Issue 504

K-STATE
Research and Extension

Extension Agronomy

eUpdate

04/17/2015

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. Control of later-emerging kochia in wheat or wheat stubble

Getting kochia under control in any cropping system that includes wheat begins with the wheat crop during the spring, and shortly after wheat harvest. This is not always easy, even if an application of dicamba had been made before jointing to control kochia present at that time.

Later-emerging kochia in wheat

While a majority of kochia emerges early in the spring, some emergence can extend over a period of weeks or months. A herbicide applied early in the spring will need to have residual activity to be effective on later-emerging kochia. Several ALS-inhibitor herbicides have good residual activity, but are ineffective on ALS-resistant kochia. Most kochia are now ALS-resistant.

Dicamba, a non-ALS herbicide and one of the more effective products on most populations of kochia, must be applied before the jointing stage of wheat, meaning that later-emerging plants may not be controlled. With most of the wheat jointed now, the use of dicamba products is likely no longer an option this season.

Most other non-ALS herbicides that can be applied at a later growth stage of wheat are primarily contact herbicides that require thorough coverage to be effective, and this can be difficult to achieve when the wheat canopy gets larger and covers up some of the kochia present. Two exceptions are Huskie and Starane. These two products can be applied at later growth stages of wheat. They are both translocated (Starane more so than Huskie) and are effective on kochia. Huskie should be applied with NIS and ammonium sulfate according to the label.

Control in wheat stubble after harvest

If kochia has not been completely controlled in the wheat crop, then it may be present at the time wheat is harvested. In most cases, the kochia plants will have grown taller than the wheat canopy and will get "topped" by the combine as the wheat is harvested.

If kochia has been topped, producers should wait until some regrowth has occurred before applying herbicides in the wheat stubble to control it. A combination of glyphosate plus either dicamba or Starane may be the most effective treatments to control kochia in wheat stubble. Even if kochia populations are resistant to glyphosate, the tank-mix combinations with dicamba or Starane will probably provide good control, as long as the kochia aren't too big or stressed. Some 2,4-D can be added to the mixture to help with control of other broadleaf weeds, although 2,4-D generally will not help much in controlling kochia. Clarity or Starane tanked mixed with a pound of atrazine and 2 oz of Sharpen have provided excellent control of kochia following harvest. This is another option depending on future cropping plans.

An additional option would be to treat the kochia with Gramoxone. Gramoxone activity will be increased if applied with atrazine. However, only corn or sorghum may be planted the following spring if atrazine is used. If soybeans will be planted the following spring, metribuzin (Dimetric, Glory, Metri, Metribuzin, Tricor, and others) can be used instead of atrazine to enhance the Gramoxone activity. Wheat can be planted 4 months after a metribuzin application. These chemistries are contact herbicides requiring thorough coverage and more spray volume than does a glyphosate treatment.

To improve the chances of getting good control after wheat harvest, apply the postharvest treatments in the morning hours or after the field has received some moisture, not when the kochia plants are under maximum stress. If kochia has been severely drought stressed before treatment, waiting a couple days following a good rain may provide optimum control from the herbicide treatment. If glyphosate is the product of choice, use the highest labeled rate, and make sure to add ammonium sulfate and any necessary surfactants.

Recent research results

In 2014, a trial at the K-State Southwest Research-Extension Center – Tribune field compared several herbicide products applied at different times for kochia control in an irrigated wheat field. The field was seeded late at the rate of 40 lbs/acre to simulate a relatively thin stand. The only weed present in this field was kochia. The wheat was harvested July 9.

Kochia control in wheat and wheat stubble: Southwest Research-Extension Center – Tribune, 2014						
			% Kochia control			
Treatment	Product and rate	Application date	May 15	July 14 (stubble)	July 22 (stubble)	August 13 (stubble)
A. Pre-joint + Postharvest treatments						
1.	Clarity, 4 fl oz/a 2,4-D LV4, 12.8 fl oz/a	April 17	63	48	60	7
	Clarity, 16 fl oz/a 2,4-D LV4, 16.8 fl oz/a NIS, NPAK AMS	July 14				
2.	Clarity, 4 fl oz/a 2,4-D LV4, 12.8 fl oz/a Zidua, 2 oz wt/a	April 17	100	96	98	98
	Clarity, 16 fl oz/a 2,4-D LV4, 16.8 fl oz/a NIS, NPAK AMS	July 14				
3.	Clarity, 4 fl oz/a Zidua, 2 oz wt/a	April 17	100	100	100	100
	Clarity, 16 fl oz/a Atrazine, 1 qt/a Sharpen, 2 fl oz/a MSO, UAN	July 14				
4.	Clarity, 4 fl oz/a Huskie, 14.4 fl oz/a NIS, NPAK AMS	April 17	93	74	99	95
	Atrazine, 1 qt/a Sharpen 2 fl oz/a MSO, UAN	July 14				
5.	Rave, 4 oz wt/a NIS	April 17	68	58	97	93
	Atrazine, 1 qt/a Sharpen, 2 fl oz/a MSO, UAN	July 14				
B. Flag leaf + Postharvest treatment						
6.	WideMatch, 21.3 fl oz/a	May 15	--	94	100	100
	Clarity, 16 fl oz/a Atrazine, 1 qt/a Sharpen, 2 fl oz/a MSO, UAN	July 14				
C. Postharvest only treatments						
7.	Clarity, 16 fl oz/a Atrazine, 1 qt/a + COC	July 14	--	--	66	65
8.	Clarity, 16 fl oz/a Atrazine, 1 qt/a Sharpen, 2 fl oz/a MSO, UAN	July 14	--	--	95	94
9.	Clarity, 16 fl oz/a Atrazine, 1 qt/a Impact, 1 fl oz/a MSO, UAN	July 14	--	--	81	86
10.	Gramoxone, 1.5 qt/a Atrazine, 1 qt/a + COC	July 14	--	--	99	85
11.	Clarity, 16 fl oz/a 2,4-D LV4, 16.8 fl oz/a NIS, NPAK AMS	July 14	--	--	48	68

Comments on this trial:

- At the time the pre-joint treatments were applied on April 17, kochia were very small. The largest kochia were about 0.5 inches tall. A significant amount of kochia emerged following this pre-joint treatment. All pre-joint treatments provided excellent control of kochia 9 days following application. A rating 28 days after application on May 25 suggest that kochia were emerging through any dicamba applications, as well as the Clarity+Huskie application. Only those pre-joint treatments that included 2 oz of Zidua provided excellent residual control of kochia. Zidua has limited foliar activity and primarily controls later-germinating seedlings. The kochia that were present following wheat harvest after the pre-joint treatments containing Zidua (treatments 2 and 3) were much smaller and emerged later than kochia in the other pre-joint treatments. However, it is also important to note that Zidua is only labelled up to the 4 tiller stage of wheat, which often occurs prior to mid-April in most wheat fields.

