



Extension Agronomy

eUpdate

10/16/2015

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.

1. Considerations when planting wheat into dry soils.....	3
2. Timing of cheatgrass herbicides on wheat.....	6
3. Late-season purpling in sorghum.....	7
4. Mini-video: Apparent sugarcane aphid resistance in experimental sorghum lines.....	10
5.....	11
6. Comparative Vegetation Condition Report: September 29 - October 12.....	14

1. Considerations when planting wheat into dry soils

The full soil profile observed early this summer due to abundant rainfall has become steadily drier through the late summer and early fall. Topsoil conditions are now very dry in many areas of Kansas, which leaves producers with basically three main options for wheat yet to be planted:

“Dust in” the wheat

Producers can choose to “dust in” the wheat at the normal seeding depth and normal planting date, and hope for rain. Some farmers may consider planting it shallower than normal, but this could increase the potential for winterkill or freeze damage. Planting the wheat crop at the normal depth and hoping for rain is probably the best option where soils are very dry. The seed will remain viable in the soil until it gets enough moisture.



Figure 1. Wheat dusted in near Belleville in October 2015. Photo by Romulo Lollato, K-State Research and Extension.

Before planting, producers should look at the long-term forecast and try to estimate how long the dry conditions will persist. If it looks like there's a good chance the dry weather will continue until at least the back end of the optimum range of planting dates, producers should treat the fields as if they were planting later than the optimum time. Rather than cutting back on seeding rates and fertilizer to save money on a lost cause, producers should increase seeding rates, consider using a fungicide seed treatment, and consider using a starter phosphorus fertilizer to improve early season

development. However, producers should be cautious with in-furrow nitrogen or potassium fertilizers as these can make it more difficult for the seed/seedling to absorb water needed for germination. The idea is to make sure the wheat gets off to a good start and will have enough heads to have good yield potential, assuming it will eventually rain and the crop will emerge late. Wheat that emerges in October may still hold full yield potential, but wheat that emerges in November almost always has fewer fall tillers and therefore can have decreased yield potential.

There are some risks to this option. First, a hard rain could crust over the soil or wash soil off planting ridges and into the seed furrows, potentially causing emergence problems. Another risk is the potential for wind erosion if the field lies unprotected with no ridges. Also, the wheat may not come up until spring, in which case it may have been better not to plant the wheat at all and plant a spring crop instead. In fact, not planting wheat and allowing soil moisture to build for a summer crop planted next spring is an option.

Probably the worst-case scenario for wheat planted into dry soils would be if a light rain occurs and the seed gets just enough moisture to germinate but not enough for the seedlings to emerge through the soil or to survive very long if dry conditions return. Once the coleoptile extends to the soil surface, the plant must have enough moisture to continue growth otherwise it will perish. This situation may be worsened if producers are planting wheat following a summer crop such as corn, soybean, or sorghum, which depleted subsoil moisture through late summer. Without subsoil moisture to sustain growth, there can be a complete loss of the wheat stand. If late October brings cooler temperatures, dusting wheat in becomes a more interesting option as soil moisture from a possible rainfall event could be stretched further.

Plant deeper than usual into moisture with hoe drill

Planting deeper than usual with a hoe drill can work if the variety to be planted has a long coleoptile, the producer is using a hoe drill, and there is good soil moisture within reach. The advantage of this option is that the crop should come up and make a stand during the optimum time in the fall. This would keep the soil from blowing. Also, the ridges created by hoe drills also help keep the soil from blowing.

The main risk of this option is poor emergence. Deep-planted wheat normally has below-normal emergence, so a higher seeding rate should be used. Any rain that occurs before the seedlings have emerged could add additional soil into the seed furrow, making it even harder for the coleoptile to reach the soil surface. Any time you increase the seeding depth, the seedling will have to stay within the soil just that much longer before emerging through the soil surface.

Delayed emergence leads to more potential for disease and pest problems. Additionally, deep-planted wheat generally results in reduced tillering and consequently a reduced number of heads, which directly reduces the yield potential of the crop. It's even possible that the wheat would get planted so deep that it would germinate but never emerge at all, especially if the coleoptile length is too short for the depth of planting. Generally speaking, it's best to plant no deeper than 3 inches with most varieties. It is also important to keep in mind that ridges formed by narrow press wheels can make the effective planting depth much deeper if the seed furrows fill in during a heavy rainfall event.

Wait for rain before planting

To overcome the risk of crusting or stand failure, producers may decide to wait until it has rained and soil moisture conditions are adequate before planting. Under the right conditions, this would result in good stands, assuming the producer uses a high seeding rate and a starter fertilizer, if appropriate. If it remains dry well past the optimum range of planting dates, the producer would then have the option of just keeping the wheat seed in the shed until next fall and planting spring crop next year instead.

The risk of this option is that the weather may turn rainy and stay wet later this fall, preventing the producer from planting the wheat at all while those who dusted their wheat in have a good stand. There is also the risk of leaving the soil unprotected from the wind through the winter until the spring crop is planted.

Crop insurance considerations and deadlines will play a role in these decisions. Another consideration is to delay the bulk of nitrogen application until topdress time in the spring, as wheat does not require much nitrogen in the fall. This would defer expenses until an acceptable wheat stand is assured.

Romulo Lollato, Wheat and Forages Specialist

lolato@ksu.edu

2. Timing of cheatgrass herbicides on wheat

Producers who want to treat their fields of continuous wheat with a cheatgrass herbicide have to decide when to apply it. Should they spend the money and apply it this fall or wait until spring to see if the wheat is going to yield enough to pay for it?

Each of the most commonly used cheatgrass herbicides – PowerFlex, Olympus, and Beyond (Clearfield wheat only) – is most effective on cheatgrass when applied in the fall, especially for control of downy brome. They can also be effective when applied in winter if the cheat is actively growing, or in the early spring. But control is most consistent when applied in the fall. These products should be applied when the cheatgrass is small and actively growing, and when the wheat has at least three leaves but prior to jointing.

Another benefit of fall application compared to spring application is that a fall application helps minimize rotational restrictions because of the extra time between application and planting the next crop. Fall application may even open the door for double-cropping or planting failed acres to soybeans in the spring following PowerFlex or Olympus.

The cheatgrass species present is a very important factor in the level of control to expect. All the listed herbicides can provide very good control of true cheat and Japanese brome (unless the weed population has developed resistance to the ALS class of herbicides), but are less effective on downy brome. ALS-resistant cheat and Japanese brome were first documented in Kansas in 2007. ALS-resistant cheatgrass first appeared in fields with a long history of Olympus and Maverick use. These populations were cross-resistant to all of the cheatgrass herbicides used in wheat. Since that time, other fields with ALS-resistant cheatgrass have also been confirmed.

