



K-STATE
Research and Extension

Extension Agronomy

eUpdate

10/10/2014

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. Sorghum development and potential freeze injury

The latest “Crop Progress and Condition” report from Kansas Agricultural Statistics, on October 6, stated that grain sorghum maturity and harvest are behind normal by 14%. Will remaining sorghum reach maturity before first freeze? The answer is, “it depends.” There are two main factors involved: 1) weather conditions and how they affected the development of sorghum during the season, and 2) crop phenology -- when was the crop planted, hybrid maturity, and the date of half-bloom.

Weather component

Similar to 2013, the hot and dry conditions in some areas early in the season -- before flowering -- accelerated emergence and the vegetative progress, but delayed heading. Also, K-State researcher Vara Prasad and others found that high temperature stress after growing point differentiation (approximately 30 days after emergence) delays heading and decreases seed number and size, affecting final yields. Grain sorghum is even more sensitive to drought and heat stress around flowering -- 10 days before, and 10-20 days after flowering (Figure 1).

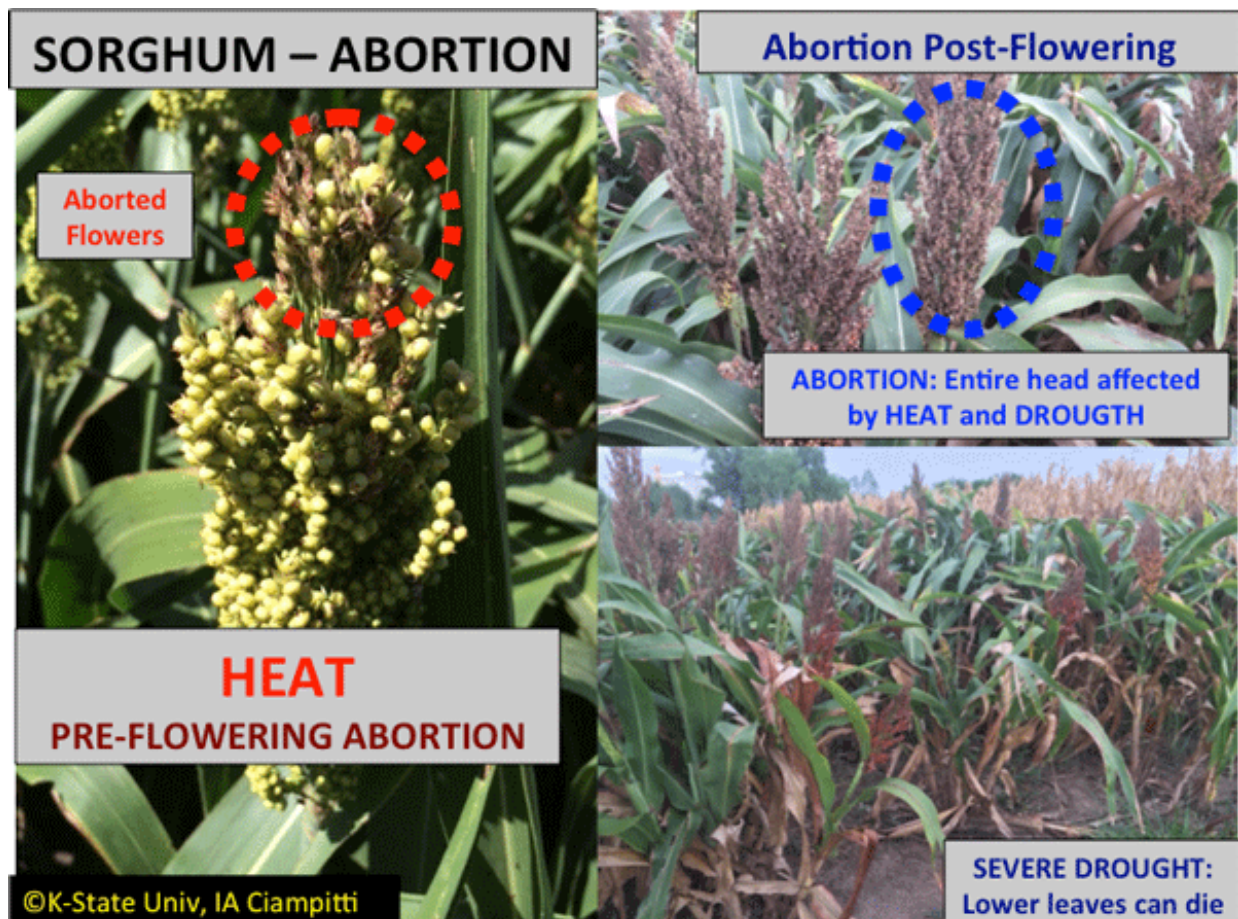


Figure 1. Pre- and post-flowering grain abortion associated with heat and drought stresses. Photo by Ignacio Ciampitti, K-State Research and Extension.

Sorghum is also sensitive to cold temperatures during most of its growth period. Temperatures below 40 degrees F will inhibit sorghum development. Previous K-State research by Scott Staggenborg and Richard Vanderlip documented an impact on grain weight during early grain fill when temperatures were below 30 degrees F. Low temperatures at this time caused lower photosynthetic rates and the inability of the plant to translocate carbohydrates to the developing grains, interrupting the flow of sugars from the plant to the head.

Crop phenology

The amount of time between emergence and half-bloom depends on the planting date and the temperatures during this period. If sorghum was planted late and temperatures were cool early in the season, half-bloom will occur relatively late in the season. Hybrid maturity characteristics also make a difference in how rapidly the crop will go from emergence to flowering. Short-season hybrids have a shorter time from emergence to blooming; while full-season hybrids will need more degree days to reach flowering. The overall cumulative GDD from flowering to maturity, or "black-layer," is around 1400-1600, with the shortest requirement in GDD for the short-season as compared to the full-season hybrid. From maturity to the harvest time, sorghum grain will dry down from about 35 to 20 percent moisture, but the final maximum dry mass accumulation has been already attained at maturity.

