



Extension Agronomy

eUpdate

09/11/2015

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. Assessing the impact of late-season hail damage on corn and soybeans

During the week of Sept. 7-11, one or more severe hailstorms went through portions of Kansas, with variable impacts on corn and soybeans. Where a hailstorm occurs this late in the growing season, the main thing producers can do is to understand the potential impact of the hail damage on yields and get an estimate of the expected yield loss.

Corn

At this point in the growing season (late reproductive stages), if a large proportion of the leaf area is lost, then the primary yield impact could be related to a reduction in kernel size (seed weight). It is also critical to determine the impact of hail on standability (potential lodging issues), stalk damage, direct damage to the ears, and defoliation of the crop canopy. As the crop gets near physiological maturity and black layer formation, any loss of leaf area will have less effect on yield than if the defoliation had occurred earlier in the season.

The estimated yield loss based on the percent of final defoliation is presented in Figure 1. If a defoliation event took place in your corn close to maturity (from dent to maturity), the yield impact from defoliation could be minimum. At those later stages, even with high levels of defoliation -- 70 to 90% -- the yield impact ranges from just 5 to 20%.

As for management options after a defoliation event, corn with hail damage could mature more quickly but it will not dry down faster than non-damaged corn. Moldy ears could appear much faster if plant tissue was wounded and openings were created due to the hail damage. Scout your fields for lodging and stalk damage, and check for the overall status of the leaf canopy.

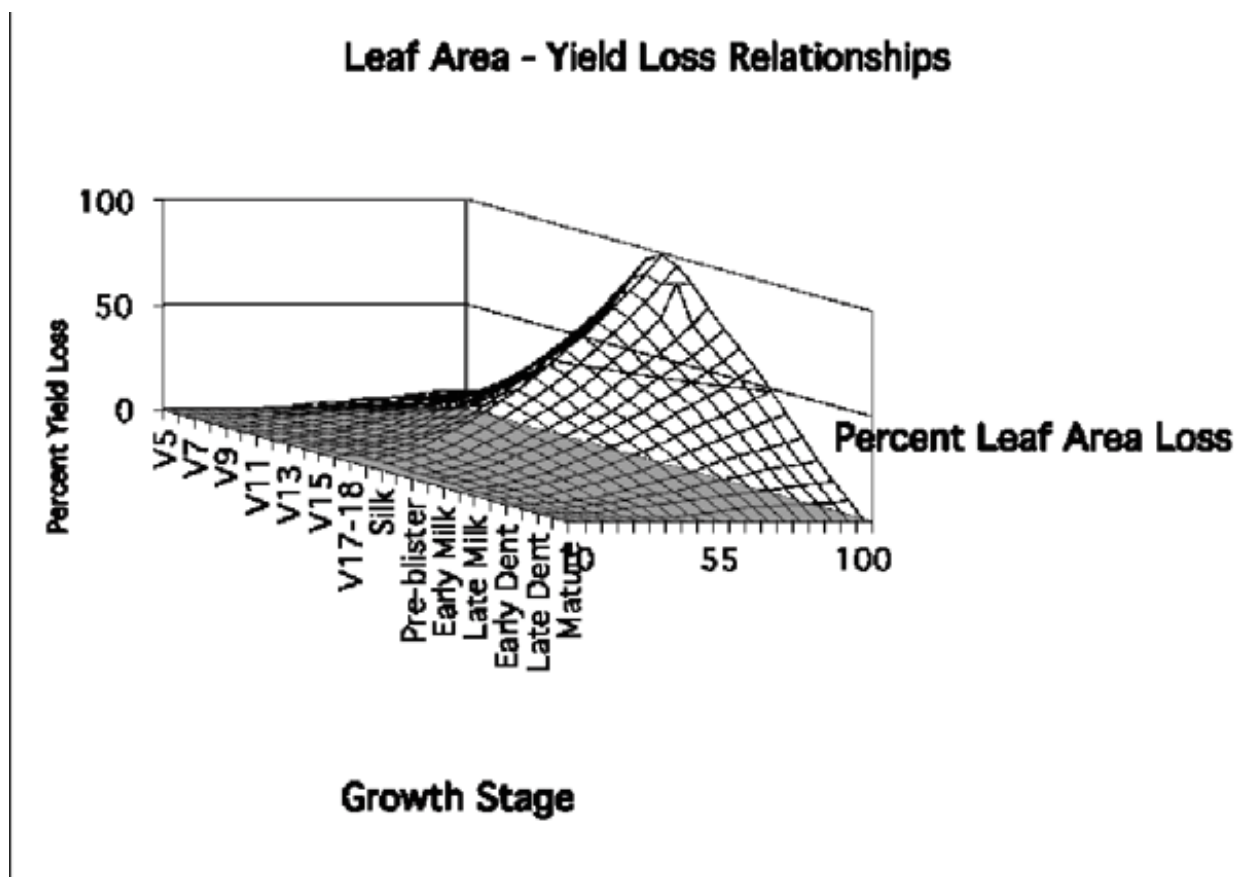
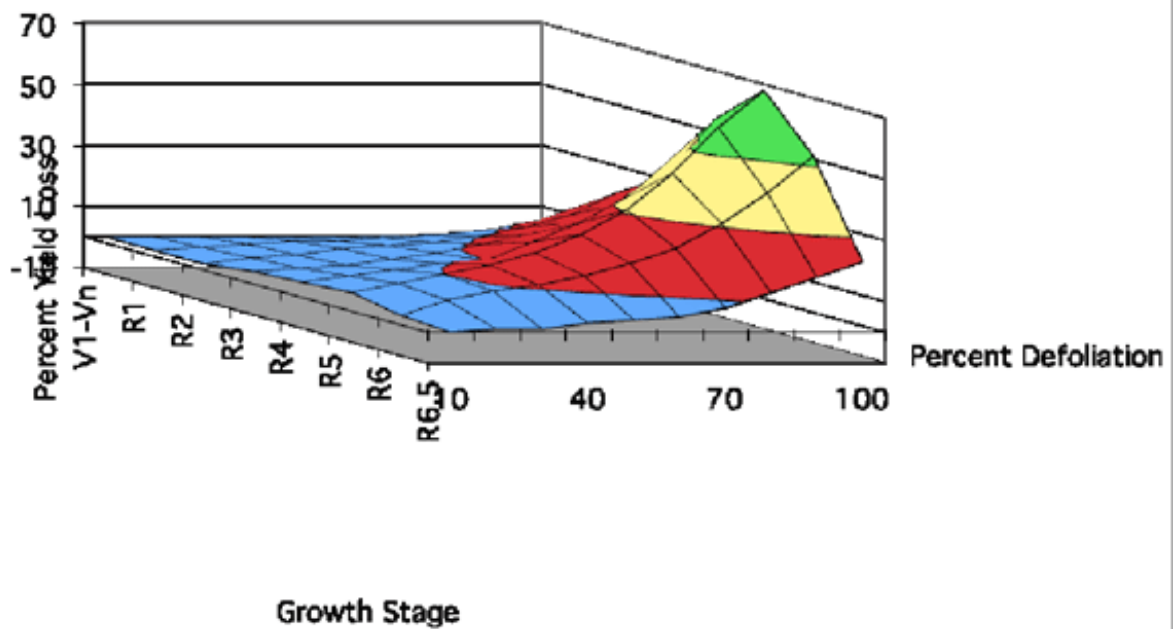


Figure 1. Graphic illustrating the relationship between estimated yield loss and percent leaf area loss at different growth stages of corn (based on data from Corn Loss Adjustment Standards Handbook, USDA-FCIC-25080, pages 7-98).