The only herbicide previously mentioned that can provide control of jointed goatgrass or feral rye is Beyond, but producers would need to have planted a Clearfield wheat variety in order to use Beyond herbicide.

PowerFlex and Beyond can also provide good control of ryegrass, while Olympus will only provide suppression. Producers need to realize that rye and ryegrass are not the same plant, but are two different grassy weeds. Thus, it is important that producers make that distinction when they hear or read advertisements about ryegrass control. Beyond can provide control of both ryegrass and rye. PowerFlex can give very good ryegrass control, but will not control rye. Olympus can provide suppression of ryegrass, but will not control rye.

Dallas Peterson, Weed Management Specialist
dpeterso@ksu.edu

3. Late-season purpling in sorghum

Purpling of plant tissues has been detected on sorghum in various regions of the state this fall.



Figure 1. Purpling in sorghum, October 2015. Photo by Ignacio Ciampitti, K-State Research and Extension.

In many cases, this is related to an abundance of photosynthetic sugars and accumulation of a pigment called anthocyanin (reddish-purple pigment) within the plants. Anthocyanin is a sugar-containing glucoside compound. The accumulation of reddish-purple anthocyanin pigment within the plant is primarily due to an imbalance between continued production of photosynthetic sugars by leaves (the “source”) and weak demand for those sugars by grain (the “sink”). Basically, this results in sugar and anthocyanin buildup within the plants during the late-reproductive period.

From a physiological perspective, such a sugar buildup might be related to biotic/abiotic stresses that resulted in poor pollination, which reduced the number of grains per head. When this happens, the total amount of grain produced by the head is insufficient to utilize all the sugars generated by photosynthesis. Thus, the sugars and anthocyanin accumulate in the leaves and stems.

The symptoms are typically seen in the upper stem and leaves, close to the head (Figure 1). Less frequently, the symptoms occur in lower sections of the stems. Purpling sometimes is found in sorghum heads when there is poor grain formation and stressful weather conditions around flowering, followed by a release of the stress (favorable weather during grain filling).

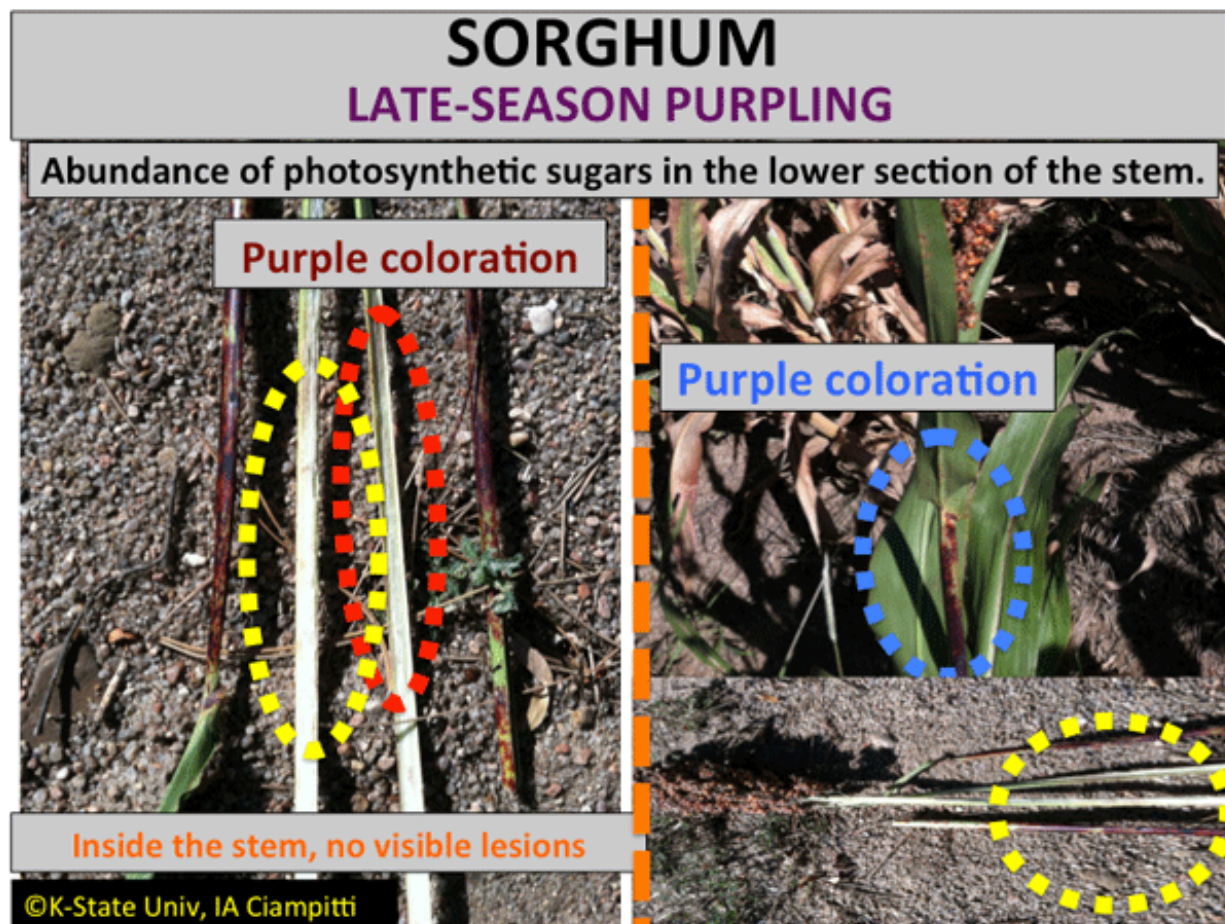


Figure 2. Reddish-purple sorghum plants during the grain-filling period. Photo by Ignacio Ciampitti, K-State Research and Extension.

To properly diagnose the cause of purpling in the stem, split the stem open to check for any damage or discoloration inside. If the stem is white with a creamy texture, and without brown spots or lesions, this indicates the stem is still functional and mobilizing nutrients (carbon) and water from the main

plant to the head. In that case, we can say that the purpling is related to an accumulation of sugar within the plant due to lower-than-normal demand by the grain.

Regardless the specific factor causing this reddish-purple coloration by anthocyanin buildup in sorghum plants late in the season, the purpling does not affect plant functionality. Instead, it is a warning sign associated with the occurrence of an earlier biotic or abiotic stress that affected the plant and reduced grain development. Will the purpling reduce yields? Not directly. But whatever stress that occurred earlier to reduce grain counts within the head will almost surely affect yields.