- On May 14, the WideMatch treatment was applied to kochia 0.5 to 1.5 inches tall. WideMatch did a very good job controlling the kochia, indicating that coverage was adequate. Complete control was not attained, however. The postharvest treatment following WideMatch applied at flag leaf did provide complete control of kochia. At the time the postharvest treatments were made, the kochia following the WideMatch treatment made at flag leaf were much smaller than the kochia following the earlier, pre-joint treatments.
- The wheat was harvested July 9. At the time of the postharvest treatments, July 14, kochia was actively growing and protruding above the stubble. Much of the kochia was 15-20 inches tall at that time. Where there was excellent in-crop control, only a few kochia were present and those plants were about 2-6 inches tall.
- The heavy density of kochia in the stubble following the pre-joint Clarity+2,4-D treatment proved to be unmanageable after harvest. The postharvest treatment of Clarity+2,4-D provided 64% control, which would be considered a failure.
- Huskie+Clarity (treatment 4) provided about 75% control of kochia at the end of the season. A postharvest treatment of atrazine and Sharpen provided very good control, with only an occasional plant recovering.
- The incrop treatment with Rave (treatment 5) did not provide adequate control in the wheat crop, likely because the kochia in this trial were ALS-resistant and the dicamba residual control was too short. The postharvest treatment of atrazine+Sharpen did provide very good control, however (as it did following the incrop Huskie treatment).
- A postharvest only approach isn't recommended. Unfortunately, many producers attempt to manage kochia in this manner, especially when the wheat crop is marginal.
- The best of the postharvest-only treatments was Sharpen+atrazine+Clarity, which was the only treatment to exceed 90% control by August 13. Postharvest-only treatments that provided inadequate control were Clarity+atrazine and Clarity+2,4-D, with less than 70% control.

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2. K-State research on seed treatments for Sudden Death Syndrome in soybeans

Soybean Sudden Death Syndrome (SDS) is a disease caused by the soilborne fungus *Fusarium virguliforme*. This fungus prefers wet conditions and thus is usually most severe in irrigated fields, although it can and has occurred in non-irrigated fields in Kansas. SDS tends to be most severe on well-managed soybeans with a high yield potential. It also tends to be more prevalent in fields that are:

- Infested with soybean cyst nematode
- Planted early when soils are wet and cool

There is no easy way to completely control SDS. Effective management of SDS requires an integrated approach. Management should start with the planting of SDS resistant varieties, but this provides only limited options. Most varieties are susceptible to some degree; very few have good resistance.

Although the presence of SDS is strongly correlated with the presence of soybean cyst nematode, it is not possible to manage SDS simply by selecting varieties that have soybean cyst nematode resistance. Some varieties with resistance to soybean cyst nematode are susceptible to SDS and some varieties that are susceptible to soybean cyst nematode are resistant to SDS. Ideally, producers should select varieties that have both resistance to SDS and to multiple races of soybean cyst nematode. There are only a limited number of such varieties available. Results of screening trials for many commercial varieties for both SDS and SCN can be found at: http://www.agronomy.k-state.edu/services/crop-performance-tests/soybean/index.html.

Cultural management practices that can reduce the risk of SDS infection include delaying planting until soil temperatures are warmer, avoiding planting into overly wet soils, and reducing compaction problems within a field. Producers who have fields with compaction problems should make every effort to correct that problem before planting soybeans next season. Do not delay planting beyond the normal optimal time since yield losses due to delayed planting may exceed the losses from the disease alone. SDS infested fields should be the last fields planted within the normal planting time.

Crop rotation also seems to have some positive effect on SDS, but only if the field is not planted to soybeans for four years or more.

One promising method of controlling SDS is the use of new seed treatments. Recent research with seed treatments on soybeans in 2014 and 2013 has shown some promising results in tests at K-State's Kansas River Valley Experiment Field. These studies were planted in fields with a long history of SDS, and irrigated earlier and more often than normal to promote the disease.

2014 results

In this study, ILeVO -- a new seed treatment from Bayer CropScience, Fluopyram 600 FS -- was applied to a soybean variety with a high level of tolerance to SDS, Stine 43RE02. The most severely infested plots had more than 50% of the leaf area expressing symptoms of SDS by the R6 growth stage. Treatments with ILeVO reduced the amount of foliar symptoms and increased yields up to 12 bu/acre, or more than 25%.

Table 1. Influence of ILeVO seed treatment for SDS (Bayer CropScience) on yield of SDS-resistant soybean variety, Kansas River Valley Experiment Field-Rossville, 2014		

Seed treatments	Yield (bu/acre)	SDS severity (% leaf area at R6)
Poncho/VOTiVO check	47.4	52
ILeVO (0.15 mg/seed) + Poncho/ VOTiVO	59.6	16
ILeVO (0.075 mg/seed) + Poncho/ VOTiVO	57.0	31
Gaucho 600 check	54.0	25
ILeVO (0.15 mg/seed) + Gaucho 600	57.2	16
ILeVO (0.075 mg/seed) + Gaucho 600	57.1	7
LSD (0.05)	3.7	22.9

Source: Adee, E.A. (2015) "Effects of Seed Treatment on Sudden Death Syndrome Symptoms and Soybean Yield," *Kansas Agricultural Experiment Station Research Reports*: Vol. 1: Iss. 2. http://newprairiepress.org/kaesrr/vol1/iss2/3/

Another study in 2014 had treatments with an experimental seed treatment from DuPont. This product reduced the amount of foliar disease from over 70% of leaf area with SDS symptoms to less than 30% on two susceptible varieties, and increased yields up to 10 bu/acre, or more than 25%. The two varieties reacted similarly to the seed treatment, so the table below presents the average of both varieties.