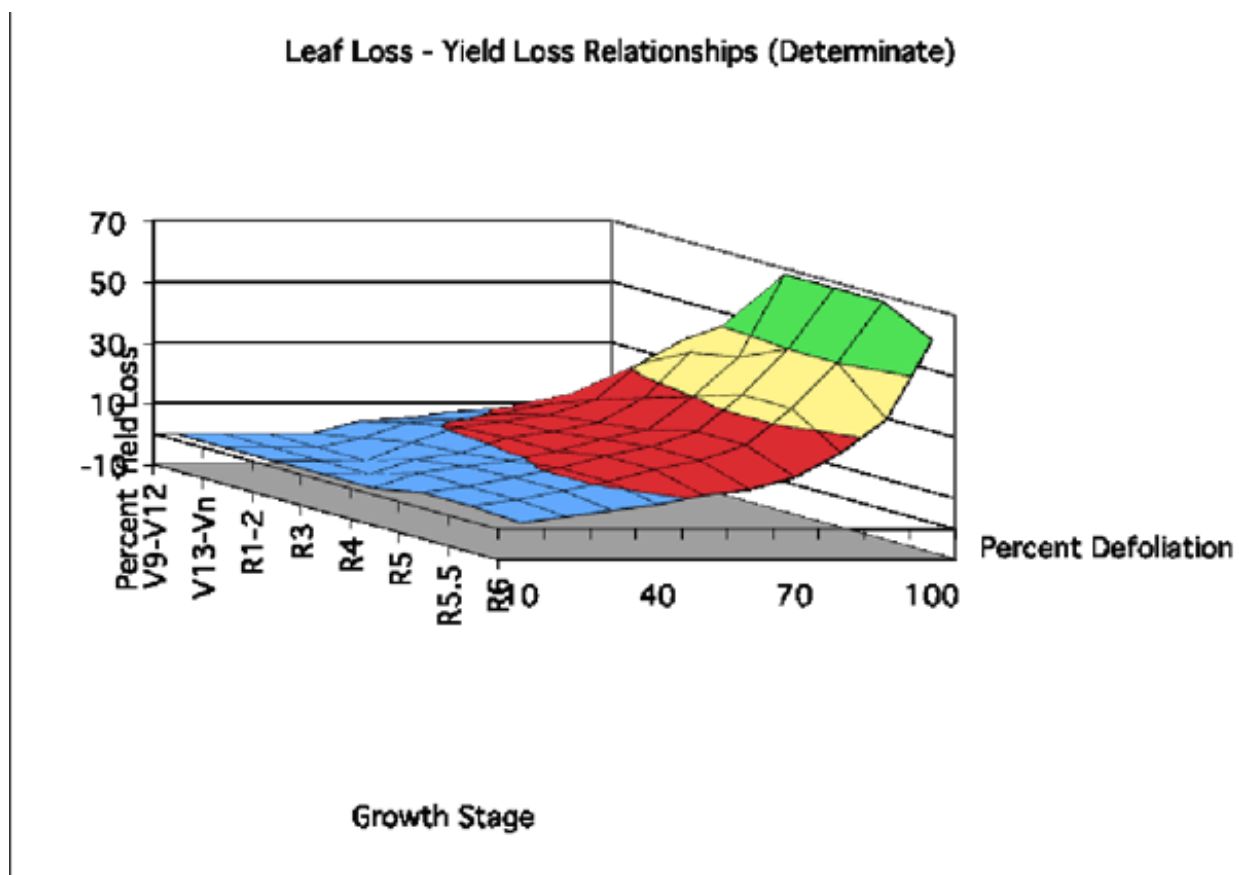
Soybeans

Most of the soybeans have set pods and are entering into the last most critical stages of seed-filling (R5-R6). For indeterminate varieties, defoliation that takes place at beginning of seed formation (R5 stage) will impact yields to a greater extent than an early hail event.

Leaf Loss - Yield Loss Relationships (Indeterminate)



For determinate soybean varieties, loss of leaf area could produce more losses than for indeterminate varieties since the reproductive stages in determinate varieties tend to be more compressed, with less opportunity to compensate if pods are damaged. Determinate varieties have 3% to 17% greater yield losses than indeterminate varieties from hail damage that occurs in the early reproductive stages (R2 to R3), depending on the extent of leaf loss. Yield losses are greatest from damage at R4 to R5.5.



Stand loss: If hail breaks the stems of plants and causes plant death in the R1 to R6 reproductive stages of growth, the remaining plants will normally have only limited ability to branch out and compensate.

Pod fill through maturity (R6.5 and later): Plants cannot compensate through either additional flowering or new branch development after R6.5. Therefore, the way to estimate yields at these stages is to make a direct seed count. Hail damage to leaves at these stages will have little or no effect on seed development or yields.

Summary

Scout your acres for late-season hail damage impact on corn and soybeans. The impacts of hail damage on yield can be known with more precision in the 6-8 days after the hail event. If defoliation occurred, the stage of crop development will largely determine the extent of the crop yield loss to be expected.

When the hail damage event takes place close to crop maturity, hail damage could have minimal impact on yields on corn, with any yield loss primarily related to the effects of leaf loss on seed weight. For soybeans, defoliation during seed-filling will have a large impact on seed weight and final yield, with the amount of the yield loss depending on the extent of the defoliation and the timing relative to the stage of the crop. Hail damage that occurs earlier during seed formation will result in a larger expected yield loss than hail damage that occurs close to the end of the seed fill.

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2. Stalk rots in grain sorghum

Stalk rot is a common problem in grain sorghum, and is already causing some lodging this year. Although stalk rot occurs in both sorghum and corn, it can be an even bigger problem in grain sorghum than in corn due to a generally thinner stalk in sorghum.



Figure 1. Sorghum lodging in 2015 caused by *Fusarium* stalk rot. Photo by Kim Larson, K-State Research and Extension.

Annual losses are difficult to determine, because unless lodging occurs, the disease goes mostly unnoticed. The best estimates are that at least 5 percent of the sorghum crop is lost each year to stalk rot. The incidence of stalk rot in individual fields may reach 90 to 100 percent with yield losses of 50

percent. The most obvious losses occur when plants lodge. More important may be the yield losses that go unnoticed.

In sorghum, these losses are caused by reduced head size, poor filling of grain, and early head lodging as plants mature early.

In grain sorghum, the two most common types of stalk rot are charcoal rot and Fusarium stalk rot. Although caused by many different organisms, the symptoms of the various stalk rots are somewhat similar.

Symptoms generally appear several weeks after pollination when the plant appears to prematurely ripen. The leaves become dry, taking on a grayish-green appearance similar to frost injury. The stalk usually dies a few weeks later. Diseased stalks can be easily crushed when squeezed between the thumb and finger and are more susceptible to lodging during wind or rainstorms. The most characteristic symptom of stalk rot is the shredding of the internal tissue in the lowest internodes of the stalk, which can be observed when the stalk is split. This shredded tissue may be tan colored (Fusarium stalk rots); red or salmon, (Fusarium and Gibberella stalk rots); or grayish-black (charcoal rot).