Remember to continue scouting your acres for early identification of any potential problem affecting your crops before harvest time.

Ignacio Ciampitti, Crop Production and Cropping Systems Specialist
ciampitti@ksu.edu

4. Mini-video: Apparent sugarcane aphid resistance in experimental sorghum lines

In a new short video produced by K-State Research and Extension, K-State sorghum breeder Tesfaye Tesso shows apparent sugarcane aphid resistance in some of his program's new experimental sorghum lines. Tesso also talks about the yield potential of these new lines and discusses other sorghum breeding projects in which K-State is involved.

Title of video: Sugarcane aphids in sorghum

Length: 2:30

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

The mini-video can be seen at: <https://youtu.be/gCSBokLHNNY>

Steve Watson, Agronomy eUpdate Editor

swatson@ksu.edu

A new poster, titled *Sorghum Growth and Development*, has been published by K-State Research and Extension. It is available online at: <http://www.bookstore.ksre.ksu.edu/pubs/MF3234.pdf>

The poster is 20x30 inches, and describes nine stages of growth of the sorghum plant. The author is Ignacio Ciampitti, Crop Production and Cropping Systems Specialist, with input from Curtis Thompson, Extension Agronomy State Leader and Weed Management Specialist; Richard Vanderlip, Professor Emeritus, and Vara Prasad, Professor of Crop Physiology.

Print versions of the poster are available at no charge, as long as supplies last, and can be ordered at: <http://www.bookstore.ksre.ksu.edu/Category.aspx?id=2&catId=281>

County Extension offices can order copies by request, but have not been pre-stocked with copies.

Steve Watson, Agronomy eUpdate Editor
swatson@ksu.edu

Vegetative

Reproductive

Stage 0

Emergence: The plant breaks through the soil surface; early growth usually is slow. The time between planting and emergence depends on soil temperature, residue cover and distribution, soil moisture, planting depth, and seed vigor. Adjust planting time so emergence occurs in favorable conditions.

Stage 1

Three-leaf stage: Three leaves are fully expanded with a visible collar (leaf tissue at the junction of the leaf blade and sheath). The growing point is under the soil surface. This stage occurs 10 to 20 days after emergence, depending on soil temperature and moisture.

Stage 2

Five-leaf stage: Five leaves are fully expanded with a visible collar. The growing point is below the soil surface. The plant begins a rapid growth and nutrient accumulation phase. The root system is expanding rapidly. Minimize weed competition from planting through this growth stage. This stage occurs 20 to 25 days after emergence.

Stage 3

Growing point differentiation: Potential leaf number is defined 30 to 40 days after emergence. Maximum plant growth and nutrient uptake rates are achieved. The growing point is above the surface and changes from producing leaves to forming heads.

Stage 4

Flag leaf visible: Rapid stem elongation and increases in leaf area occur at this stage. The final leaf, the "flag leaf" is visible in the whorl. Potassium uptake is >40%, nitrogen >30%, phosphorus >20%, and total growth is about 20% complete relative to final nutrient content.

Stage 5

Boot stage: Maximum leaf area has been achieved. Maximum potential head size and seed number has been set. The upper stalk, known as the "peduncle," begins to elongate. Final size of the peduncle varies with the genotype. This stage occurs 50 to 60 days after emergence.

Stage 6

Half-bloom: Full exertion of the head occurs at this stage and 50% of the plants in the field are in some stage of bloom. For an individual plant, this stage is when the flowering reaches 50% of the head. Total growth is 50% complete. Compared to final nutrient content, nutrient accumulation is 60% for phosphorus, 70% for nitrogen, and >80% for potassium.

Stage 7

Soft-dough: Grain formation begins immediately after flowering and the grain fills rapidly (50% of dry weight). The stem loses weight due to a remobilization process (from stem to grain). Grains are the main priority for the plant; thus, without a good balance between leaves (source) and grain (sink), the duration of grain filling can be shortened. A severe stress at this growth stage can produce lighter and chaffy grains.

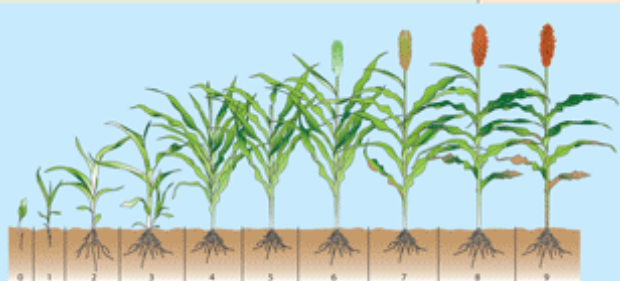
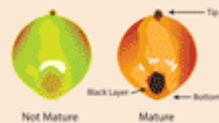
Stage 8

Hard-dough: Grain reaches 75% of its final dry weight and nutrient uptake is almost complete. Lower leaves lose functionality due to remobilization of nutrients to grains or senescence. A severe stress at this growth stage can still reduce grain weight, but not at the extent possible in the soft-dough stage.

Stage 9

Physiological maturity: Grain achieves its maximum dry weight. Mature grain is identified by looking for the dark spot, the black layer, on the bottom of the kernel. Grain moisture ranges from 25 to 35%. The time to harvest depends on the environmental conditions. Artificial drying can be promoted by the use of desiccants without affecting yield when applied after maturity.

Growth stage	Identifying characteristic
0	Emergence. Coleoptile visible at soil surface.
1	Three-leaf stage. Collar of third leaf visible.
2	Five-leaf stage. Collar of fifth leaf visible.
3	Growing point differentiation. About eight-leaf stage with a visible collar.
4	Flag leaf visible. Final leaf visible in whorl.
5	Boot stage. Head extended into flag leaf sheath.
6	Half-bloom. Half of the plants at some stage of bloom.
7	Soft-dough. Grains are soft with little or no liquid present when squeezed.
8	Hard-dough. Grains are hard when squeezed.
9	Physiological maturity. Black layer on the bottom of kernel.



Sorghum Development Stages



Technical Content and Project Leader: Ignacio A. Ciampelli
Crop Production and Cropping Systems Specialist
Department of Agronomy, Kansas State University
ciampelli@ksu.edu; Twitter@KSUCROPS
Reviewers: Curtis R. Thompson, Richard L. Vanderby, and Pix Vana Praetel
Based on information from *How to Grow Sorghum*
Developed by K-State Research and Extension

Kansas State University Agricultural Experiment Station and Cooperative Extension Service
W6414 October 2015
K-State Research and Extension is an equal opportunity provider and sorghum is found in hundreds of Cooperative Extension Web, Web 2.0, and print materials. K-State Research and Extension is an equal opportunity provider and sorghum is found in hundreds of Cooperative Extension Web, Web 2.0, and print materials. K-State Research and Extension is an equal opportunity provider and sorghum is found in hundreds of Cooperative Extension Web, Web 2.0, and print materials.

