



Extension Agronomy

eUpdate

10/17/2014

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. Late-season purpling in sorghum

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

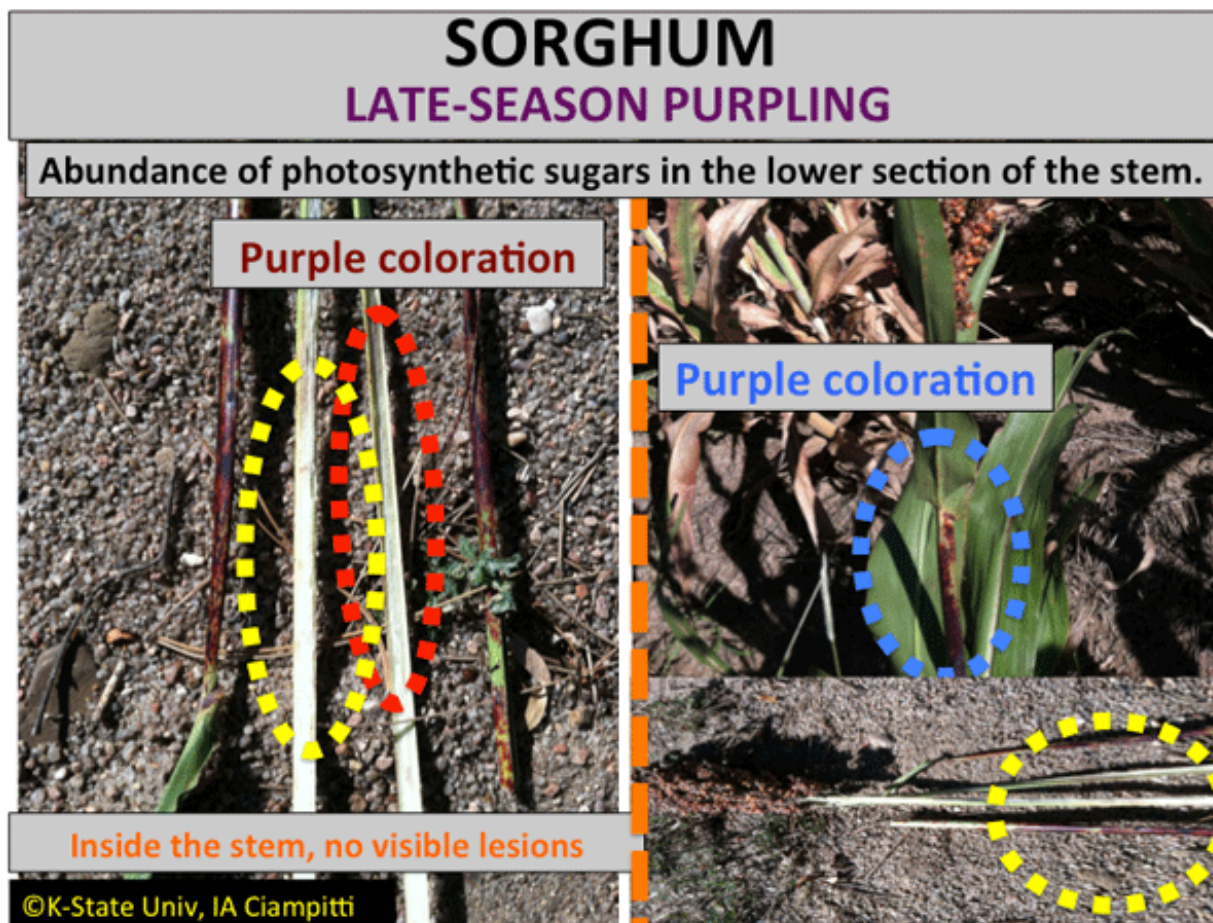


Figure 1. Reddish-purple sorghum plants during the grain-filling period. Photo by Ignacio A. Ciampitti, K-State Research and Extension.

In order 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.

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2. Wheat seedling development concerns

Over the next month or two, wheat stands will hopefully become established over most of the state. Ideally, the wheat will take on a solid green color, form a secondary root system, and develop one or two tillers in addition to the main tiller. But sometimes there are problems. The most common symptoms of problems are discoloration, stunting, loss of leaves, or dying of emerged seedlings.

Causes of chlorosis or poor growth

If wheat is yellow or stunted and not growing this fall, what are the possible causes? Is it something producers can correct? Will it hurt yields? Some of the most common causes of yellowing and/or stunting in the fall are:

Nitrogen deficiency. Nitrogen deficiency causes an overall yellowing of the plant with the lower leaves yellowing and dying from the leaf tips inward. Nitrogen deficiency also results in reduced tillering, top growth, and root growth in the fall. The primary causes of nitrogen deficiency are insufficient nitrogen fertilizer rates, leaching from heavy rains, early-season denitrification or volatilization, and the presence of heavy amounts of crop residue, which can immobilize nitrogen. Topdressing the field during the winter can solve the problem, provided there is enough moisture to move the fertilizer into the root zone (and the ground isn't frozen at the time of application).

Poor root growth. Chlorosis and stunting can also be due to poor root development, which can often result in nitrogen deficiency. If the plants have been emerged for several weeks or more, can be pulled up easily, and have only a couple primary roots visible, then the plants are yellow or stunted because the root systems are not extensive enough to provide enough nutrients. This may be due to dry soils, waterlogging, or poor seedbed conditions at planting time. If conditions improve, plants should develop secondary roots and the color should improve. If conditions do not improve and root growth remains stunted, the plants may winterkill more easily or may not be strong enough next spring to reach their full yield potential.



Figure 1. Poor root development caused by dry soils. Photo by Jim Shroyer, K-State Research and Extension.

Aluminum toxicity (low-pH soils). Strongly acid soils may present several problems for wheat production. Aluminum toxicity is the most common problem associated with acid soils. Typical symptoms include thin stands and lack of vigor. High concentrations of aluminum will reduce development of the roots, giving them a short stubby appearance. The roots will often have a brownish color. In general, aluminum toxicity will reduce yield potential when soil pH levels get below 5.5 and KCl-extractable (free) aluminum levels are greater than 25 parts per million. When soil pH levels are 5.0 or less, yields start dropping off rapidly in most cases. Selecting adequate varieties for low pH conditions is essential. Applying phosphorus in the seed row at planting can also help. Liming to adequate pH levels following recommendations from a soil test can fix the problem long term.



Figure 2. Poor growth of seedling wheat in Harper County due to low-pH soil and aluminum toxicity. Photo by Stu Duncan, K-State Research and Extension.