Summary of sorghum stalk rots		
Disease	Symptoms	Weather
Charcoal rot stalk rot	Internal shredding of lower nodes; black sclerotia attached to the vascular tissue	High soil temperatures (98 degrees F) and low soil moisture during grain fill
Fusarium stalk rot	Internal shredding of lower nodes; tan or pink-to-purple internal discoloration	Dry conditions early and warm (82-86 degrees F) wet weather 2 to 3 weeks after pollination

Charcoal rot

Hot, droughty weather with soil temperatures in the range of 90 degrees or more are ideal for the development of charcoal rot. Drought does not cause the problem, but it weakens the plants' defenses to the disease. Charcoal rot is usually less severe if drought stress is not a factor.

While it is difficult to separate the effects of charcoal rot from simple drought stress, a good rule of thumb is that plants infected with charcoal rot will die about two weeks earlier from dry weather than plants that do not have charcoal rot. Grain fill that would have occurred during this period is the amount of yield loss that can be attributed to charcoal rot.

The plants will die prematurely. When stalks are split, the typical shredded appearance in the lower stalk associated with all stalk rots will be present. Additionally, there will be a gray to black discoloration of the inner stalk caused by numerous sclerotia (small, black reproductive structures of the fungus) forming on the vascular bundles and decaying tissue.



Figure 2. Close-up of charcoal rot in grain sorghum. Photo by Doug Jardine, K-State Research and Extension.

Fusarium stalk rot

Fusarium root and stalk rot is generally found in the same areas where charcoal rot develops. The pith of Fusarium stalk rot infected plants will have a shredded appearance and is typically tan in color, but in some hybrids the pith in the lower stalk may be pink to red in color. Plants may die prematurely or lodge.

Fusarium stalk rot is favored by dry conditions early in the season, which decreases nutrient solubility, making the nutrients unavailable to the plant. Later in the season, following pollination, warm (82 to 86 degrees), wet weather can leach remaining nutrients from the soil resulting in late-season nitrogen stress and an increase in stalk rot.



Figure 3. Fusarium stalk rot in grain sorghum. Source: *Stalk Rots of Corn and Sorghum*, K-State publication L-741.

General considerations

Stalk rot is a stress-related disease. Any stress on a crop can increase both the incidence and severity of stalk rot. Research has indicated that when the carbohydrates used to fill the grain become unavailable due to nutrient shortage, drought stress, leaf damage from insects, hail, disease or reduced sunlight, the plant uses nitrogen and carbohydrate reserves stored in the stalk to complete grain fill. Where sugarcane aphids pressure was heavy this year, that will likely increase the incidence of stalk rot and producers should be prepared to harvest as soon as the grain is ready.

The loss of nitrogen and carbohydrate reserves resulting from leaf damage weakens stalk tissues and results in increased stalk rot susceptibility. Early maturing hybrids are generally more susceptible than full-season hybrids.

Other than irrigation or rain, there is little that can be done to prevent stalk rot by late summer. No hybrid has complete immunity to the stalk rotting pathogens. When choosing a hybrid, a grower should select a hybrid that is not only a high yielder, but one that has good standability and “stay-green” characteristics. This will help assure that if stalk rot does occur, losses due to lodging will be minimal. A balanced nutrition program based on soil tests should be used. Overall fertility levels should be adjusted to fit the hybrid, plant population, soil type, environmental conditions and management program. An excess as well as a shortage of nitrogen can lead to increased stalk rot problems.

Producers can check their sorghum for stalk rots by squeezing the lower stem with their thumb and fingers. If the stalks crush easily, they are probably infected with one of the stalk rot organisms and may lodge at any time. Check 100 plants across the field to determine the percent of affected plants. If the percentage of stalk-rot-infected plants is high, sorghum should be harvested as soon as possible, even if it hasn’t dried down adequately in the field. If the stalks are firm, the plants will probably be able to stand just fine in the field for several more weeks if necessary.

Rotation with non-susceptible crops, such as small grains and alfalfa will reduce the severity of stalk rot but will not eliminate it. A good insect control program is a must in limiting losses to stalk rot. In addition to the effect of leaf damage on stalk integrity, pathogens may enter stalks or roots through wounds created by insects. Hail damage will generally increase the amount of stalk rot damage.

For more information, see “Stalk Rots of Corn and Sorghum,” K-State publication L-741, at:
<http://www.ksre.ksu.edu/bookstore/pubs/L741.pdf>

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3. Bur ragweed control with early fall treatments

With improved moisture conditions in parts of Kansas this year, this is a good time to treat fields for perennial broadleaf weeds such as bur ragweed, bindweed, and Canada thistle.

Bur ragweed (also called woollyleaf bursage) is a perennial broadleaf weed, and is classified as a noxious weed in Kansas. It is a significant problem on nearly 94,000 acres in the western half of the state. It is adapted to low areas where water runoff collects in cultivated fields or in noncropland areas. Its ability to extract and store water and its deep perennial root system, which can reach a depth of 15 feet, allow bur ragweed to survive extended periods of drought or harsh weather. These circumstances make it very difficult to control.



Figure 1. Bur ragweed. Photo courtesy of Curtis Thompson, K-State Research and Extension.

Woollyleaf Bursage Distribution in Kansas

2013 summary 93829 down from 2011 of 103797

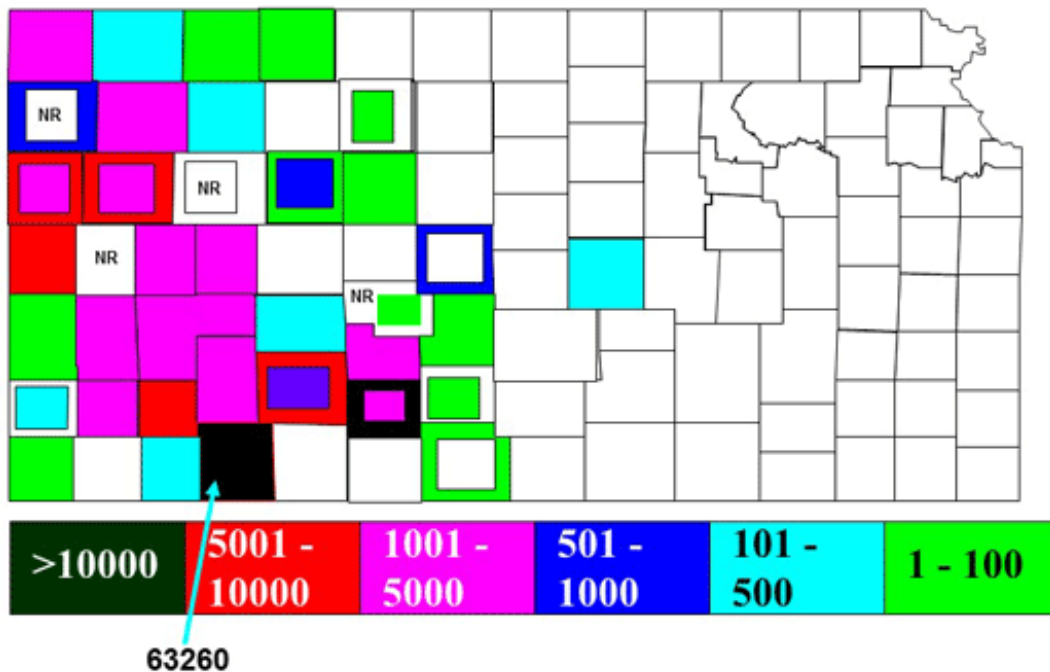


Figure 2. Distribution of bur ragweed in Kansas.