6. Comparative Vegetation Condition Report: September 29 - October 12

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 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:

Kansas Vegetation Condition

Period 41: 09/29/2015 - 10/12/2015

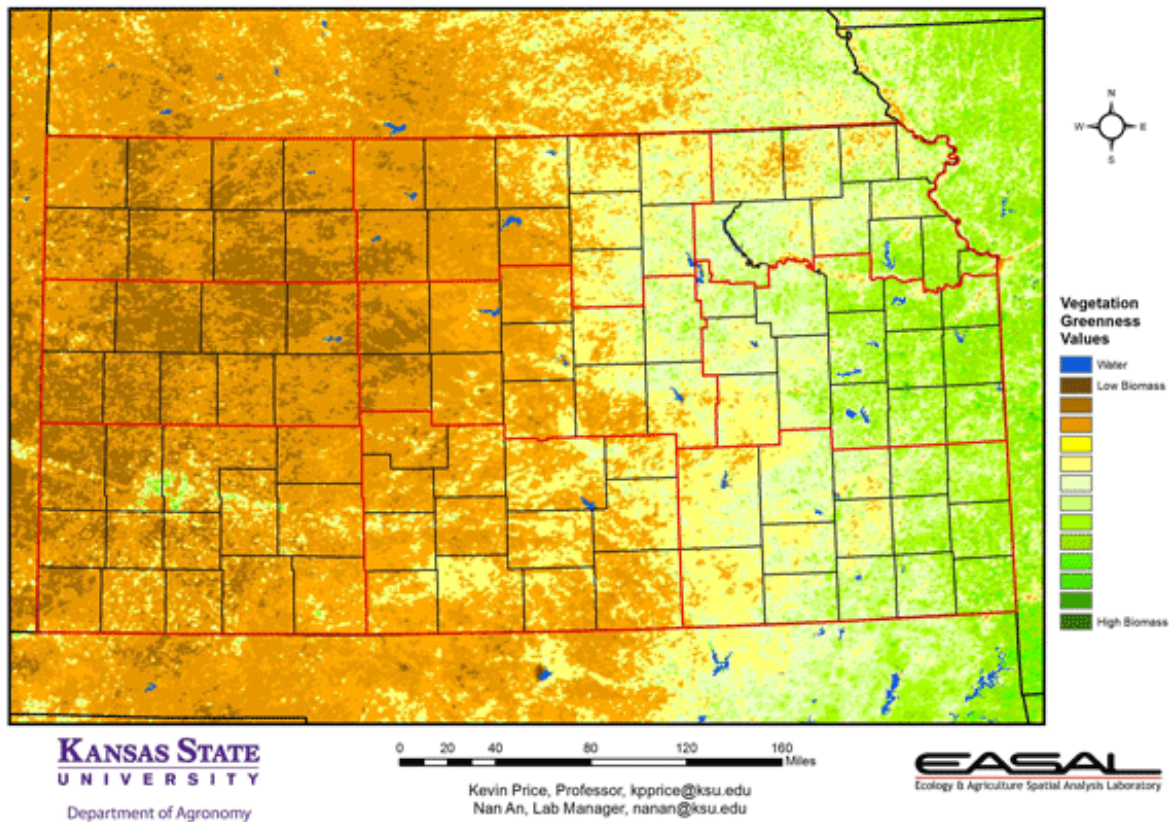


Figure 1. The Vegetation Condition Report for Kansas for September 29 – October 12 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that the highest biomass production continues to be in eastern Kansas. There is an area of increased photosynthetic activity in southwest Kansas, where rainfall continues to be higher than average. Favorable soil moisture and moderate temperatures resulted in increased biomass production in these areas. Much lower NDVI values are visible in Trego, Ellis, Rush, and Ness counties, and have expanded into Pawnee and Barton counties, where drought conditions have intensified.

Kansas Vegetation Condition Comparison
Early-October 2015 compared to the Early-October 2014

