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10/23/2015

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. No-till: Water Quality Best Management Practices

(Note: The following article is a slightly edited excerpt from *Water Quality Best Management Practices, Effectiveness, and Cost for Reducing Contaminant Losses from Cropland* K-State Research and Extension publication MF-2572, August 2015, by Peter Tomlinson, Environmental Quality Specialist, Agronomy; John Leatherman, Agricultural Economist; Josh Roe, Economist, Kansas Department of Agriculture; Nathan Nelson, Soil Fertility and Nutrient Management, Agronomy; Dorivar Ruiz Diaz, Nutrient Management Specialist, Agronomy; Dan Devlin, Director, Kansas Center for Agriculture Resources and the Environment; Aleksey Sheshukov, Environmental Engineer, Biological and Agricultural Engineering; Phil Barnes, Environmental Engineer, Biological and Agricultural Engineering; Joel DeRouchey, Environmental Management and Livestock Nutrition Specialist, Animal Science and Industry; and Charles Rice, Soil Microbiologist, Agronomy. -- Steve Watson, Agronomy eUpdate Editor)

K-State Research and Extension faculty have conducted field, laboratory, and computer modeling studies on the effect of crop management practices on the runoff of pesticides, nutrients, and sediments/suspended solids from no-till crop fields. This article and chart list recommended best management practices (BMP) for no-till cropping systems, along with the effectiveness of a BMP in reducing edge of field surface runoff of a contaminant, and an estimated cost of implementing BMPs.

Figure 1. No-till field in east central Kansas. Photo by Steve Watson, K-State Research and Extension.

The percent reduction in surface runoff by adopting a listed BMP is the effectiveness obtained from adoption of a single new BMP. It is not appropriate to consider the effectiveness of the adoption of several BMPs to be additive.

A reported BMP cost is the expected loss in producer profitability associated with adoption. Alternatively, it can be treated as the payment-to-producer required to encourage adoption. BMP costs and effectiveness figures are based on research, farm data, and professional estimates.

The table below contains the cost and effectiveness of reducing the edge of field surface runoff of contaminants from the adoption of various BMPs in a no-till system. The data on reduction of surface runoff by adopting a BMP are relative to a no-till corn and grain sorghum field where atrazine herbicide is applied preemergence (herbicide broadcast, surface applied following crop planting but before crop emergence), phosphorus and nitrogen fertilizer broadcast applied before planting the crop, with greater than 1 percent slope on upland clay or clay loam soils. For wheat and other crops, the comparison benchmark is phosphorus and nitrogen fertilizer broadcast applied, unincorporated, no-till before planting the crop, with greater than 1 percent slope on upland clay or clay loam soils.

Best Management Practice for No-till	Cost/Acre	Atrazine	Soluble Phosphorus	Total Phosphorus	Nitrogen	Suspended Solids
	($)	(percent reduction in surface runoff by adopting BMP)				
Use postemergence herbicide applications	5.48	50	0	0	0	0
Use alternative herbicides to atrazine	11.69	100	0	0	0	0
Band herbicides, nitrogen, and phosphorus on the soil surface before or at planting, typically 30% of surface area, weeds between rows controlled with	7.95	50	20	20	25	0

cultivation						
Subsurface apply phosphorus or nitrogen fertilizer	13.25	0	70	50	70	0
Apply atrazine in fall for next year's row crop	5.48	50	0	0	0	0
Apply herbicide in early spring, before May 1	5.48	50	0	0	0	0
Use split applications of herbicide, e.g., 1/2 to 2/3 before May 1 and 1/2 to 1/3 at planting	5.48	25	0	0	0	0
Use reduced soil-applied herbicide application rates followed by a postemer gence application	5.48	33	0	0	0	0
Crop rotations	0	30	25	25	25	25
Establish vegetative buffer strips	a/	25	25	50	35	50
Do not spray/apply herbicides or nutrients within 100 feet of streams or near where runoff enters a stream	b/	20	25	25	25	0
Use weed sco uting/integrat ed pest management	5.00	0-50	0	0	0	0
Contour farming	9.43	20	20	30	20	20

(without terraces)						
Terraces with tile outlets	c/	10	10	30	10	30
Terraces with grass waterways (with contour farming)	d/	30	30	30	30	30
Soil sampling and testing	1.00	0	0-25	0-25	0-25	0
Sound fertilizer reco mmendations	0	0	0-25	0-25	0-25	0
Cover crops (fall, winter, spring)	e/	0	f/ Insufficient data			

a/ Establishment cost of $150 per acre plus an annual cost equal to the average per acre land rental rate for the acreage within the buffer strip.

b/ Annual cost equal to the average per acre land rental rate for the acreage where herbicides and nutrients are not applied (i.e., acres within 100 feet of streams or before runoff enters a stream).

c/ One time installation cost of $522 per treated acre plus an annual cost of $13.20 acre.

d/ One-time installation cost of $320 per treated acre plus an annual cost of $13.20 per acre plus an annual cost equal to the average per acre land rental rate for the acreage within the grassed waterway.

e/ Cover crop seed mixes range from $10 to 50 per acre, average no-till planting costs of $15.48 per acre, chemical costs of $11.69 per acre, and chemical application costs of $5.48 per acre.

f/ At the present time there is insufficient data to determine reductions from the use of cover crops in a no-till production system. Research has been initiated in Kansas and Iowa.

Source for Custom Farm Rates:
www.agmanager.info/farmmgt/machinery/Tools/KCD_CustomRates(Feb2014).pdf

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2. Conventional tillage: Water Quality Best Management Practices

(Note: The following article is a slightly edited excerpt from *Water Quality Best Management Practices, Effectiveness, and Cost for Reducing Contaminant Losses from Cropland* K-State Research and Extension publication MF-2572, August 2015, by Peter Tomlinson, Environmental Quality Specialist, Agronomy; John Leatherman, Agricultural Economist; Josh Roe, Economist, Kansas Department of Agriculture; Nathan Nelson, Soil Fertility and Nutrient Management, Agronomy; Dorivar Ruiz Diaz, Nutrient Management Specialist, Agronomy; Dan Devlin, Director, Kansas Center for Agriculture Resources and the Environment; Aleksey Sheshukov, Environmental Engineer, Biological and Agricultural Engineering; Phil Barnes, Environmental Engineer, Biological and Agricultural Engineering; Joel DeRouchey, Environmental Management and Livestock Nutrition Specialist, Animal Science and Industry; and Charles Rice, Soil Microbiologist, Agronomy. -- Steve Watson, Agronomy eUpdate Editor)

K-State Research and Extension faculty have conducted field, laboratory, and computer modeling studies on the effect of crop management practices on the runoff of pesticides, nutrients, and sediments/suspended solids from conventional tillage crop fields. This article lists recommended best management practices (BMP) for conventional tillage cropping systems. This publication also shows the effectiveness of a BMP in reducing edge of field surface runoff of a contaminant, and an estimated cost of implementing BMPs.

Figure 2. Soil washing in conventional tillage field. Photo by Peter Tomlinson, K-State Research and Extension.

The percent reduction in surface runoff by adopting a listed BMP is the effectiveness obtained from adoption of a single new BMP. It is not appropriate to consider the effectiveness of the adoption of several BMPs to be additive.

A reported BMP cost is the expected loss in producer profitability associated with adoption.

Alternatively, it can be treated as the payment-to-producer required to encourage adoption. BMP costs and effectiveness figures are based on research, farm data, and professional estimates.

The table below contains the cost and effectiveness of reducing the edge of field surface runoff of contaminants from the adoption of various BMPs under conventional tillage systems.

The data on reduction of surface runoff by adopting a BMP are relative to a corn and grain sorghum field where atrazine herbicide is applied preemergence (herbicide broadcast, surface applied following crop planting, but before crop emergence), phosphorus and nitrogen fertilizer broadcast applied before planting the crop and unincorporated, conventional tillage (less than 30 percent residue cover following planting), with greater than 1 percent slope on upland clay or clay loam soils. For wheat and other crops, the comparison benchmark is phosphorus and nitrogen fertilizer broadcast applied, unincorporated, conventional tillage, with greater than 1 percent slope on upland clay or clay loam soils.