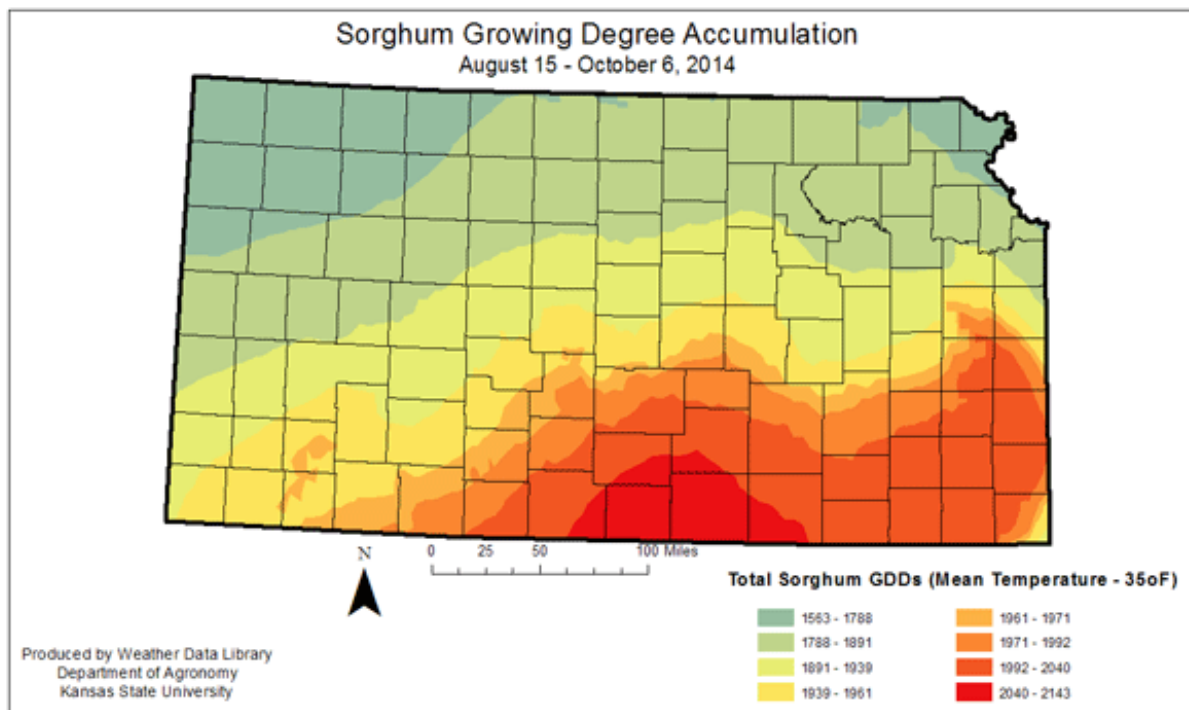
The likelihood of sorghum maturing before a freeze is related to all of these factors. When the crop flowers in late August or early September, it may not reach maturity before the first fall freeze in some parts of the state.

Probability of sorghum maturing before freeze for different flowering dates

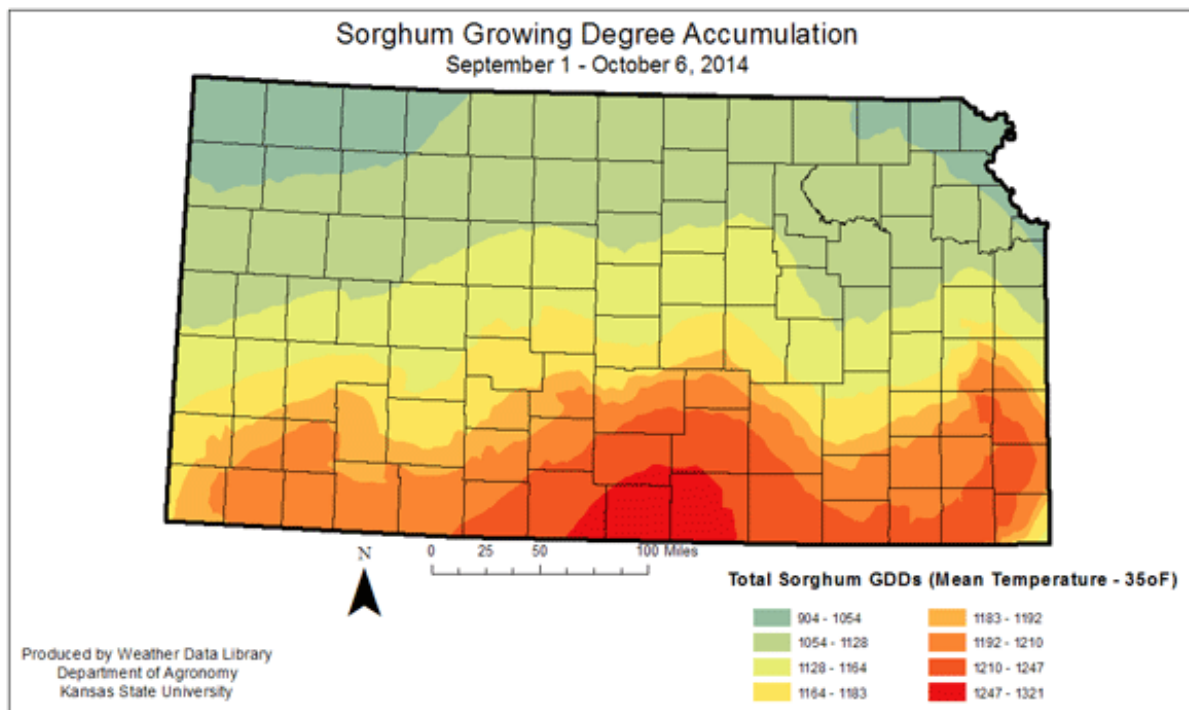
The maps below show accumulated GDDs up to October 6 for the current growing season when half-bloom began at three different dates: mid-August, early-September, and mid-September. Lower GDDs are depicted with blue colors, while higher GDDs are represented in red colors.

