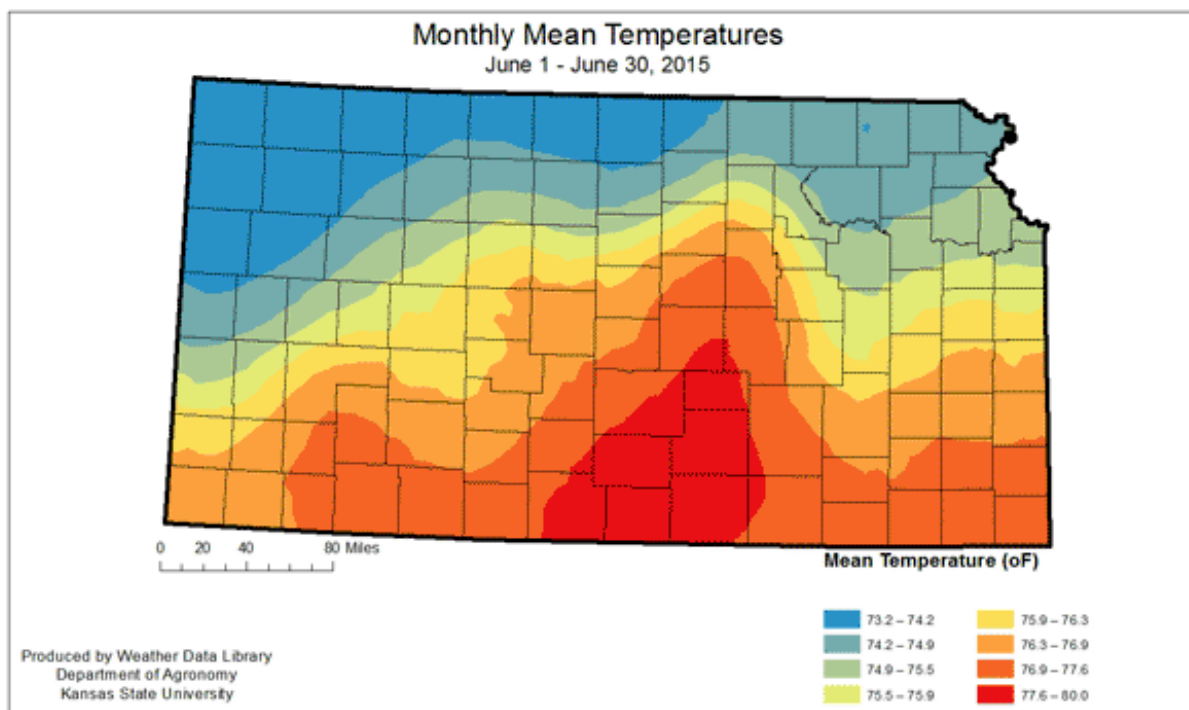
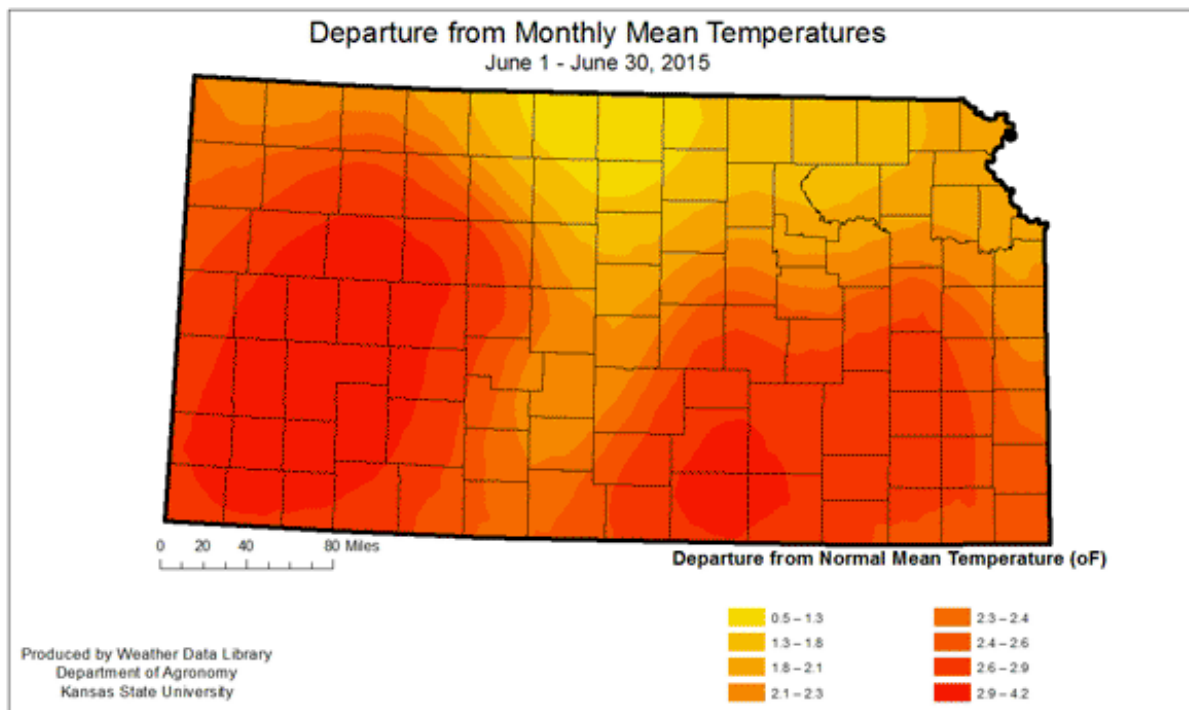
5. June 2015 weather summary for Kansas: Break in the rains

While June began on a wet note, most of the state ended up with lower-than-average precipitation for the month. Statewide average precipitation was 3.03 inches, or 69 percent of normal. This ranks as the 33rd driest June on record. Only the Northeastern Division averaged above normal. The average precipitation for the Northeast was 6.94 inches, or 134 percent of normal. Despite the overall lower-than-average precipitation, two locations in southwest Kansas set daily precipitation records for June: Hugoton with 3.90 inches on the 11th and Liberal with 5.00 inches on the 12th. The greatest monthly total for the month was 10.46 inches at Bremen, Marshall County (NWS) and 9.54 inches at Blue Rapids, Marshall County (CoCoRaHS).