Leaf rust. If leaf rust infects young seedlings in the fall, the plants may turn yellowish. Severe fall infections of leaf rust are not common in Kansas, but can occur. Producers will be able to see the small brown pustules on the leaves. Tan spot can also cause wheat to turn yellow in the fall. These seedling infections of tan spot are often associated with wheat sown into heavy wheat residue. Viral diseases, such as soil-borne mosaic, wheat streak mosaic, and barley yellow dwarf, can infect wheat in the fall. Some yellowing can occur in the fall but in most cases the severe yellowing symptoms do not show up until early spring. It rarely, if ever, pays to treat fields with fungicides in the fall for leaf rust or tan spot, even if those diseases do cause yellowing. Cold temperatures in the winter normally reduce the risk of problems.

Cold temperatures. When temperatures are quite cold at the time wheat emerges, it can result in yellow banding on the leaves. If this is the cause of the yellowing, symptoms should eventually fade away.



Figure 3. Cold temperature yellow banding on wheat seedlings. Photo by Jim Shroyer, K-State Research and Extension.

Greenbugs or bird cherry oat aphids. These insects most commonly infest wheat sometime after the first freeze and before Christmas. They can cause plants to turn yellow and be somewhat stunted. These symptoms can occur in the fall, but don't usually show up until early spring. Often, greenbug and bird cherry oat aphid infestations occur in patches in a field, not uniformly distributed. Each of these patches infestations are usually initiated by one winged female landing on a susceptible wheat plant. That female starts to produce more females, which then produce more females, and so on. The resulting infestation often radiates out from the initial infested plant in a roughly circular pattern. Greenbug and aphid infestations in the fall can make the wheat more susceptible to winterkill under normal winter temperatures.

Hessian fly. Seedlings infested by Hessian fly in the fall are typically not yellow, but are often stunted. Affected plants usually have an unusually large, broad greenish leaf for about a month in the fall. Stem elongation is typically much shorter than normal.

Flea beetles. These tiny insects cause whitish streaks on the upper surfaces of leaves. If streaking is severe, plants may die.

Causes of seedling death or loss of leaves

If leaves are being lost, or the plants are sickly or have died, it is important to find out why before replanting. Some of the most common causes of seedling death, sickliness, or loss of leaves include:

Seedling blight. This is one of the most common causes of post-emergence seedling death or sickliness. The root system or coleoptile region may be diseased or dead in infected plants. Several fungi cause seedling blight, and these diseases are often worse on early-planted wheat. Seedling blight may not kill the seedlings outright, but can lead to later problems with common root rot, crown rot, sharp eyespot, and dryland root rot (also known as dryland foot rot).

Atrazine carryover. Wheat planted into soils with atrazine residue emerges then dies back from the tips of the oldest leaves first. Atrazine carryover is most likely to occur where there were high application rates, high soil pH, coarse-textured soils, and under dry conditions.

Fall armyworms and army cutworms. Where fall armyworms infest the wheat, leaves start looking ragged from the “windowpaning” effect. As the worms grow, they will chew off entire leaves, tillers, or whole plants. Fall armyworms can move across a field in a wave, starting on one side of the field. Army cutworms may also damage wheat, much like fall armyworms. Army cutworms may successfully overwinter and continue feeding during mild spells throughout the winter and spring. Fall armyworms won't overwinter, thus they'll only be a problem until the advent of cold weather.



Figure 4. Fall armyworm, and the windowpaning damage it causes to wheat in the fall. Photos by Jeff Whitworth, K-State Research and Extension.

Grasshoppers. Grasshoppers can be a problem along the edge of a field, where severe feeding can occur as other foliage turns brown. Three to four passes, as needed, from a sprayer with an

insecticide along the edge of a field can usually minimize damage from this pest.

False wireworms. These insects typically feed on seeds or seedling roots, and can cause death.

White grubs. If young plants are dying, with no aboveground symptoms evident, white grubs may be the cause. Check to see if roots are pruned.

This is not a complete list of possible problems on early-season wheat by any means, just some of the most commonly found problems. For a complete discussion, see K-State's publication S-84, "Diagnosing Wheat Production Problems" at: <http://www.ksre.ksu.edu/bookstore/pubs/s84.pdf>

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3. 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 Maverick – 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.

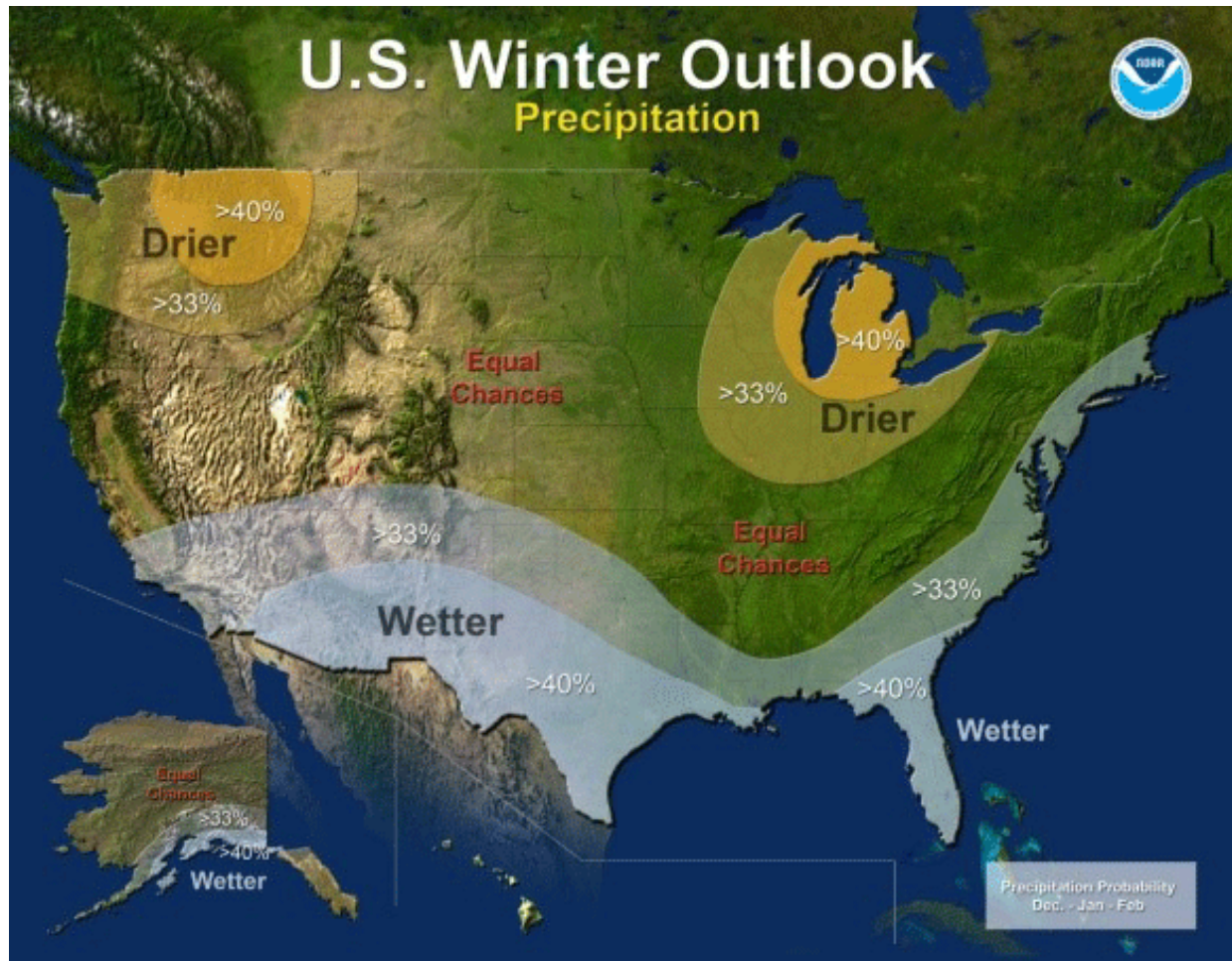
None of the herbicides previously discussed control jointed goatgrass or feral rye. To control jointed goatgrass and suppress feral rye in wheat, producers would need to have planted a Clearfield wheat variety and use Beyond herbicide. Beyond can also provide control of cheat, Japanese brome, downy brome, and Italian ryegrass. Like the other herbicides, fall applications of Beyond generally are more effective for weed control than spring treatments.