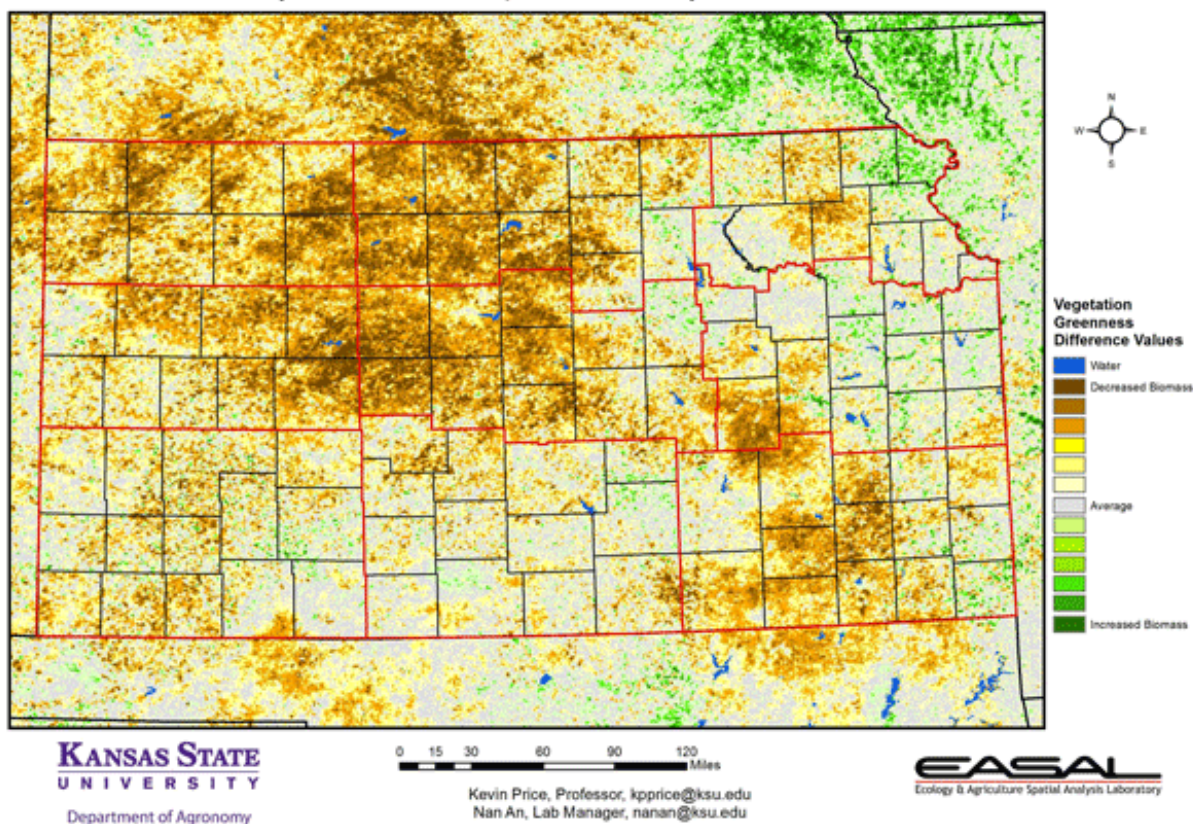


Figure 2. Compared to the previous year at this time for Kansas, the current Vegetation Condition Report for September 29 – October 12 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows parts of central and west central Kansas have much lower photosynthetic activity. These areas continue to miss out on the storm systems, and drought conditions have intensified. This area is now considered to be in moderate drought. Lower NDVI values are also visible in parts of east central and northeast Kansas.

Kansas Vegetation Condition Comparison

Early-October 2015 compared to the 26-Year Average for Early-October

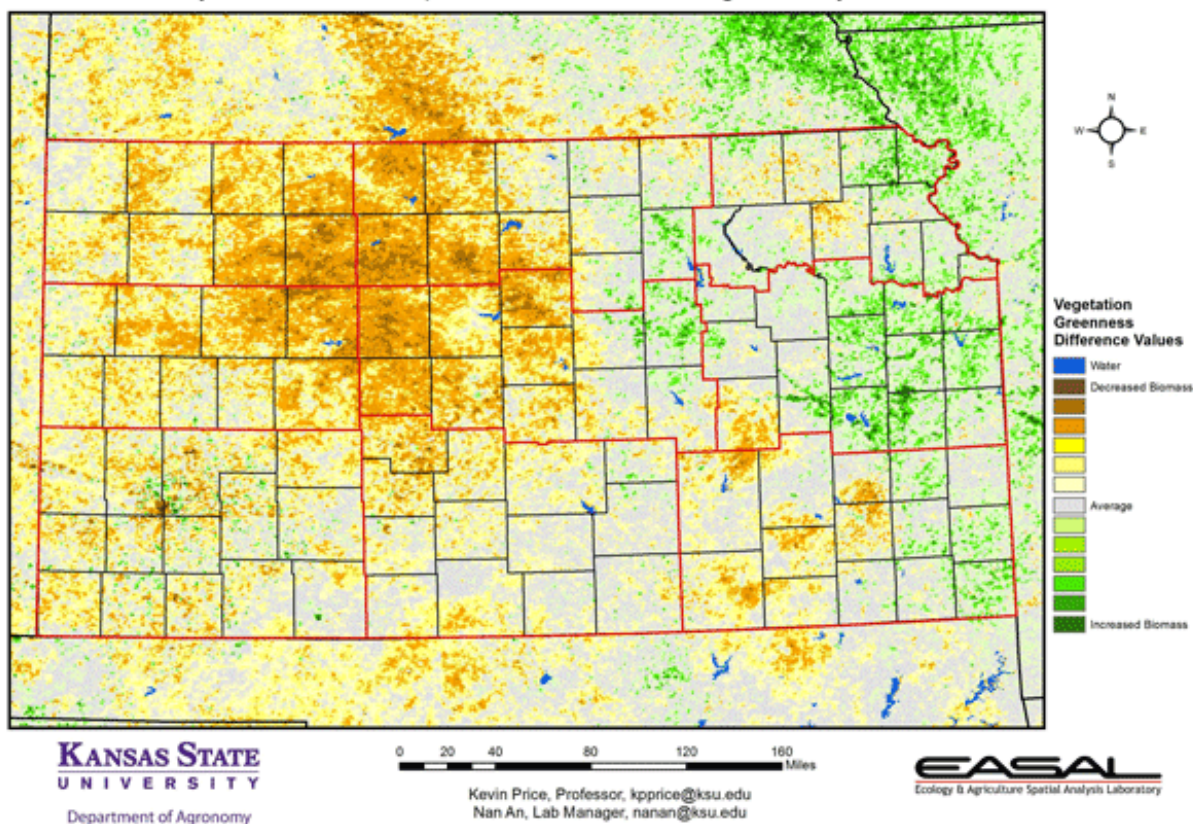


Figure 3. Compared to the 26-year average at this time for Kansas, this year's Vegetation Condition Report for September 29 – October 12 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that most of the state continues to show near-average photosynthetic activity. Most of the below-average photosynthetic activity is concentrated on the boundaries of the Western and Central Divisions. These areas continue to miss most of the storm systems, and moderate drought is expanding in these areas. In east central Kansas there is an area of above-average photosynthetic activity, where precipitation has continued above average through the growing season.

Kansas State University Department of Agronomy

2004 Throckmorton Plant Sciences Center | Manhattan, KS 66506

www.agronomy.ksu.edu | www.facebook.com/KState.Agron | www.twitter.com/KStateAgron