Table 2. Influence of DuPont experimental seed treatment for SDS on yield of SDS-resistant soybean variety, Kansas River Valley Experiment Field-Rossville, 2014		
Seed treatments	Yield (bu/acre)	SDS severity (% leaf area at R6)
Untreated check	29.6	71.1
DuPont experimental treatment (0.65x)	29.7	39.1
DuPont experimental treatment (1.0x)	31.9	45.3
DuPont experimental treatment (2.0x)	35.3	41.0
DuPont experimental treatment (3.0x)	40.0	26.6
LSD (0.05)	4.8	15.7

Source: Adee, E. A. (2015) "Effects of an Experimental Seed Treatment from DuPont on Sudden Death Syndrome Symptoms and Soybean Yield," *Kansas Agricultural Experiment Station Research Reports*: Vol. 1: Iss. 2. http://newprairiepress.org/kaesrr/vol1/iss2/4/

2013 results

In 2013, the ILeVO seed treatment was applied to three soybean varieties of with different levels of tolerance to SDS. The most severely infested plots had more than 80% of the leaf area expressing symptoms of SDS by the R6 growth stage. The seed treatment reduced the amount of foliar disease in all varieties and increased yields up to 16 bu/acre, or more than 40% (Table 3).

Table 3. Influence of soybean variety and seed treatment on SDS, Kansas River Valley Experiment Field-Rossville, 2013						
	Soybean varieties					
	Most resistant	Moderately resistant	Susceptible	Most resistant	Moderately resistant	Susceptible
Seed treatment	Yield (bu/acre)			SDS severity (% leaf area at R6)		
None	28.6	29.2	21.3	18%	44%	63%
ILeVO* at 0.25 mg/seed	41.6	39.7	37.4	4%	28%	45%
ILeVO at 0.15 mg/seed	42.9	41.0	26.2	5%	28%	72%
LSD 0.05	8.3			17.4		

Summary

Having products that can protect the soybean plant against SDS and reduce yield loss will be a very important tool for growers to have in their arsenal to improve soybean yields in fields with a history of SDS. Combining these products with variety selection will help reduce yield loss to SDS, and improve the profitability of soybeans. The Bayer product, ILeVO, is on the market in limited quantities this year. The DuPont experimental product may be a year or two away from being made available to growers.

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3. Q&A on current wheat disease and fungicide use issues

I have received several questions over the past few days on wheat diseases and potential fungicide application issues this year.

Q: Is stripe rust a potential concern in Kansas this spring?

A: Yes, it's certainly possible. But it's still too early to know for sure whether it will occur. There is a fair amount of stripe rust being reported now on wheat in Texas and Oklahoma. Recent conditions have been cool and wet in many areas of those states. Where conditions are wet in Kansas, stripe rust could soon be found on wheat. The recent rains may have moved stripe rust into Kansas but it will take time for the disease to become established. The first generation of stripe rust infections does not cause as much damage as the second or third generations after an infection takes hold, so if the weather warms up soon that will help minimize the long-term risk of yield loss from stripe rust even if an initial infection were to occur soon. Stripe rust thrives best when nighttime temperatures are in the 40's or low 50's. If nighttime lows are in the 60's, stripe rust activity will slow down considerably. Wheat in far south central Kansas has headed in many cases as of April 17, but wheat in the northern half of Kansas is just now around the flag leaf stage – give or take several days. In general, wheat is about two weeks ahead of normal in most areas of the state. Given that, it seems likely that the biggest threat of stripe rust epidemics causing a significant yield loss might be in the northern half of Kansas, north of McPherson where wheat is currently at an earlier stage of growth. But if stripe rust moves up quickly into Kansas and conditions are cool and wet, wheat in the southern half of Kansas could also be at risk. By the time wheat is past the soft dough stage of grain fill, a stripe rust infection will result in less yield loss. Wheat producers in all of Kansas should be scouting their fields regularly, starting now.

Q: What about leaf rust?

A: Yes, leaf rust is also a concern for Kansas producers this year. Leaf rust is also active now in many areas of Texas and Oklahoma, and spores could blow into Kansas this spring. We are at a time of year now when temperatures will start to warm into the range in which leaf rust thrives – with nighttime lows in the 60's. As with stripe rust, scouting for leaf rust will be important.

Q: Which fungicides can be applied latest in the season on wheat?

A: Always consult the label on this since any label violations could have unwelcome consequences. In general, the triazole fungicides can be applied the latest. Tebuconazole products (Folicur and generic products), Caramba, and Prosaro can be applied through the flowering stage. But these products have a 30-day preharvest interval as well, so producers have to keep that in mind and make sure they're not applying it so late that they will have to delay harvest to meet the preharvest interval.

Q: Are any other diseases a problem this year?

A: Wheat streak mosaic is relatively common this year, even in central and eastern Kansas. One factor producers should keep in mind going forward is that volunteer wheat is not always being controlled in some situations, including in stands of cover crops in some cases. Uncontrolled volunteer wheat is always a threat to cause wheat streak mosaic problems in nearby wheat fields.

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4. Comparative Vegetation Condition Report: March 31 - April 13

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 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:

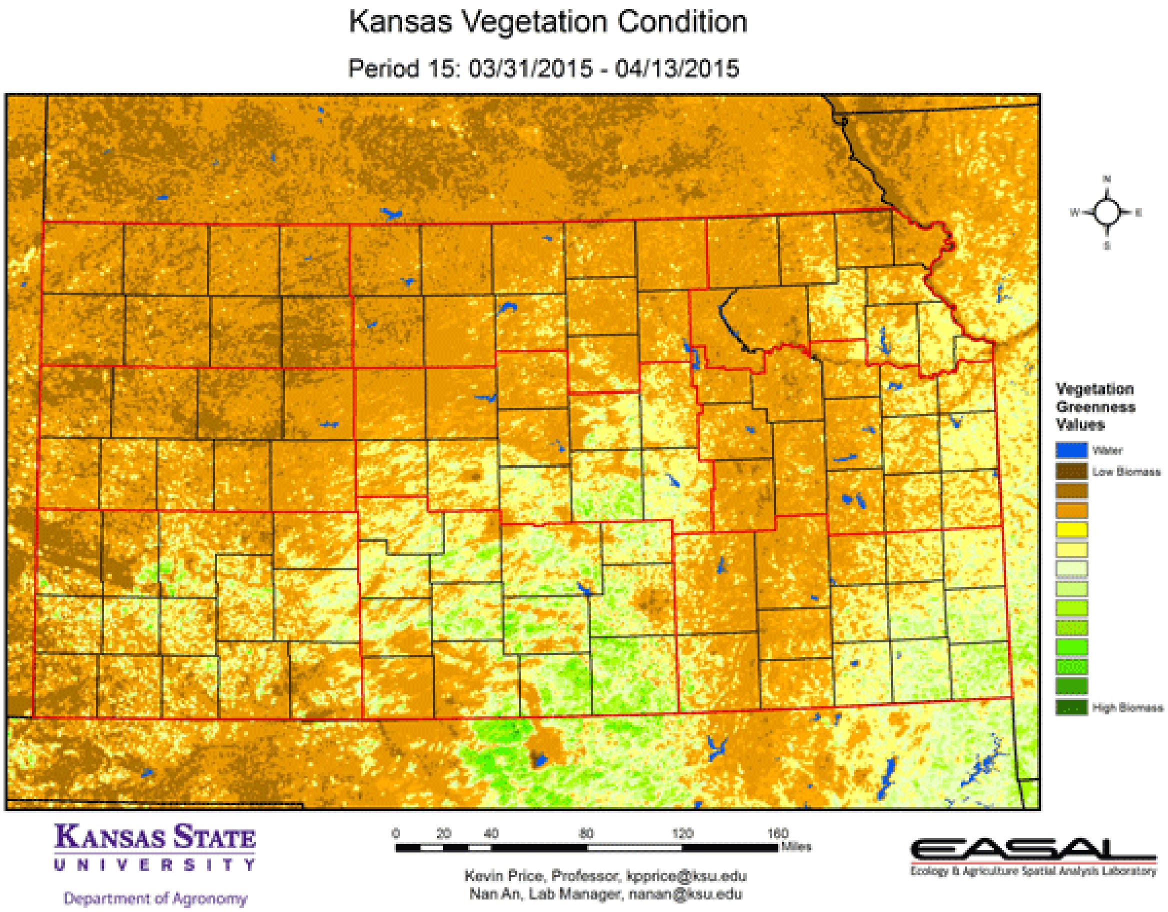

Figure 1. The Vegetation Condition Report for Kansas for March 13 – April 13 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that photosynthetic activity is greatest in the South Central Division and Cherokee County. Impacts from the Easter freeze will be slow in developing.

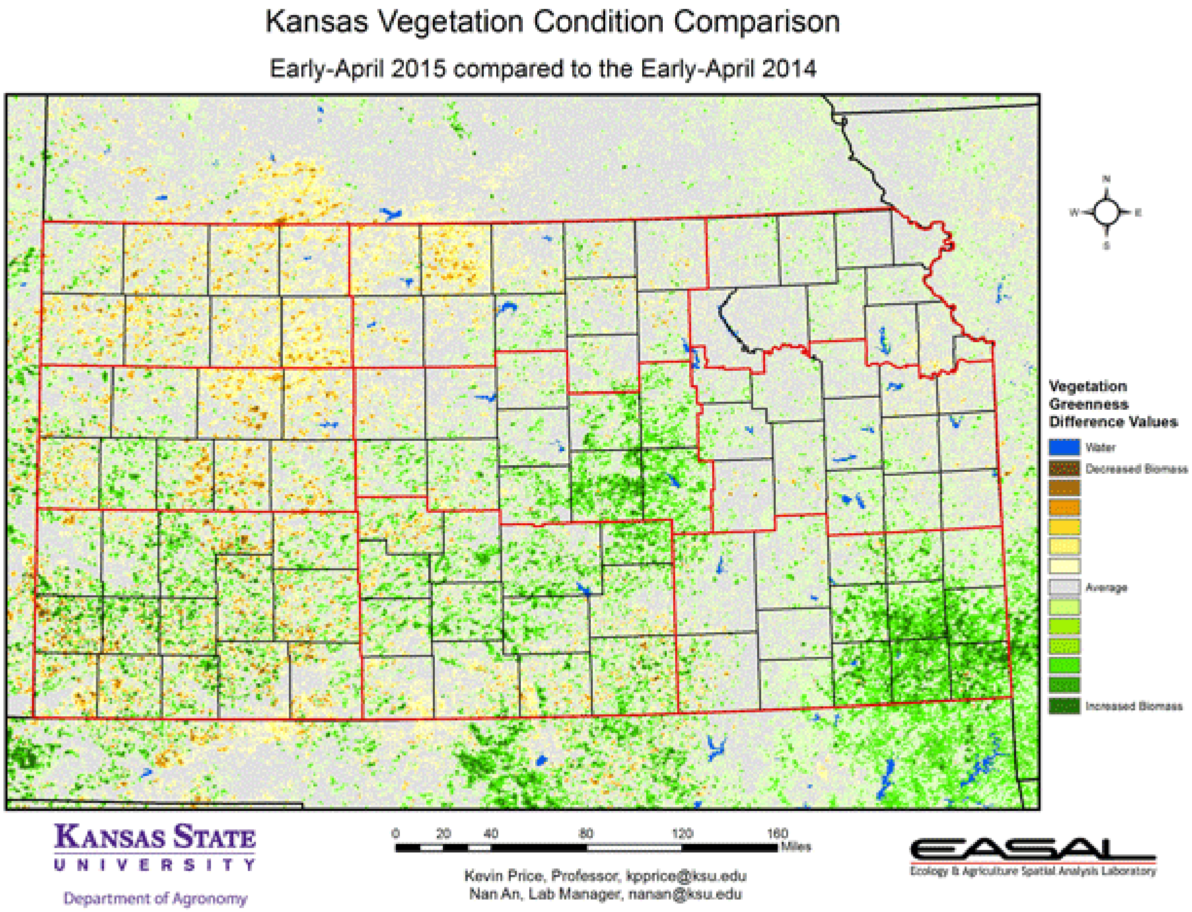

Figure 2. Compared to the previous year at this time for Kansas, the current Vegetation Condition Report for March 13 – April 13 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows the greatest increase in southeast Kansas. Mild temperatures and favorable moisture in the region have favored vegetative development.