Bur ragweed is extremely competitive with crops, and can reduce grain yield by 100 percent in dry years. Even with irrigation, losses of 40 to 75 percent are common. Bur ragweed is more competitive with summer crops than with winter wheat because bur ragweed growth is minimal during much of the winter wheat life cycle. However, in dry years, bur ragweed will deplete soil moisture for fall-planted wheat and thereby reduce grain yield significantly.

Flower development begins in late July or early August. Seed contributes to the spread of bur ragweed and likely is a source of new infestations. New plants also arise from the vegetative buds, which develop on the root stocks, thus contributing to the spread of bur ragweed. Tillage also can redistribute vegetative buds, aiding the spread of bur ragweed.

Bur ragweed control is best when treated in late summer or fall, prior to a killing frost with Tordon tank mixed with dicamba or 2,4-D ester. Complete control of bur ragweed with a single treatment is unlikely. Control will not be as effective if the bur ragweed plants are under stress at the time of treatment. Bur ragweed is a difficult weed to control, and a single treatment application will usually not be sufficient. A fall treatment with the herbicides mentioned above followed by glyphosate treatments in glyphosate-tolerant crops during the growing season can help manage bur ragweed long-term. However, spring crops may be injured severely from fall applications of Tordon. Wheat has the most tolerance and can be planted 45 days following a ½ pint of Tordon 22K application.

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Apply each herbicide or herbicide mixture according to directions, warnings, and precautions on the product label(s).

Control of Bur Ragweed in Western Kansas with mid-September Treatments		
Treatment	Rate (lbs/acre)	% Control 11 months after treatment (2-year average)
Tordon + Banvel	0.25 + 0.5	82
Tordon + 2,4-D LVE	0.25 + 1	74
Roundup + Banvel	1.5 + 0.5	16
Roundup + 2,4-D LVE	1.5 + 1	27

Source: Woollyleaf Bursage Biology and Control, MF-2239 <http://www.ksre.ksu.edu/bookstore/pubs/MF2239.pdf>

For more information, see *2015 Chemical Weed Control for Field Crops, Rangeland, Pastures, and Noncropland*, K-State publication SRP-1117, <http://www.ksre.ksu.edu/bookstore/pubs/srp1117.pdf> or *Woollyleaf Bursage Biology and Control*, K-State publication MF-22239, at: <http://www.ksre.ksu.edu/bookstore/pubs/MF2239.pdf>

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4. Agronomy Field Day to feature sorghum production research, Oct. 9

Exciting advances in sorghum research will be featured at the 2015 Agronomy Field Day on October 9 at the Agronomy North Farm, 2200 Kimball Ave. in Manhattan. Topics will range from increases in yield potential to the sugarcane aphid, cover crops, and more.

Higher yield potential remains the No. 1 priority for producers, and it's the top priority for K-State sorghum breeders as well. In theory, grain sorghum should yield just as much as corn in Kansas, given the same amount of fertilizer and with substantially less water, according to Tesfaye Tesso, K-State sorghum breeder in Manhattan and one of the featured speakers at the field day.

In practice, this has not yet happened consistently. New experimental lines in advanced testing at K-State are about to change that, however, Tesso said. These advancements are thanks in large part to funding from the Kansas Grain Sorghum Commission.

"Sorghum has high yield potential, much higher than what we're getting now. We know that," Tesso said. "We have been working to find new compatible parental lines that will be able to produce hybrids that can come closer to realizing sorghum's yield potential. At the same time, we need to make sure any new line has an acceptable maturity range, good standability, drought tolerance, good head exertion, and other necessary agronomic traits."

Tesso will talk about the most recent results of this research into higher-yielding sorghum lines at the field day.

The full list of topics and K-State speakers:

- Sorghum genetics and breeding – Tesfaye Tesso, Sorghum Breeder, and Geoffrey Morris, Sorghum Geneticist
- Inzen sorghum, a tool for postemergence grass control in sorghum– Curtis Thompson, Weed Management Specialist
- Heat and water stress sorghum physiology – Vara Prasad and Krishna Jagadish, Crop Physiologists
- Sorghum in Kansas cropping systems – Ignacio Ciampitti, Crop Production Specialist
- Sorghum response to cover crops in no-till systems – Kraig Roozeboom, Cropping Systems Agronomist
- Update on sugarcane aphid in Kansas – Brian McCornack, Entomologist

The field day will begin with registration at 9 a.m. and wrap up at 1 p.m. Sessions include two concurrent one-hour tours in the morning, starting at 9:30, followed by a poster session during and after lunch.

In addition, there will be displays from commercial companies and K-State researchers in the shed near the registration area, along with the crop garden, forage garden, and weed garden for browsing. Extension specialists will be available to answer questions.

There is no charge to attend, and a complimentary lunch will be available. Preregistration is requested by October 6 so that a lunch count can be made. Those interested in attending can preregister by calling Troy Lynn Eckart at 785-532-5776. To preregister online, see:

<https://kstateagron2015.eventbrite.com>

On-site registration will also be available.

For more information, interested persons can contact Dorivar Ruiz Diaz at 785-532-6183 or ruizdiaz@ksu.edu

Research and new technologies for sorghum production



*Agronomy
Field Day 2015
Agronomy North Farm, Manhattan
Friday, October 9
9:00 a.m.- 1:00 pm*

KANSAS STATE
UNIVERSITY

Department of Agronomy

5. Comparative Vegetation Condition Report: August 25 - September 7

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 36: 08/25/2015 - 09/07/2015