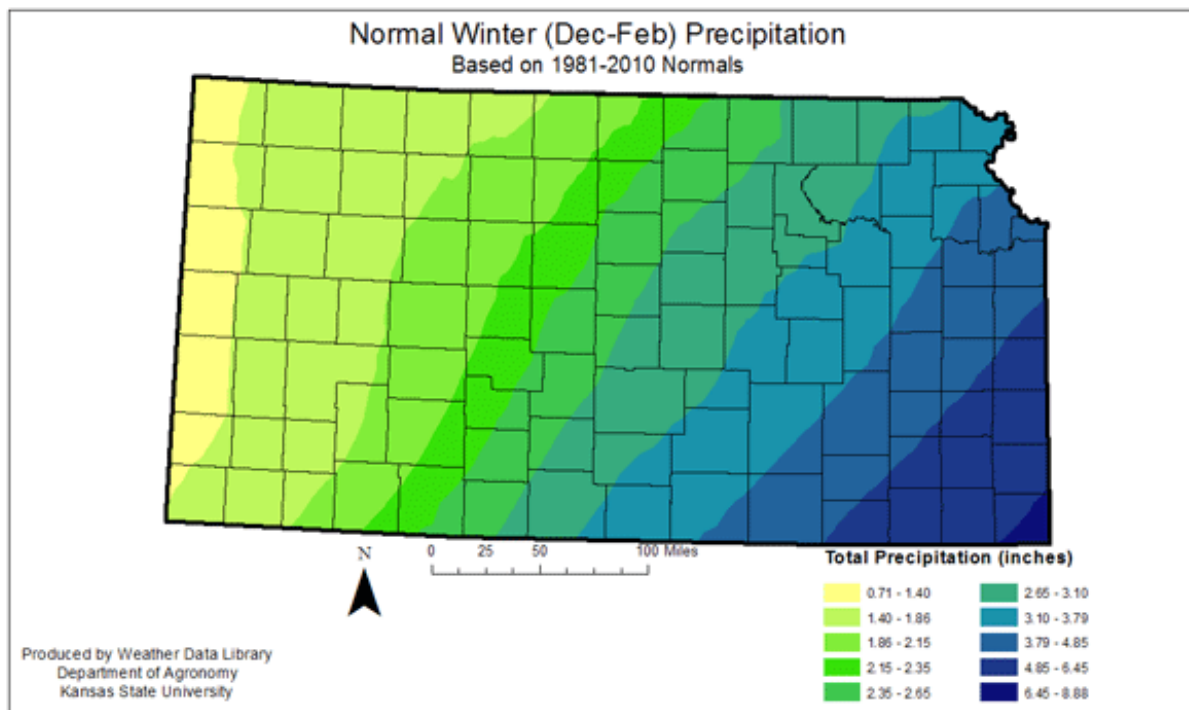
Producers need to realize that rye and ryegrass are not the same plant. Feral rye and Italian ryegrass are two different grassy weeds. Thus, it is important that producers make that distinction when they hear or read advertisements about ryegrass control. Beyond can provide control of both ryegrass and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

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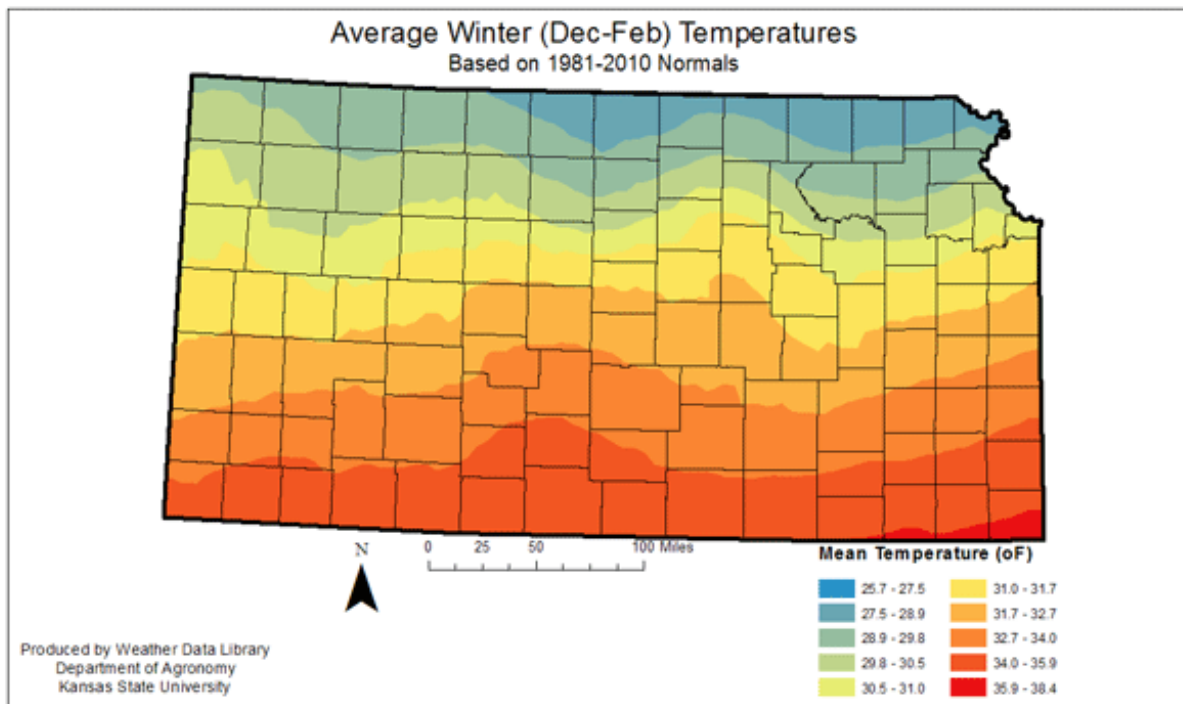
4. Winter weather outlook