Where blooming occurred during early- to mid-August the likelihood for maturing before freeze is almost 100% for all the state. Where blooming occurred during early September, the sorghum in the northern and central areas of Kansas will have a lower chance of maturing, having accumulated less than 1100 GDDs, before the first freeze. A worse picture is projected if sorghum blooming did not occur until mid-September. In this case, there is an extremely low probability of maturing before the first freeze (very low GDDs, < 900) almost everywhere in the state.

Half-bloom occurred in mid-August



Half-bloom occurred in early September



Half bloom occurred in mid-September

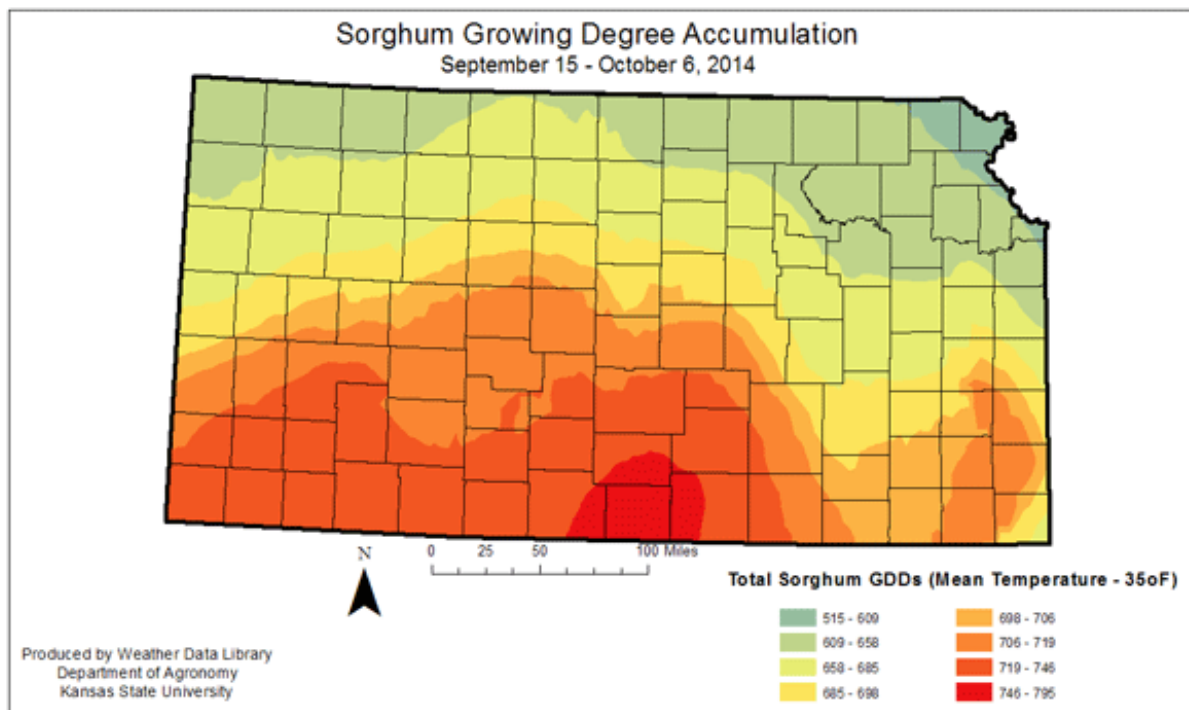


Figure 2. Accumulated Growing Degree Days (expressed in °F), as of October 6, for grain sorghum at three flowering dates: August 15, September 1, and September 15. The darker the red, the higher the number of accumulated GDDs.

As of October 6, the lowest temperature recorded for the season was close to or below the freezing point (32 F) for the northwestern area of Kansas, which includes the counties of Cheyenne, Rawlins, Decatur, Sheridan, Norton, Graham, Trego, Phillips, Rooks, Smith, Osborne, Greeley, Wallace, Sherman, Thomas, and Logan. Many of these low temperatures were reported in mid-September. These freezing temperatures could potentially affect sorghum fields. Even if most of the yield potential was realized, the test weight might be reduced.

