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eUpdate

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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. Will your corn need additional nitrogen this year?

Many Kansas farmers are getting concerned about yellow, off-colored corn, potential N loss, and possible need to apply additional sidedress N. In the May 15, 2015 issue of the Agronomy eUpdate we addressed the issues surrounding N loss from leaching and denitrification. See: https://webapp.agron.ksu.edu/agr_social/eu_article.throck?article_id=559

With 6 to 10 inches of rainfall in May and more predicted in many areas of Kansas, the questions now become: How can I determine if my corn actually needs additional N? Should I be considering sidedressing additional N as soon as it dries up? Should I call in a plane and fly on urea? If I do need more N, how can I determine how much is actually needed?

These are very important questions, and ones that are difficult to answer with certainty. But there are some tools available to provide some helpful information and guidance.

Probably the most important place to start is with how much N was applied early to the crop. If half or more of the intended N rate was applied early, there is probably enough N present in the soil in most fields to provide the N needed to set a reasonable sized ear. In these cases, we probably have some time to develop and execute a good plan. But if no N -- or very little N as starter only -- was applied, there will be more pressure to get N on quickly to ensure decent ear size. This may mean flying on N or some other means to get N into the plant.

The amount of N applied early is important because corn determines ear size and yield potential around the s6-leaf growth stage. If corn is under significant N stress at this point, it will set a small ear with a limited number of kernel rows. Even with adequate N later, yield potential will be low.

Assuming you have a little time to develop a plan, what are some of the tools you might consider using to figure out how much N you need to think about adding. The following are some of the things to consider.

Soil testing. Traditional profile nitrate-N soil tests are probably not the most reliable tool for assessing soil N supply at this time. Soil nitrate-N samples collected from growing crops will generally indicate less available N than is actually likely to be available. This is because some of your fertilizer N has been incorporated into an easily mineralizable N pool (temporary immobilization, incorporation in root mass, etc.) that is not reflected in the soil nitrate-N test. The test also doesn't consider the ammonium-N, which is present from mineralization and from ammonium in fertilizer which has not yet been nitrified (and potentially denitrified). An additional problem is sampling, especially in fields where ammonia was applied. How frequently are you going to find those ammonia bands? So while a profile-N test is great for use in late fall or winter, prior to planting, it might not be the best tool now. It might provide some information, but will it be useful information?

A second type of soil test which has never been widely used in Kansas is the **Pre-Sidedress nitrate soil test**. This test was developed in New England and has been successfully used in areas where high soil organic matter or regular applications of animal manure are routinely applied. This would be a tool to consider for corn where chicken litter has been used, or other organic N sources have been applied. A number of states, such as Wisconsin, Michigan, Iowa and Indiana, have correlated and calibrated the test. But one reason it has never gained wide use is it can tell you if you need N, but it doesn't tell you accurately how much N to apply. It can provide an estimate of N need, but is not as accurate as we would like. However, I would consider it strongly for fields with a history of manure application.

Two publications that describe the test and provide fertilizer rate recommendations are:

"The Pre-Sidedress Soil Nitrate Test for Improving N Management in Corn," AY 314-W from Purdue University: http://www.agry.purdue.edu/ext/pubs/ay-314-w.pdf

"Pre-Sidedress Soil Nitrate Test for Corn," Agronomy Facts 17 from Pennsylvania State University: http://extension.psu.edu/plants/crops/grains/corn/nutrition/pre-sidedress-soil-nitrate-test-for-corn

Plant analysis. Plant analysis is another tool which I really like for diagnostics and routine monitoring, but not for this purpose. Again, we can do a good job of telling if the crop has enough N, but the calibrations and correlations have not been developed for this purpose. Plus there will be lag time between sampling and analysis -- and when it dries out, we'll need to roll. So this may not be the best option.

Chlorophyll meters and crop sensors. My first choice to determine where we are at today is the use of a chlorophyll meter such as the Minolta Spad meter. This technology has been around for a long time, and used successfully in many areas for planned late-season N applications, such as fertigation. It also has been used in dryland areas where N loss is common, but it is pricey. A SPAD meter cost about $2,000. In more recent years, attention has shifted to crop sensors such as the Trimble Greenseeker, AgLeader Optrx, or the Holland Scientific Rapid Scan.

Crop sensors are more attractive as a tool for making N recommendations because the system can be automated and applied directly to the applicator vehicle for on-the-go precision applications. But our knowledge base and experience with sensors is not yet as great as we'd like, and the algorithms, or rate-calculating equations, probably not as strong. But I would utilize either a chlorophyll meter or a crop sensor if it were available to me.

A chlorophyll meter makes a measurement of leaf color. A person needs to walk or drive through the field, stop, clamp the instrument on a corn leaf, and take a reading. Since the color will vary across a field, one needs to take 20-30 individual readings and average those values to get a good estimate. Normally, the average from a series of readings is compared to a similar average reading made from a well-fertilized reference area. The reading from the target area you want to fertilize is then divided by the reading from the reference area. This value, or percentage of the reference, is commonly called a **Sufficiency Index**. An example calculation is given below:

$$\text{Sufficiency Index} = \frac{\text{Average Spad Reading in Target area}}{\text{Average Spad Reading in Reference Strip}} \times 100$$

The sufficiency index is used to determine the needed additional N. The N recommendations based on the Sufficiency Index made by several states is summarized below.

Table 1. N recommendations using a chlorophyll meter to determine a sufficiency index from

several Midwestern states			
Iowa		Indiana	
Sufficiency index	N rate (lb/acre) to apply at 8- to 12-leaf corn	Sufficiency index	N rate (lb/acre) to apply at 8- to 12-leaf corn
<88	100	<90	60
88-92	80	90-95	40
93-95	60	95+	0
95-97	30		
>97	0		

What is a reference area, and how can you establish one? A reference strip or area is simply a well-fertilized area where the corn is adequately supplied with N. Generally these areas are developed prior to or at planting by supplying 125% or so of the normally recommended N rate for the field. The areas don't have to be large. Four rows, 50 feet long make a good reference strip for a chlorophyll meter or hand-held sensor. It is actually better to have multiple small reference strips scattered across a field than one big reference strip. The small strips can help you capture differences in soil texture and drainage, which will have an impact on nitrogen loss.