The National Oceanic and Atmospheric Administration (NOAA) has issued its Winter Outlook. For Kansas, winter precipitation is equally likely to be in any of the three categories -- above, below or average. Total precipitation for the three-month period of Dec-Feb ranges from less than an inch-and-a-half along the Kansas-Colorado border to more than 5 inches in southeast Kansas.





The temperature outlook is also neutral, with conditions equally likely to be above- or below-average in the Central Plains. The three month (Dec-Feb) normal mean temperatures range from about 26 degrees F along the northern tier of counties to more than 39 degrees along the southeastern parts of the state. Nationally, the biggest departures from average are expected on the coasts, with the western U.S. having a greater chance of warmer-than-average temperatures. Along the Gulf Coast, conditions are expected to be cooler than average.



Chances for an El Niño continue to be reduced, and at this time if one develops it is expected to only be weak to moderate. El Niño conditions favor milder and wetter-than-normal conditions in Kansas during the winter but it is not the only global circulation pattern than can produce those conditions. A persistent ridge to the west, similar to last year, could also favor a wetter-than-normal winter

period. It is also important to note that these are based on averages, and individual storm tracks will greatly influence the month-to-month, or day-to-day conditions.

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5. Comparative Vegetation Condition Report: September 30 - October 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=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 25-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, service climatologist:

Kansas Vegetation Condition

Period 41: 09/30/2014 - 10/13/2014

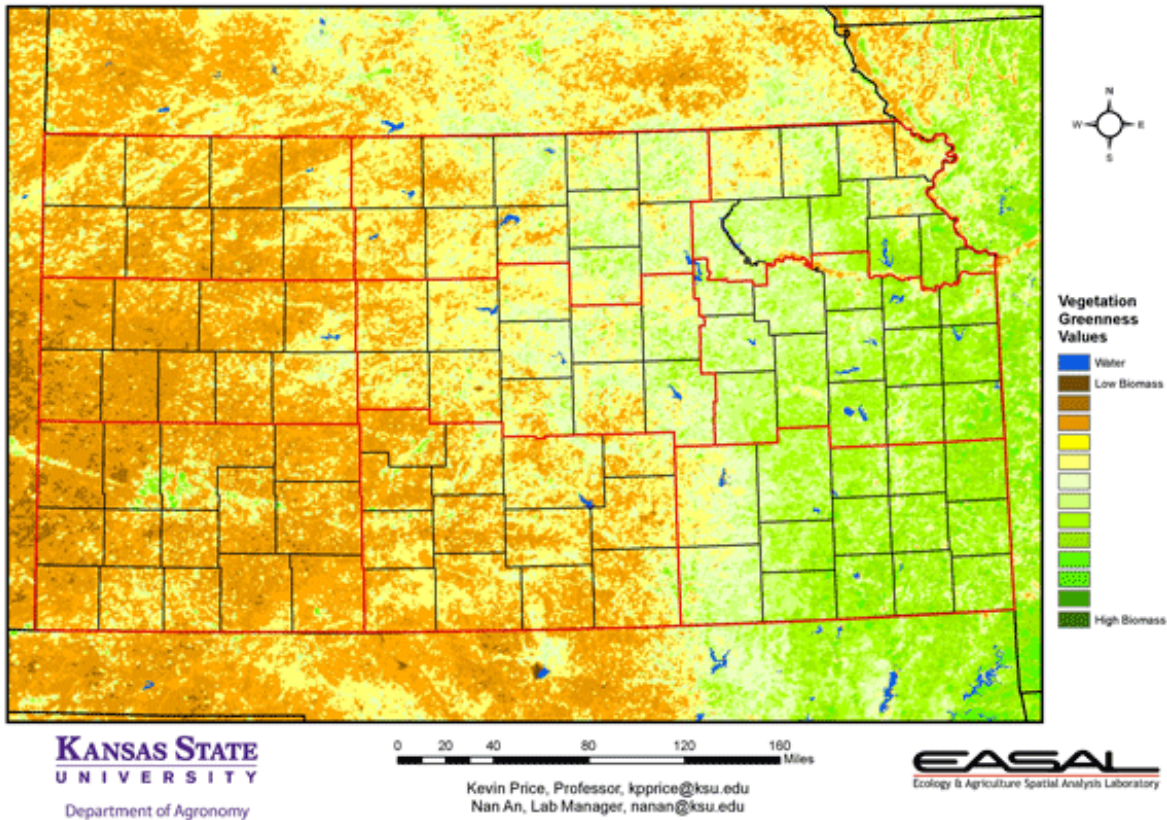


Figure 1. The Vegetation Condition Report for Kansas for September 30 – October 13 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that the most photosynthetically active region continues to be in the eastern third of the state. Some lower biomass production values are visible in Brown and Doniphan counties where excess moisture created flooding problems.