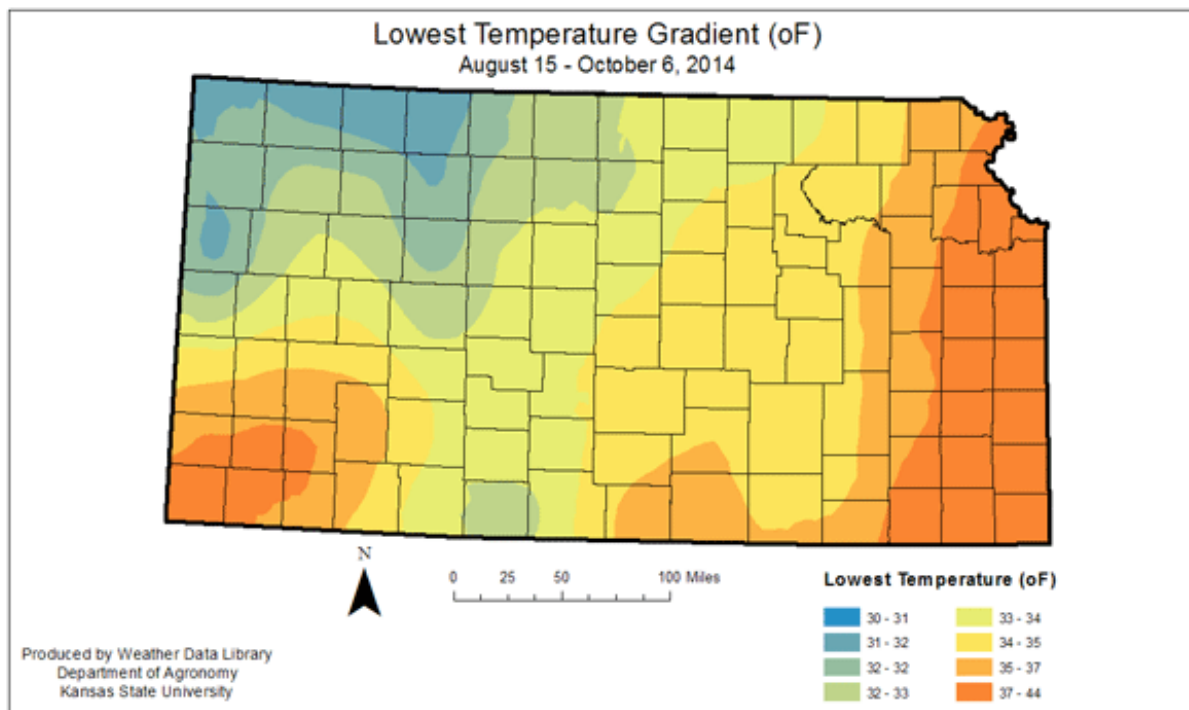


Figure 3. Map of the lowest temperatures recorded from August 15 to October 6. The deeper the blue, the lower the minimum temperature (30-31 degrees F); the deeper the red, the higher the minimum temperature (37-44 degrees F).

The average day for the first fall freeze is earliest in northwest Kansas and latest in south central and southeast Kansas.

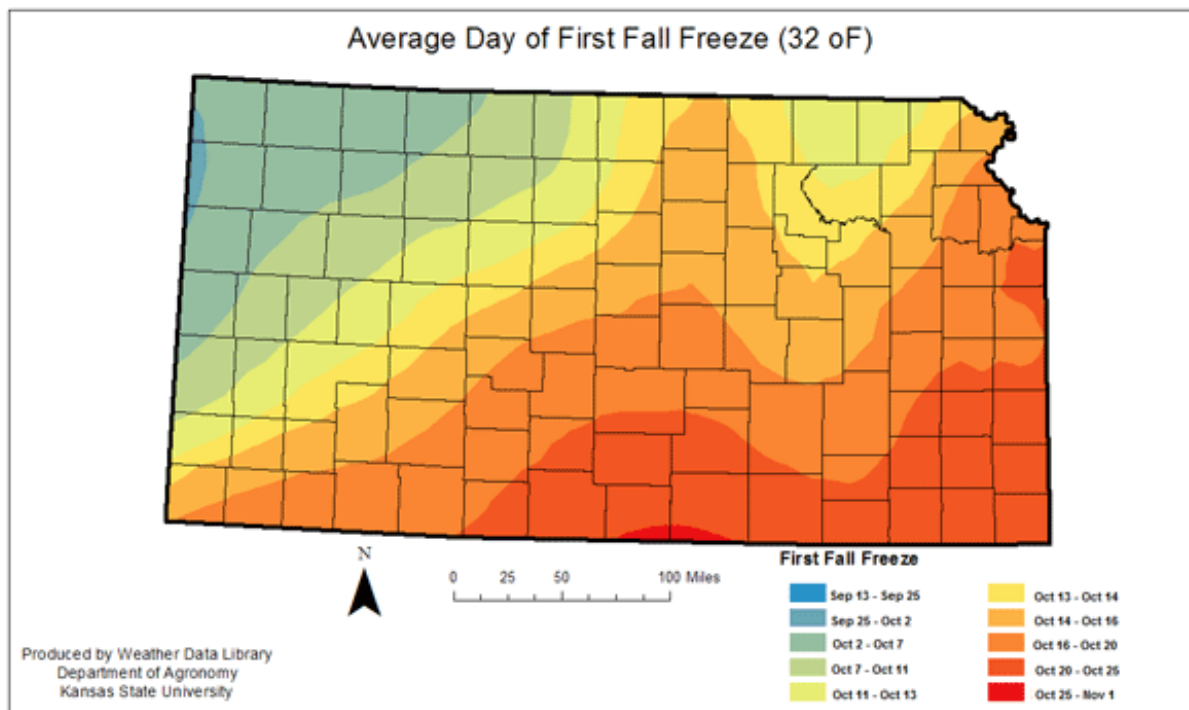


Figure 4. Average day of first fall freeze (32 F).

Management considerations

From a management perspective, the best way to mitigate this issue is to plan in advance. Recommended practices are:

- Use early planting dates for full-season hybrids, or
- When planting later, use medium- to short-season hybrids

If the sorghum is killed by a freeze before maturity, producers should first analyze the crop for test weight and yield potential before deciding grazing or harvesting for silage. Freeze damage may cause problems with drydown in sorghum.

For more information on this, see “Harvesting Grain from Freeze-damaged Sorghum,” K-State publication MF-1081: <http://www.ksre.ksu.edu/bookstore/pubs/mf1081.pdf>

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2. Get an early start on weed control in soybeans

Fall harvest is a good time for producers to assess the weed problems they had in soybean fields this year, and plan a good weed control program for next year. In most cases, it is no longer possible to rely strictly on glyphosate for broadleaf weed control in Roundup Ready soybeans. Before deciding what herbicide program to implement, it is necessary to identify the problem weeds in each field, and what kind of herbicide resistance issues might be present. Some good options for seven of the most common broadleaf weed and grass problems include:

1. Pigweeds (including waterhemp and Palmer amaranth). Glyphosate-resistant waterhemp is now fairly common in eastern Kansas and glyphosate-resistant Palmer amaranth increased dramatically in central Kansas this past summer. For preemergence pigweed control, the Valor-based herbicides (Valor SX, Valor XLT, Fierce, Fierce XLT, Gangster, Surveil, Envive, Enlite, and Trivence) and Authority-based herbicides (Authority Maxx, Authority Elite, Authority XL, Authority First, Sonic, Authority Assist, Authority MTZ, and Spartan) can all provide very good to excellent control to supplement a postemergence program. Prefix is another excellent “foundation” herbicide for residual pigweed control in soybeans and can be applied early postemergence as well as prior to emergence. Metribuzin, Intrro, Dual, Outlook, and Prowl products can also provide some early-season pigweed control, but generally are not as effective as those previously mentioned products. Zidua and Anthem contain the active ingredient pyroxasulfone (also a component of Fierce). Pyroxasulfone has a similar mode of action to Intrro, Dual, and Outlook but may provide longer residual control of pigweeds.