Best Management Practice for Conventional Tillage	Cost/Acre	Atrazine	Soluble Phosphorus	Total Phosphorus	Nitrogen	Suspended Solids
	($)	(percent reduction in surface runoff by adopting BMP)				
Preplant incorporate into the top 2 inches of soil before the first runoff	9.92	70	60	20	50	0
Use postemer gence herbicide applications	5.48	50	0	0	0	0
Use alternative herbicides to atrazine	11.69	100	0	0	0	0
Use in-season cultivation to minimize herbicide use	17.10	30	0	0	0	0
Band herbicides, nitrogen, and phosphorus	7.95	50	20	20	25	0

on the soil surface before or at planting; typically 30 percent of surface area, weeds between rows controlled with cultivation						
Subsurface apply phosphorus or nitrogen fertilizer	13.25	0	60	30	60	0
Apply atrazine in fall for next year's row crop	5.48	50	0	0	0	0
Apply herbicide in early spring, before May 1	5.48	50	0	0	0	0
Use split applications of herbicide, e.g., 1/2 to 2/3 before May 1 and 1/2 to 1/3 at planting	5.48	25	0	0	0	0
Use reduced soil-applied herbicide application rates followed by a postemer gence application	5.48	33	0	0	0	0
Crop rotations	0	30	25	25	25	25
Establish vegetative buffer strips	a/	25	25	50	35	50
Do not spray/apply herbicides or nutrients within 100 feet of	b/	20	25	25	25	0

streams or near where runoff enters a stream						
Use weed sco uting/integrat ed pest management	5.00	0-50	0	0	0	0
Conservation tillage farming (>30 percent residue cover following planting)	0	20	0	35	15	30
No-till farming	0	0	0	40	25	75
Contour farming (without terraces)	6.80	20	20	30	20	35
Terraces with tile outlets	c/	10	10	30	10	30
Terraces with grass waterways (with contour farming)	d/	30	30	30	30	30
Soil sampling and testing	1.00	0	0-25	0-25	0-25	0
Sound fertilizer reco mmendations	0	0	0-25	0-25	0-25	0
Cover crops (fall, winter, spring)	e/	0	40	50	25	40

a/ Establishment cost of $150 per acre plus an annual cost equal to the average per acre land rental rate for the acreage within the buffer strip.

b/ Annual cost equal to the average per acre land rental rate for the acreage where herbicides and nutrients are not applied (i.e., acres within 100 feet of streams or before runoff enters a stream).

c/ One time installation cost of $522 per treated acre plus an annual cost of $13.20 acre.

d/ One-time installation cost of $320 per treated acre plus an annual cost of $13.20 per acre plus an annual cost equal to the average per acre land rental rate for the acreage within the grassed waterway.

e/ Cover crop seed mixes range from $10 to 50 per acre, average no-till planting costs of $15.48 per acre, chemical costs of $11.69 per acre, and chemical application costs of $5.48 per acre.

Source for Custom Farm Rates:
www.agmanager.info/farmmgt/machinery/Tools/KCD_CustomRates(Feb2014).pdf

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3. Livestock waste applications to cropland: Water Quality Best Management Practices

(Note: The following article is a slightly edited excerpt from *Water Quality Best Management Practices, Effectiveness, and Cost for Reducing Contaminant Losses from Cropland* K-State Research and Extension publication MF-2572, August 2015, by Peter Tomlinson, Environmental Quality Specialist, Agronomy; John Leatherman, Agricultural Economist; Josh Roe, Economist, Kansas Department of Agriculture; Nathan Nelson, Soil Fertility and Nutrient Management, Agronomy; Dorivar Ruiz Diaz, Nutrient Management Specialist, Agronomy; Dan Devlin, Director, Kansas Center for Agriculture Resources and the Environment; Aleksey Sheshukov, Environmental Engineer, Biological and Agricultural Engineering; Phil Barnes, Environmental Engineer, Biological and Agricultural Engineering; Joel DeRouchey, Environmental Management and Livestock Nutrition Specialist, Animal Science and Industry; and Charles Rice, Soil Microbiologist, Agronomy. -- Steve Watson, Agronomy eUpdate Editor)

K-State Research and Extension faculty have conducted field, laboratory, and computer modeling studies on the effect of land application of livestock waste on the runoff of pesticides, nutrients, and sediments/suspended solids from crop fields. This article lists recommended best management practices (BMP) for land application of livestock waste. This publication also shows the effectiveness of a BMP in reducing edge of field surface runoff of a contaminant, and an estimated cost of implementing BMPs.

Figure 1. Poultry litter being loaded into a spreader. Photo by Doug Shoup, K-State Research and Extension.

The percent reduction in surface runoff by adopting a listed BMP is the effectiveness obtained from adoption of a single new BMP. It is not appropriate to consider the effectiveness of the adoption of several BMPs to be additive.

A reported BMP cost is the expected loss in producer profitability associated with adoption. Alternatively, it can be treated as the payment-to-producer required to encourage adoption. BMP costs and effectiveness figures are based on research, farm data, and professional estimates.

The table below contains the cost and effectiveness of various BMPs for reducing the edge of field surface runoff of contaminants associated with the application of livestock waste. The data on reduction of surface runoff by adopting a BMP are relative to livestock waste application broadcast applied in summer months without incorporation to conventionally tilled fields, with greater than 1 percent slope on upland clay or clay loam soils.

Best Management Practice for Livestock Waste Applications to Cropland	Cost/Acre	Fecal Coliform Bacteria	Soluble Phosphorus	Total Phosphorus	Nitrogen	Suspended Solids
	($)	(percent reduction in surface runoff by adopting BMP)				
Incorporate with tillage equipment	9.92	90	70	20	50	0
Subsurface inject liquid waste	35.37	90	70	20	50	0
No-till farming	0	60	0	40	0	60
Conservation tillage farming	0	50	0	35	0	50
Test livestock waste for nutrient value	1.00	0	0-30	0-30	0-30	0

Source for Custom Farm Rates:
www.agmanager.info/farmmgt/machinery/Tools/KCD_CustomRates(Feb2014).pdf

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4. Mini-video: Soils and the Products We Use, 2015 International Year of Soils

In a new short video produced by K-State Research and Extension, Mickey Ransom, Professor of Agronomy shows how soils not only help us grow our foods, but also helps create many of the products we use. Gasoline, diesel and other petroleum products come from decomposed plants millions of years ago. Trees, computer chips and many other products come from different types of soil, from sands to clay. Clay is another product we use every day for pottery and building materials, as shown by Amy Santoferraro, Assistant Professor of Art.