Kansas Vegetation Condition Comparison
Early-October 2014 compared to the Early-October 2013

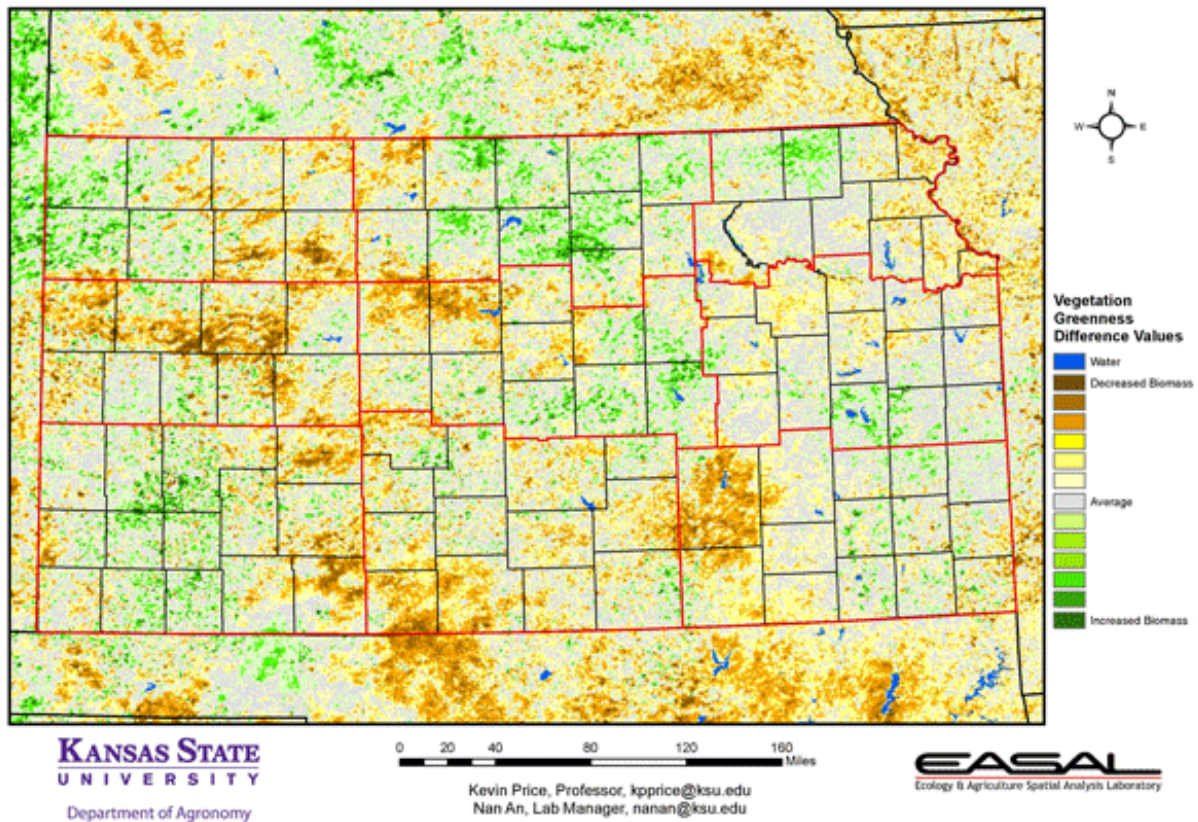


Figure 2. Compared to the previous year at this time for Kansas, the current Vegetation Condition Report for September 30 – October 13 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that there is a mix of higher and lower photosynthetic activity. The higher values are most visible in the northern counties, where summer crop development into senescence has been slowed by cooler temperatures.

Kansas Vegetation Condition Comparison
Early-October 2014 compared to the 25-Year Average for Early-October

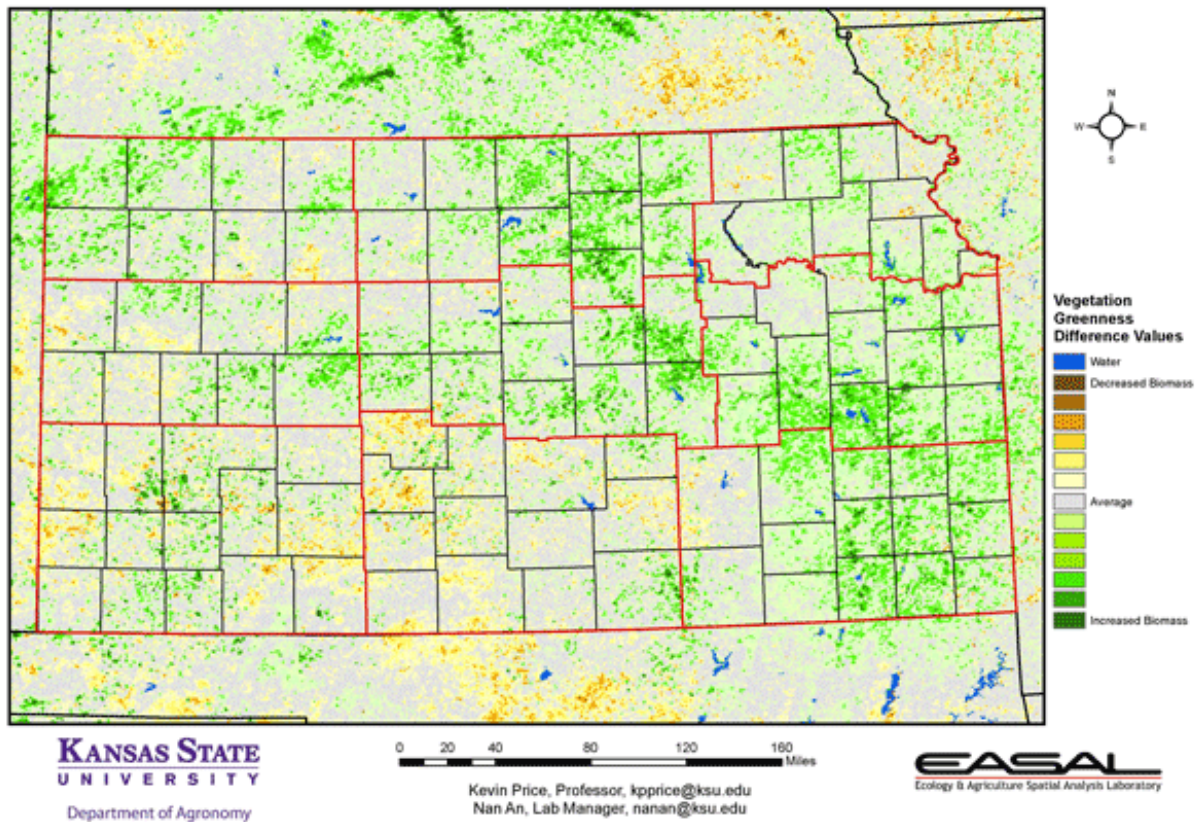


Figure 3. Compared to the 25-year average at this time for Kansas, this year's Vegetation Condition Report for September 30 – October 13 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows the Southeast and East Central Divisions have the greatest increase in biomass production. Mild temperatures and ample moisture have favored continued development in these areas.