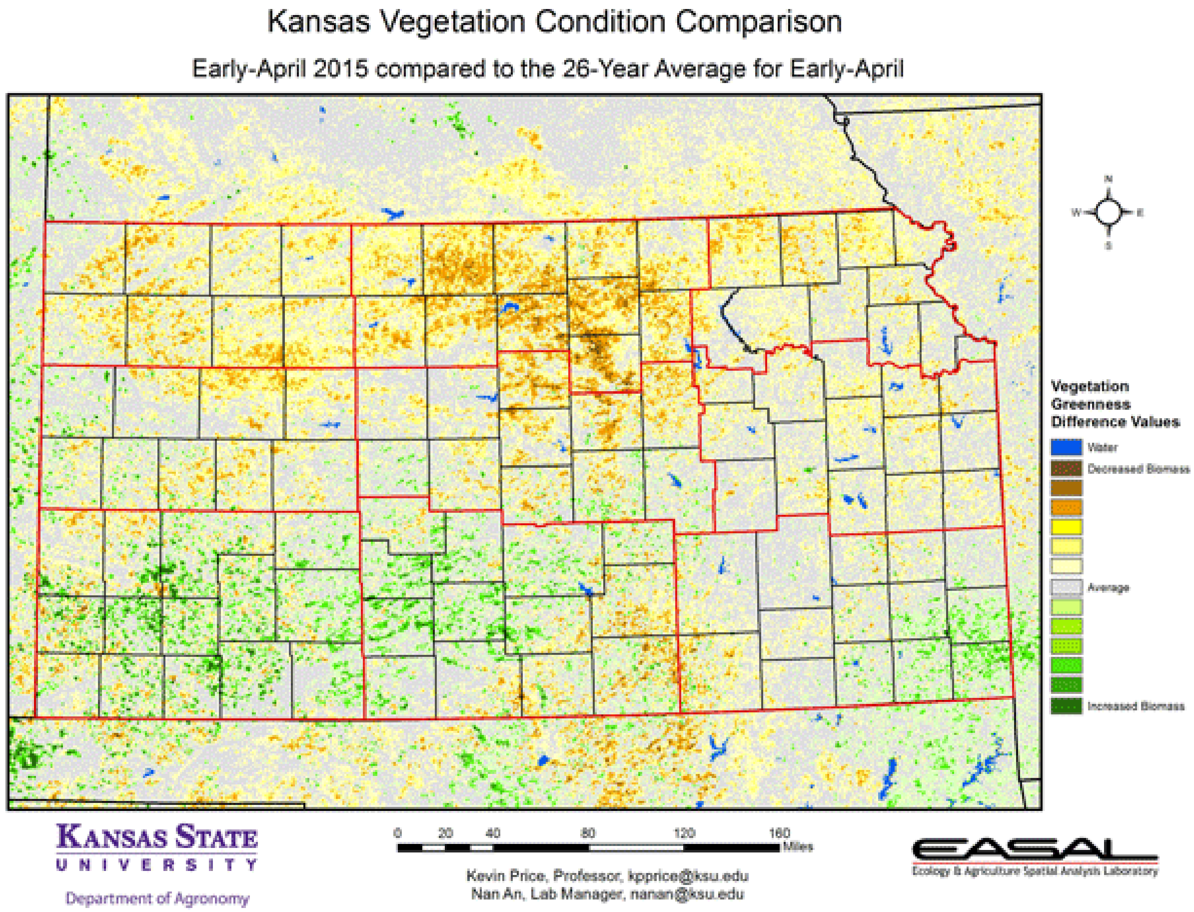

Figure 3. Compared to the 26-year average at this time for Kansas, this year's Vegetation Condition Report for March 13 – April 13 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that greater-than-average vegetative activity is greatest in the southern portion of Kansas. Sumner and Cowley counties are major exceptions and are the areas where some of the coldest temperatures and longest durations of freezing temperatures occurred.

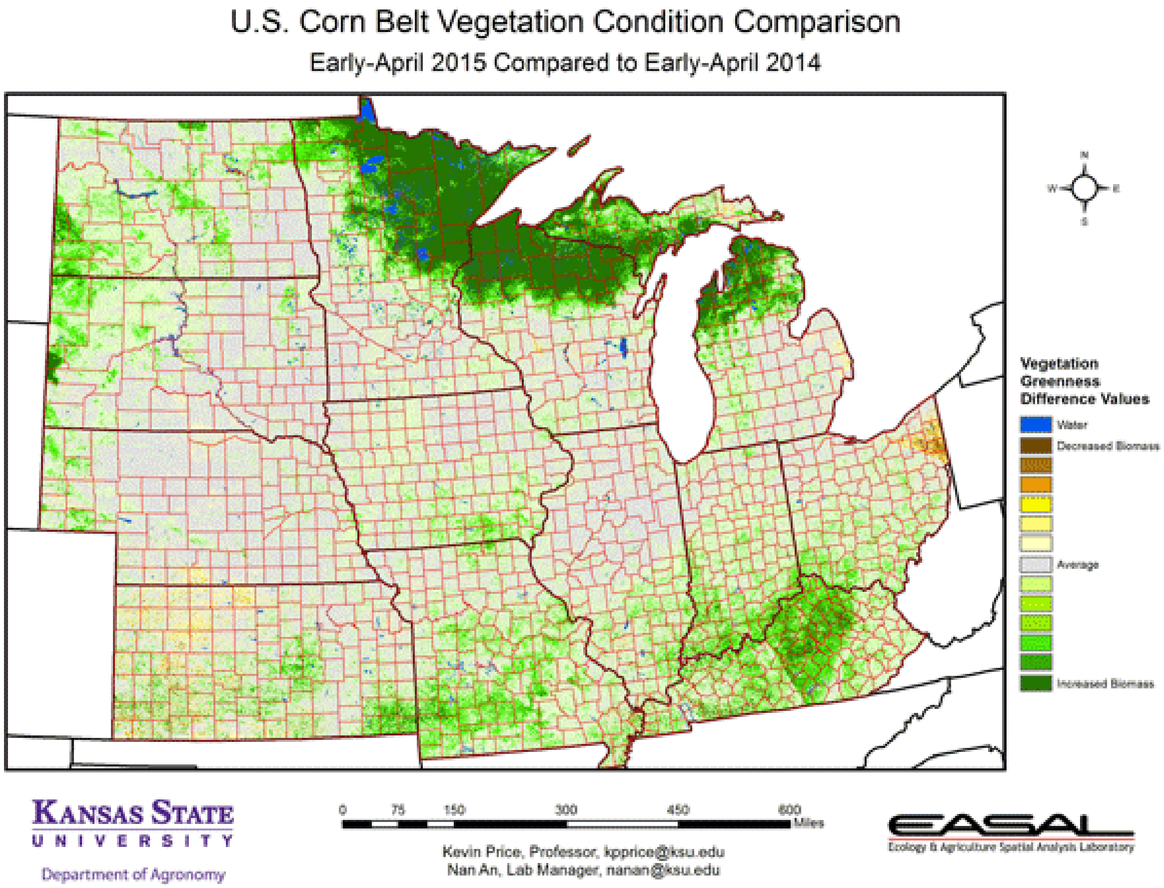

Figure 4. The Vegetation Condition Report for the Corn Belt for March 13 – April 13 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that biomass production is greatest in central Kentucky and southeastern Missouri. Favorable temperature and rainfall have resulted in more active photosynthesis in these regions.