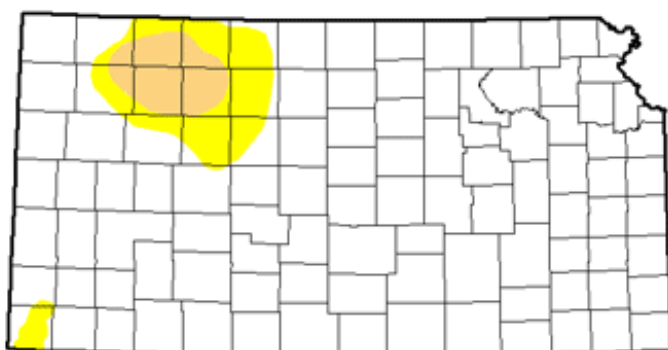
Temperatures averaged warmer than normal for the month. The statewide average temperature was 75.7 degrees F, which is 2.7 degrees warmer than normal. The Southwest Division had the greatest departure with an average of 76.8 degrees F, or 3.6 degrees warmer than normal. The North Central Division was closest to normal with an average of 74.6 degrees F, or 1.3 degrees above normal. The warmest reading was 105 degrees F and occurred at two different locations and dates: Norton Dam on the 25th and Hill City on the 30th. This rapid switch from cool wet conditions to warm dry conditions have had mixed impacts. The dry weather allowed for rapid progress on wheat harvest and for field work such as haying. On the other hand, the warm temperatures stressed spring planted crops such as corn and soybeans that had limited root development.



Severe weather activity was less than last month. Preliminary data indicates there were 15 tornadoes

reported during June, compared to 99 in the May. Hail reports were also fewer, with 83 in June versus 108 in May. There was an increase in damaging wind reports with 65 reports this month and only 52 reports last month. Drought conditions continued to improve slightly as the wet end to May and wet start to June were included in the assessments. The only remaining moderate drought area is in northwest and north central Kansas, with a small area of abnormally dry conditions in the southwest. 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. For example, Norton, Cedar Bluff, Kirwin, and Webster reservoirs are all less than 75 percent of conservation pool.

U.S. Drought Monitor Kansas



Author:
Brian Fuchs
National Drought Mitigation Center



<http://droughtmonitor.unl.edu/>

June 30, 2015

(Released Thursday, Jul. 2, 2015)

Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0	D1	D2	D3	D4
Current	90.36	6.15	3.49	0.00	0.00	0.00
Last Week 6/23/2015	90.36	6.15	3.49	0.00	0.00	0.00
3 Months Ago 3/31/2015	6.52	24.78	46.25	20.57	1.88	0.00
Start of Calendar Year 1/1/2015	19.49	43.02	19.18	16.05	2.25	0.00
Start of Water Year 9/1/2014	18.51	35.36	26.63	17.13	2.37	0.00
One Year Ago 7/1/2014	0.17	13.53	39.18	34.48	12.63	0.00

Intensity

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

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

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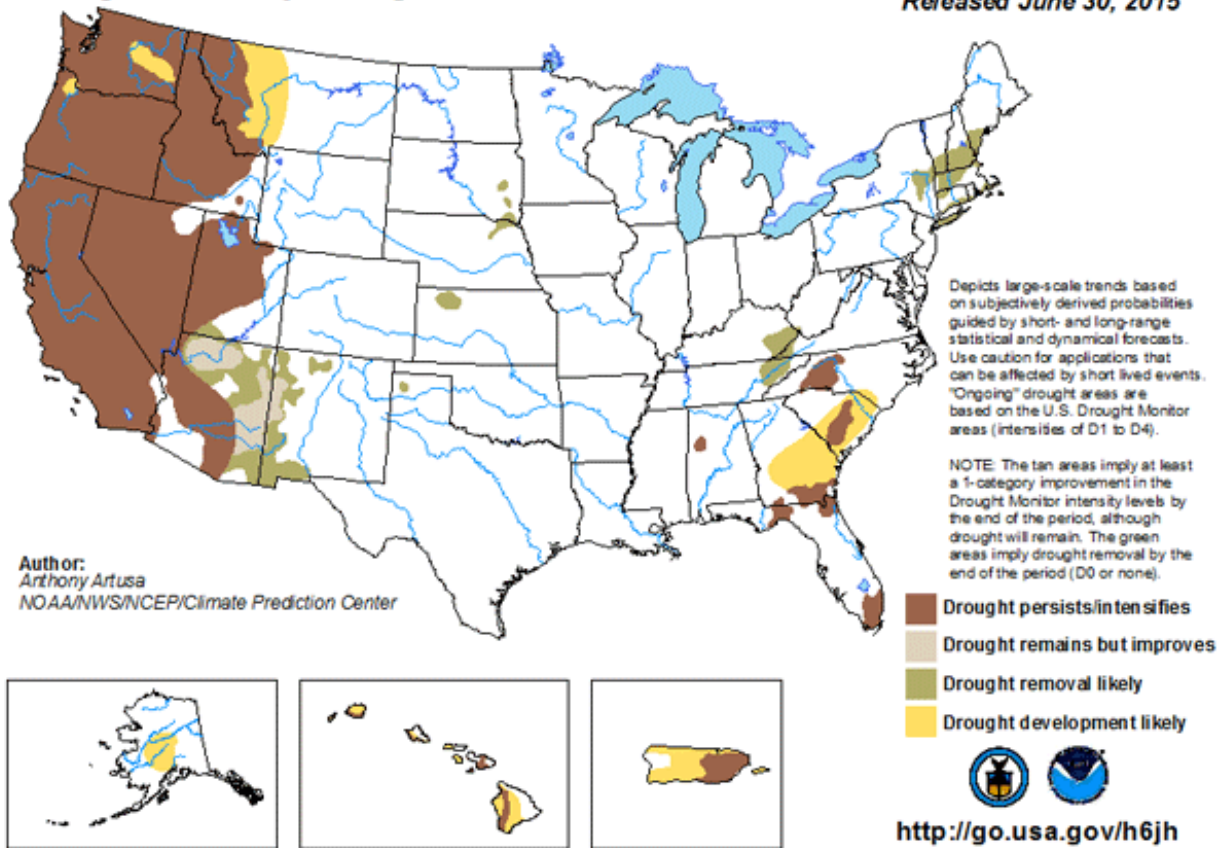
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U.S. Monthly Drought Outlook