U.S. Corn Belt Vegetation Condition

Period 41: 09/30/2014 - 10/13/2014

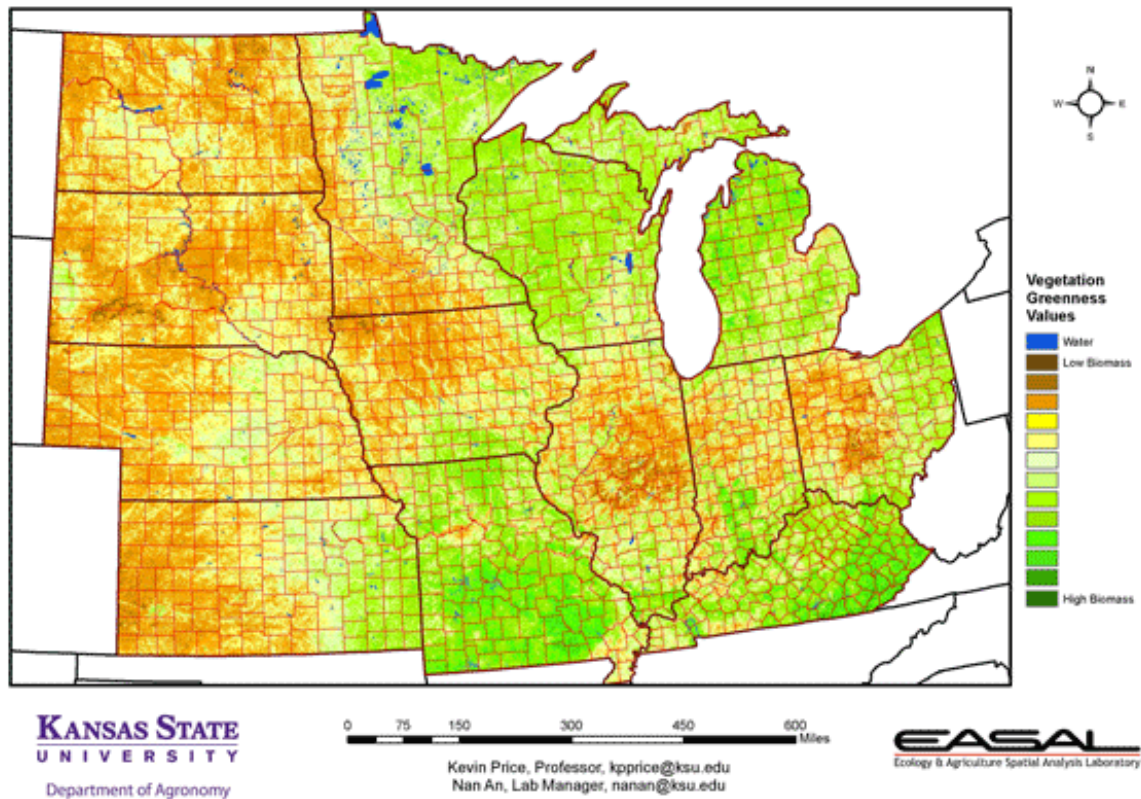


Figure 4. The Vegetation Condition Report for the Corn Belt for September 30 – October 13 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that high levels of biomass productivity are evident along the northern and southern fringes of the region. In the Great Lakes region, plant development continues to be delayed. In the southern portions, favorable moisture and mild temperatures have continued to aid photosynthetic activity.

U.S. Corn Belt Vegetation Condition Comparison
Early-October 2014 Compared to Early-October 2013

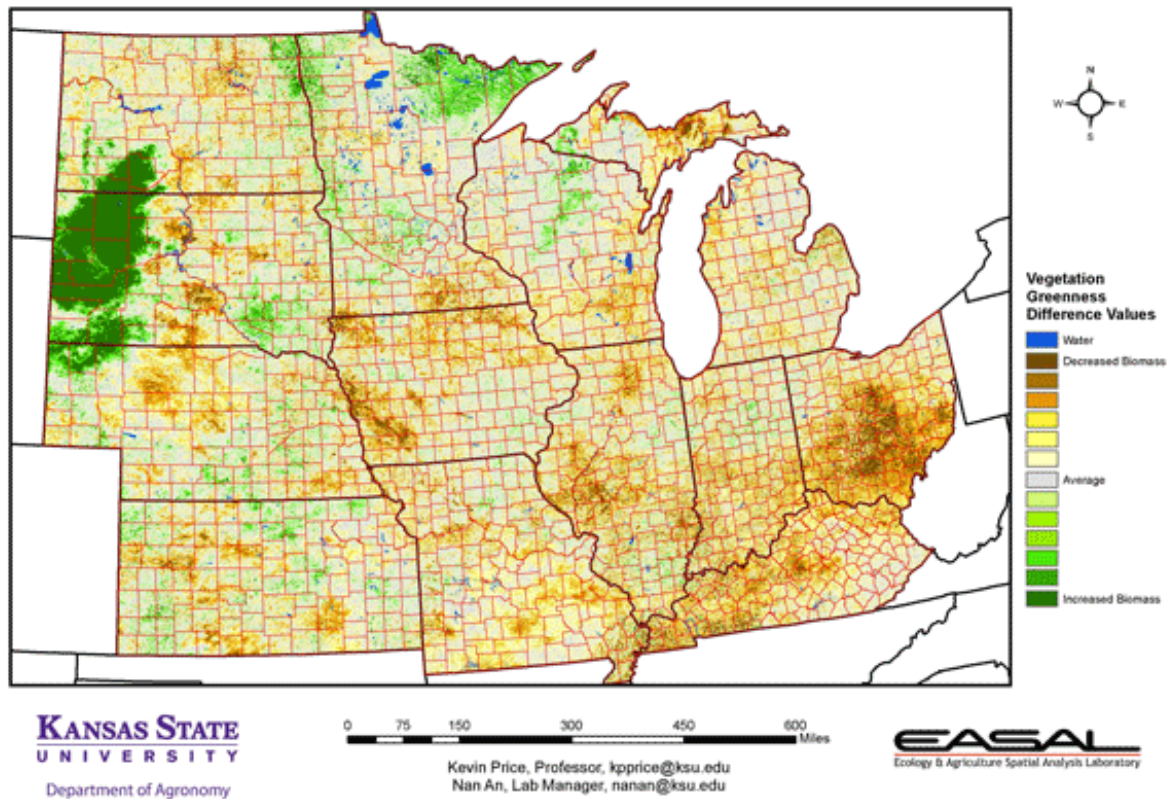


Figure 5. The comparison to last year in the Corn Belt for the period September 30 – October 13 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that the biggest change is in the Black Hills of South Dakota. Last year this region had unusually low photosynthetic activity due to an unusually early and severe winter storm. Snow depths ranged from 23 to 48 inches.