Although some of these herbicides can be applied in the fall or early spring, those treatments generally will not persist long enough to give good pigweed control into the soybean growing season. If pigweed is the primary target, treatments will be most effective if applied no more than two weeks prior to planting. If glyphosate-resistant pigweeds escape preemergence control, the primary postemergence tank-mix options would be Cobra, Flexstar, Ultra Blazer, or Marvel. However, timing is critical for good control. These products should be applied before pigweeds exceed 4 inches tall for optimum control.

2. Velvetleaf. Glyphosate is not always entirely effective on velvetleaf. To assist in velvetleaf control, the Valor-based and FirstRate-based herbicides (Valor SX, Valor XLT, Fierce, Fierce XLT, Gangster, Surveil, Authority First, and Sonic) are some of the most effective preplant and preemergence herbicides you can use. Postemergence tank-mixes to enhance velvetleaf control would include FirstRate, Cadet, and Resource.

3. Cocklebur. The most effective preplant and preemergence herbicides to aid in cocklebur control are those that contain FirstRate, Classic, or Scepter. Such products would include Authority First, Sonic, Gangster, Surveil, Envive, Trivence, Valor XLT, and Fierce XLT. Extreme, which is a premix of glyphosate and Pursuit, can also be used as a preplant or postemergence treatment in Roundup Ready soybeans to provide residual cocklebur control. However, all of these herbicides are ALS-inhibiting herbicides, and ALS-resistant cocklebur may be present in some fields.

4. Marestalk. Marestalk is probably the most widespread glyphosate-resistant weed in Kansas. Marestalk control in fields going to soybeans should begin with fall or early spring herbicide treatments that include dicamba, 2,4-D, or an ALS-inhibiting herbicide such as Canopy EX or Autumn

Super. Unfortunately, ALS resistant marestail may also be present in some fields, so a tank-mix with dicamba or 2,4-D is still recommended. Dicamba has provided better marestail control than 2,4-D in K-State research the last several years. Fall treatments should be delayed until November when most of the fall-germinating marestail has emerged. With spring applications, be aware of the intervals required between application of these herbicides and planting soybeans.

A couple of relatively new options for marestail control in soybeans without a preplant waiting interval (except on coarse soils with 2% organic matter or less) are the Kixor-containing products, Sharpen and OpTill. Sharpen is Kixor alone, while OpTill is a premix of Kixor and Pursuit. Both products can be used for burndown control of marestail anytime before soybean emergence (cracking). To optimize marestail control with Sharpen and OpTill, spray before marestail gets too big, use an adequate spray volume to insure good spray coverage, and apply in combination with a methylated seed oil. The Kixor rates that can be used in soybeans will not provide very much residual control of marestail. Other residual preplant herbicides that can help with burndown and residual marestail control include Valor and FirstRate-based herbicides, such as Valor XLT, Fierce, Fierce XLT, Enville, Trivence, Enlite, Authority First, Sonic, Gangster, or Surveil.

Marestail is best controlled before soybean planting and before the marestail begins to bolt. FirstRate or Synchrony would probably be the most effective tank-mix partner with glyphosate for postemergence marestail control in Roundup Ready soybeans. However, if ALS-resistant marestail are present, these treatments will not be very effective. Liberty is one of the better herbicides to control marestail that has started to bolt in the spring. Liberty can be used as a burndown treatment prior to emergence of any soybeans, or as a postemergence treatment in Liberty Link soybeans.

5. Morningglory. Glyphosate sometimes has trouble controlling morningglory. To help get better control, you can use either Authority-based or Valor-based herbicides preplant or preemergence. Liberty can also provide good morningglory control in Liberty Link soybeans.

6. Kochia. Kochia is a major weed problem in western areas and has often been difficult to control with glyphosate, especially as it gets bigger. In addition, glyphosate-resistant kochia is now common across much of western Kansas. Since much of the kochia emerges well before soybean planting, one of the keys to managing kochia in soybeans is to control it early in the spring before soybean planting. Research by K-State in recent years indicates that several preemergence herbicides can help provide control of glyphosate-resistant kochia, especially the Authority-based products listed above. Early applications of dicamba can also provide effective control of kochia, but the appropriate precipitation and preplant waiting intervals need to be followed to avoid potential soybean injury and stand loss. The Kixor-containing products Sharpen and OpTill may help with kochia burndown, but the Kixor rates that can be used in soybeans will not provide very much residual control. ALS-inhibiting herbicides may or may not provide kochia control because of the occurrence of ALS-resistant kochia.

7. Crabgrass and small-seeded broadleaf weeds. Glyphosate usually gives good control of most grasses, but producers may want to apply a foundation herbicide to control grasses early, followed by a postemergence glyphosate application to clean up any escapes. Prefix, Fierce, Intrro, Dual II Magnum, Outlook, and Prowl H2O can all provide good early-season grass and pigweed control ahead of Roundup Ready soybeans. Of these, Prefix and Fierce generally provide the best pigweed control, and Prowl H2O the least. Several residual herbicides, such as Warrant, Outlook, and metolachlor products can be applied as a postemergence tank-mix with glyphosate, depending on soybean growth stage, to provide extended residual control of grasses and broadleaves later in the

season. However, it is important to understand that these products do not have postemergence activity, so they will not control emerged glyphosate-resistant pigweeds.