Drought Tendency During the Valid Period

Valid for July 2015
Released June 30, 2015



Jun 2015

Kansas Climate Division Summary

Precipitation (inches)						Temperature (°F)				
Jun 2015			2015 January through June			Monthly Extremes				
Division	Total	Dep. ¹	% Normal	Total	Dep. ¹	% Normal	Ave	Dep. ¹	Max	Min
Northwest	1.66	-1.17	57	9.82	-0.85	92	73.4	2.5	105	41
West Central	1.07	-1.74	37	10.29	0.04	100	74.6	2.9	103	41
Southwest	2.79	-0.42	85	13.81	3.85	136	76.8	3.4	104	48

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North Central	3.63	-0.20	89	13.06	-0.84	91	74.6	1.3	103	45
Central	2.67	-1.41	62	13.90	-1.07	91	76.7	2.3	104	47
South Central	2.63	-2.16	55	17.48	0.98	106	77.8	2.8	100	45
Northeast	6.96	1.82	134	19.88	2.49	114	74.7	1.8	99	51
East Central	3.82	-1.76	68	18.72	-0.49	96	75.5	2.3	99	52
Southeast	3.04	-2.90	51	19.59	-2.01	90	76.8	2.5	98	51
STATE	3.03	-1.23	69	15.23	0.29	102	75.7	2.4	105	41

1. Departure from 1981-2010 normal value

Source: KSU Weather Data Library

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Mary Knapp, Weather Data Library

mknapp@ksu.edu

6. Comparative Vegetation Condition Report: June 16 - 29

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=CRP3Y5Nlggw>

<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 nanan@ksu.edu 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:

Kansas Vegetation Condition

Period 26: 06/16/2015 - 06/29/2015

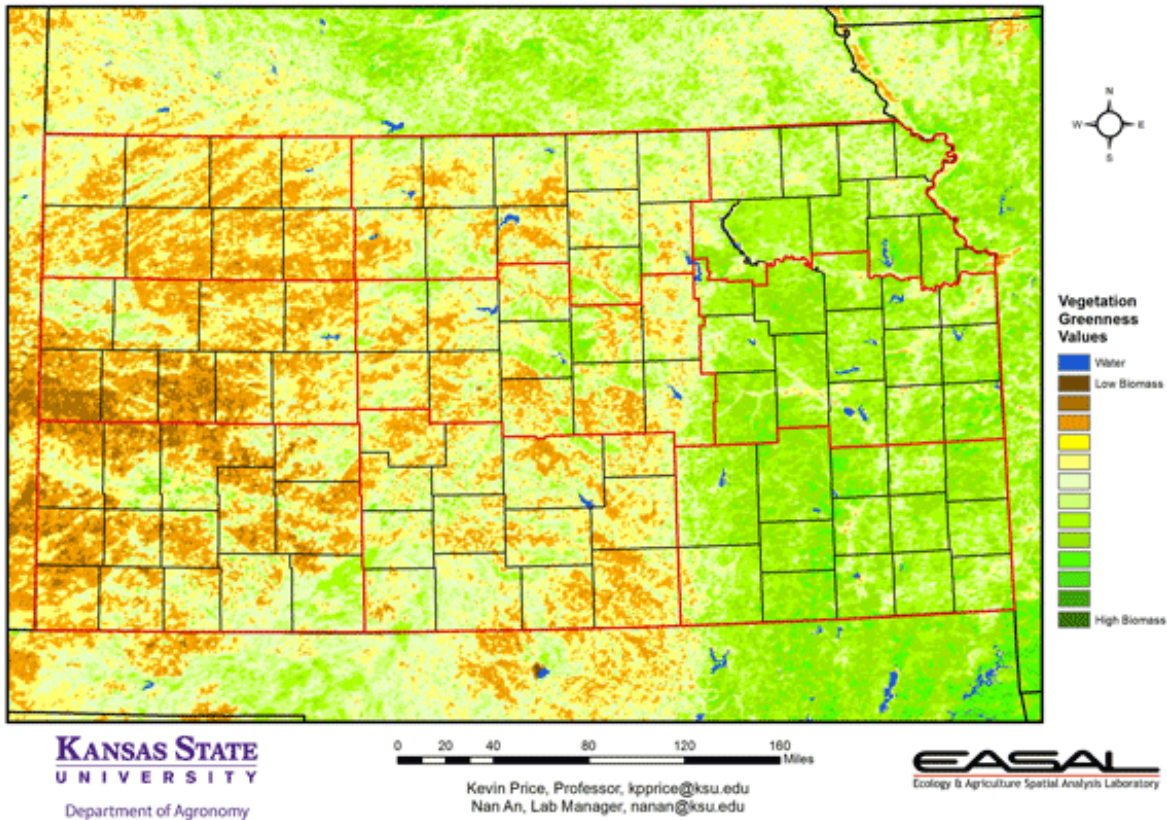


Figure 1. The Vegetation Condition Report for Kansas for June 16 - 29 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that vegetative activity has continued to increase across the state. The highest NDVI values in western Kansas are visible along the stream beds where favorable moisture continues to spur plant development.