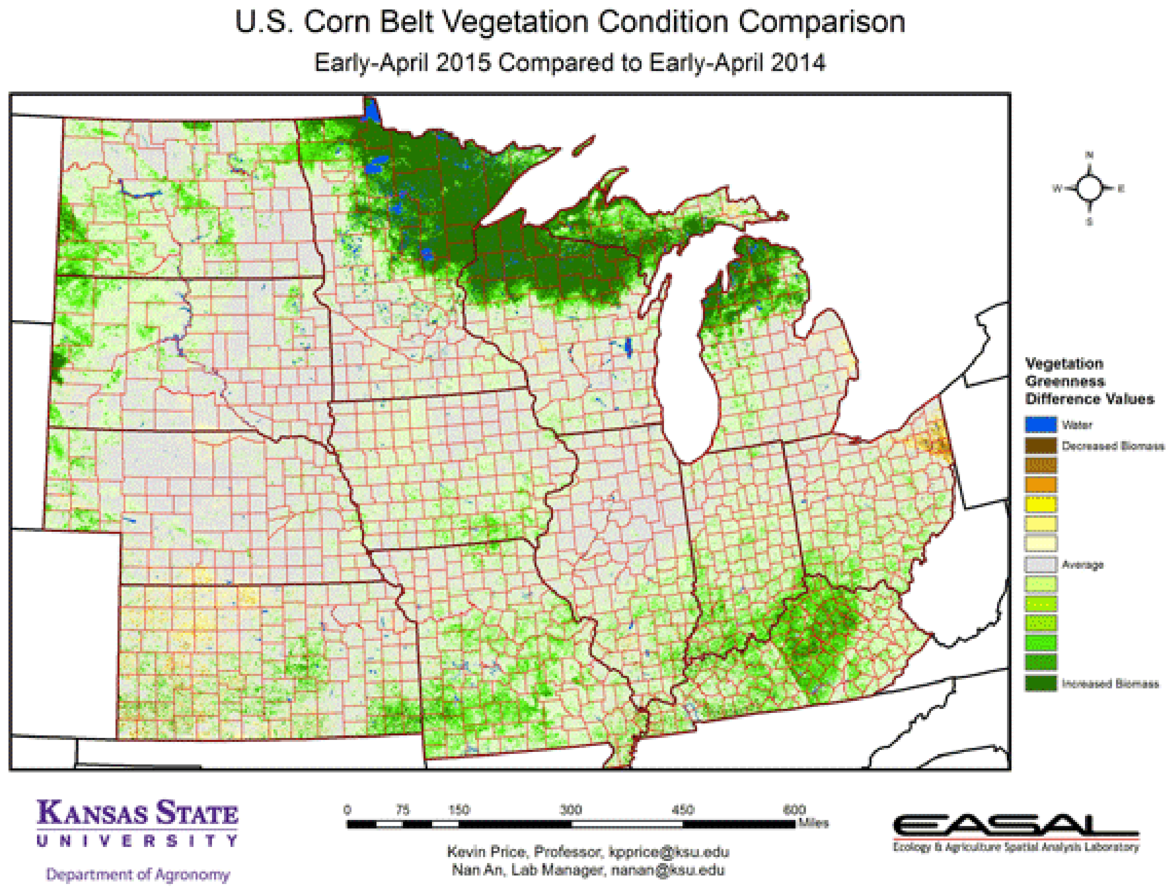

Figure 5. The comparison to last year in the Corn Belt for the period March 13 – April 13 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that northern Minnesota and northern Wisconsin have the greatest increase in photosynthetic activity. Most of this is driven by lower snow cover in these areas. In the eastern portion of the Upper Peninsula snow cover is closer to last year and so is the photosynthetic activity.