Liberty Link soybeans are an alternative technology to Roundup Ready, especially in the presence of glyphosate-resistant weeds. Liberty can provide effective postemergence control on a broad spectrum of weeds, but good performance is very dependent on several application factors, such as weed size, spray coverage, and humidity. The most successful Liberty Link weed control programs will utilize a good preemergence herbicide treatment at planting, followed by a timely application of Liberty when the weeds are relatively small using a minimum spray volume of 15 gallons per acre to ensure good spray coverage.

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3. Green stem syndrome in soybeans

Green stem syndrome in soybean is a condition by which the stem remains green while the seeds are mature and ready to harvest. In parts of the state, there are many fields of soybeans with brown pods but green stems (Figure 1). A hard freeze will kill the leaves and stems, but it still may take a while for the leaves to drop, if leaves are still green.

Producers can either harvest these soybeans now if the seed moisture is dry enough, or wait until the leaves have dropped and stems dry down. In most cases, it would be best to harvest sooner rather than later to reduce losses from shattering and lower seed quality. Harvesting beans before the leaves have dropped can be messy and gum up the combine, but at least the yield level will be maintained. Make sure harvesting equipment is sharp and in top condition, and take it slow in the field. Harvesting soybeans with green stems can be challenging.



Figure 1. Green stem syndrome in soybean, characterized by green stem and brown pods (seeds are fully mature). Photo by Ignacio Ciampitti, K-State Research and Extension.

Causes

What caused this unusual situation this year? It's most likely due to a combination of stress, low pod counts, and late rains. Also, soybean aphids, stink bugs, leaf beetles and viruses can help cause this problem.

In a normal situation, soybeans will accumulate carbohydrates and proteins in the leaves and stems up until seeds begin to form (R5). The leaves provide the photosynthates needed by the newly formed seeds as they begin filling. As the seeds continue to get bigger, their need for photosynthates will eventually become greater than what the leaves can provide through normal photosynthesis. As this happens, the plants will move carbohydrates and proteins from the leaves and stems into the seeds. This can be referred to as "cannibalization" of the vegetative tissue (rapid senescence process and defoliation), but it's a normal process. This eventually causes leaves to turn yellow and drop, and the stems to turn brown and die.

The fewer the number of seeds, due to abiotic or biotic stresses, the lower the demand for photosynthates produced by leaves and stems. If demand is low enough, the leaves and stems are never "cannibalized" for their carbohydrates and protein. As a result, the leaves and stems will remain green longer than normal, even up through physiological maturity of the beans. Late-season rainfall can make the problem worse by keeping the plants alive as the seeds have dried down. It will take either a frost or a desiccant to kill the leaves and stems in this situation.

If the leaves are still green and intact when pods have turned brown and have reached 13-14% moisture, it's almost always an indication of mid-season stress around flowering/pod set and low yield potential – at least relative to the amount of foliage produced.

What can be done for harvesting purposes?

Eventually, freezing temperatures will kill the leaves and dry down the stems. Otherwise, the utilization of desiccants to kill leaves and drop the stem moisture down is a viable option, but only if the producer wants to harvest the field soon, before a freeze is likely to occur. If the stems and/or leaves are still green when the field is harvested, the best option is to harvest slowly and make sure the harvesting equipment is sharp and in excellent condition.

We recommend scouting your field right before harvest to better understand what environmental conditions led to the green stems.

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4. Comparative Vegetation Condition Report: September 23 - October 6

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 40: 09/23/2014 - 10/06/2014