Kansas Vegetation Condition Comparison

Late-June 2015 compared to the Late-June 2014

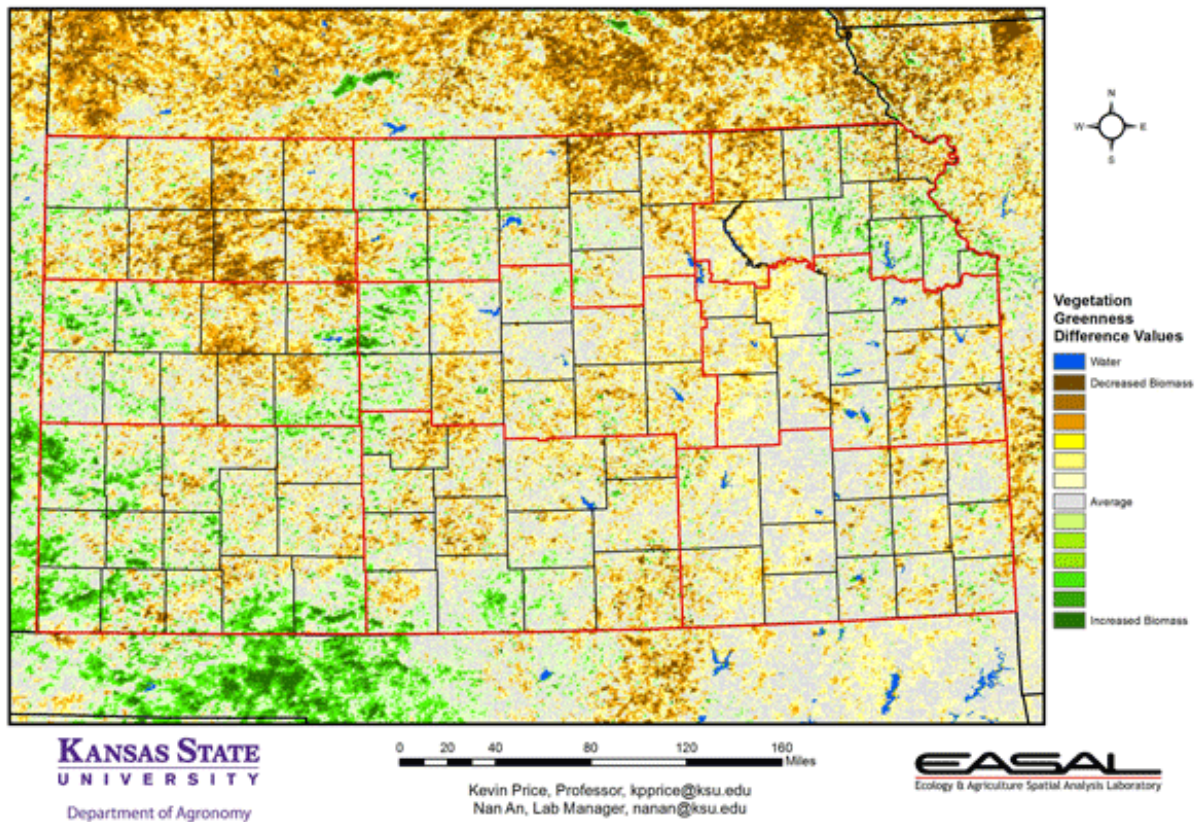


Figure 2. Compared to the previous year at this time for Kansas, the current Vegetation Condition Report for June 16 - 29 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows biomass production is higher across much of the western parts of the state. It is particularly noticeable in Meade and Clark counties. Last year, precipitation didn't pick up until late June. In northwest Kansas an area of lower NDVI values remains. This corresponds to lingering moderate drought in this region.

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Kansas Vegetation Condition Comparison