U.S. Corn Belt Vegetation Condition

Period 41: 09/29/2015 - 10/12/2015

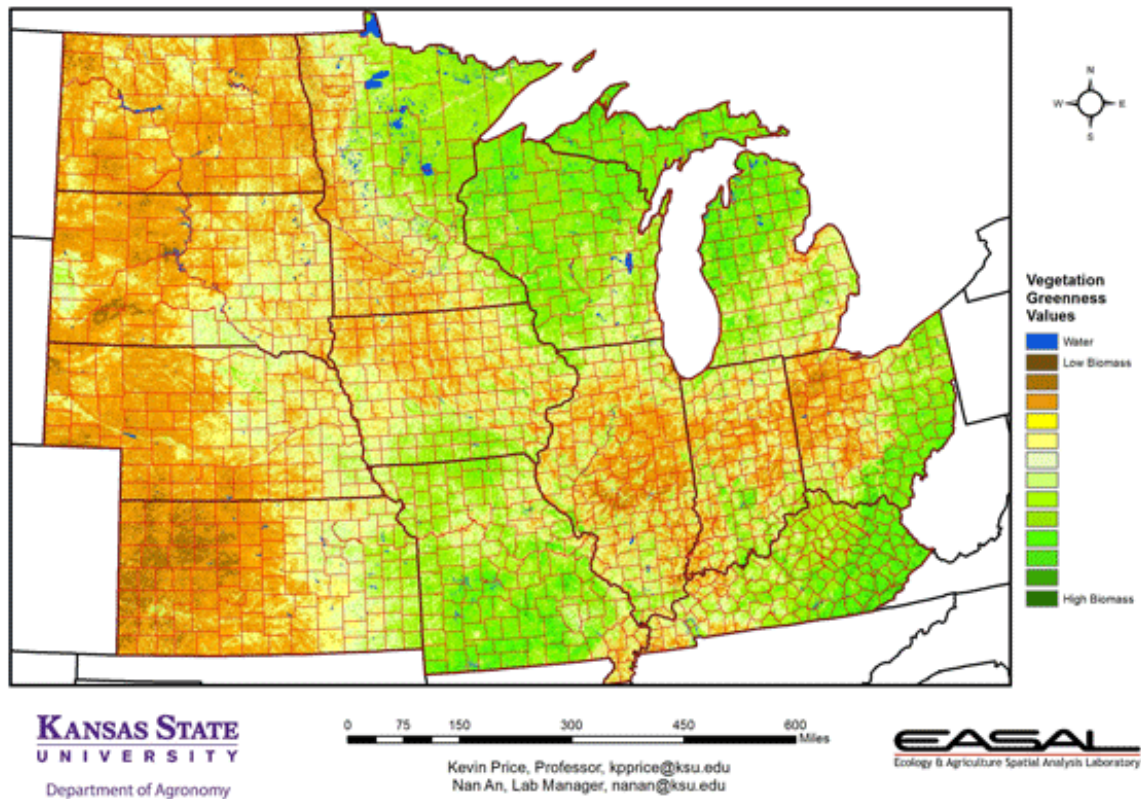


Figure 4. The Vegetation Condition Report for the Corn Belt for September 29 – October 12 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that the greatest photosynthetic activity is concentrated in the northern and southern parts of the region. Favorable moisture conditions have resulted in high photosynthetic activity. Lower NDVI values are present from North Dakota through Iowa to Illinois and Ohio, as crops are maturing early.

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

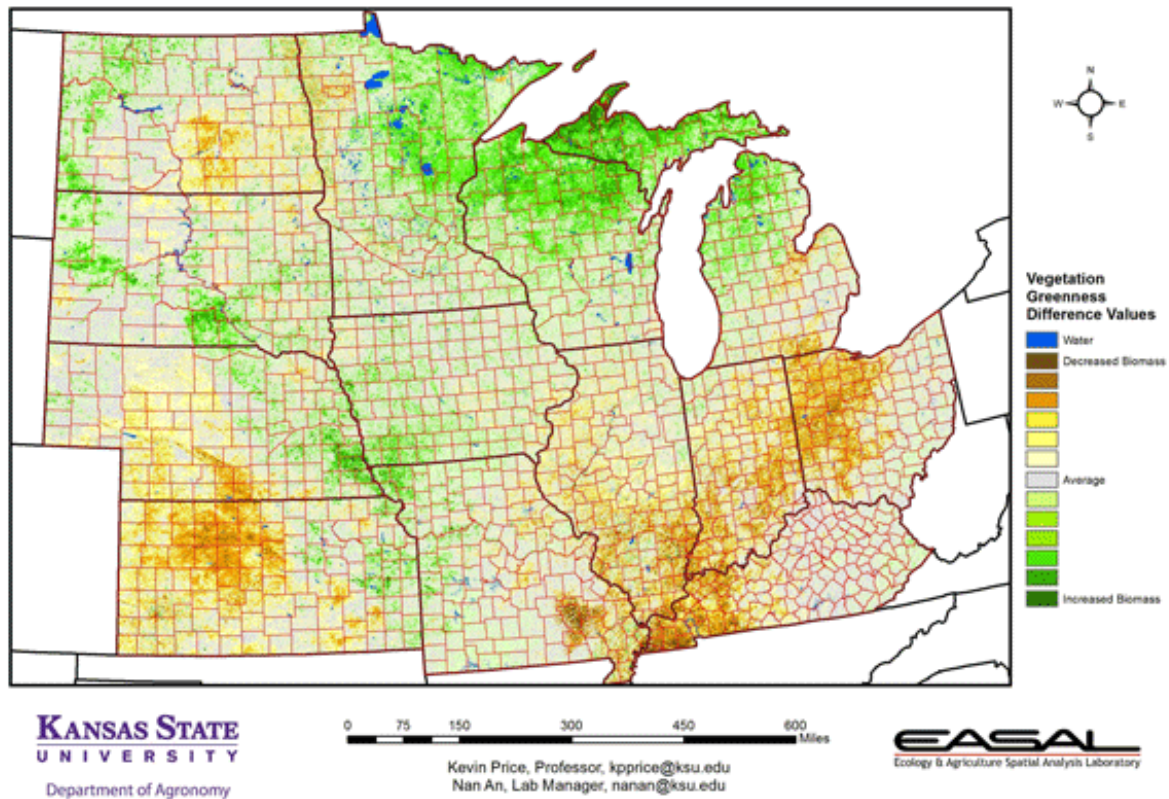


Figure 5. The comparison to last year in the Corn Belt for the period for September 29 – October 12 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows lower photosynthetic activity along the Central Plains, as an extended dry period has slowed plant development and drought conditions intensify. Conditions haven’t changed in California, Oregon and Washington where the drought continues. In southern Georgia, persistent clouds show as reduced photosynthetic activity.