Title of video: Soils and the Products We Use, 2015 International Year of Soils

Length: 2:31 minutes

Source: Dan Donnert, K-State Research and Extension, Photographer/Videographer

The mini-video can be seen at: ksu.ag/1NXXBkB

Steve Watson, Agronomy eUpdate Editor

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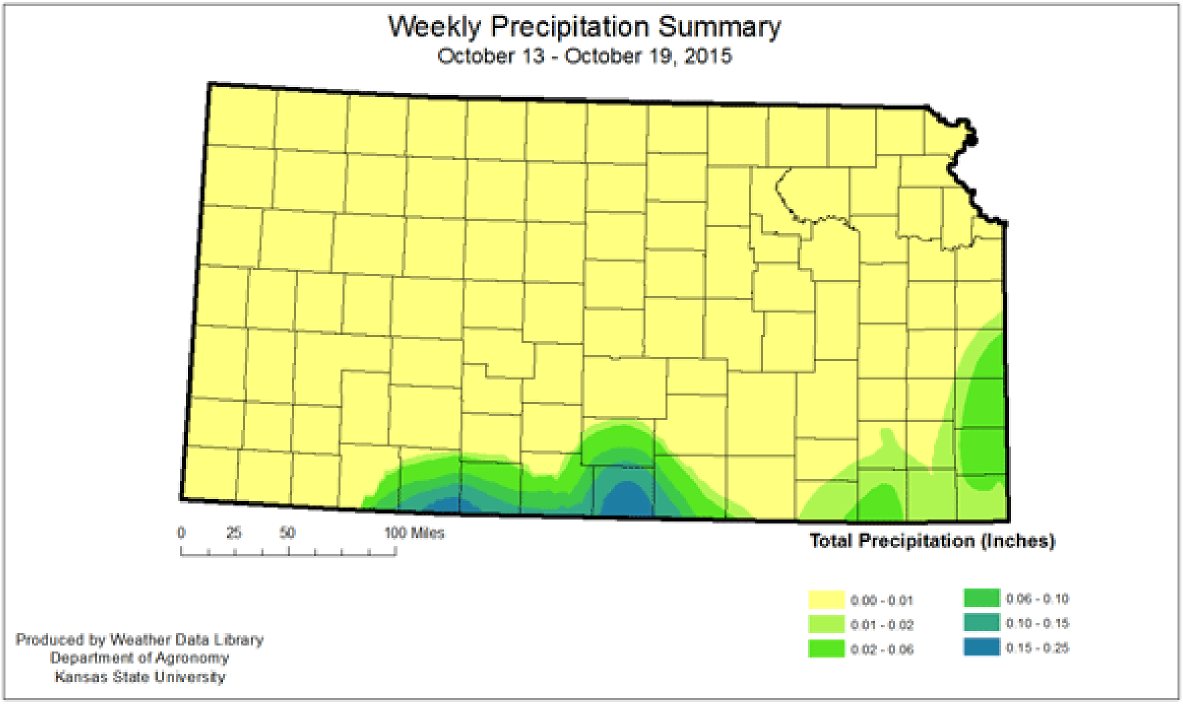
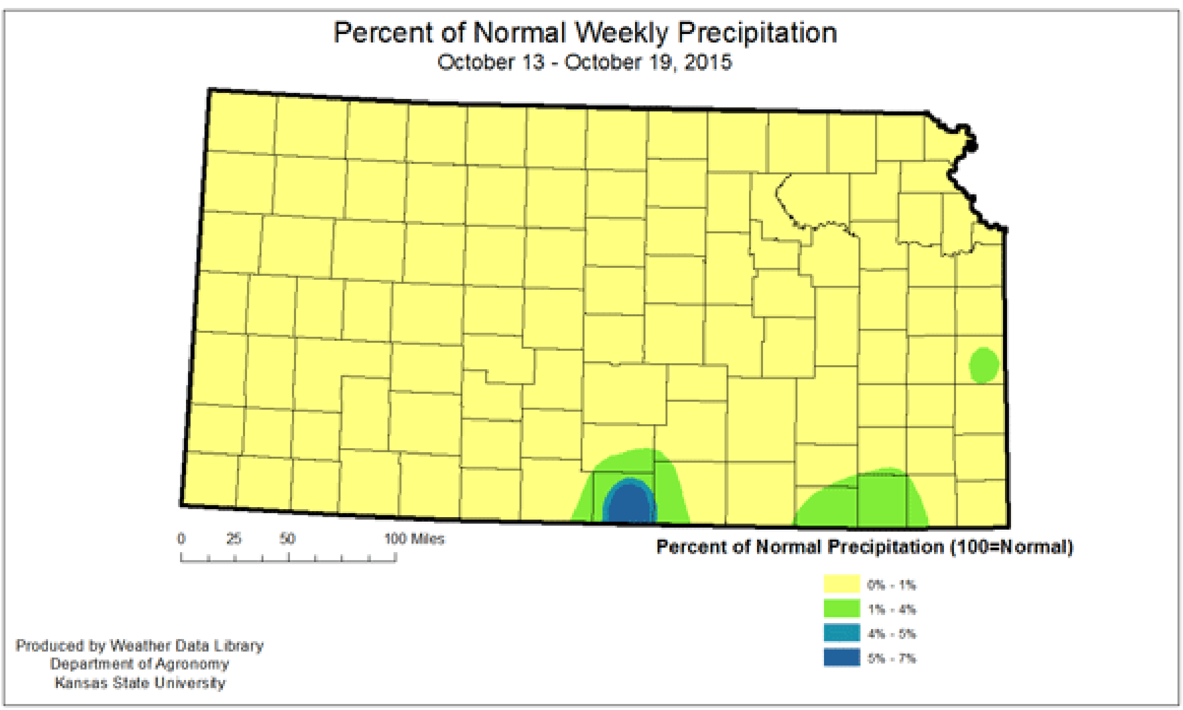
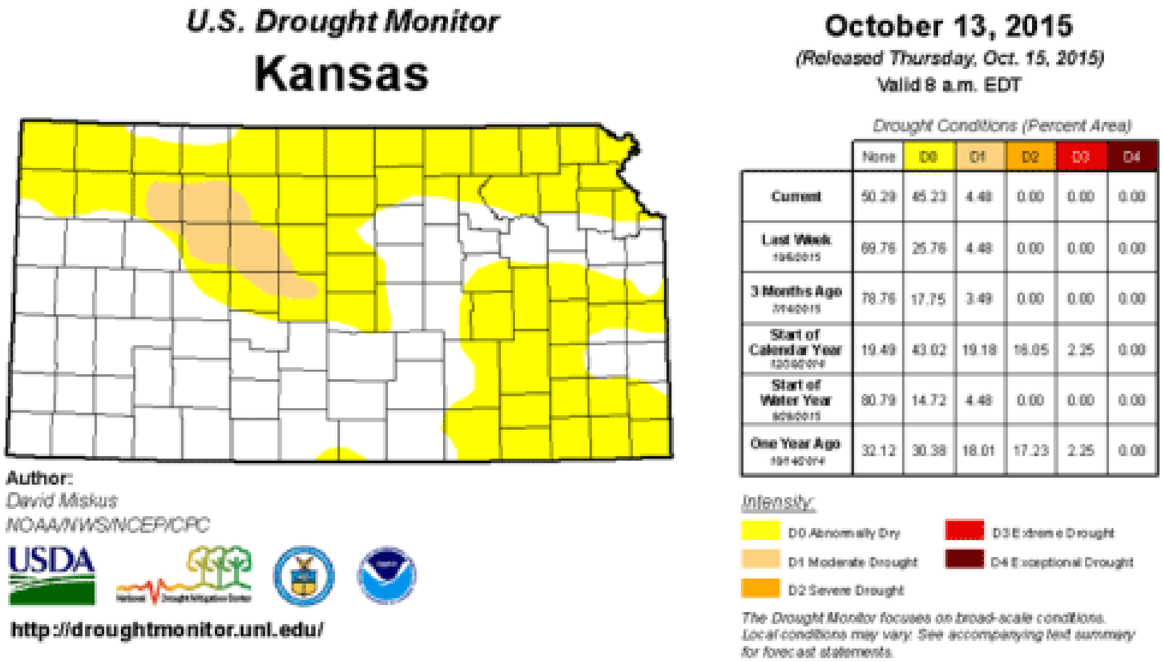
5. Recent rainfall totals in Kansas: The winners and losers

Rain made a welcome return to Kansas this week. Unfortunately, the beneficial moisture didn't make it as Far East as originally predicted. The weekly precipitation totals through Monday were minimal, as seen in these maps:

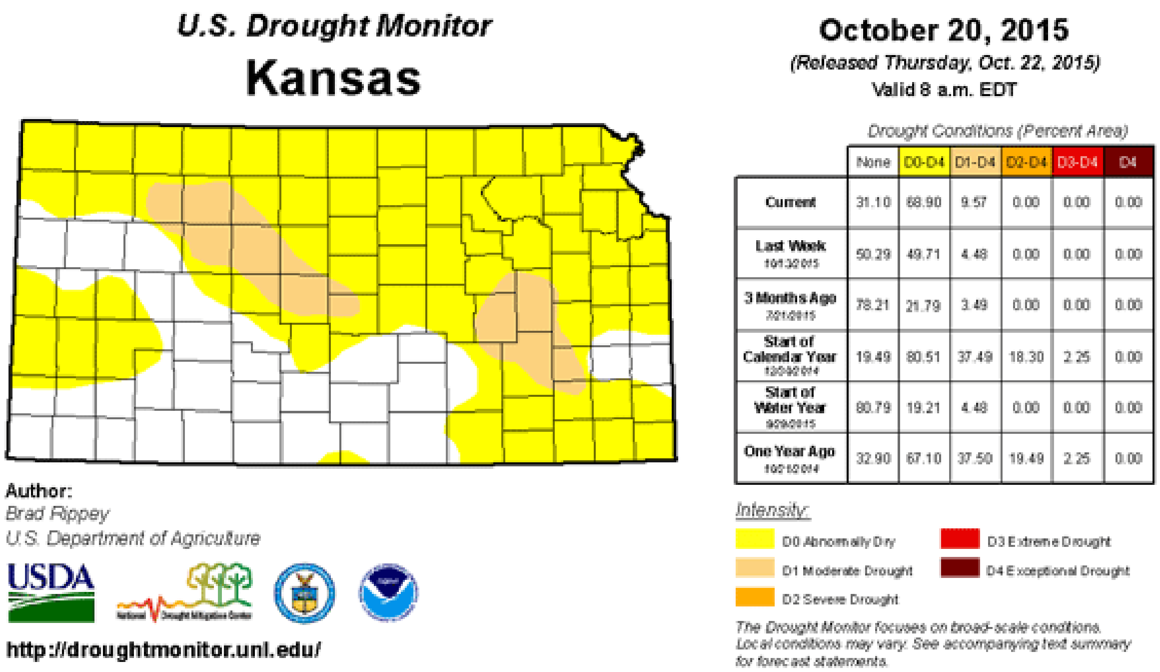




With that, it wasn't surprising to see the abnormally dry conditions expand across much of the state:

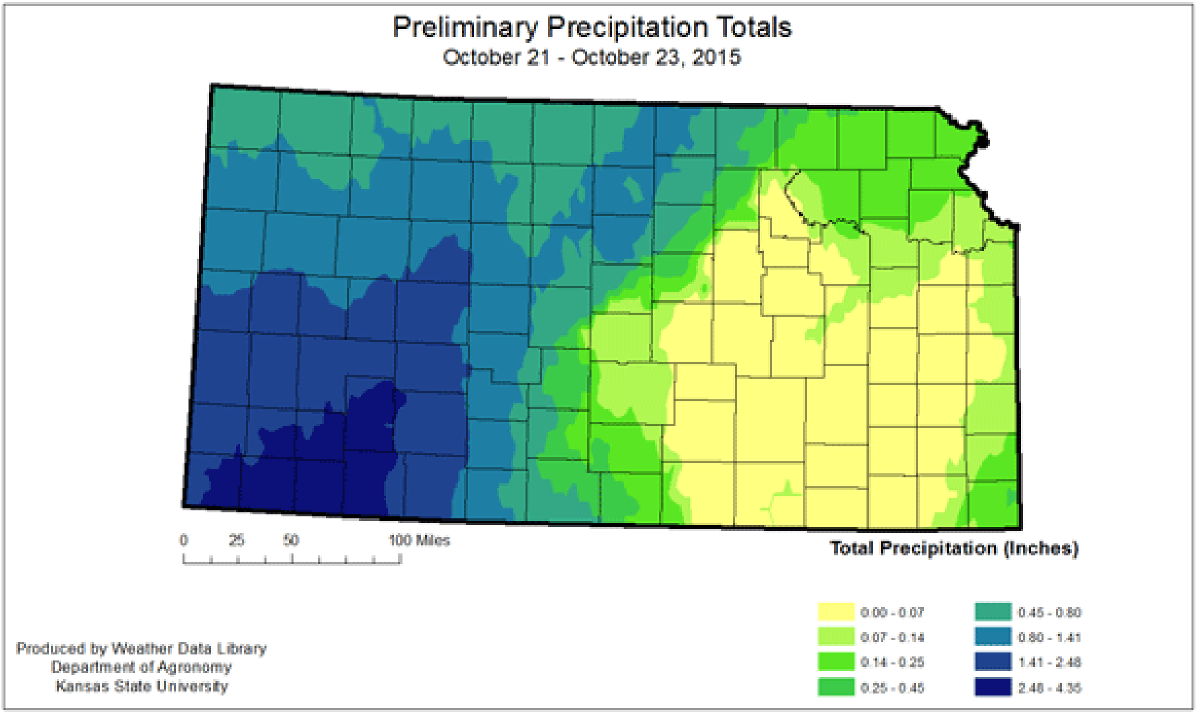


	None	D0	D1	D2	D3	D4
Current	50.29	45.23	4.48	0.00	0.00	0.00
Last Week 10/6/2015	69.76	25.76	4.48	0.00	0.00	0.00
3 Months Ago 7/14/2015	78.76	17.75	3.49	0.00	0.00	0.00
Start of Calendar Year 12/30/2014	19.49	43.02	19.18	16.05	2.25	0.00
Start of Water Year 9/29/2015	80.79	14.72	4.48	0.00	0.00	0.00
One Year Ago 10/14/2014	32.12	30.38	18.01	17.23	2.25	0.00



	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	31.10	68.90	9.57	0.00	0.00	0.00
Last Week 10/13/2015	50.29	49.71	4.48	0.00	0.00	0.00
3 Months Ago 7/21/2015	78.21	21.79	3.49	0.00	0.00	0.00
Start of Calendar Year 12/30/2014	19.49	80.51	37.49	18.30	2.25	0.00
Start of Water Year 9/29/2015	80.79	19.21	4.48	0.00	0.00	0.00
One Year Ago 10/21/2014	32.90	67.10	37.50	19.49	2.25	0.00

The rains from October 21-23 were concentrated in the western third of the state, with the highest totals in southwest Kansas. These amounts are likely to erase the abnormally dry conditions in that area. However, amounts dropped sharply as the system moved north and east. There is unlikely to be significant improvement in northwest and north central Kansas. Also, conditions are likely to deteriorate in the eastern divisions.



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6. Comparative Vegetation Condition Report: October 6 - 19

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:

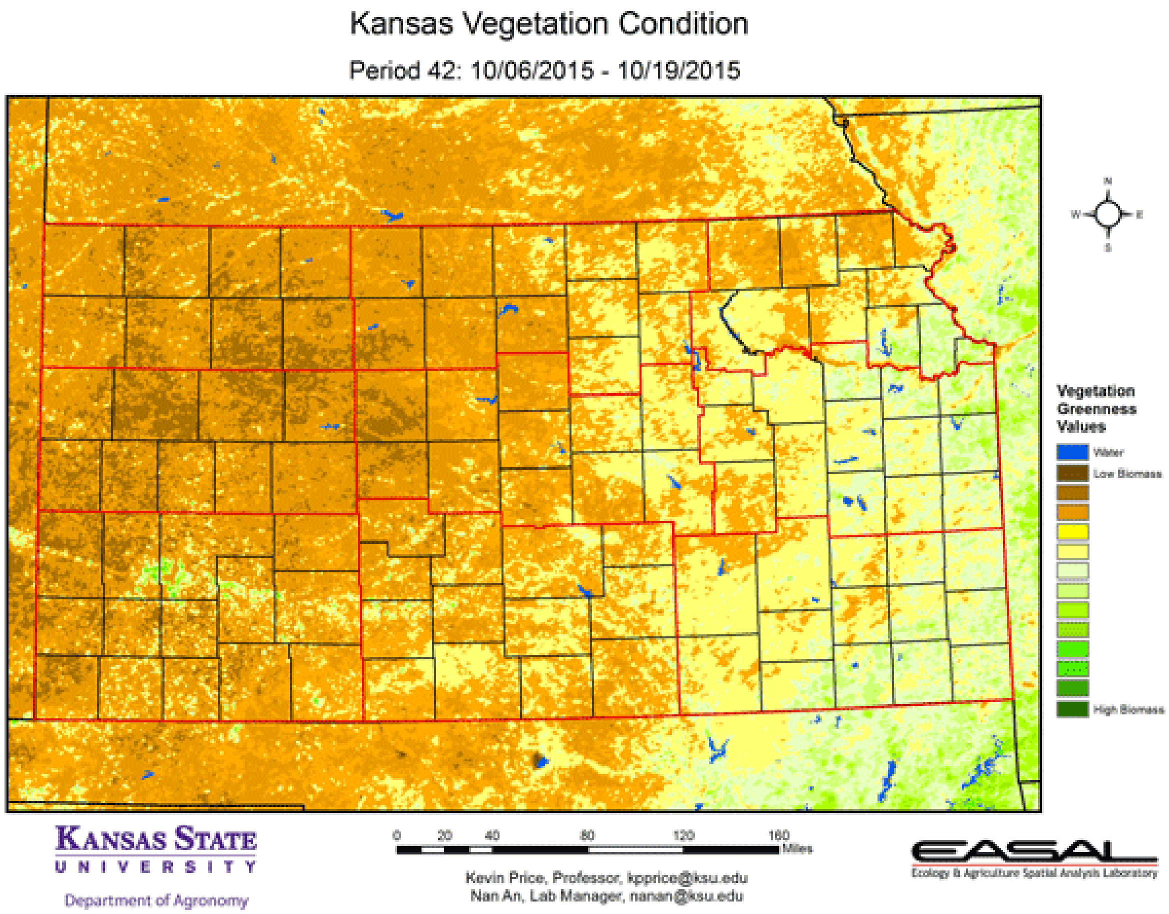


Figure 1. The Vegetation Condition Report for Kansas for September October 6 – 19 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that the highest biomass production is a small pocket of activity along the Arkansas River in southwest Kansas. Irrigated alfalfa is a major product in the region. There is an area of increased photosynthetic activity in northeast Kansas, where rainfall continues to be higher than average. Favorable soil moisture and moderate temperatures resulted in increased biomass production in these areas. Very low NDVI values are visible in Trego, Ellis, Rush, and Ness counties and have expanded into Pawnee and Barton counties, where drought conditions have intensified.

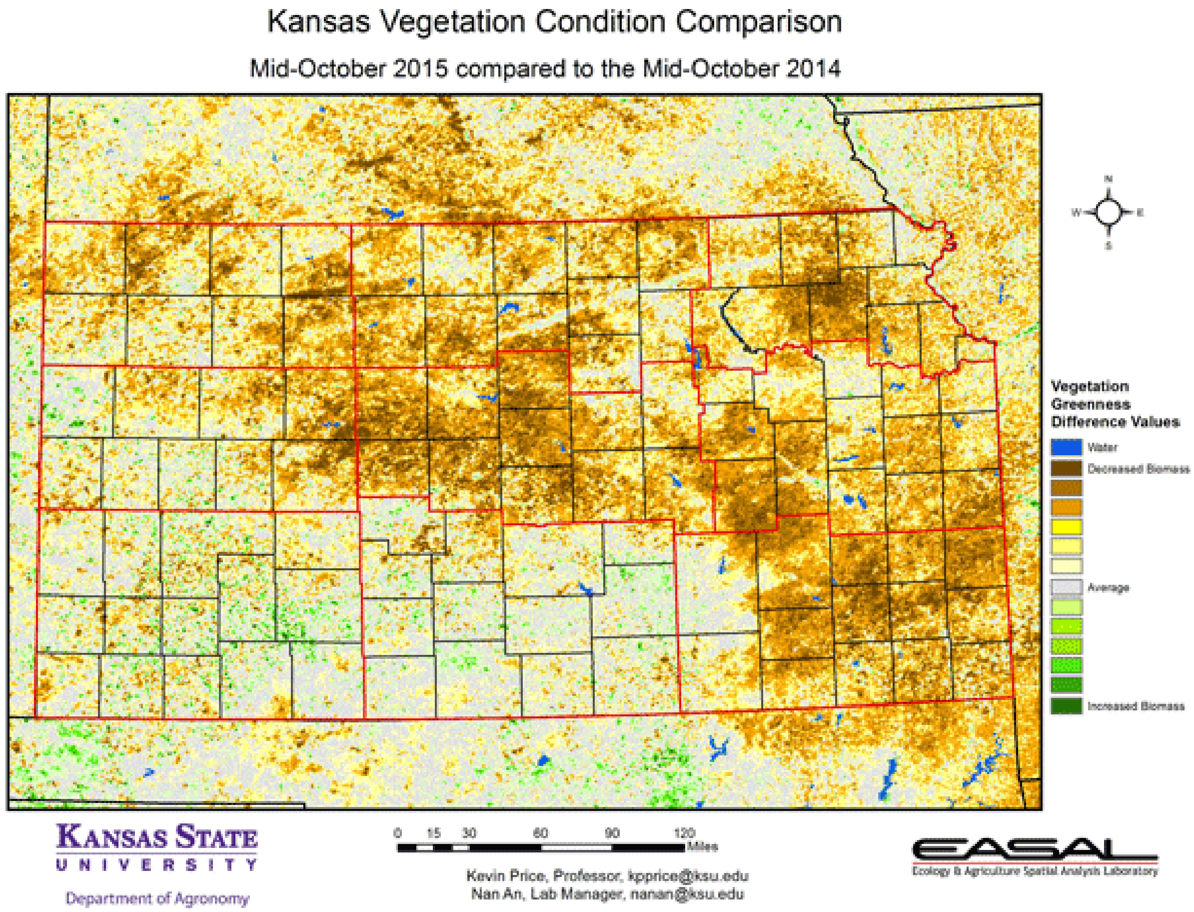
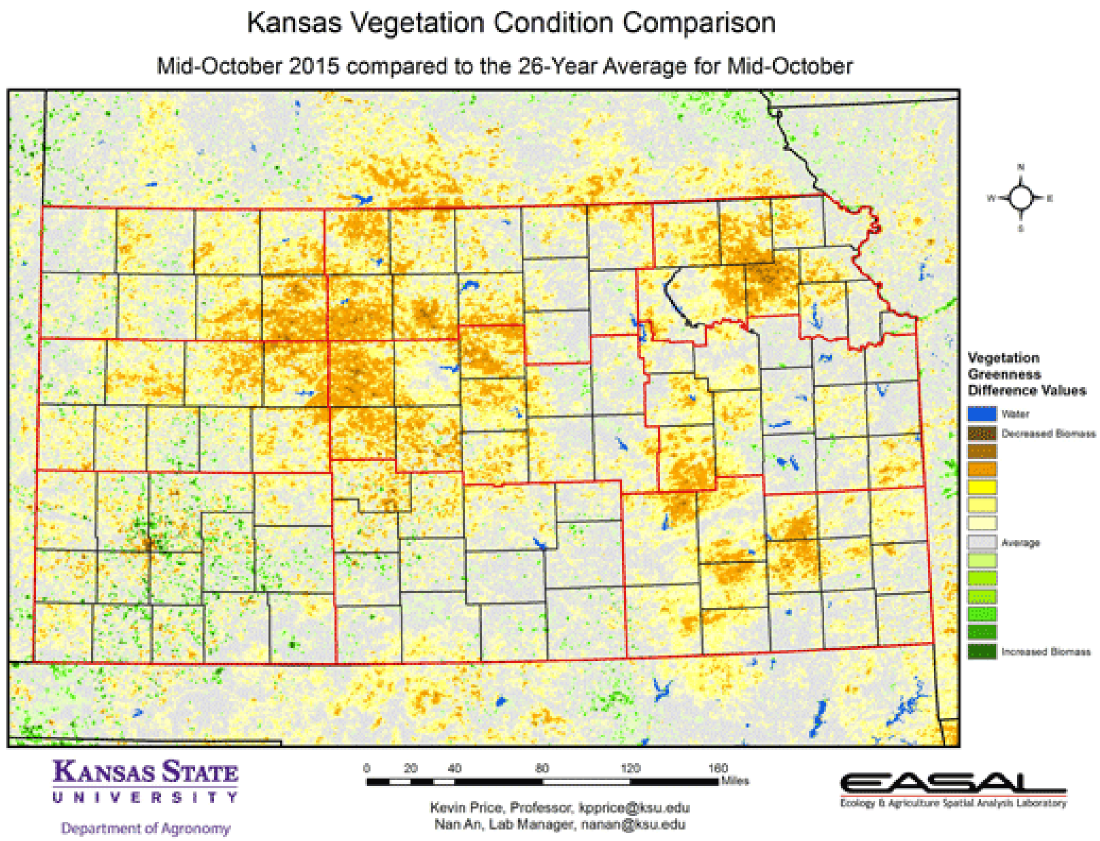