Late-June 2015 compared to the 26-Year Average for Late-June

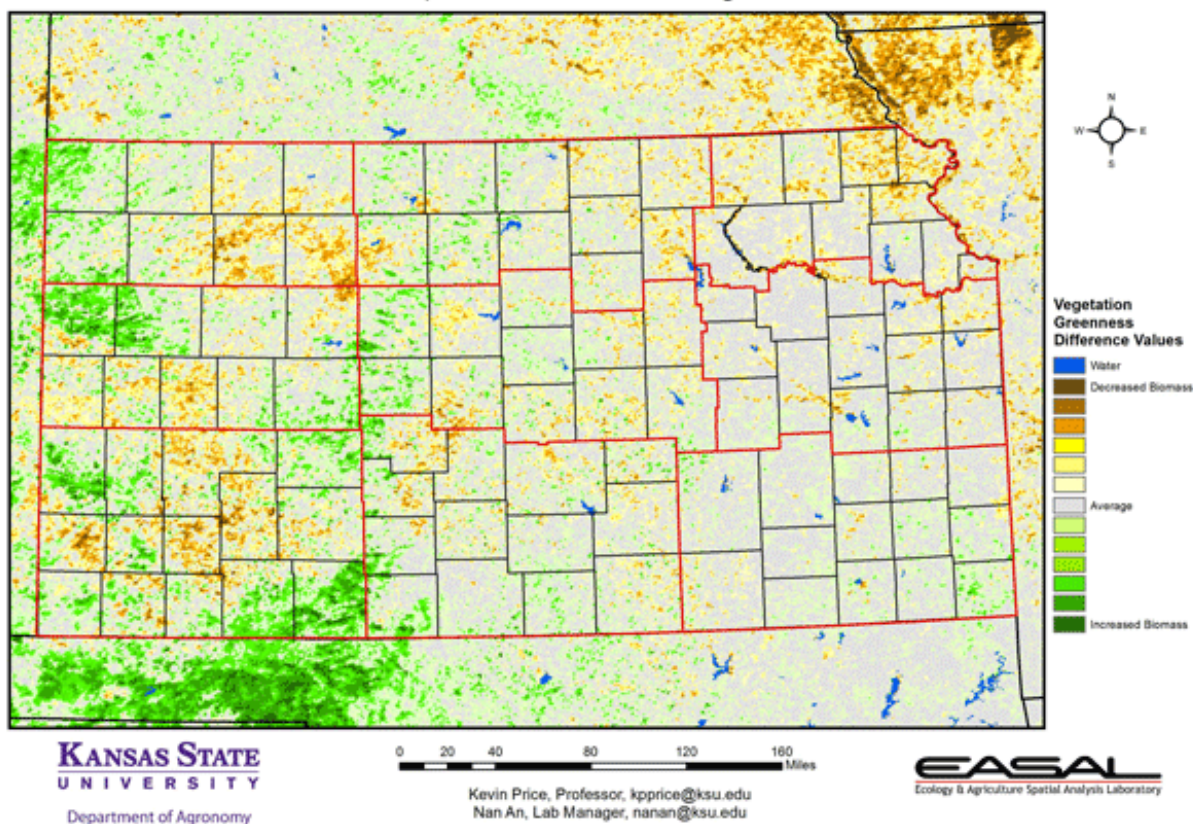


Figure 3. Compared to the 26-year average at this time for Kansas, this year's Vegetation Condition Report for June 16 - 29 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that most of the state has a fairly average level of photosynthetic activity. The western divisions have the greatest increase over normal photosynthetic activity. While precipitation in this region is above normal, it has not been quite as excessive as in the Northeastern Division, so has not been limiting. Lower NDVI values are seen in Sheridan and Graham counties, where moderate drought persists. In contrast, the lower NDVI values in Brown and Doniphan counties are due to continued higher-than-normal precipitation.

U.S. Corn Belt Vegetation Condition

Period 26: 06/17/2015 - 06/29/2015

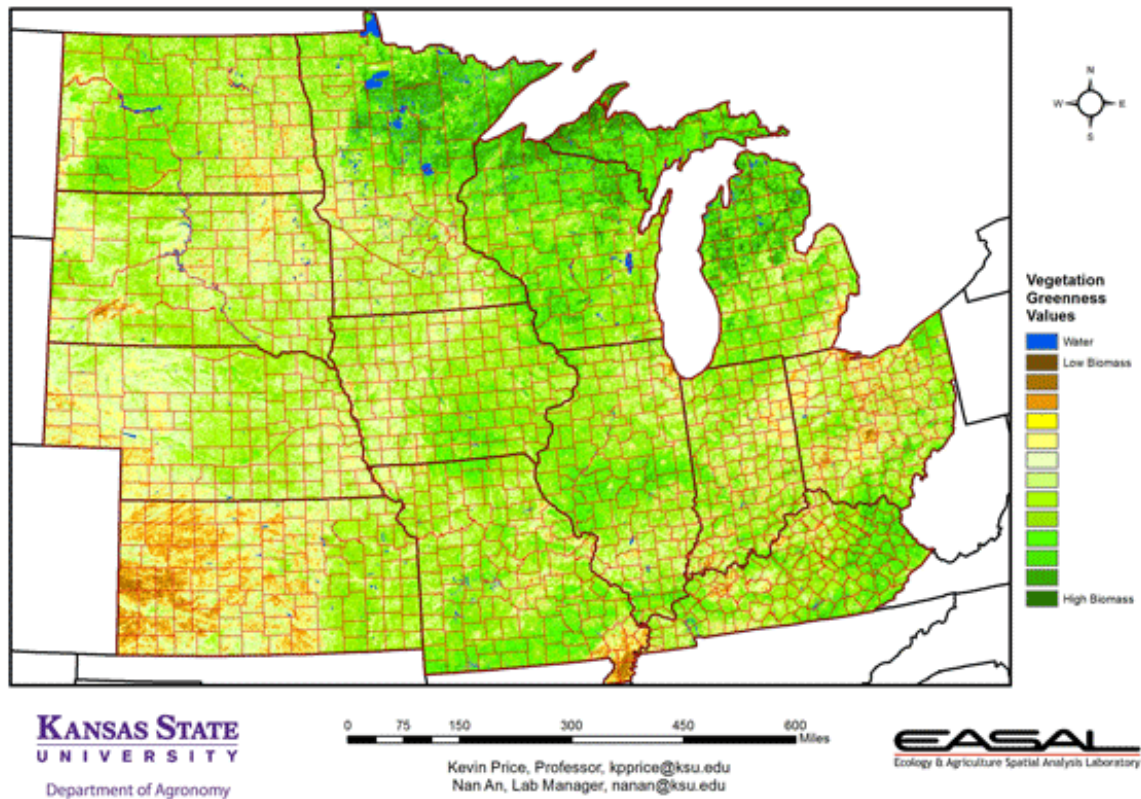


Figure 4. The Vegetation Condition Report for the Corn Belt for June 16 - 29 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows a high level of photosynthetic activity across the northern areas of the region from Minnesota through northern Michigan. Favorable temperatures and moisture have resulted in accelerated biomass production.