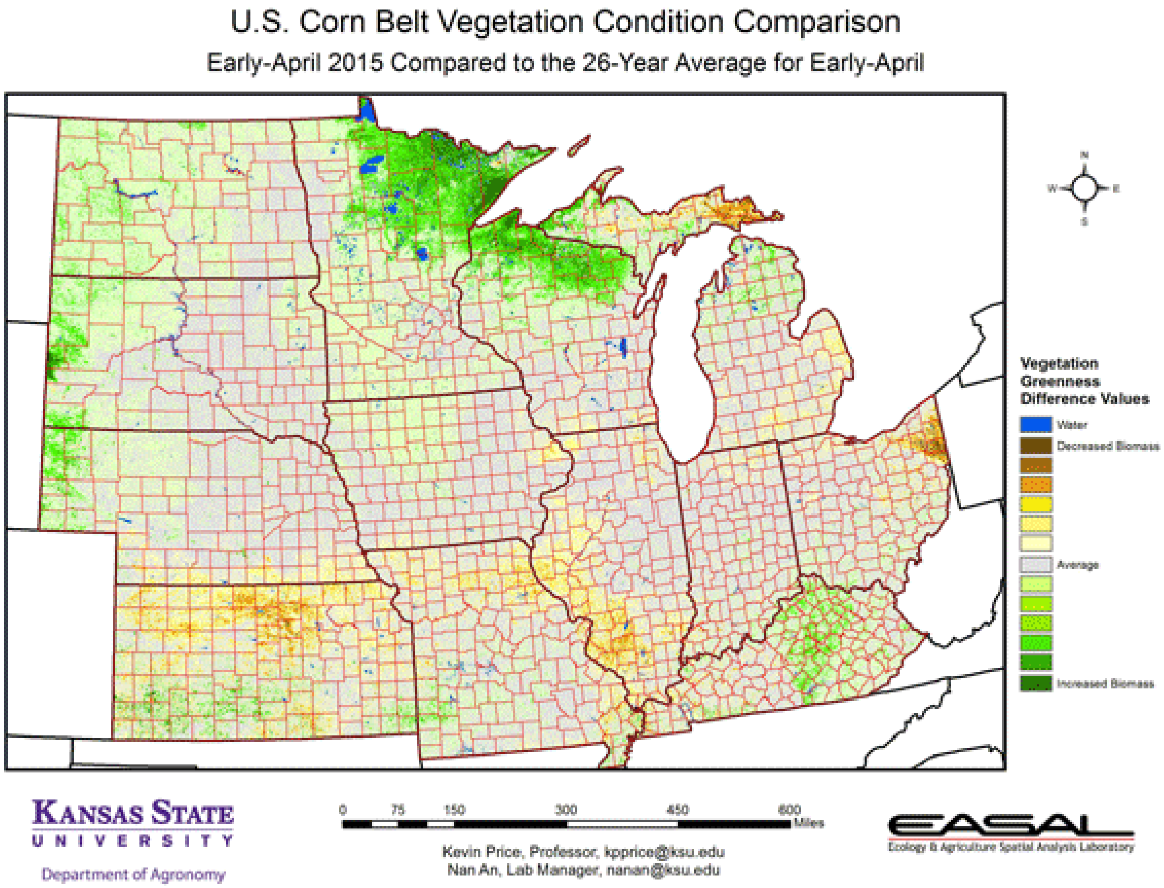

Figure 6. Compared to the 26-year average at this time for the Corn Belt, this year's Vegetation Condition Report for March 13 – April 13 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows pockets of below-average biomass production in north central Kansas, western Illinois, northeastern Ohio, and the eastern side of the Upper Peninsula of Michigan. In the eastern portions of the region, this decrease is due to persistent snow. In north central Kansas, the combination of winterkill and dry soils have slowed plant productivity.

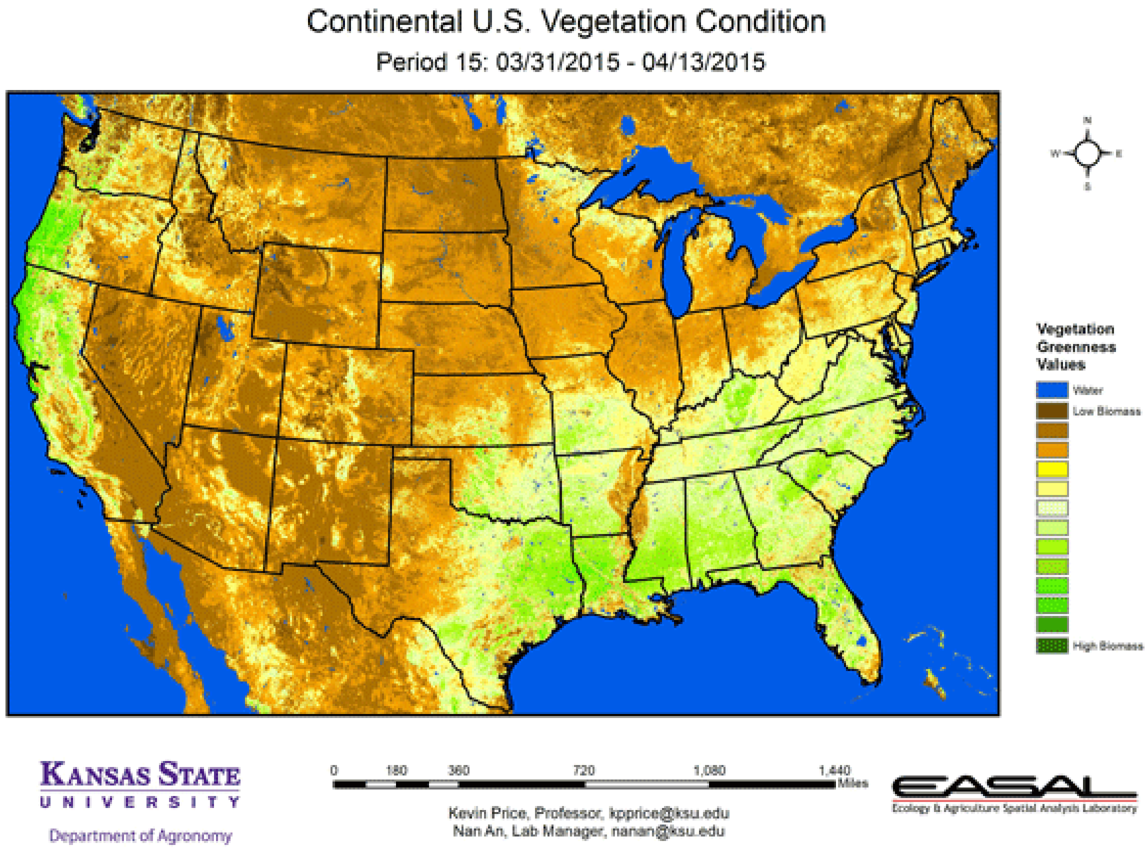

Figure 7. The Vegetation Condition Report for the U.S. for March 13 – April 13 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that the greatest level of photosynthetic activity is in the Southeastern region and along the Pacific Coast from Oregon through central California. This increased photosynthetic activity along the West Coast continues to raise drought concerns in the region, as it marks a much earlier end to the snow season, with lower water supplies expected. There is an area of lower photosynthetic activity along the central part of the Mississippi. Flood advisories continue in these areas.