Figure 2. Compared to the previous year at this time for Kansas, the current Vegetation Condition Report for October 6 – 19 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows much of the state with lower photosynthetic activity. Only the Southwest and South Central Divisions have similar to slightly higher photosynthetic activity. These areas continue have beneficial moisture, while the rest of the state has been dry. This does not show the impact of the rains that fell this week as it will take several weeks for the impacts to be



visible.

Figure 3. Compared to the 26-year average at this time for Kansas, this year's Vegetation Condition Report for October 6 – 19 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that most of the state continues to show near-average photosynthetic activity. While much of the below-average photosynthetic activity is concentrated on the boundaries of the Western and Central Divisions, pockets are visible in northeast, east central and southeast Kansas. These areas continue to miss most of the storm systems, and areas of moderate drought and abnormally dry conditions continue to expand.

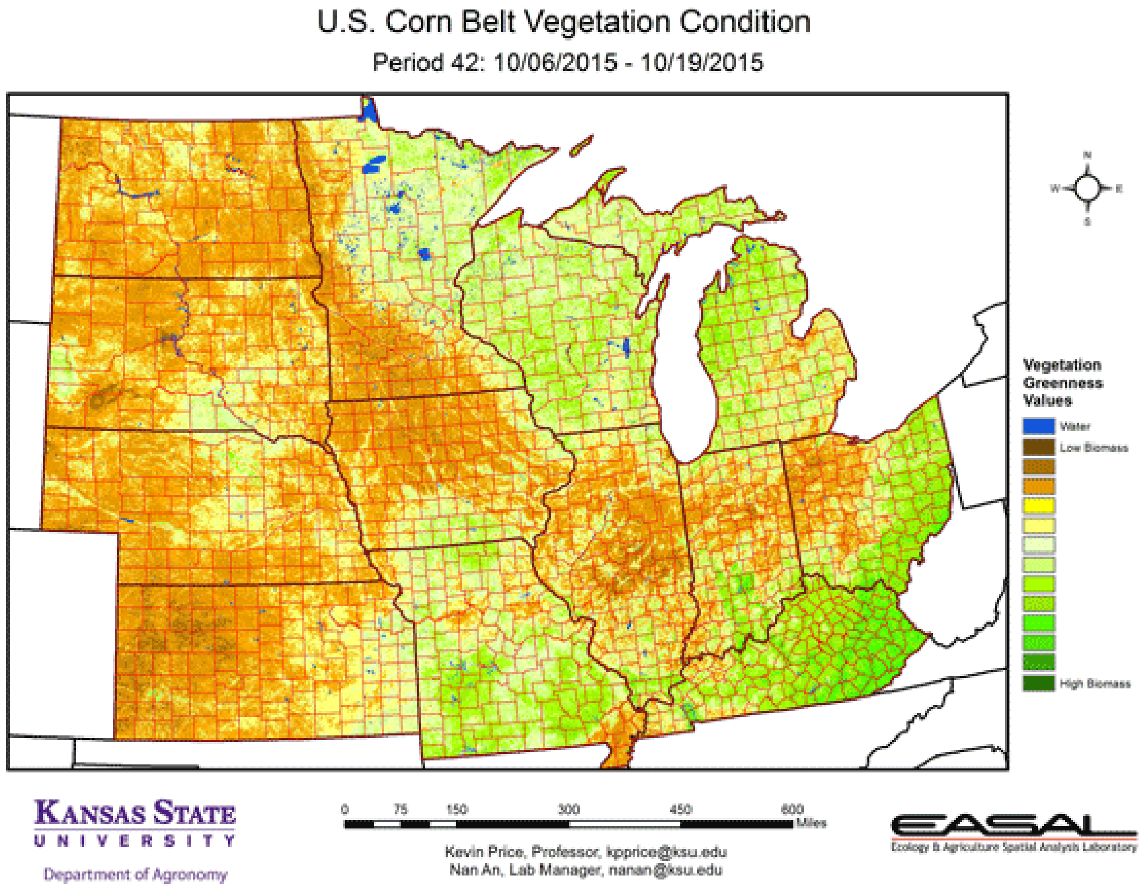


Figure 4. The Vegetation Condition Report for the Corn Belt for October 6 – 19 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that greatest photosynthetic activity is concentrated in the southern parts of the region. Favorable moisture conditions have resulted in high photosynthetic activity. Lower NDVI values are present from North Dakota through Iowa to Illinois and Ohio, as crops continue to mature.