U.S. Corn Belt Vegetation Condition Comparison
Early-October 2015 Compared to Early-October 2014

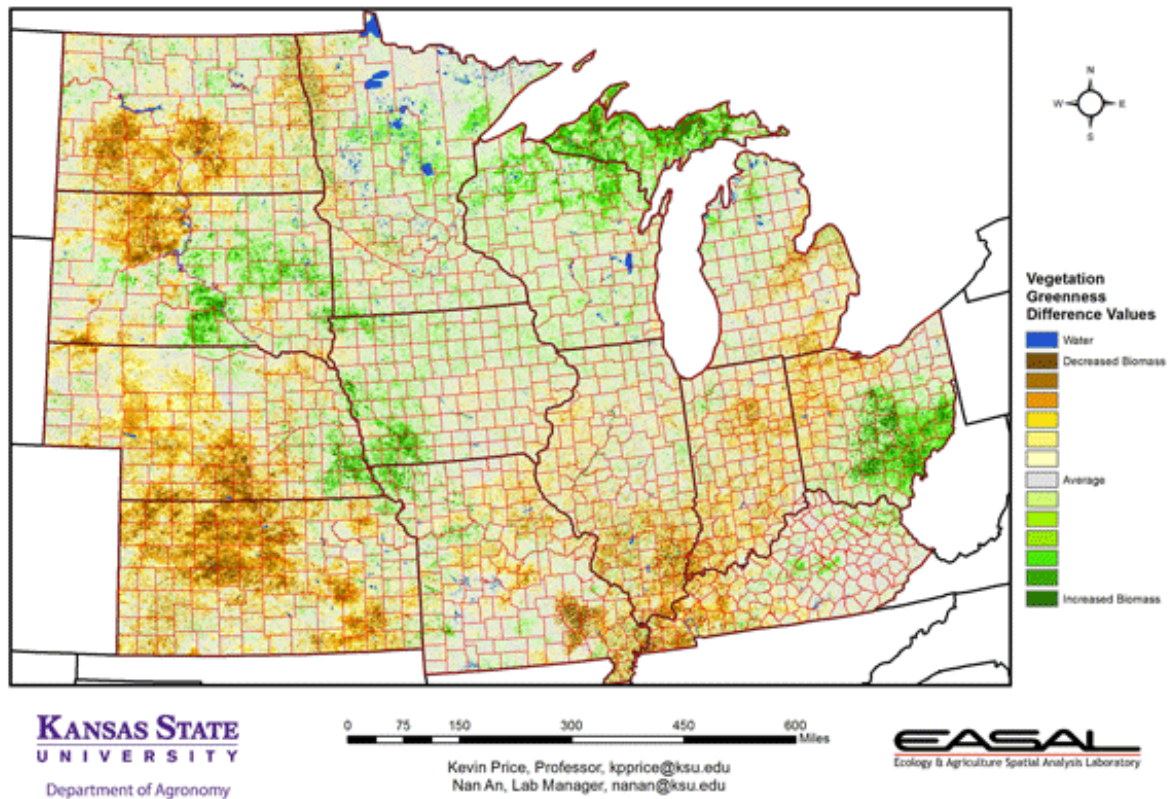


Figure 6. Compared to the 26-year average at this time for the Corn Belt, this year's Vegetation Condition Report for September 29 – October 12 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows most of the region has average biomass production. Above-average photosynthetic activity can be seen in northern Minnesota through the Upper Peninsula of Michigan, where temperatures have continued mild. Central Illinois through western Ohio stand out with lower NDVI values, although crop conditions are rated favorably. Crop development is ahead of average in these regions. There is an area of below-average photosynthetic activity in western Kansas, where drought is intensifying.

Continental U.S. Vegetation Condition

Period 41: 09/29/2015 - 10/12/2015

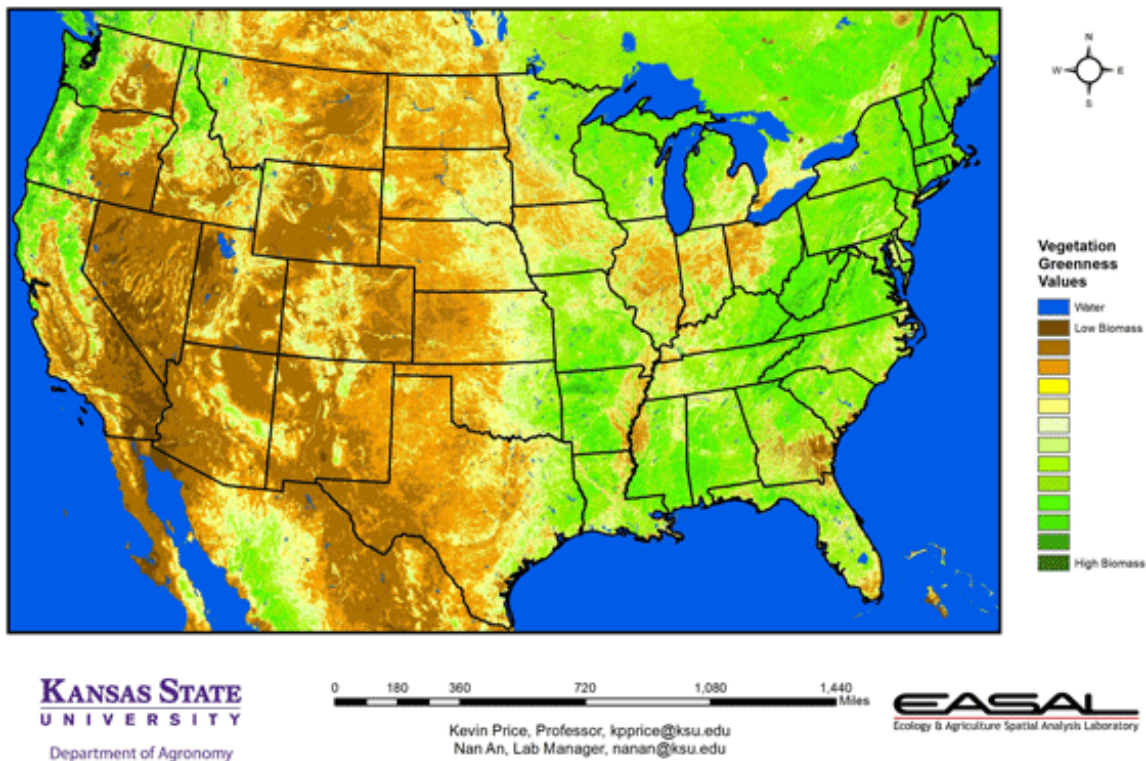


Figure 7. The Vegetation Condition Report for the U.S for September 29 – October 12 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that the highest photosynthetic activity is centered in the Appalachians of West Virginia and Tennessee. Lower NDVI values are noticeable in southern Georgia, where persistent drought conditions continue. While rains have been more prevalent in the area, impacts have been limited. Low NDVI values are also notable along the western Cascades in Oregon, where drought and wildfires continue to affect vegetation.