A simple way to establish a reference strip at this point in the season is to measure off an area in your field 4 rows wide (10-ft wide for corn in 30-inch rows) and 50 feet long. Mark the corners well with stakes or posts so you can find the areas as the corn grows, because you will want to come back to them. If you have already applied at least ¾ of the intended N to the field, weigh out and apply 2.5 pounds of urea to the reference area. This will be the equivalent of 100 additional pounds of N per acre. Now wait for the corn to take up the N and green up. This will likely take 2 weeks or longer. Don't panic! If you had applied your normal N rate on the field you will still likely have enough N present to carry the crop though most of the vegetative growth stages with minimal yield reductions. But start taking your readings on a regular, perhaps weekly, basis.

What will the numbers tell you? If you had adequate N present and N loss was minimal, the difference between the target bulk field readings and the new reference strip readings may be small (a sufficiency index >95%). That's good news. Additional N may not be needed, or a needed application will be small. If the difference develops quickly, and becomes large (<90%), N loss was severe and the needed rate will be fairly high. In that case, you should make the application as soon as possible.

In both cases, you should continue to make the readings and be prepared to make a second application later in the vegetative growth period. As corn grows, N is taken up and deficiencies are more likely to develop. So what appears okay today at 6-leaf corn may not be okay at 14-leaf corn. In Kansas we have a lot of experience with multiple application N management systems, especially with irrigated corn. We know we can get good responses to N applied in bands to the soil surface with a high-clearance ground rig prior to tassel. The only challenge is figuring how much N is needed.

Using a crop sensor is generally a similar process. Most of the rate calculators used by sensors require a reference strip, and are designed to use the difference in color and vegetation to make the recommendation. In general, the best window for use of most sensors is in the 8- to 12-leaf growth stage. K-State has algorithms you can download for free at the Agronomy Soil Testing Lab website for use with most sensors. The sensors can be used at later growth stages also, but variability can become an issue.

Some publications describing the use of chlorophyll meters are:

"Determining Nitrogen Fertilizer Sidedress Application Needs in Corn Using a Chlorophyll Meter" AY-317-W from Purdue University: http://www.agry.purdue.edu/ext/pubs/ay-317-w.pdf

"Using a Chlorophyll Meter to Improve N Management" NebGuide G1632, University of Nebraska: http://ianrpubs.unl.edu/live/g1632/build/g1632.pdf

"In-Season Sensing for Nitrogen Stress in Corn" from Iowa State University, download online.

An excellent summary on using crop sensors is "Managing Nitrogen with Crop Sensors: Why and How" by Peter Scharf at the University of Missouri: http://plantsci.missouri.edu/nutrientmanagement/nitrogen/pdf/sensor_manual.pdf

Summary

While N loss through denitrification or leaching likely has occurred this year in parts of Kansas, not all of the N will have been lost even if the corn has N deficiency symptoms. As soils warm and dry, the root system will develop more extensively and N mineralization from organic sources will occur. The challenge will be making a reasonable estimate of the amount of N which will need to be added to ensure good yields. Several tools are available to help make that decision.

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2. Sericea lespedeza control in rangeland, pasture, and CRP

June is just around the corner, and sericea lespedeza (*Lespedeza cuneata*) will soon be in a rapid vegetative growth stage. Sericea lespedeza continues to be a major concern on rangeland, pasture, and some CRP acres in Kansas.

Figure 1. Sericea lespedeza in vegetative growth stage. Photo by Walt Fick, K-State Research and Extension.

There are no known biological controls that can be effectively used on sericea lespedeza. However, grazing with goats can suppress sericea lespedeza stands and produce a saleable product. It takes 4 to 5 goats per acre (of sericea) to graze the plant heavily enough to eliminate seed production. Sheep will also graze sericea.

Frequent mowing will damage sericea lespedeza, but is also damaging to plants that might be growing/competing with sericea. A single mowing in mid- to late-July will eventually reduce stands of sericea lespedeza to some extent, but several years of mowing have not eliminated sericea in K-State work. A late-summer mowing will eliminate seed production most years. Integration of mowing and herbicides can reduce stands of sericea lespedeza. Wait about 4 weeks after mowing before applying a herbicide.

Herbicides applied at the correct time and under favorable environmental conditions can significantly reduce sericea lespedeza.

Remedy Ultra (triclopyr) and PastureGard HL (triclopyr + fluroxypyr) can provide effective control when applied during June and into early July when the sericea plants are in a vegetative growth stage. Broadcast applications of Remedy Ultra at 1 to 1.5 pints/acre and PastureGard HL at 0.75 to 1.5 pints/acre should be applied in spray volumes of 10 to 20 gallons/acre. Do not apply Remedy Ultra and PastureGard HL on CRP land until the grasses are established. These herbicides are likely to damage broadleaf plants that have been planted in CRP.

Products containing metsulfuron, such as Escort XP, Cimarron Plus, and Chaparral are generally more effective in the late summer when sericea lespedeza is actively blooming. Recommended rates are 0.5 oz/acre of Escort XP, 0.625 oz/acre Cimarron Plus, and 2.5 to 3 oz/acre Chaparral. Use a non-ionic surfactant with all of these products.

For spot application, mix 0.5 fl oz PastureGard HL per gallon of water, use a 1 percent solution of Remedy Ultra in water, or 0.3 grams Escort XP per gallon of water. Aerial applications of these products should be done with a minimum spray volume of 3 gallons per acre. Higher volumes, e.g. 5 gallons per acre, will generally be more effective.

Herbicide treatments will need to be repeated every 2 to 4 years to keep this invasive species in check. Initial treatments should reduce dense stands to the point where spot treatment can be used in future years.

Sericea lespedeza is a statewide noxious weed in Kansas and therefore needs to be controlled. It has a tremendous seed bank that helps reestablish stands. Left untreated, sericea lespedeza will dominate a site, greatly reducing forage production and species diversity. Persistence is needed to manage this species.

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3. Is the fungicide on your wheat working?

Stripe rust continues to take its toll on the Kansas wheat crop this year. Spurred on by recent cool, wet weather, the disease is at moderate to severe levels in most areas of the state. The rust pressure is highly variable within many of these regions. Some fields are experiencing only minor damage and while others may experience more than 40% yield loss.

The amount of yield loss depends on the severity of the disease and the timing relative to grain development. The greatest yield losses occur when the plants suffer severe damage to the flag leaves prior to the milk stages of kernel development. Most growers are reporting major differences in disease levels between fields treated with a timely fungicide application and those left untreated. Based on observations in fields this week, it appears many growers will see significant benefits from a fungicide application this year.

The next few weeks will be a great time to do some comparisons of fields that were treated with a fungicide and those that remained untreated in your area. As you check fields, you might notice some yellow blotches and tan striping of leaves in some fields (figure 1). These symptoms might lead producers to wonder if the fungicide is working.