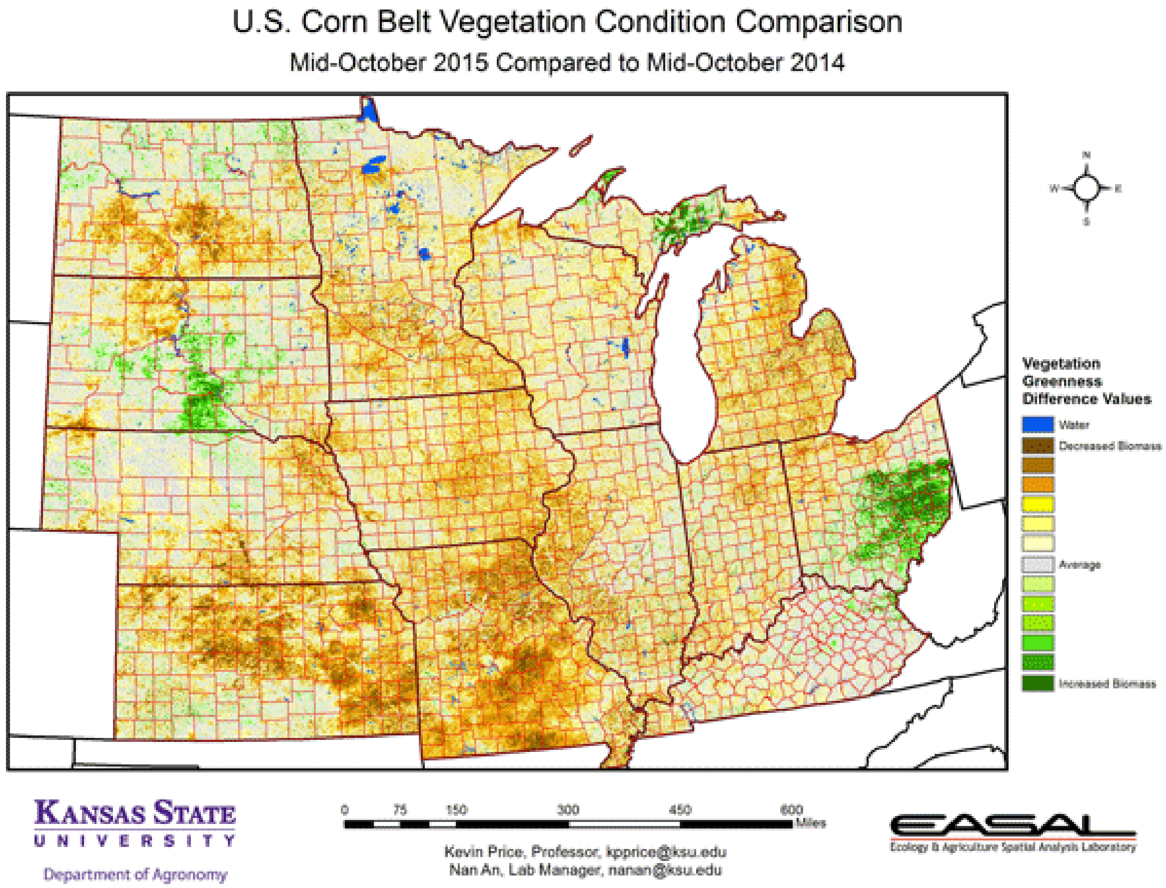


Figure 5. The comparison to last year in the Corn Belt for the period for October 6 – 19 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows lower photosynthetic activity along the Central Plains, as an extended dry period has slowed plant development, particularly with winter grains, and drought conditions intensify. There is a small area of higher NDVI values in central South Dakota and eastern Ohio where moisture has been more favorable this year.

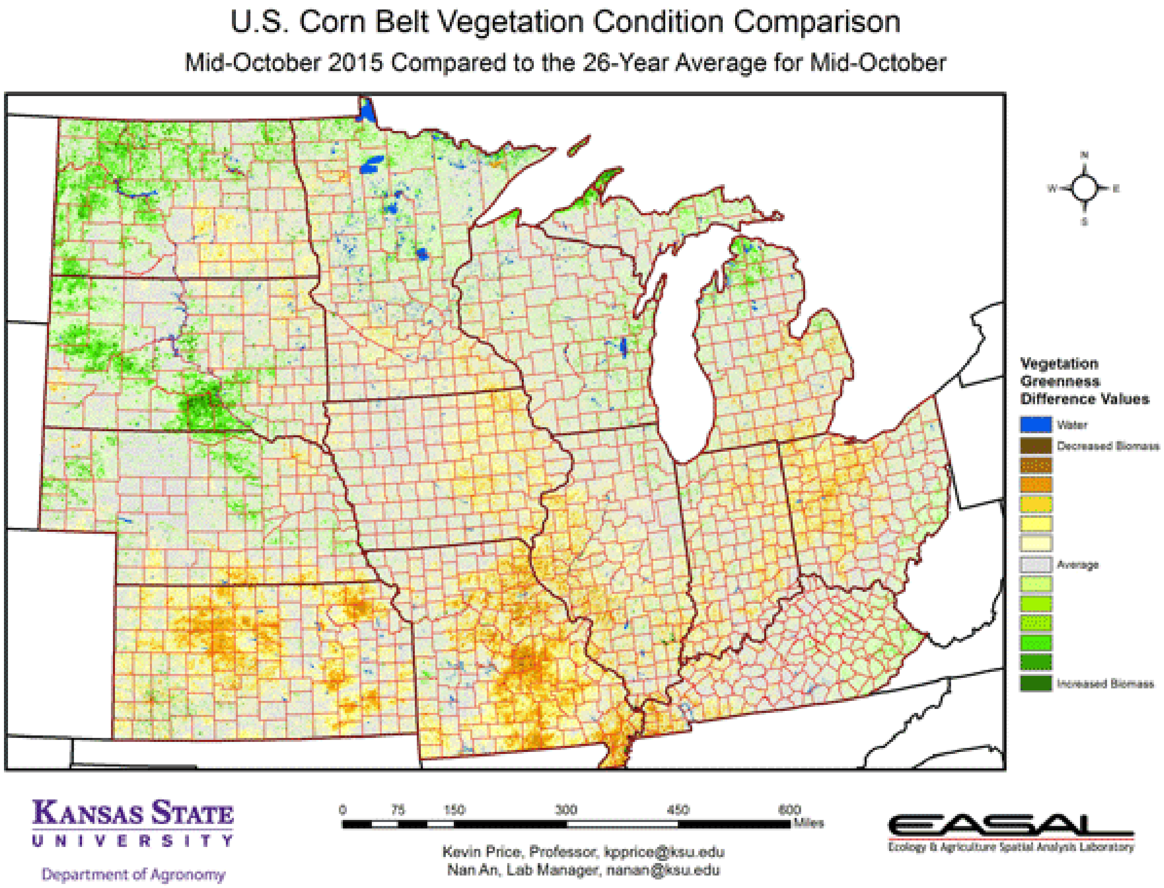


Figure 6. Compared to the 26-year average at this time for the Corn Belt, this year's Vegetation Condition Report for October 6 – 19 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows most of the region has average biomass production. Above-average photosynthetic activity can be seen in the Northern Plains, where temperatures have continued mild and moisture has been favorable. Central Illinois through western Kansas stand out with lower NDVI values as warmer-than-average temperatures and low precipitation stress vegetation.

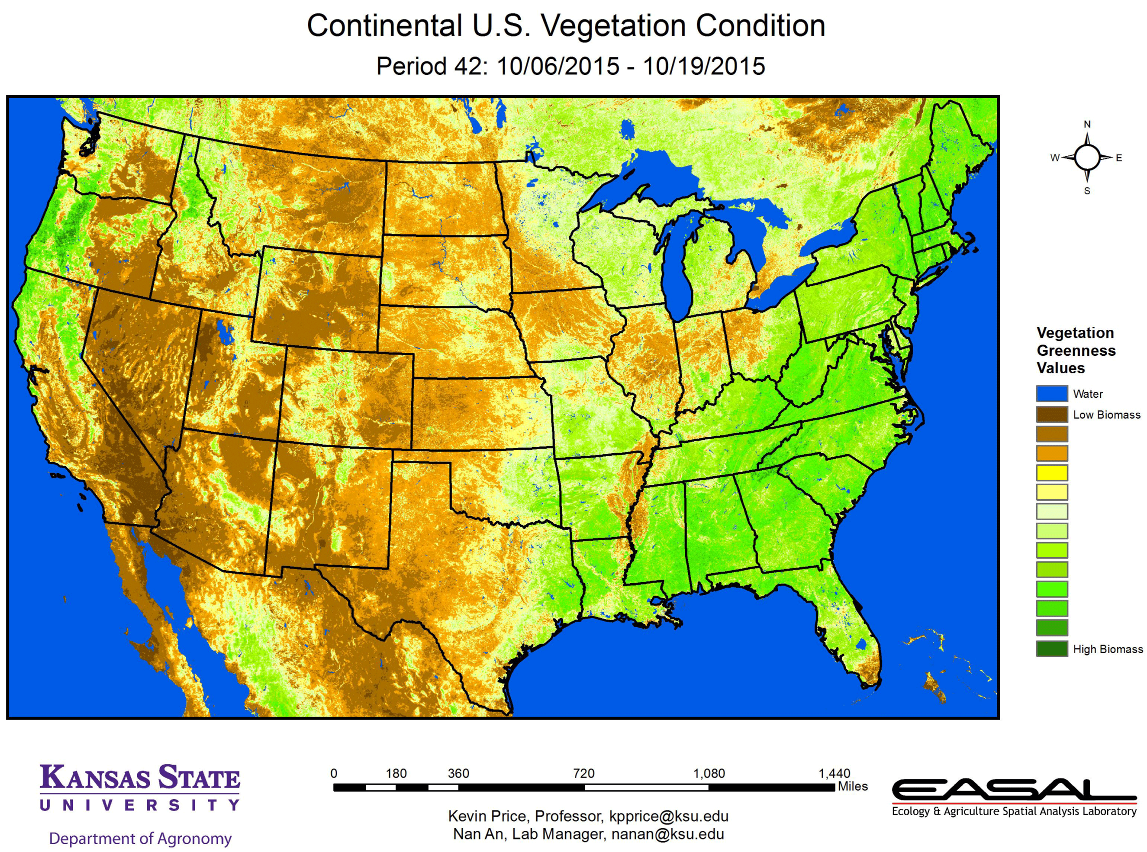


Figure 7. The Vegetation Condition Report for the U.S for October 6 – 19 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows above-average photosynthetic activity east of the Mississippi River, where favorable temperatures have extended the growing season. Lower NDVI values are noticeable in the Ohio River Valley and along the Mississippi River, where crops have matured early. Low NDVI values are also notable along the western Cascades in Oregon, where drought and wildfires continue to affect vegetation.