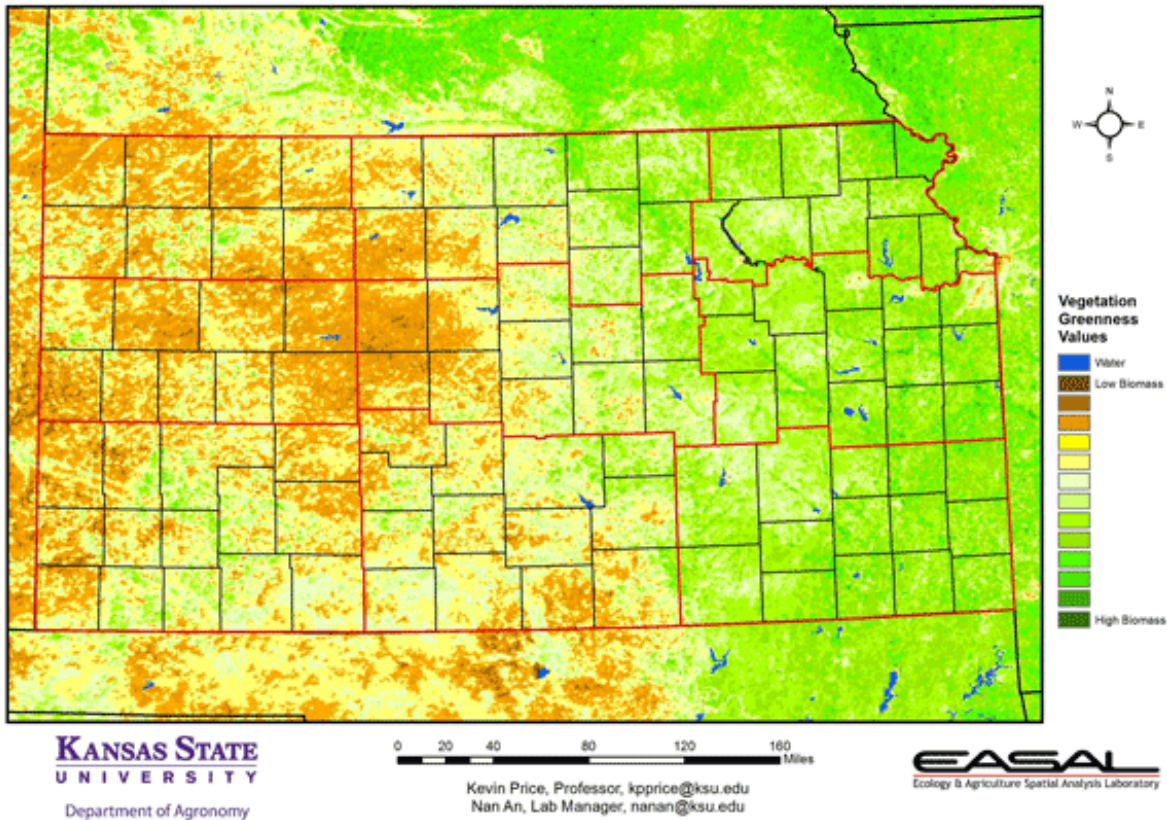


Figure 1. The Vegetation Condition Report for Kansas for August 25 – September 7 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that the highest biomass production is, as typical, in eastern Kansas. There is an area of increased photosynthetic activity in southwest Kansas, where rainfall continues to be higher than average. The highest NDVI values continue to be in Brown and Doniphan counties along the Missouri River Valley. Favorable soil moisture and moderate temperatures resulted in increased biomass production in these areas. Lower NDVI values are visible in Trego, Ellis, Rush, and Ness counties, where warmer temperatures have prevailed in the last two weeks.

Kansas Vegetation Condition Comparison

Late-Aug/Early-Sept 2015 compared to the Late-Aug/Early-Sept 2014

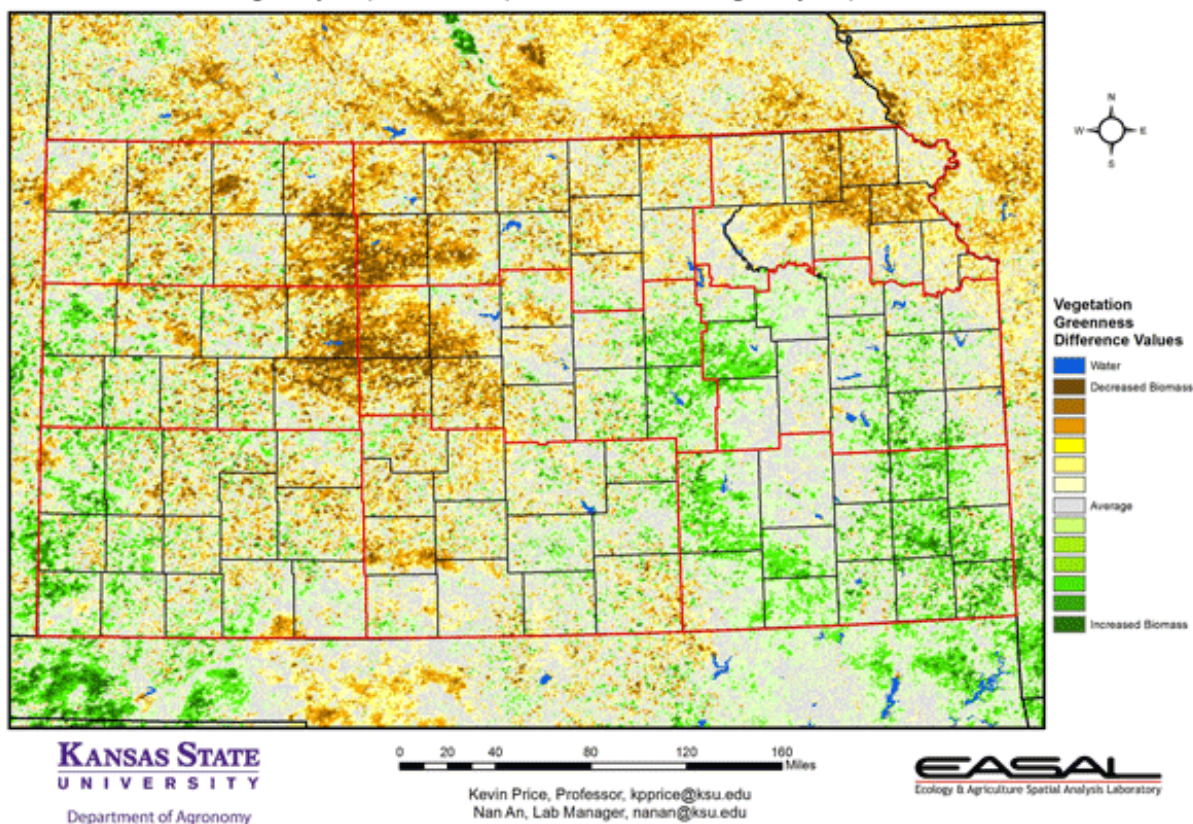


Figure 2. Compared to the previous year at this time for Kansas, the current Vegetation Condition Report for August 25 – September 7 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows parts of central and south central Kansas have lower photosynthetic activity. These areas continue to miss out on the storm systems and abnormally dry conditions persist. In contrast, the East Central Division has seen more favorable conditions this year. Moderate temperatures and favorable moisture have resulted in higher photosynthetic activity.