In most cases, a careful examination of the lesions reveals the dried remains of the stripe rust fungus and the absence of bright orange spores of the fungus. These are an indication that the fungicide may have been applied a little late but ultimately has done its job. The absence of new spores indicates that the fungus is no longer growing or initiating new infections. The remaining green leaf area should help the plant produce harvestable grain. Necrotic areas on the plant leaf will not recover and green back up after a fungicide is applied.

Figure 1. Symptoms of stripe rust that has been killed by a fungicide. Photo by Jeanne Falk Jones, K-State Research and Extension.

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Jeanne Falk Jones, Sunflower Extension District Agronomist
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4. Reports of Fusarium head blight (head scab) in wheat

The frequent rainfall and extended periods of high relative humidity have also stimulated the development of a disease in wheat known as Fusarium head bight (head scab). The *Fusarium* fungus infects wheat during the flowering or during the early stages of grain fill.

Symptoms include large tan lesions that affect an entire spikelet or portion of the head. The fungus often produces an orange mass of spores at the base on areas of the head infected first. The symptoms of Fusarium head blight are most obvious at the late milk and early dough stages of kernel development.

To date, the disease has been reported at trace levels in many areas of central Kansas but incidence is highest in the southeast portion of the state. Unfortunately, there is nothing that can be done for the disease this late in the growing season, but it is important to check fields for signs of disease to help set harvest priorities.

Figure 1. Symptoms of Fusarium head blight in wheat. Photos by Erick DeWolf, K-State Research and Extension.

Figure 2. Close-up of symptoms of Fusarium head blight showing the orange reproductive structures of the fungus.

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Doug Shoup, Southeast Area Crops and Soils Specialist
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5. Wheat tours scheduled in north central and northwest Kansas

Several wheat tours and field days are scheduled for the next two weeks in north central and northwest Kansas. The link below is a complete listing of all locations and dates, and describes which varieties are at each location. We hope you can make one or more of the wheat tours and field days.

http://www.northwest.ksu.edu/p.aspx?tabid=96

Lucas Haag, Northwest Area Crops and Soils Specialist
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6. Wheat plot tour scheduled at North Central Experiment Field, June 3

The North Central Experiment Field Wheat Plot Tour is scheduled for Wednesday, June 3, starting at 7:30 a.m.

The field is located about two miles west of Belleville on Kansas Highway 36. Juice and rolls will be served ahead of the tour. Tour topics include:

- Wheat Varieties
- Wheat Disease Update
- Production Updates

More information is available by calling the North Central Experiment Field at 785-335-2836 or contacting Andrew Resser, Agronomist-in-Charge, at aresser@ksu.edu.

7. Northwest Research-Extension Center Spring Field Day, June 4

The Northwest Research-Extension Center in Colby will host its 2015 Spring Field Day on Thursday, June 4, with a complimentary lunch to follow.

Registration, coffee and donuts plus introductions start at 8:30 a.m. Field tours and presentations begin at 9 a.m.

- Solid stem wheat varieties for Kansas – Lucas Haag, Northwest Area Crops and Soils Specialist
- Emerging crop pests: Wheat stem sawfly and sugarcane aphid – J.P. Michaud, Agricultural Research Center-Hays entomologist
- Nitrogen management with crop sensors – Jeanne Falk-Jones, Sunflower District Agronomy
- Kochia management in wheat stubble and fallow – Curtis Thompson, Weed Management Specialist and Extension Agronomy State Leader
- Field peas for fallow replacement – Lucas Haag
- Why are some wheat varieties more drought resistant? – Rob Aiken, Northwest Research-Extension Center Agronomist
- Wheat marketing and management outlook – Dan O'Brien, Northwest Area Agricultural Economist

Lunch, compliments of several sponsors, will be served at noon, following the last presentation.

More information is available at http://www.wkarc.org or by calling 785-259-2723.

8. Southwest Research-Extension Center-Tribune Dryland Wheat Tour, June 5

The Southwest Research-Extension Center will host its 2015 Dryland Wheat Tour on Friday, June 5 at the Tribune Unit, 1474 State Highway 96 (one mile west of Tribune).

K-State Research and Extension specialists will give updates on the latest research linked to dryland wheat varieties, as well as disease and insect management.

Registration begins at 8:30 a.m. MDT, with the tour and presentations starting at 8:45 a.m.

More information is available by calling 620-376-4761.

9. Southwest Research-Extension Center-Garden City Spring Field Day, June 5

The focus is on wheat and triticale at the 2015 Spring Field Day planned for Friday, June 5 at the Southwest Research-Extension Center in Garden City.

The educational event begins with registration and introductions at 4:30 p.m. K-State Research and Extension specialists will provide the latest information on wheat varieties, plus managing diseases and insects that pose a challenge to wheat production.

A presentation on triticale forage varieties wraps up the program, which is followed by a complimentary supper.

More information about the Spring Field Day is available by calling 620-276-8286.

The 2015 Kansas Composting Operators' School will be held June 9-10 in Pottorf Hall on the Riley County Fairgrounds in Manhattan. The school is co-sponsored by K-State Research and Extension Department of Agronomy and the KDHE Bureau of Waste Management.

The School provides hands-on training in municipal, agricultural, and commercial large-scale composting for operators and managers of compost facilities who want to gain knowledge and experience in composting. The program includes classroom and laboratory instruction along with field activities at the K-State Agronomy Education-Demonstration-Research Compost Site at the Agronomy Research Farm in Manhattan.

The School is a two-day training program beginning at 8:30 a.m. and running until 5:00 p.m. the second day.

Who Should Attend?

- Composting operators, managers, staff
- Composting firms
- Consultants and technology providers
- Waste management officials
- Compost users
- Interested individuals

There is a fee for the school. Class size for the school is limited to 20 people on a first-come-first-served basis. The first 20 paid reservations will be accepted.