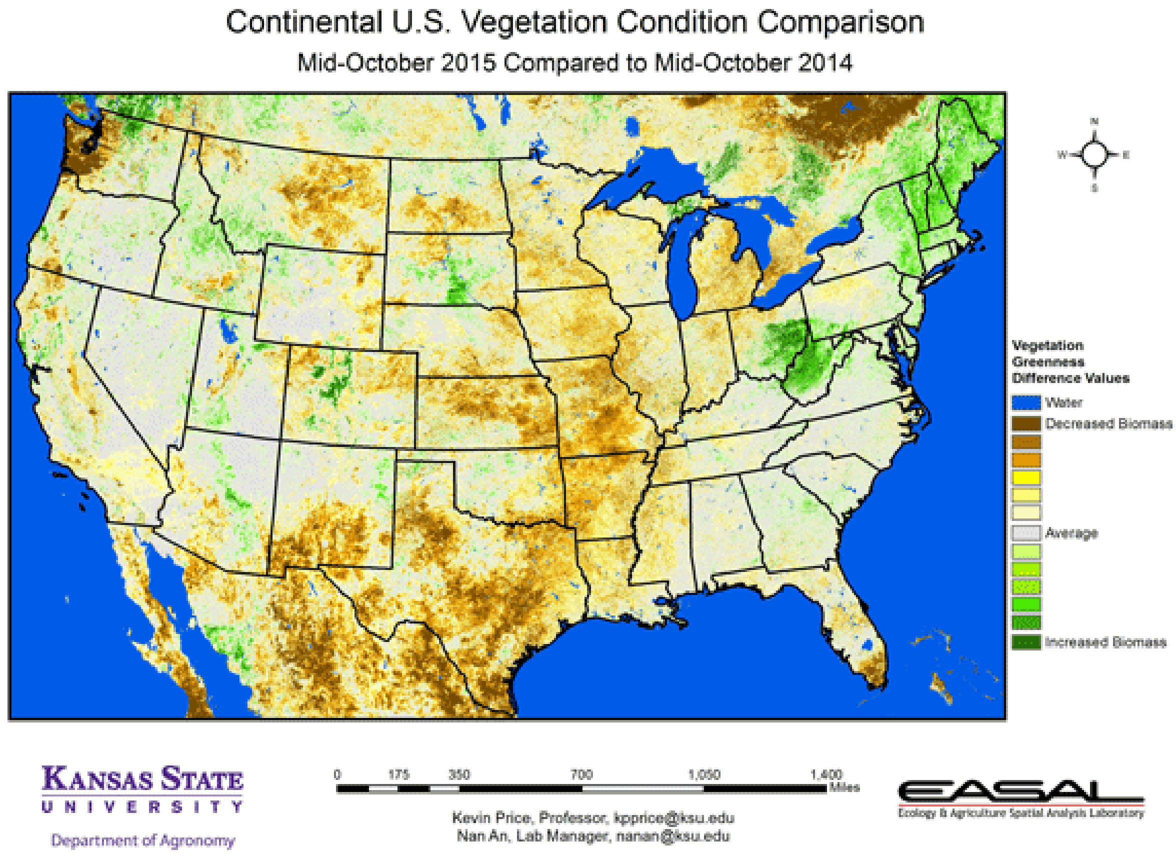


Figure 8. The U.S. comparison to last year at this time for the period September October 6 – 19 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that lower NDVI values are most evident from the Plains through the Southwest. Crop development in much of the region is ahead of average. In the western U.S., lower NDVI values are visible in eastern Montana and western North Dakota, and much lower in western Washington, which had more favorable precipitation last year. Little change is evident in Oregon and Northern California, where drought remains unchanged from last year.

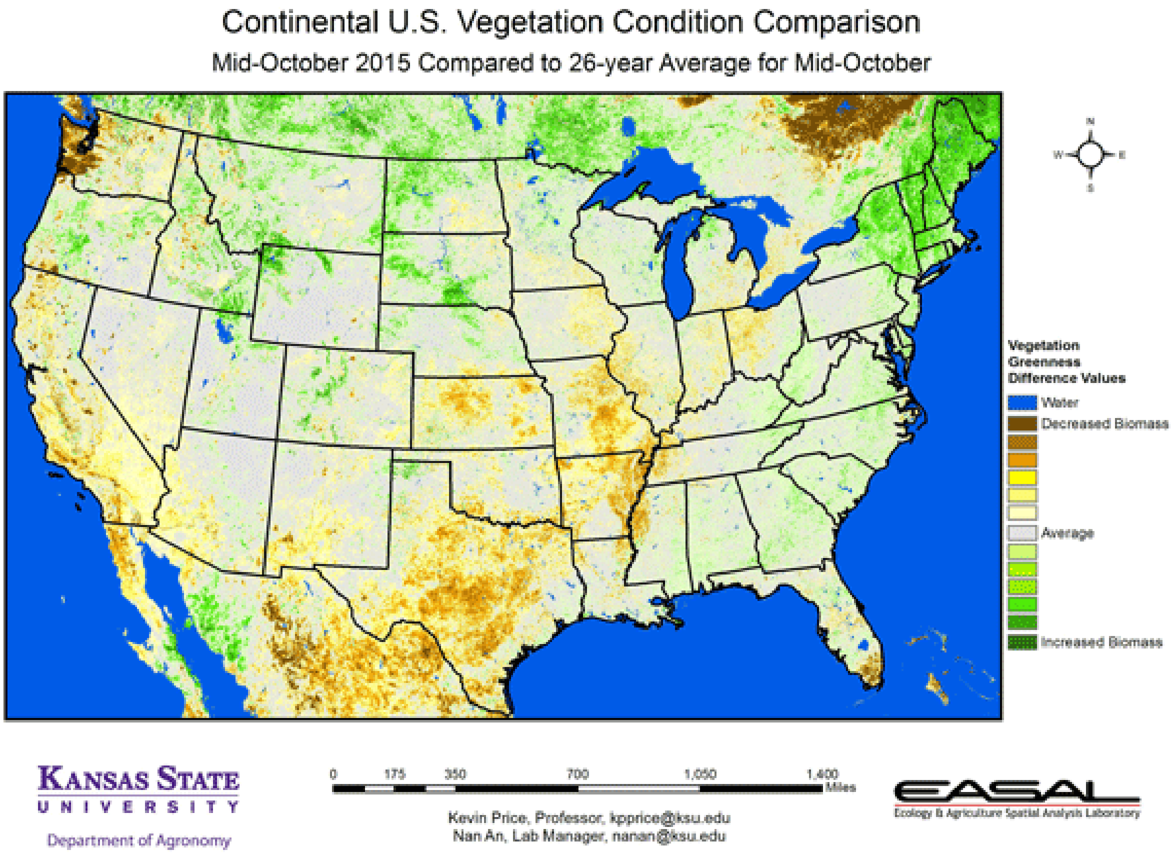


Figure 9. The U.S. comparison to the 26-year average for the period October 6 –19 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that the Southern Plains has lower-than-normal photosynthetic activity, while the greatest increase in NDVI values is in New England. Mild temperatures in the Great Lakes region have extended the growing season. Lower NDVI values in Texas show the impact of low rainfall in the last few months.

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