U.S. Corn Belt Vegetation Condition Comparison Late-June 2015 Compared to Late-June 2014

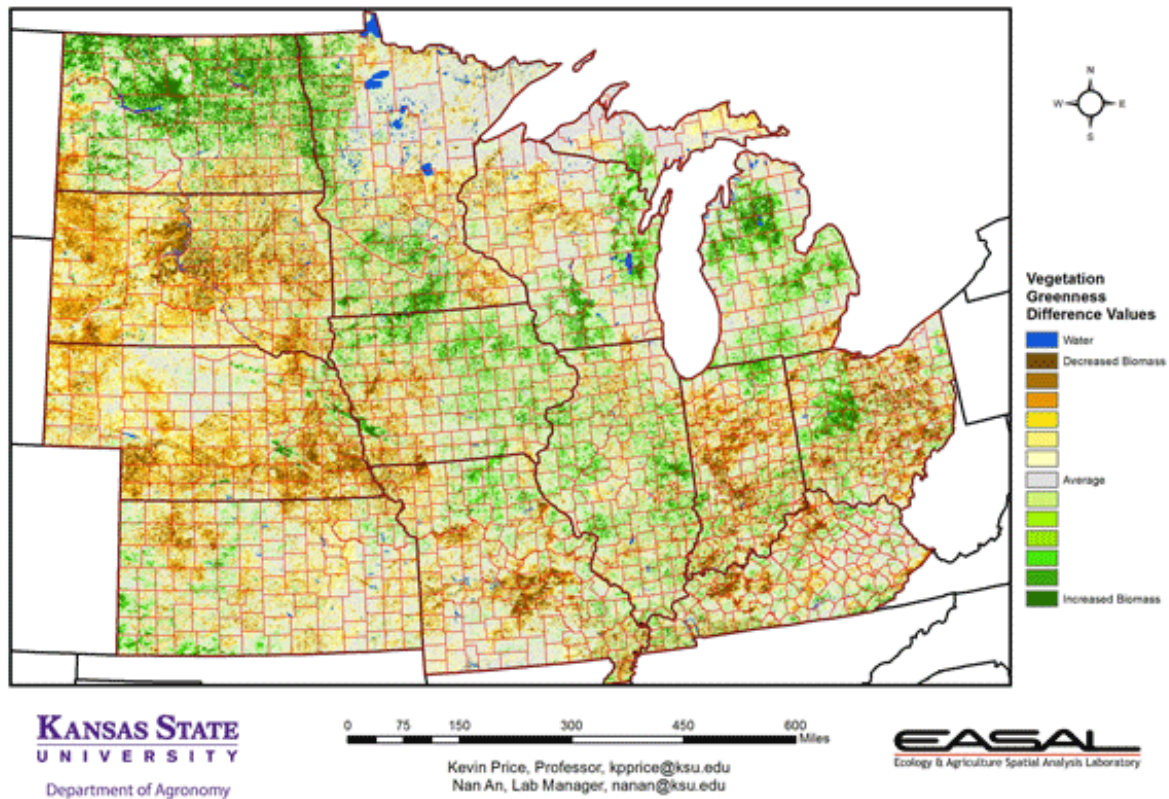


Figure 5. The comparison to last year in the Corn Belt for the period June 16 - 29 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows much of the region has much lower biomass production. North Dakota stands out in contrast, with much higher biomass production across much of the state. Dry conditions, which favored planting were replaced by favorable temperatures and precipitation, which spurred biomass development. According to the USDA Crop Condition report, 91 percent of this year's durum wheat is in good to excellent condition.

U.S. Corn Belt Vegetation Condition Comparison
Late-June 2015 Compared to the 26-Year Average for Late-June