Continental U.S. Vegetation Condition Comparison
Early-October 2015 Compared to Early-October 2014

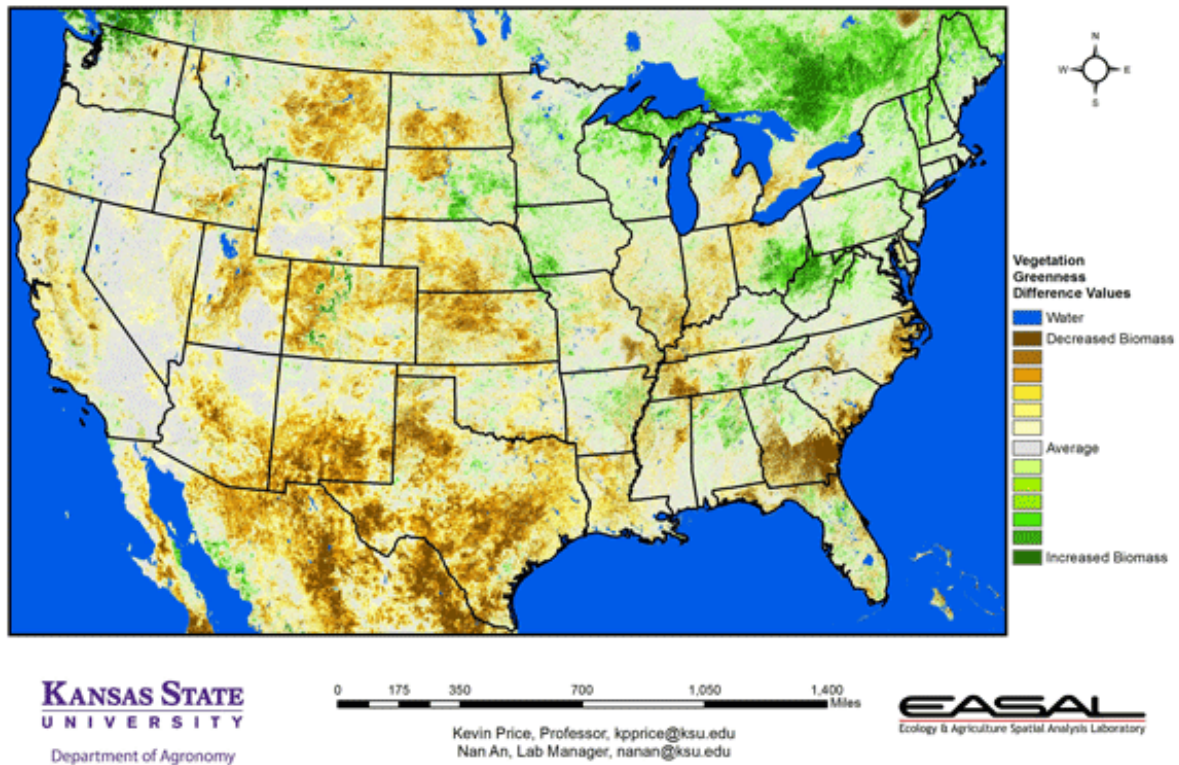


Figure 8. The U.S. comparison to last year at this time for the period September 29 – October 12 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that lower NDVI values are most evident from the Plains through the Southwest. Crop development in much of the region is ahead of average. Lower NDVI values are visible in eastern Montana and western North Dakota. Little change is evident in Oregon and Northern California, where drought remains unchanged from last year.

Continental U.S. Vegetation Condition Comparison
Early-October 2015 Compared to 26-year Average for Early-October

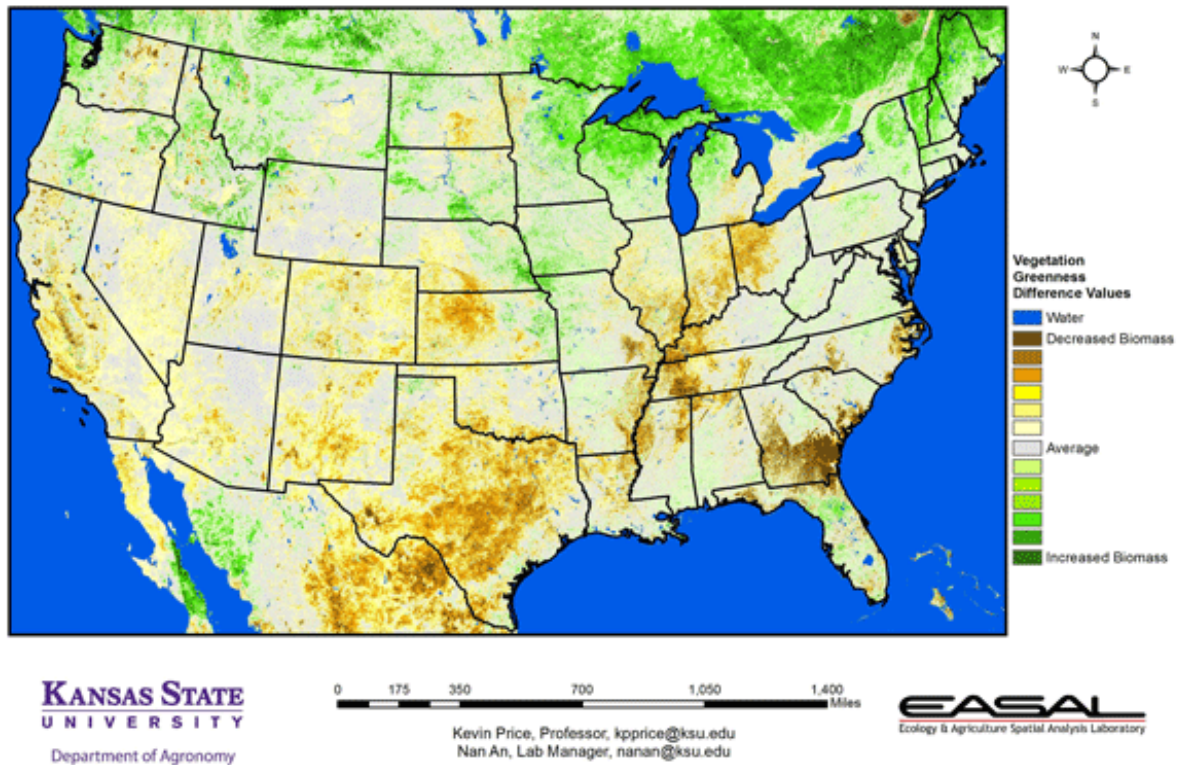


Figure 9. The U.S. comparison to the 26-year average for the period September 29 – October 12 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that the Southern Plains have lower-than-normal photosynthetic activity, while the greatest area of above-average NDVI values is along the northern Great Lakes. 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.

Mary Knapp, Weather Data Library
mknapp@ksu.edu

Kevin Price, Professor Emeritus, Agronomy and Geography
kpprice@ksu.edu

Nan An, former Graduate Research Assistant, Agronomy
an_198317@hotmail.com