Online registration with a credit card is available at: https://www.eventbrite.com/e/2015-compost-school-manhattan-tickets-16859032821

For more information, contact either:

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or

Ken Powell, KDHE, 785-296-1121, kpowell@kdheks.gov

11. Comparative Vegetation Condition Report: May 12 - May 25

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:

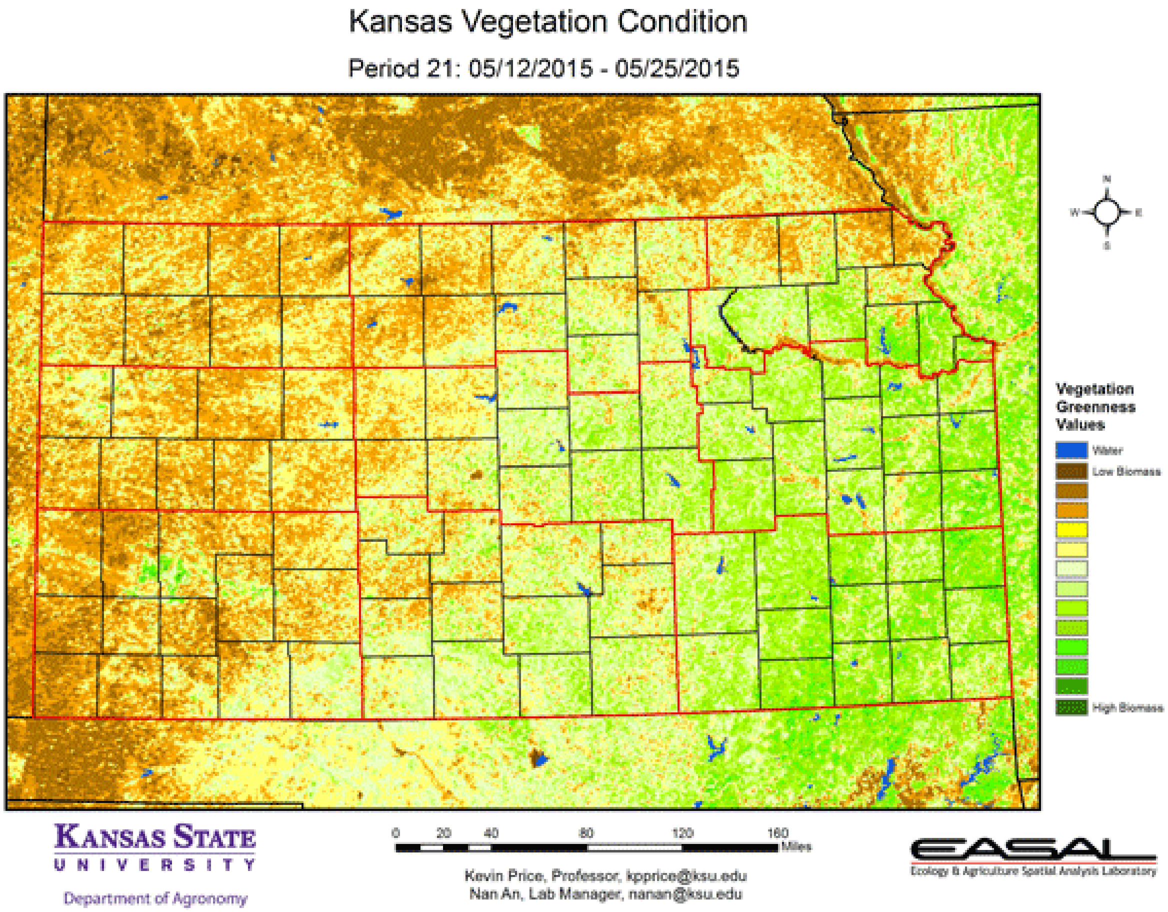

Figure 1. The Vegetation Condition Report for Kansas for May 12– 25 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that the highest NDVI values are in the eastern third of the state. Small areas of lower photosynthetic activity can be seen along the streambed of the Neosho River, where flooding has been a problem.

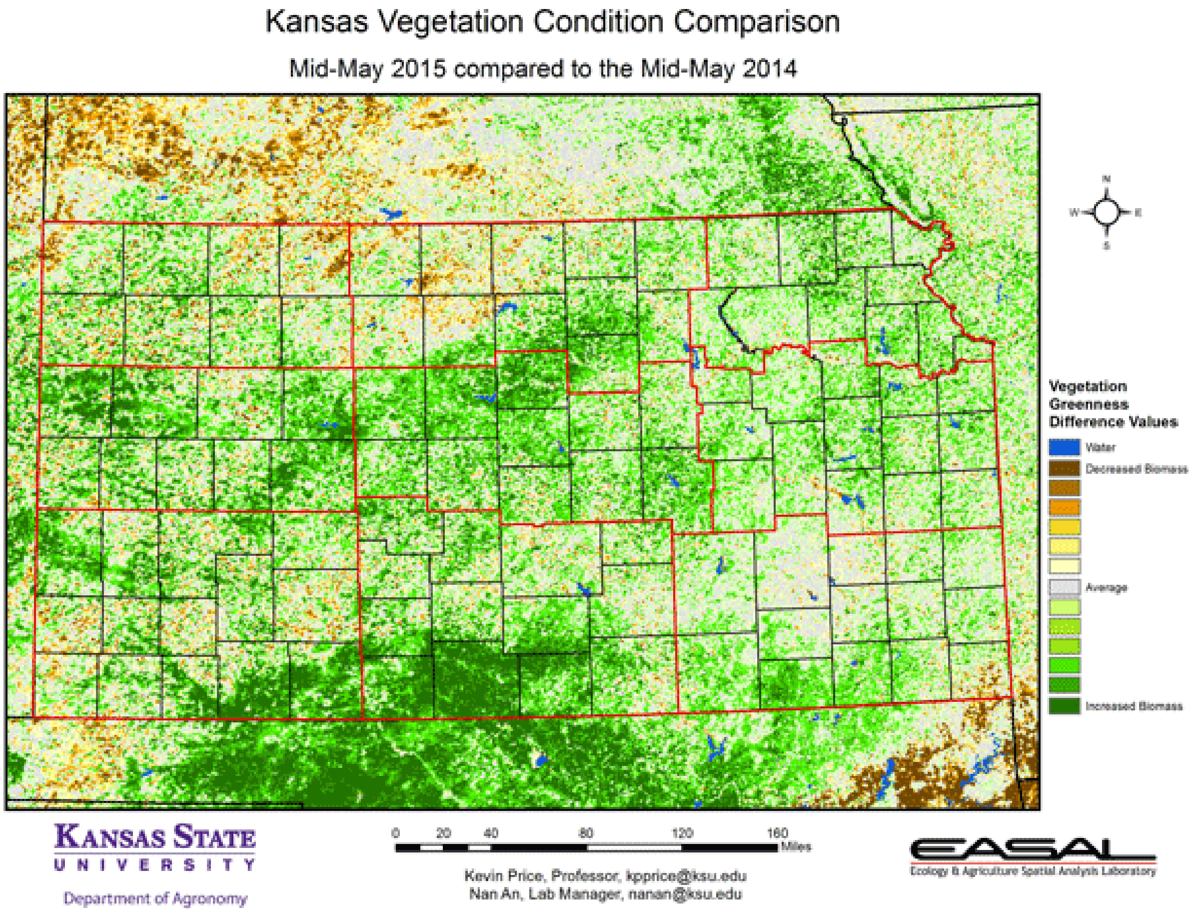

Figure 2. Compared to the previous year at this time for Kansas, the current Vegetation Condition Report for May 12– 25 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows higher biomass production for most of the state. The greatest increase in photosynthetic activity has been in the Southwest and South Central Divisions. Year-to-date precipitation is approximately one-and-a-half times normal this year compared to just a third of normal last year.