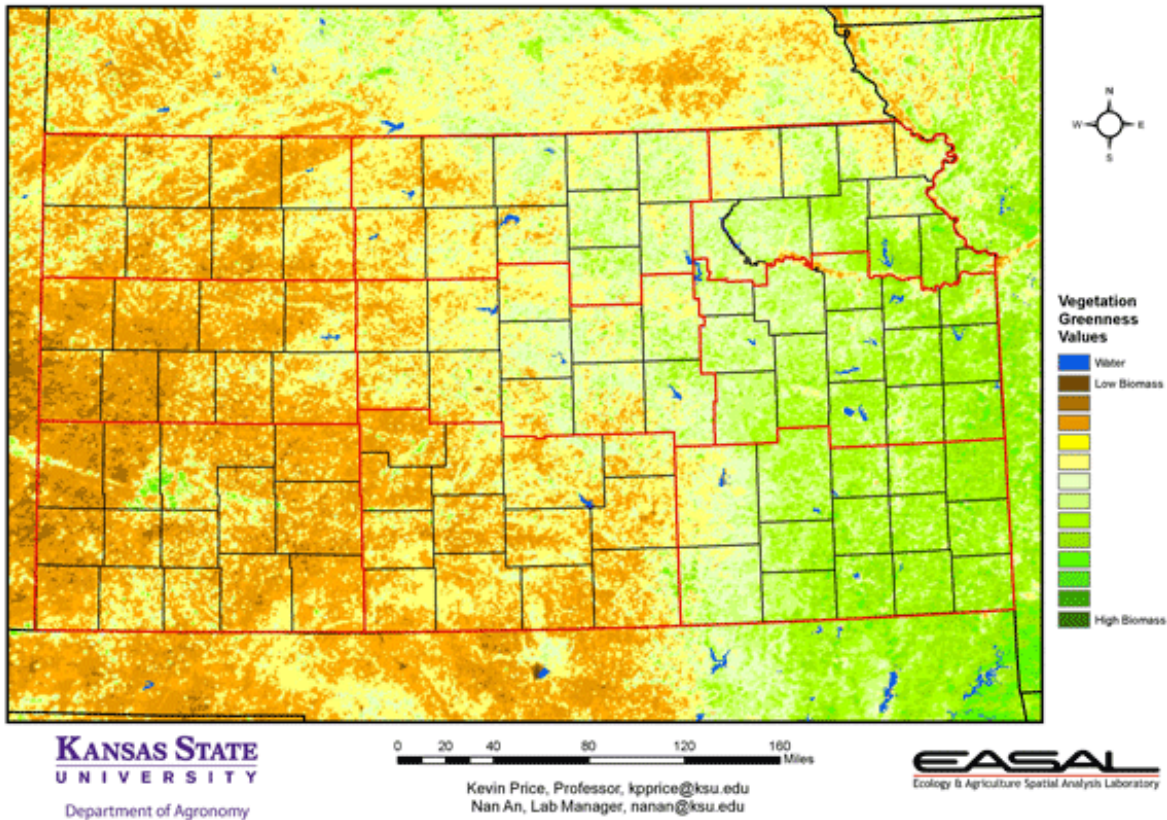


Figure 1. The Vegetation Condition Report for Kansas for September 23 – October 6 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that the highest NDVI values continue to be in the eastern third of the state. The values are highest in the Leavenworth County area. This area of the state continued to have adequate moisture and missed the recent freezing temperatures.

Kansas Vegetation Condition Comparison
Late-Sept/Early-Oct 2014 compared to the Late-Sept/Early-Oct 2013

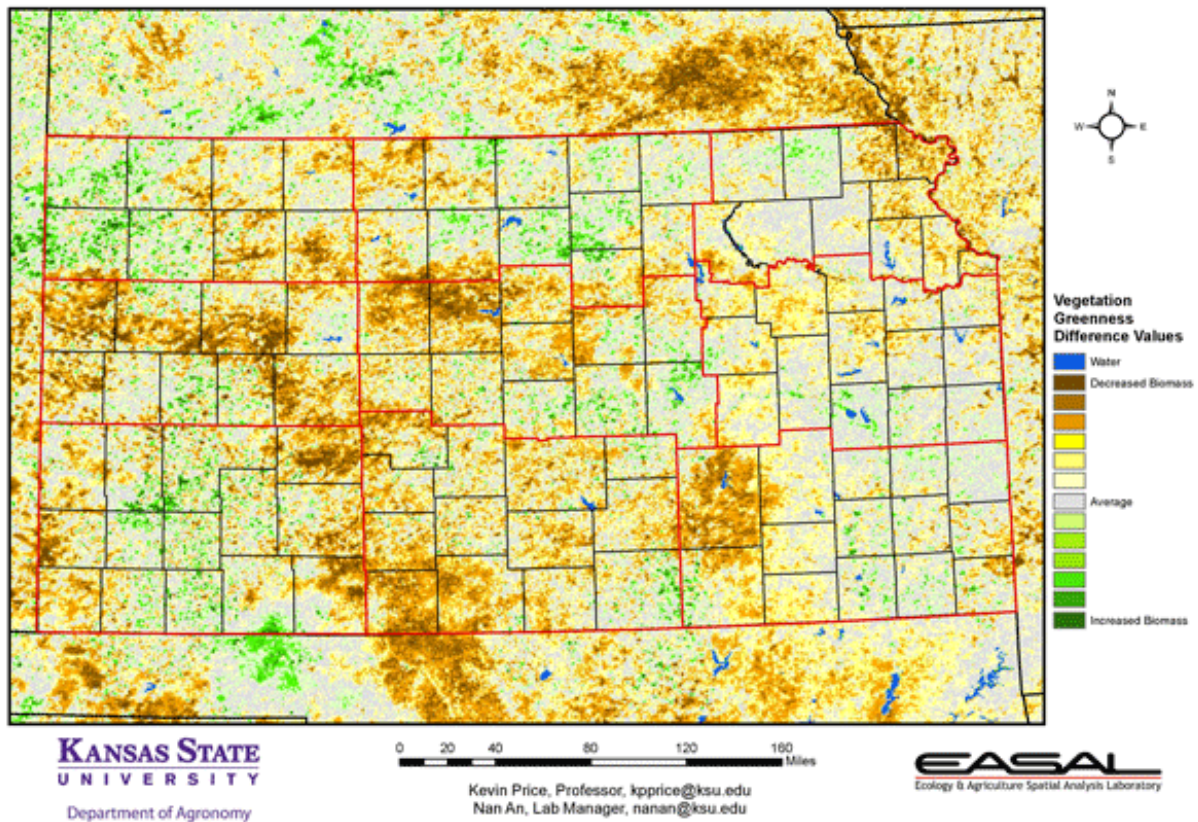


Figure 2. Compared to the previous year at this time for Kansas, the current Vegetation Condition Report for September 23 – October 6 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that parts of central and western Kansas have lower biomass production. This is particularly evident in Comanche County, where severe drought continues.