Kansas Vegetation Condition Comparison

Late-Aug/Early-Sept 2015 compared to the 26-Year Average for Late-Aug/Early-Sept

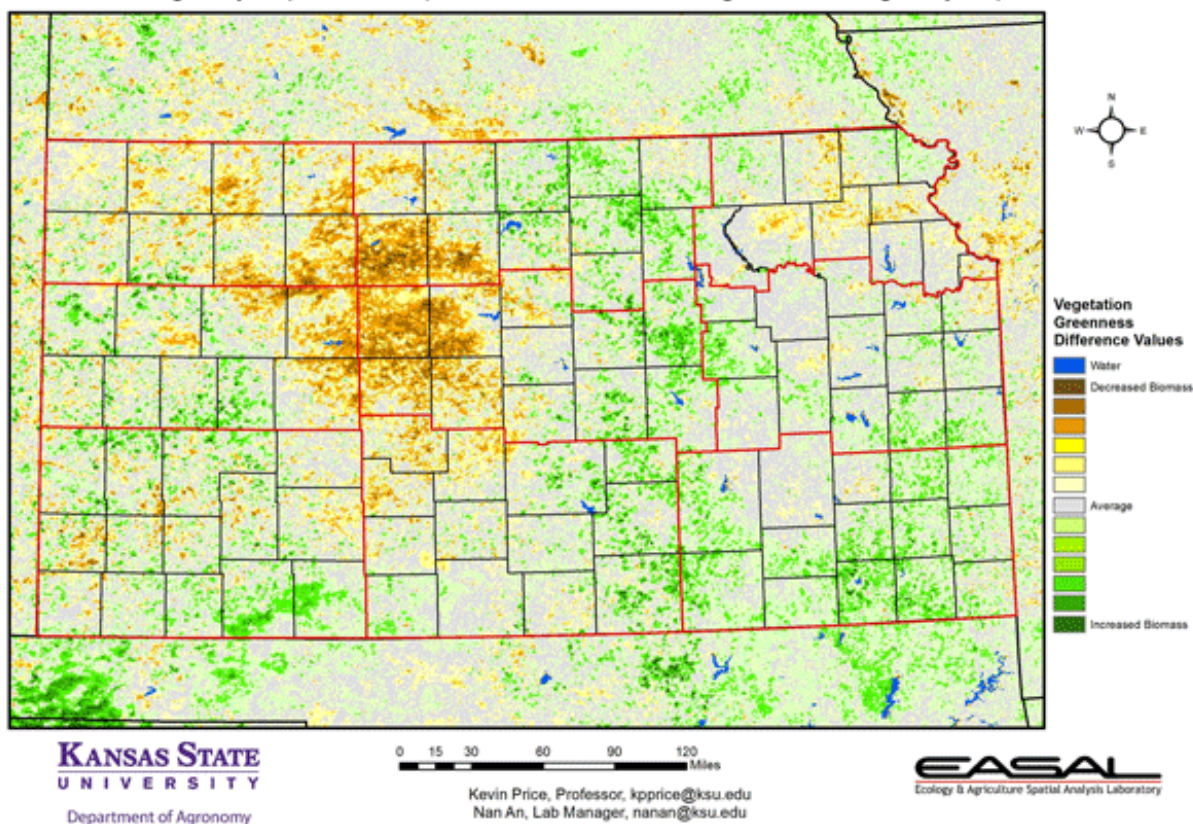


Figure 3. Compared to the 26-year average at this time for Kansas, this year's Vegetation Condition Report for August 25 – September 7 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that most of the state has at or above-average photosynthetic activity. Much-below-average photosynthetic activity is concentrated in Ellis and Ness counties. These areas continue to miss most of the storm systems and remain in abnormally dry conditions.

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U.S. Corn Belt Vegetation Condition

Period 36: 08/25/2015 - 09/07/2015

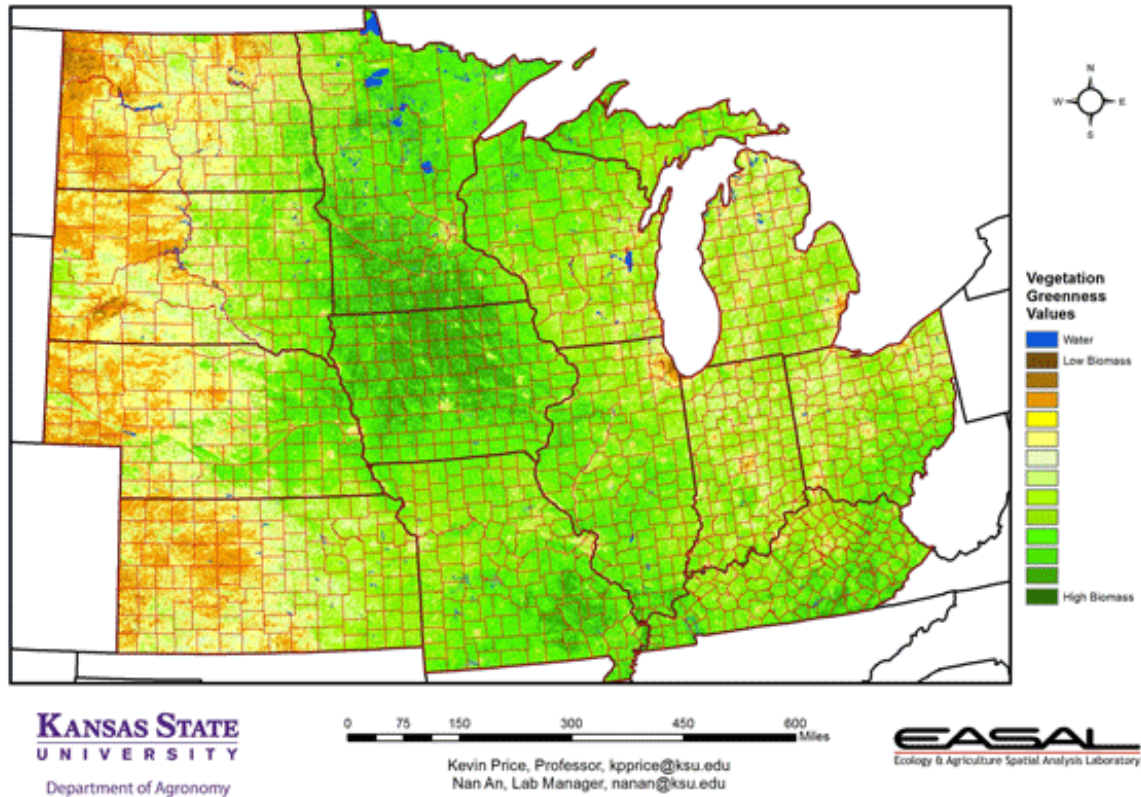


Figure 4. The Vegetation Condition Report for the Corn Belt for August 25 – September 7 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that the greatest level of photosynthetic activity is concentrated from Iowa and southern Minnesota into Illinois. Favorable moisture conditions have resulted in high photosynthetic activity. In Iowa, corn conditions have dropped to 79 percent good to excellent with reports of some disease pressure.

U.S. Corn Belt Vegetation Condition Comparison
Late-Aug/Early-Sept 2015 Compared to Late-Aug/Early-Sept 2014