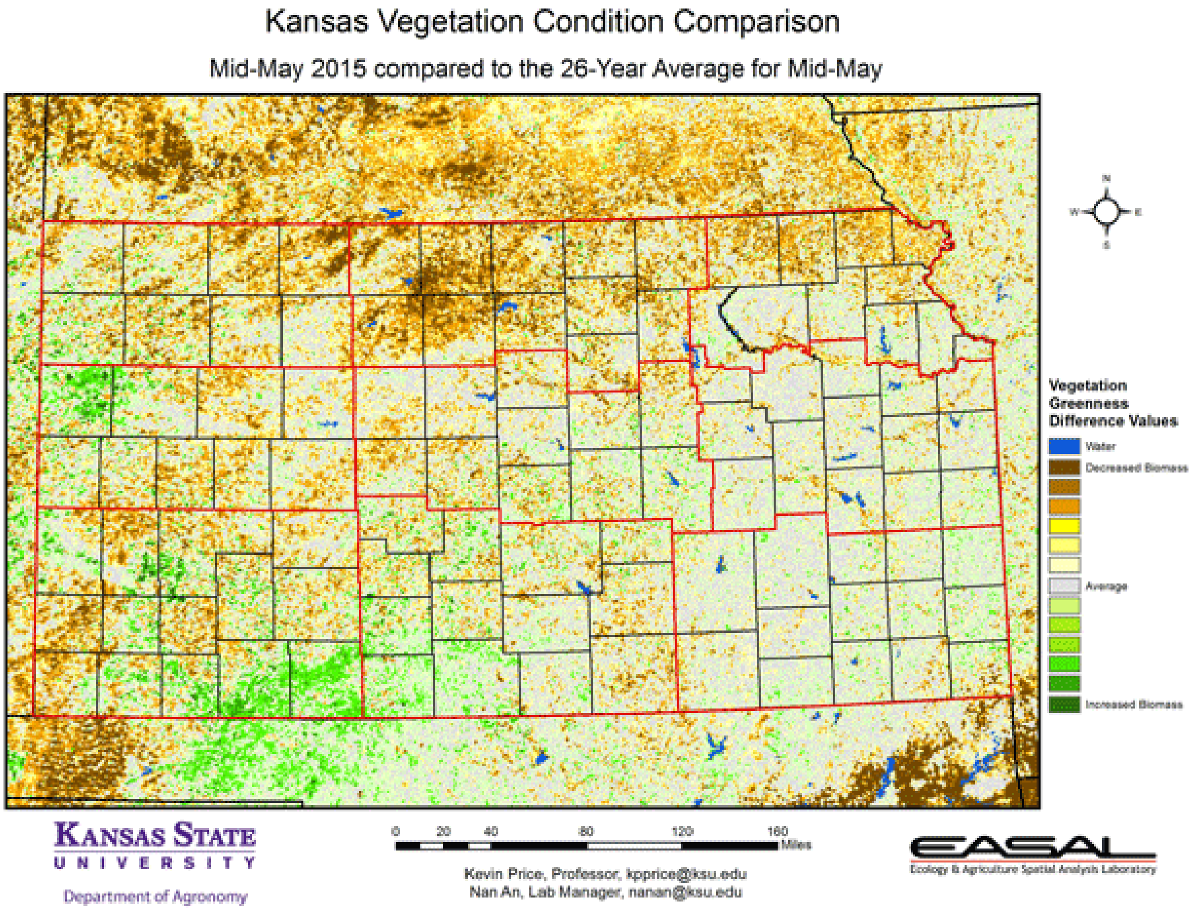

Figure 3. Compared to the 26-year average at this time for Kansas, this year's Vegetation Condition Report for May 12– 25 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that photosynthetic activity is close to average for most of the state. The largest area of below-average activity is in the North Central Division. The precipitation pattern has quickly switched from much lower-than-average to very wet. This, combined with cooler than average temperatures in May, has delayed plant development.