U.S. Corn Belt Vegetation Condition Comparison
 Early-October 2014 Compared to the 25-Year Average for Early-October

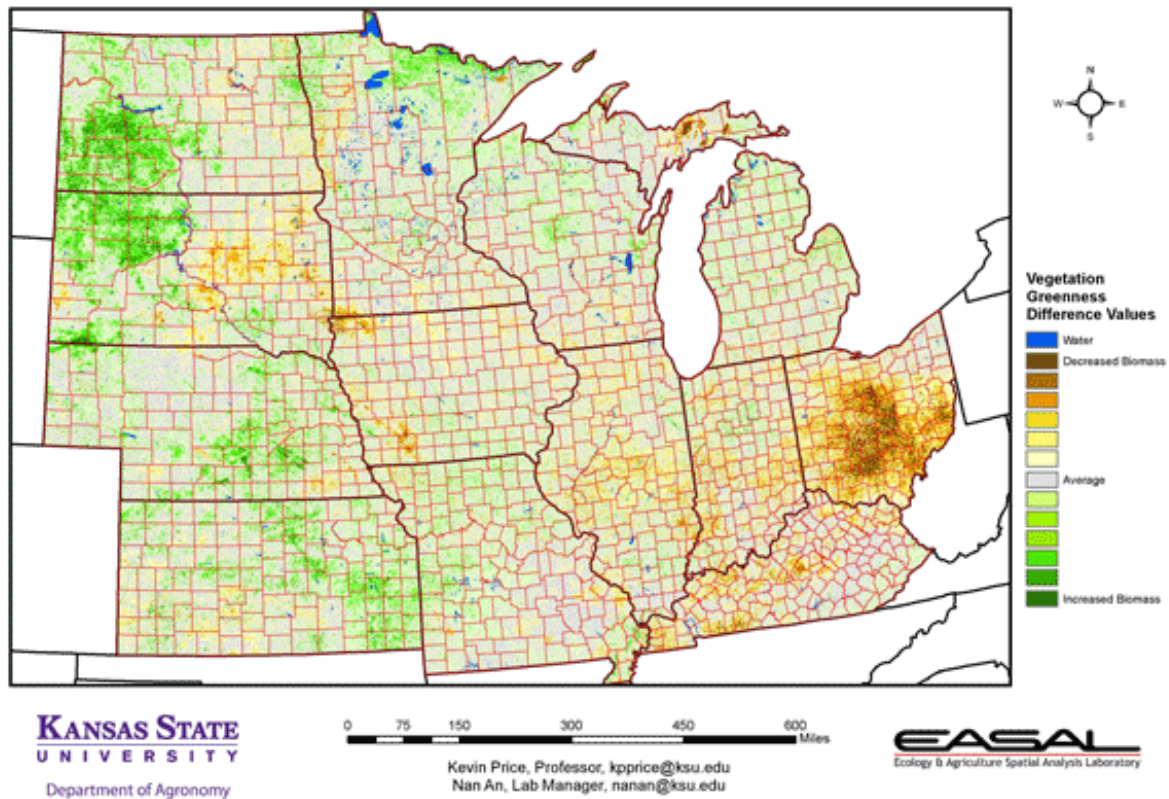


Figure 6. Compared to the 25-year average at this time for the Corn Belt, this year's Vegetation Condition Report for September 30 – October 13 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that most of the region is very close to average. There continues to be an area of higher-than-normal biomass productivity in the western parts of the Dakotas, while Ohio has much lower-than-normal biomass productivity. Cool, wet conditions have delayed harvest, but 81 percent of the corn is mature.

Continental U.S. Vegetation Condition

Period 41: 09/30/2014 - 10/13/2014

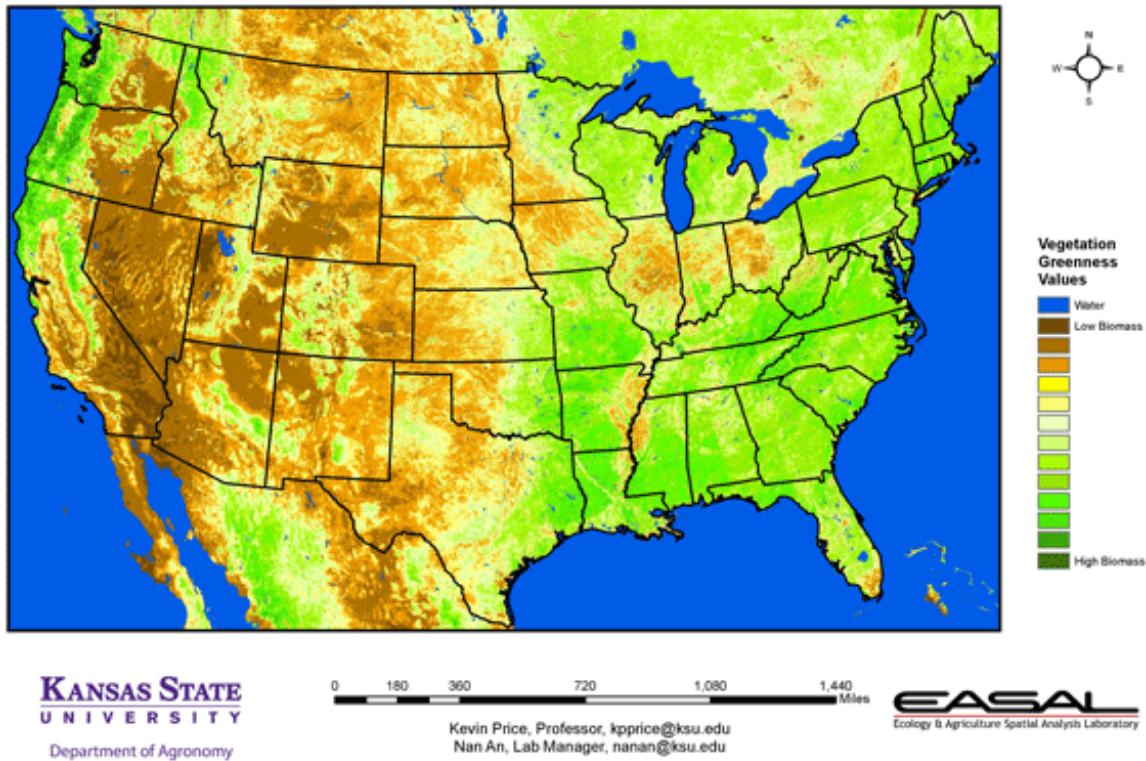


Figure 7. The Vegetation Condition Report for the U.S. for September 30 – October 13 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that moderate to high photosynthetic activity continues along the Pacific Northwest. Snow cover in the mountains continues to be limited.