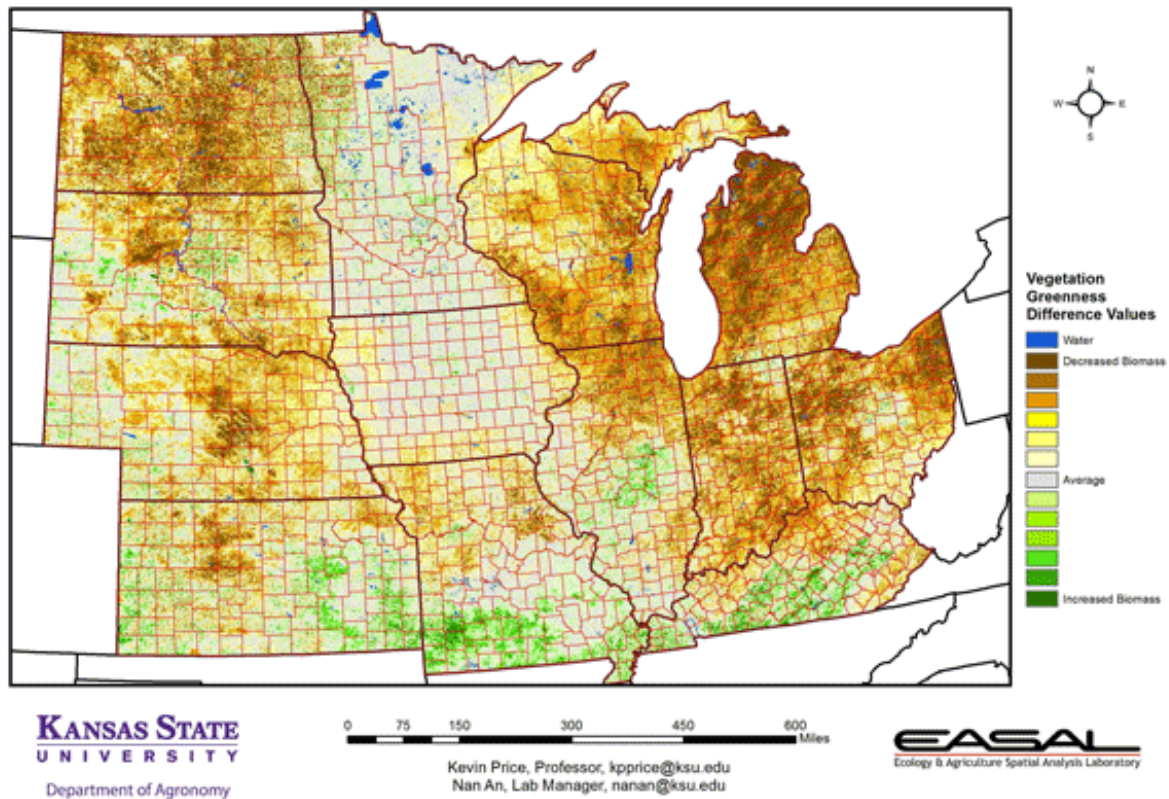


Figure 5. The comparison to last year in the Corn Belt for the period for August 25 – September 7 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows lower photosynthetic activity along the western and eastern portions of the region. The greatest decrease is in Michigan. Despite recent cool weather, both corn and soybean development is ahead of last year.

U.S. Corn Belt Vegetation Condition Comparison
Late-Aug/Early-Sept 2015 Compared to the 26-Year Average for Late-Aug/Early-Sept

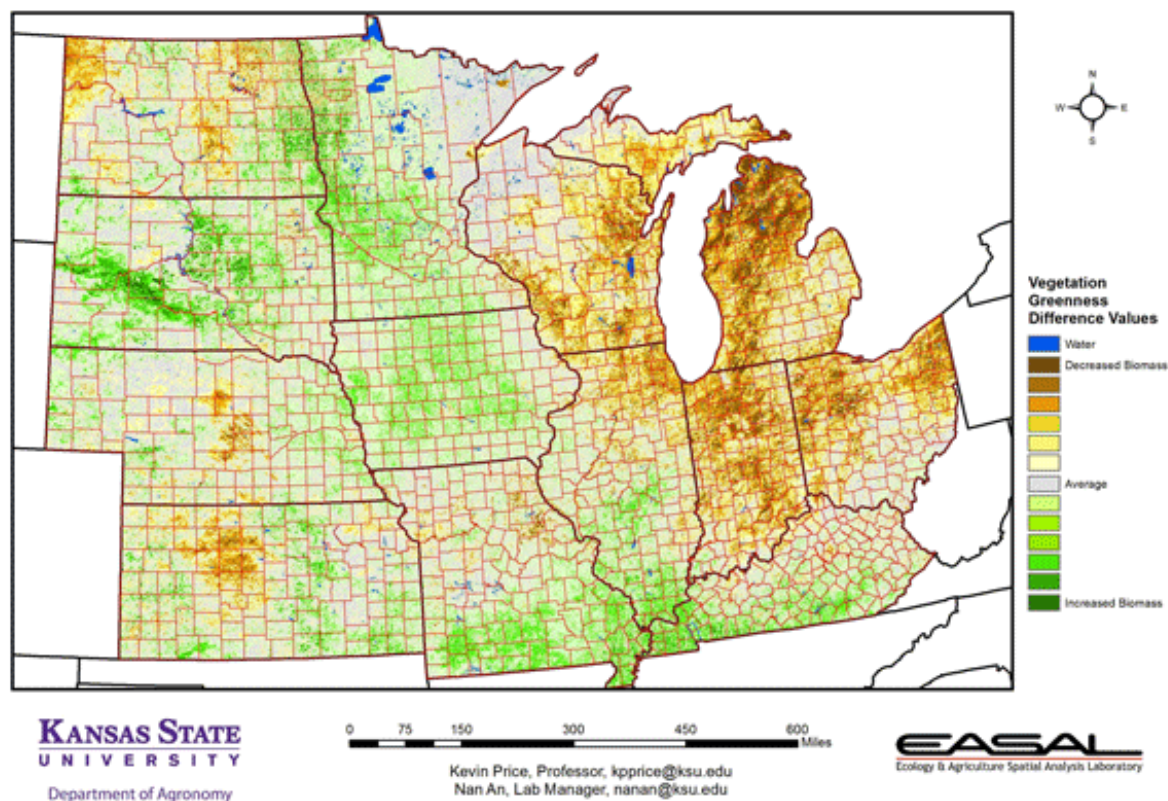


Figure 6. Compared to the 26-year average at this time for the Corn Belt, this year's Vegetation Condition Report for August 25 – September 7 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows most of the region has average biomass production. Eastern Wisconsin and western Michigan stand out with lower NDVI values, although crop conditions are rated favorably. Crop development is ahead of average in these regions.

Continental U.S. Vegetation Condition

Period 36: 08/25/2015 - 09/07/2015

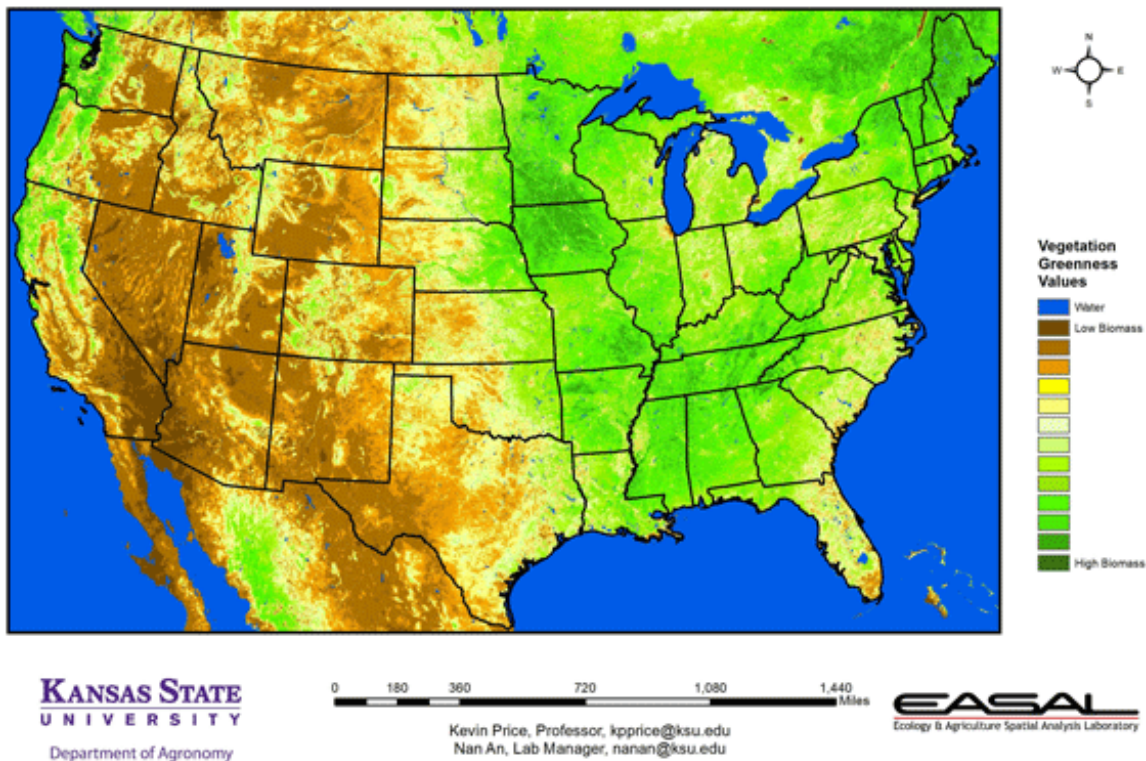


Figure 7. The Vegetation Condition Report for the U.S for August 25 – September 7 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that the highest photosynthetic activity is centered in the Upper Midwest. Lower NDVI values are noticeable in the Southeastern U.S., particularly in Georgia and South Carolina and the tip of Florida, where drought conditions continue to intensify. Rains from the recent tropical systems were less productive than anticipated. Low NDVI values are also notable along the western Cascade Mountains in Oregon, where drought and wildfires continue to affect vegetation.