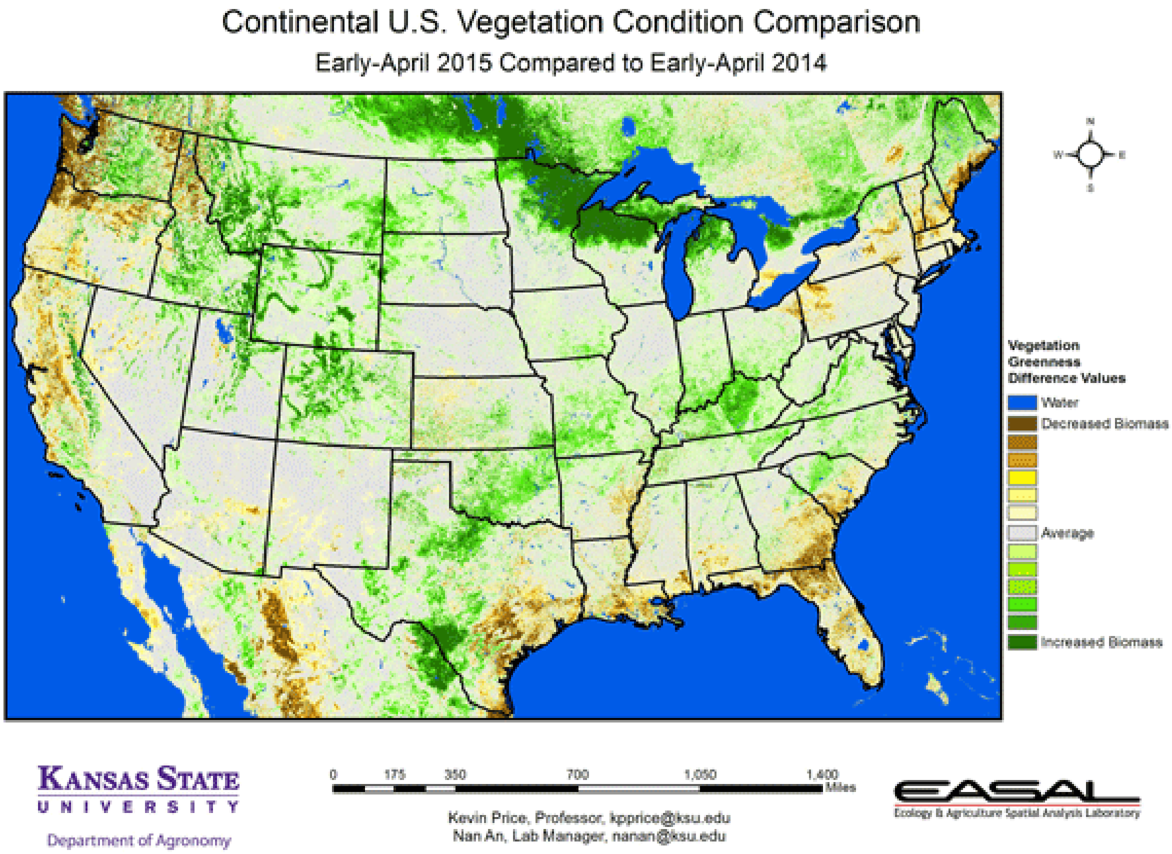

Figure 8. The U.S. comparison to last year at this time for the period March 13 – April 13 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that areas of lower photosynthetic activity are most noticeable along the coast of Washington and along the Gulf Coast from central Texas through northern Florida. These areas have seen higher precipitation. In the Upper Midwest, low snow amounts have resulted in higher photosynthetic activity.

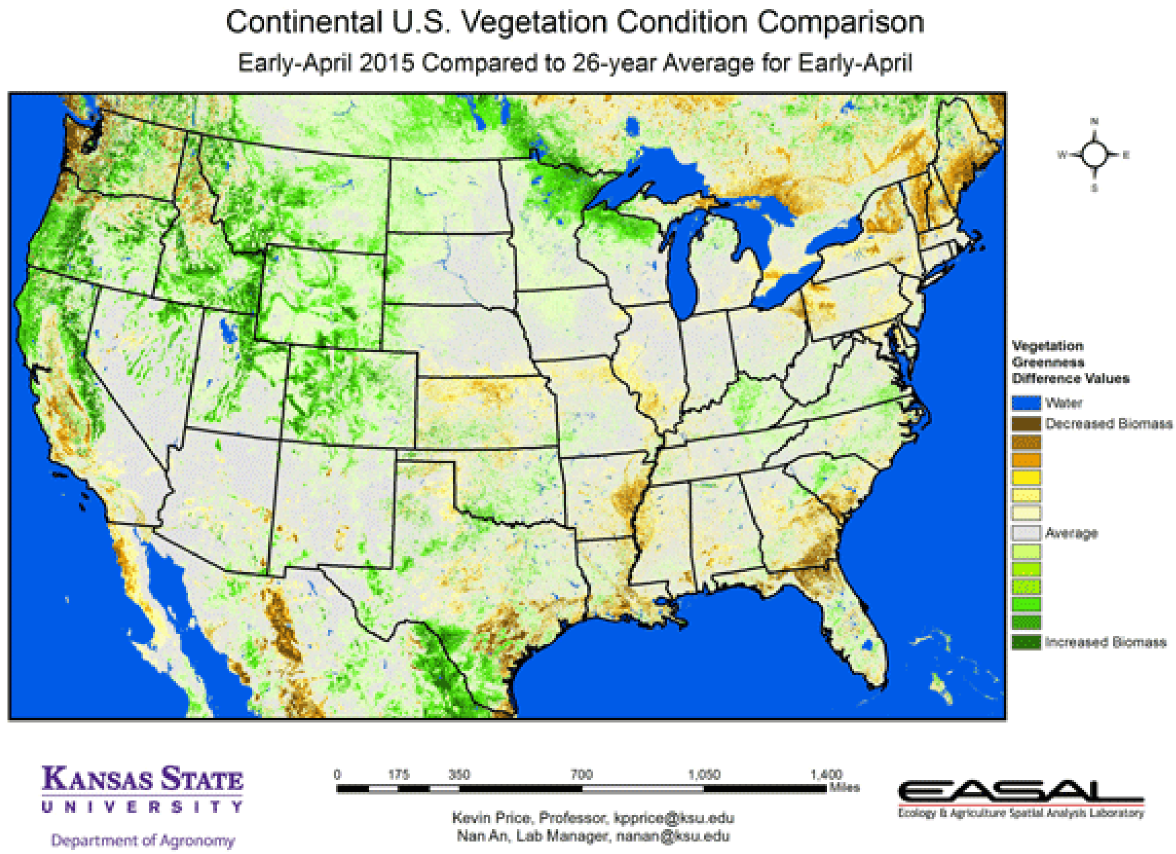

Figure 9. The U.S. comparison to the 26-year average for the period March 13 – April 13 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows areas of below-average photosynthetic activity in upper New England and pockets of the south. High precipitation in these areas has resulted in flood waters in the south and higher snow cover in New England. Along the Washington coast, rainfall has been plentiful, but snow has been lacking. This will result in lower stream flows.

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