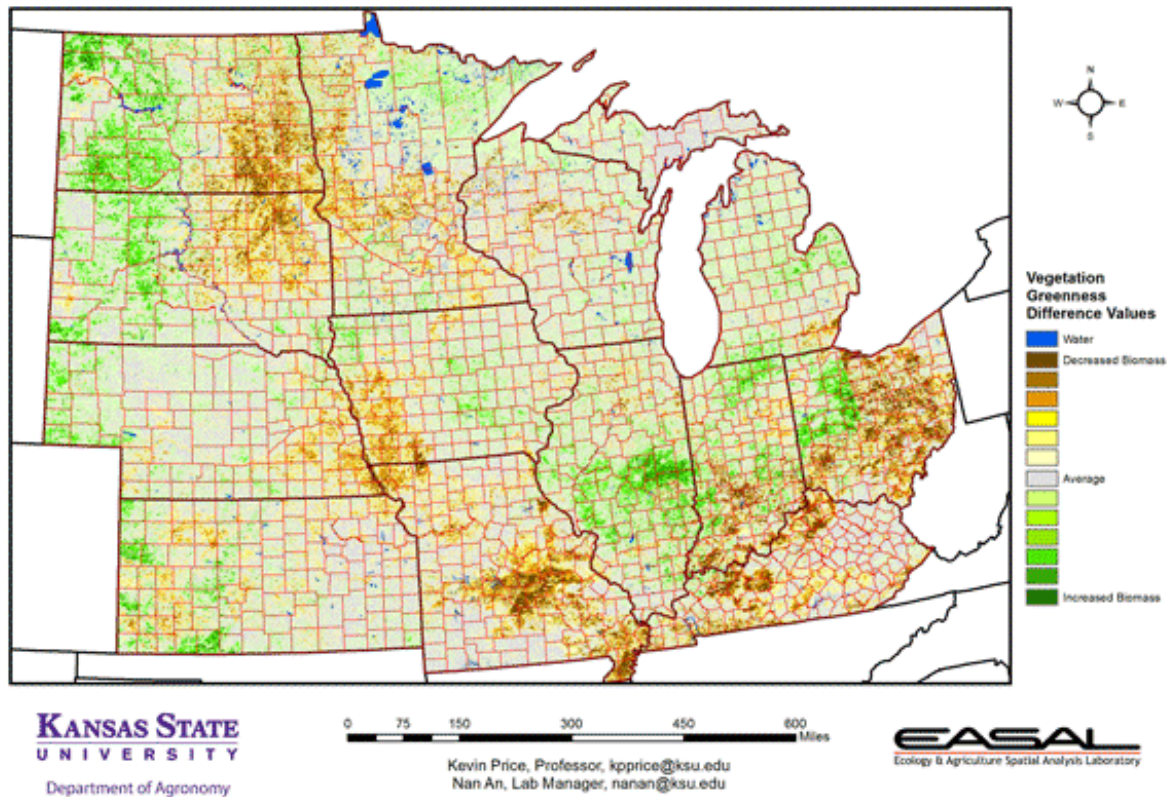


Figure 6. Compared to the 26-year average at this time for the Corn Belt, this year's Vegetation Condition Report for June 16 - 29 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that areas along the Missouri River basin and parts of the Ohio River basin have much lower-than-average photosynthetic activity. Excess moisture continues to slow plant development in these areas.

Continental U.S. Vegetation Condition

Period 26: 06/16/2015 - 06/29/2015

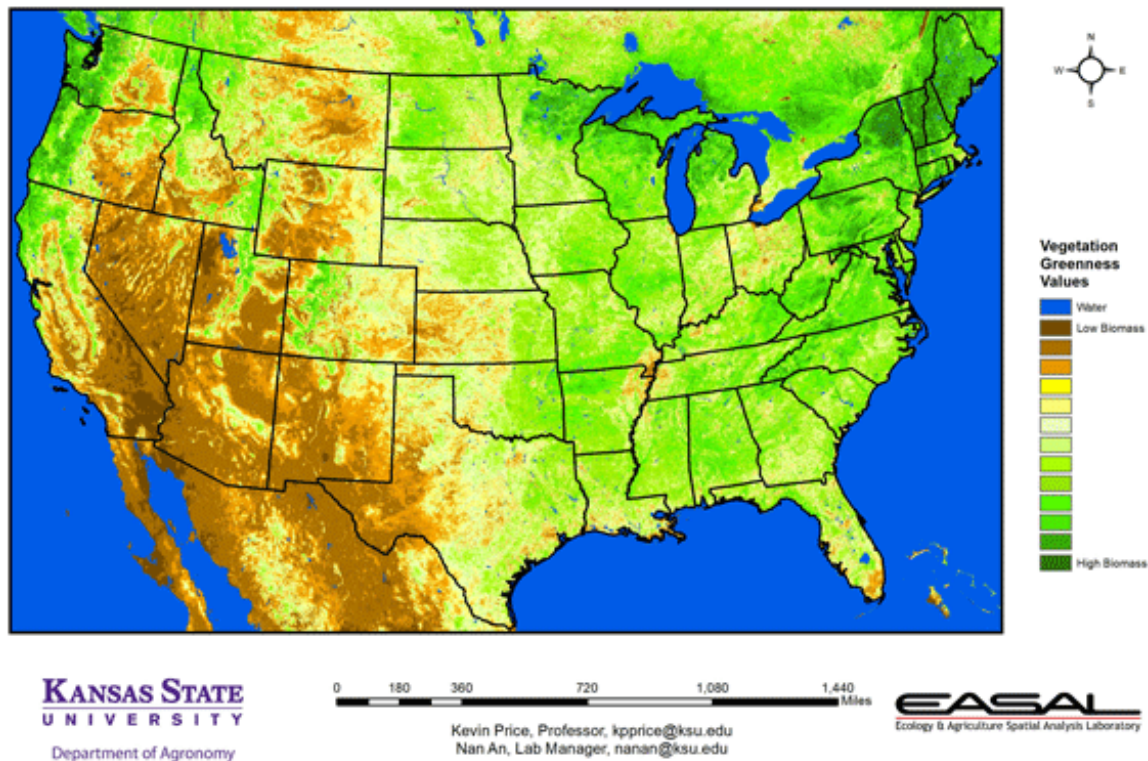


Figure 7. The Vegetation Condition Report for the U.S. for June 16 - 29 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that high photosynthetic is most visible in the New England area and along the mountains of the Pacific Northwest. Plant development has been favored by the warmer-than-normal temperatures. There is also an area of increased photosynthetic activity in Arizona in response to increased precipitation in the region. Pockets of low photosynthetic activity are evident where heavy rainfall has dominated in June, particularly along the Central Mississippi River Valley.

Continental U.S. Vegetation Condition Comparison
Late-June 2015 Compared to Late-June 2014