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

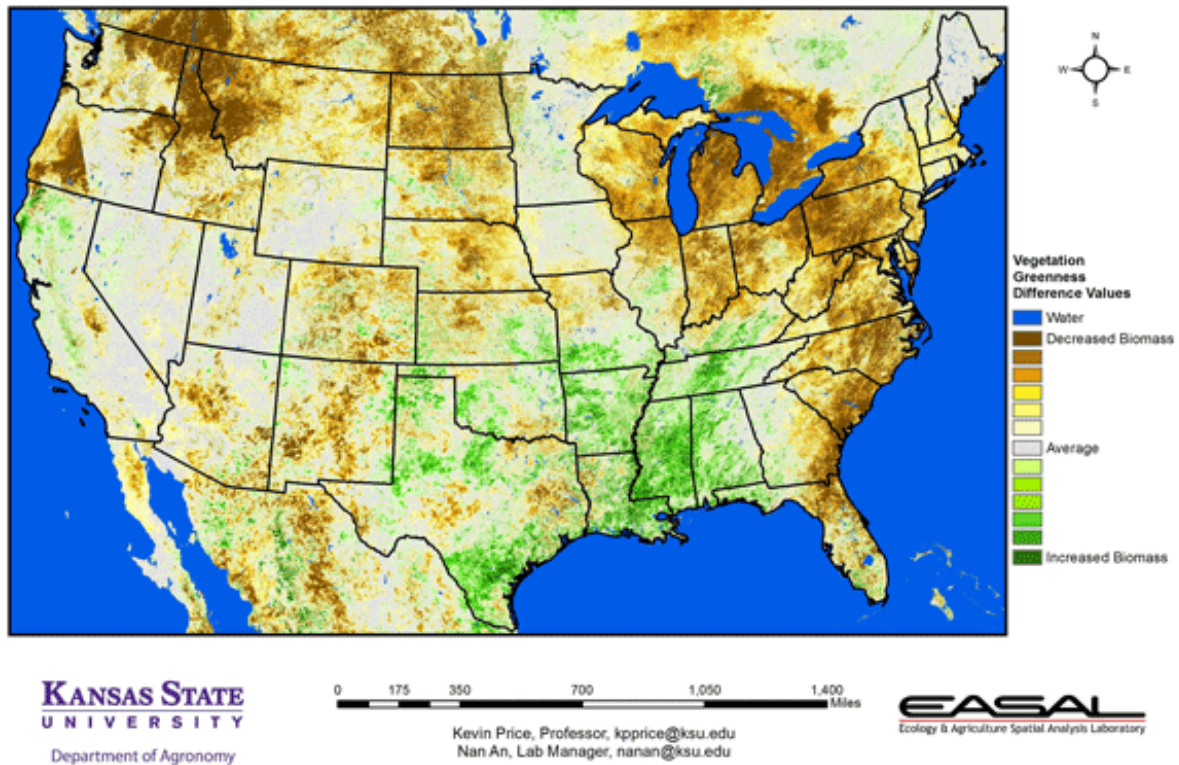


Figure 8. The U.S. comparison to last year at this time for the period August 25 – September 7 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that lower NDVI values are most evident from the Great Lakes down along the East Coast. In the West Coast region, lower NDVI values are visible in Northern California into northern Idaho and western Montana. Decreased photosynthetic activity is also evident in western Montana, as extreme drought expands in the area.

Continental U.S. Vegetation Condition Comparison
Late-Aug/Early-Sept 2015 Compared to 26-year Average for Late-Aug/Early-Sept

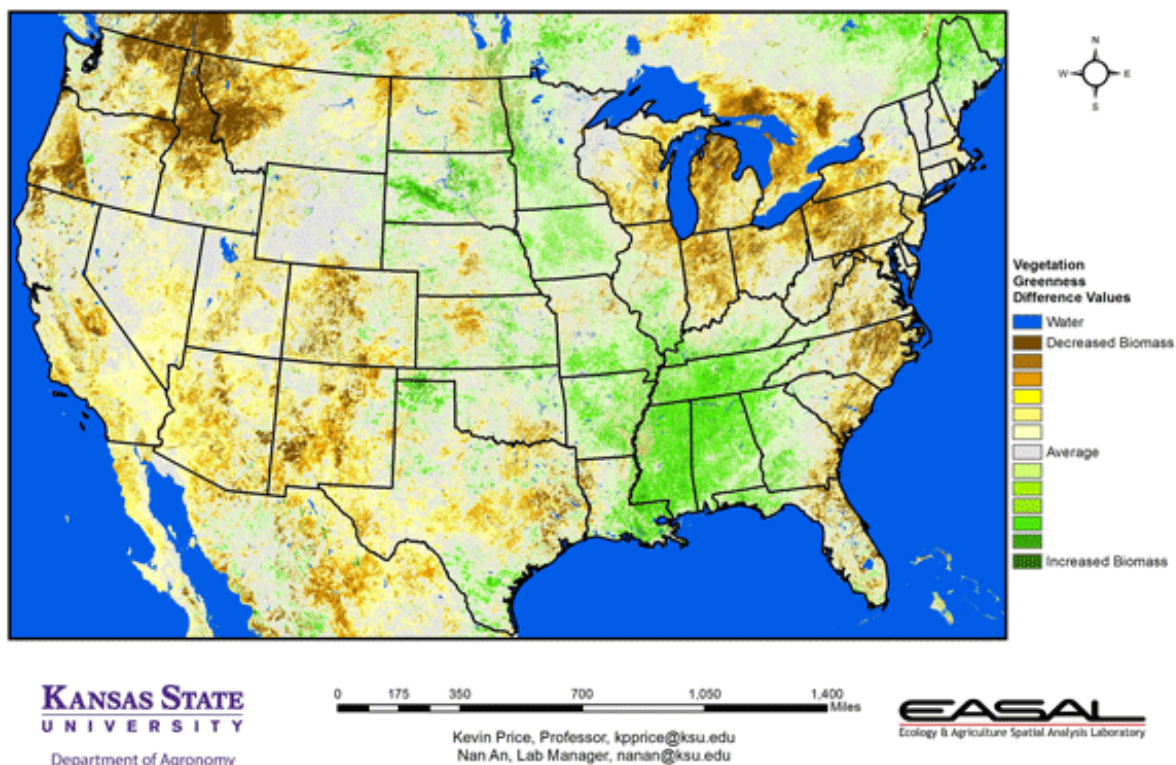


Figure 9. The U.S. comparison to the 26-year average for the period August 25 – September 7 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that the West continues to have lower-than-normal photosynthetic activity, while the greatest increase in NDVI values is in Mississippi and Alabama. There is also an area of below-average NDVI values along the lower Great Lakes to Upstate New York into New England. This marks an area of expanding moisture stress.