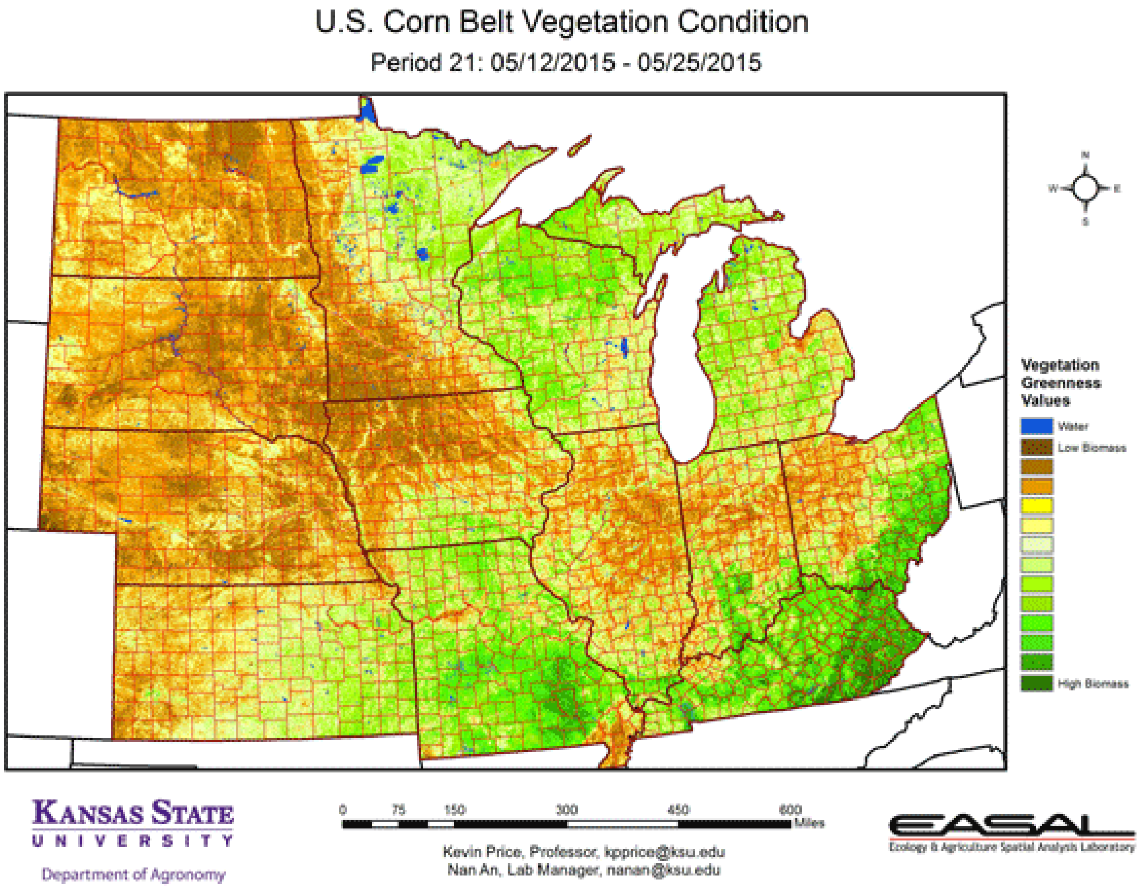

Figure 4. The Vegetation Condition Report for the Corn Belt for May 12– 25 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that the greatest NDVI values are concentrated in eastern Kentucky and eastern Ohio. Favorable moisture and temperature patterns have resulted in very active biomass production. Cold temperatures have limited development in the Northern Plains.

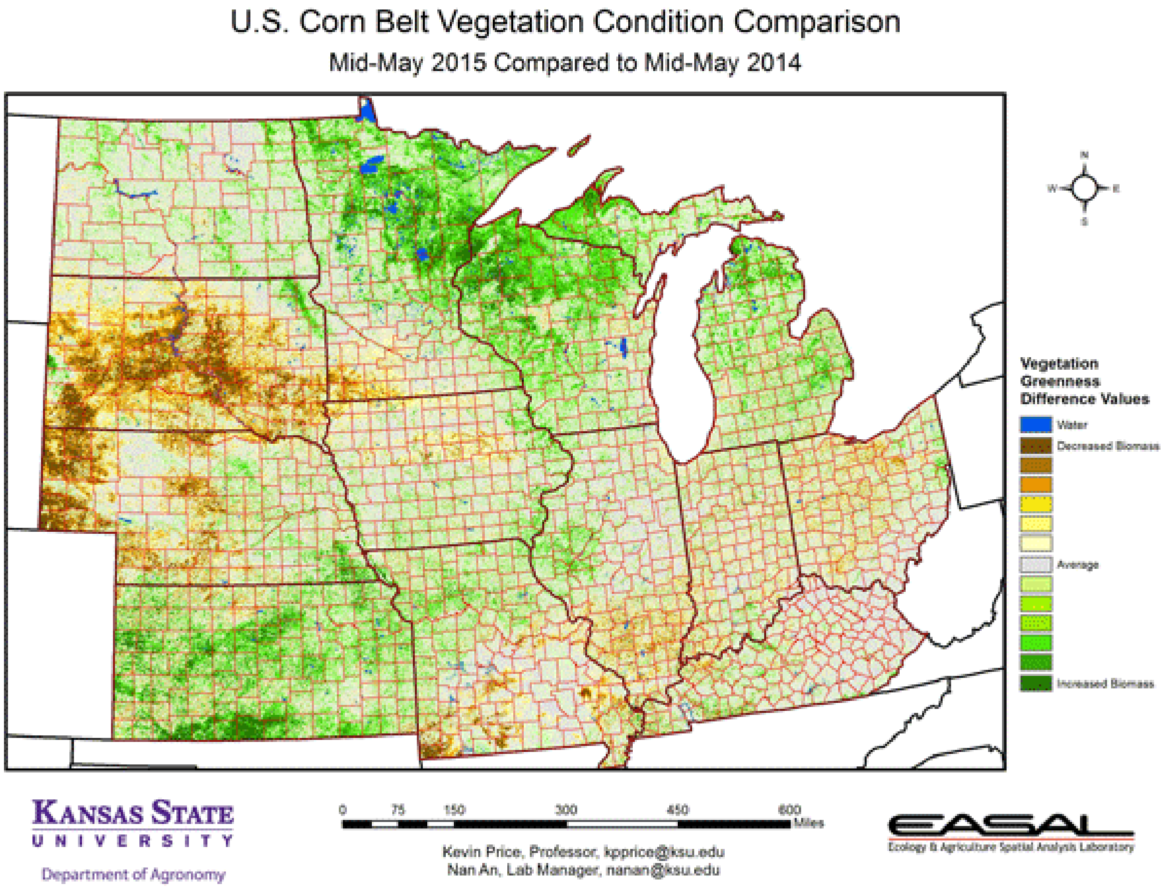

Figure 5. The comparison to last year in the Corn Belt for the period May 12– 25 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows South Dakota has the largest area of lower photosynthetic activity. Colder spring temperatures coupled with lower moisture have limited plant activity.