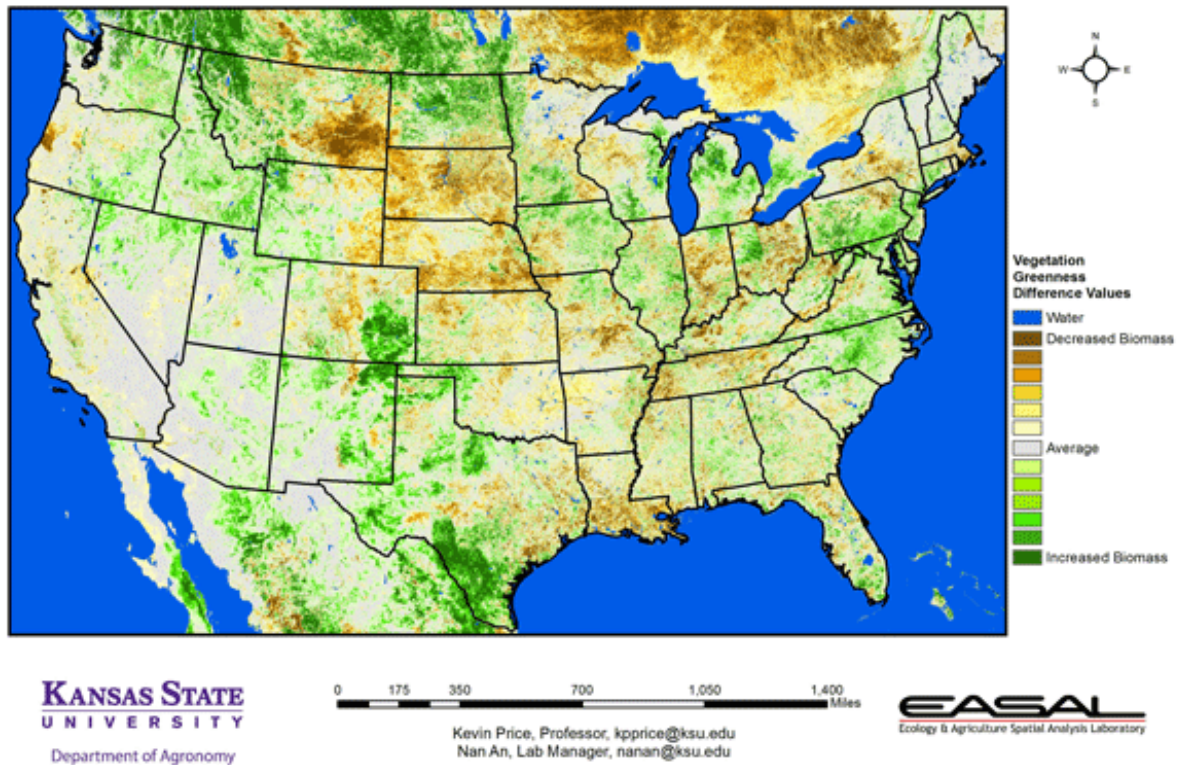


Figure 8. The U.S. comparison to last year at this time for the period June 16 - 29 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows lower photosynthetic activity in the eastern regions from Illinois through the Atlantic Seaboard. Cool temperatures and saturated soils have delayed development. Higher biomass production is visible in the western High Plains from southeastern Colorado through western Texas, where drought conditions have improved greatly. In the West, from Oregon through California, the changes have been minimal. Conditions were poor last year and continue to be poor this year.

Continental U.S. Vegetation Condition Comparison
Late-June 2015 Compared to 26-year Average for Late-June

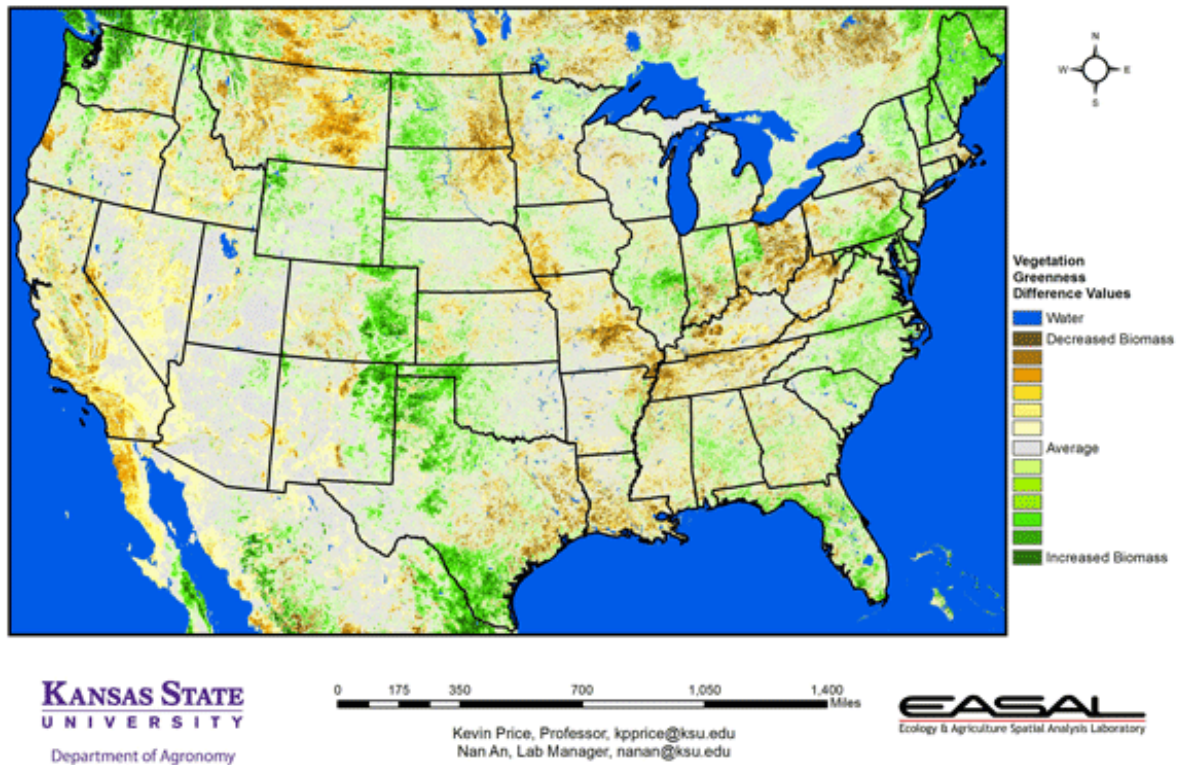


Figure 9. The U.S. comparison to the 26-year average for the period June 16 - 29 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows much of the country has close to average photosynthetic activity. Washington stands out with higher-than-average biomass production, as early snowmelt and heavier-than-usual spring rainfall has reduced some of the drought impacts. Favorable moisture in the eastern Plains of Colorado into the Panhandle of Texas has resulted in higher-than-average biomass production in this area as well. Lower-than-average production is concentrated in the Ohio River Valley, where cooler temperatures and saturated soils have slowed plant development.

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