Continental U.S. Vegetation Condition Comparison
Early-October 2014 Compared to Early-October 2013

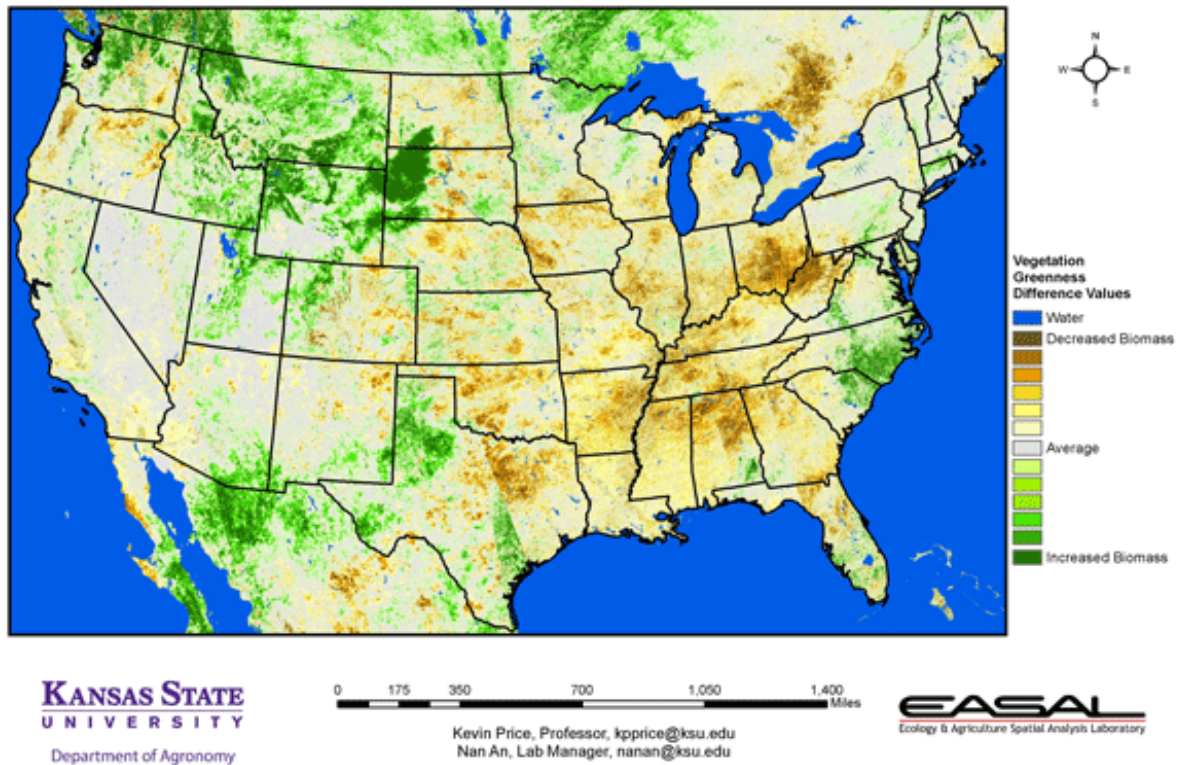


Figure 8. The U.S. comparison to last year at this time for the period September 30 – October 13 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that higher NDVI values are visible in the area from Idaho to western South Dakota. Last year at this time, a major winter storm had moved through the area. This resulted in much lower photosynthetic activity. In contrast, the Texas Panhandle has seen greater photosynthetic activity this year due to favorable moisture and temperatures.

Continental U.S. Vegetation Condition Comparison
Early-October 2014 Compared to 25-year Average for Early-October

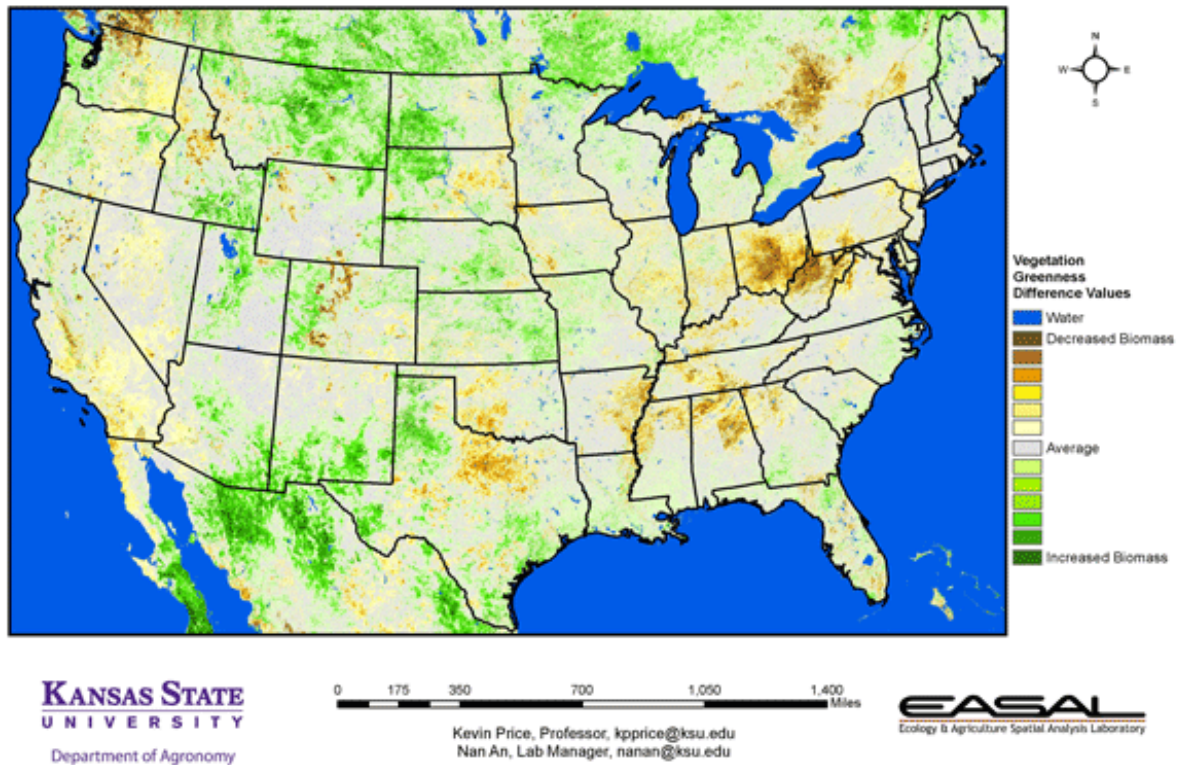


Figure 9. The U.S. comparison to the 25-year average for the period September 30 – October 13 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that cool, wet weather has limited photosynthetic activity in Ohio. Greater-than-average biomass productivity can be seen along the Rockies, with the greatest increase in Montana and the western Dakotas. Ample moisture has also fueled high biomass production along southern New Mexico into the Big Bend region of Texas.

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