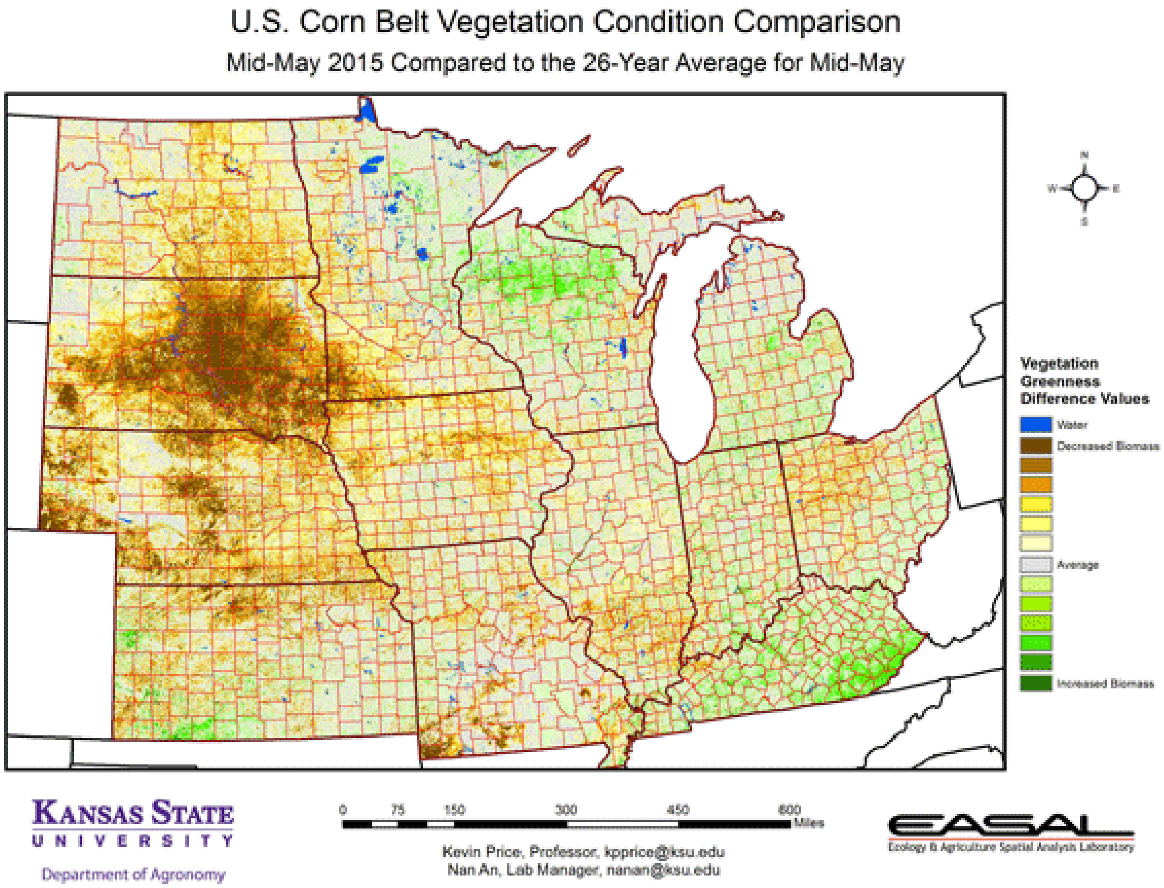

Figure 6. Compared to the 26-year average at this time for the Corn Belt, this year's Vegetation Condition Report for May 12– 25 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows South Dakota has below-average photosynthetic activity. Freezing temperatures were reported there as late as May 19th.

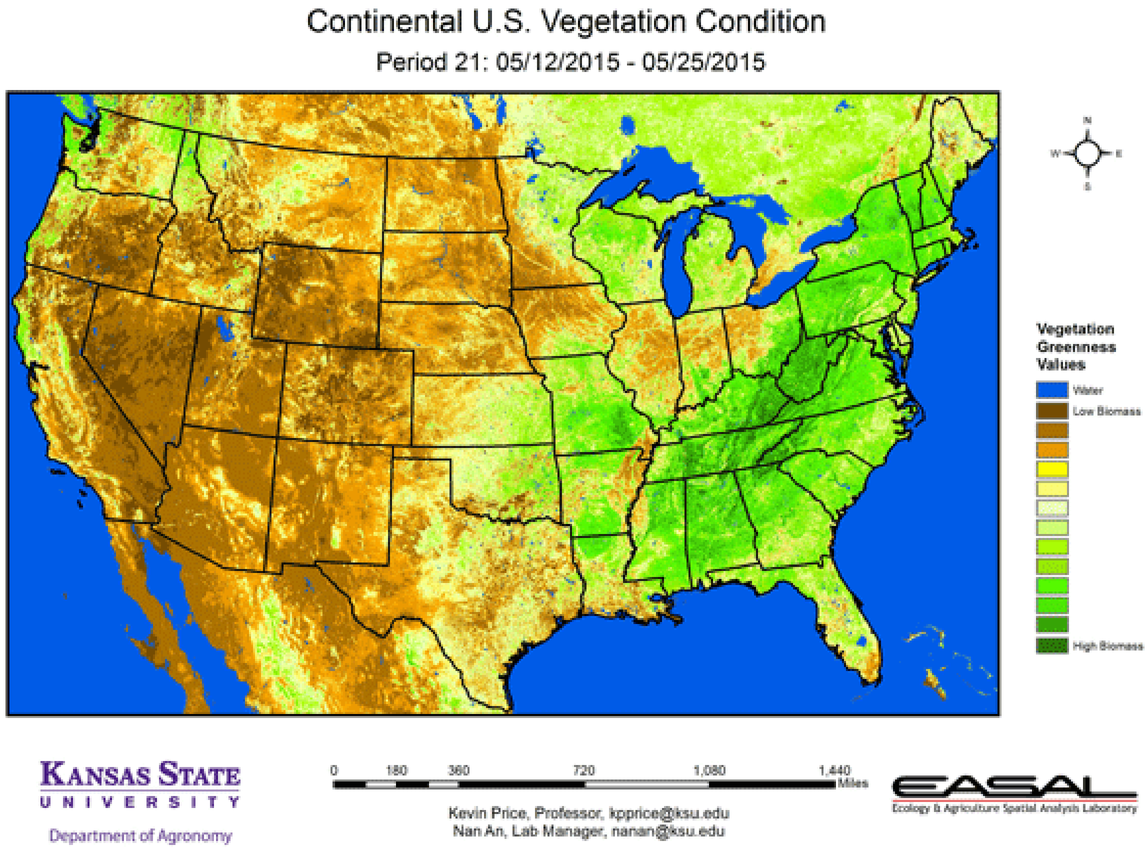

Figure 7. The Vegetation Condition Report for the U.S. for May 12– 25 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows the highest level of photosynthetic activity is in the Appalachians, where temperatures and moisture have been favorable. In Texas and Oklahoma, excessive moisture has limited plant development, particularly in east Texas. Cooler-than-average temperatures have slowed plant development in the Ohio River Valley and in the Northern Plains.

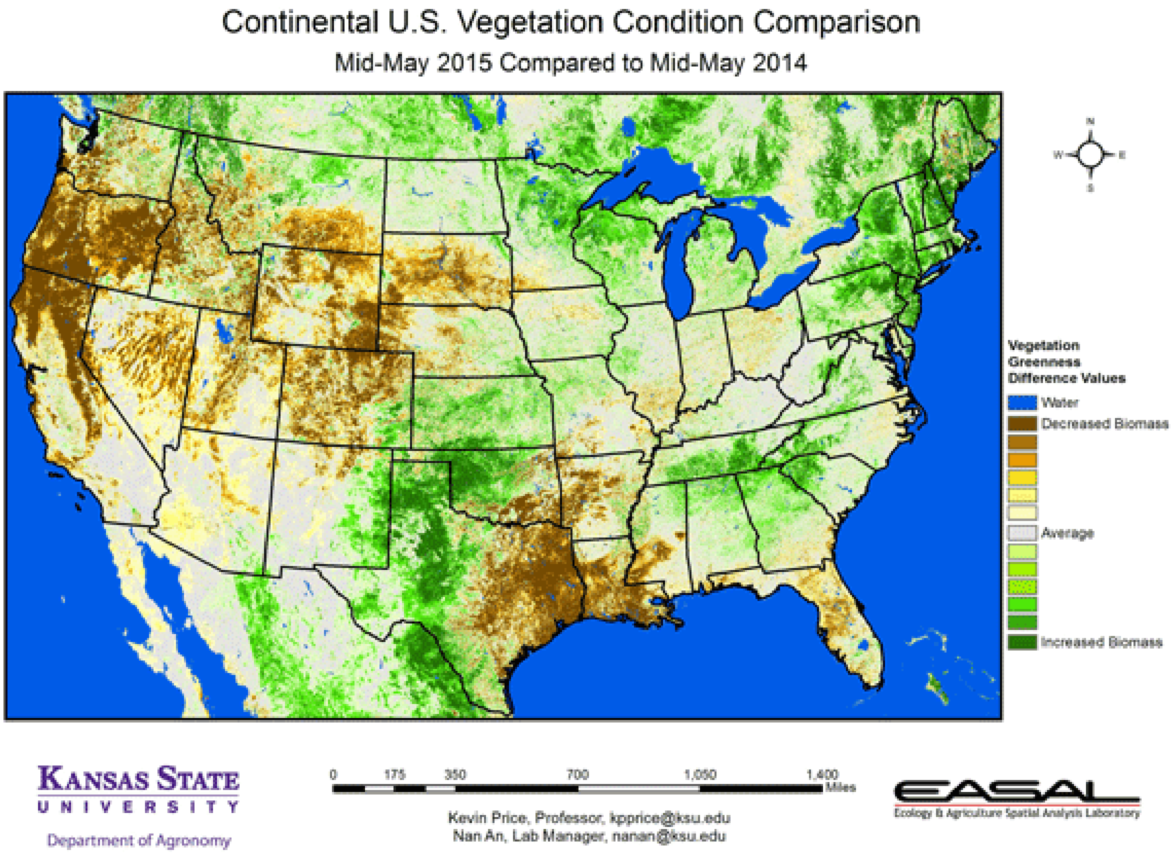

Figure 8. The U.S. comparison to last year at this time for the period May 12– 25 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows the sharpest contrast in Texas and Oklahoma. Heavy rains in these states have had a favorable impact in the western portions, where extreme drought has been persistent in recent years. In the eastern portions, the rains have been excessive. This has resulted in widespread flooding.

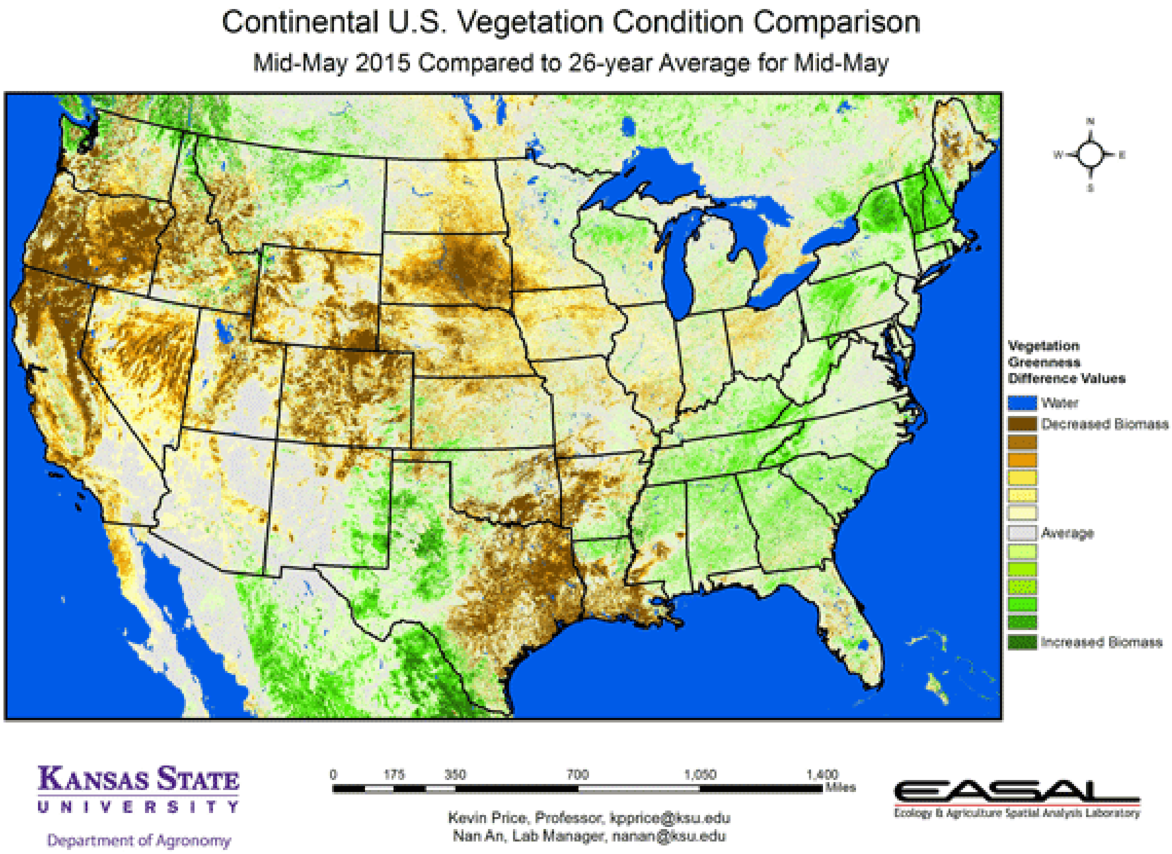

Figure 9. The U.S. comparison to the 26-year average for the period May 12– 25 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows the differences from last year are still visible. Cold conditions have limited plant development in much of Colorado, Wyoming, Nebraska, and South Dakota. Excessive moisture is the major culprit in the Southern Plains from Oklahoma to Texas and Louisiana. In contrast, drought conditions are limiting vegetative activity in northern California and Oregon.

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