Kansas Vegetation Condition Comparison

Late-Sept/Early-Oct 2014 compared to the 25-Year Average for Late-Sept/Early-Oct

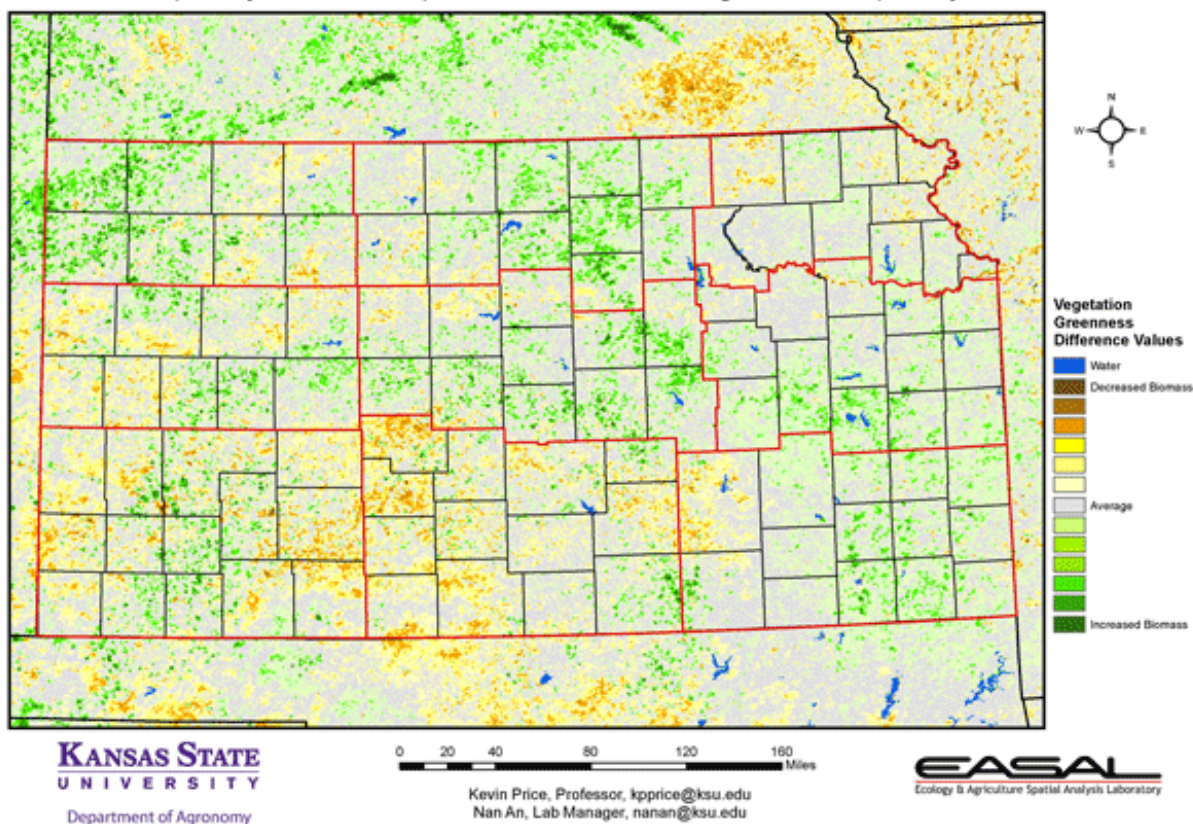


Figure 3. Compared to the 25-year average at this time for Kansas, this year's Vegetation Condition Report for September 23 – October 6 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows much of the state is close to the average. The exception is an area from Pawnee to Edwards and Clark counties.

U.S. Corn Belt Vegetation Condition

Period 40: 09/23/2014 - 10/06/2014

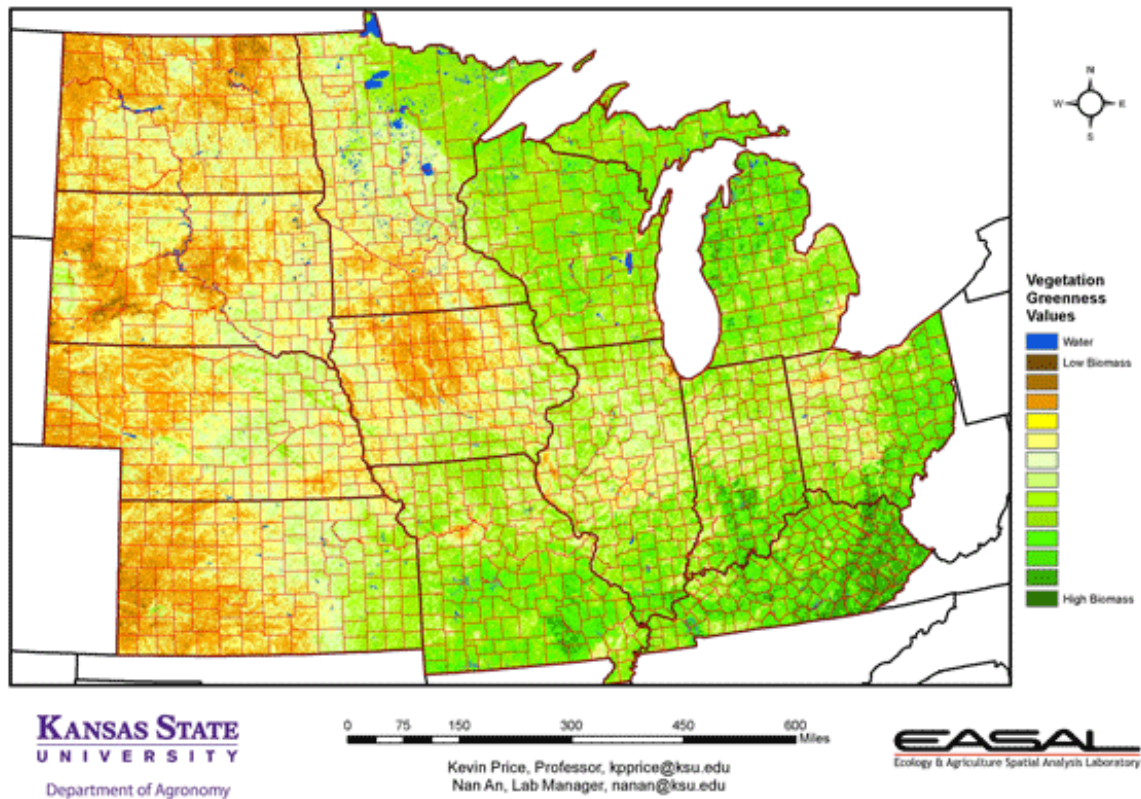


Figure 4. The Vegetation Condition Report for the Corn Belt for September 23 – October 6 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that reduced biomass productivity is most noticeable in the northern and western areas of the region. Southern Minnesota and northern Iowa also have low NDVI values. In northern Iowa, 90 percent of the soybeans have dropped leaves.

U.S. Corn Belt Vegetation Condition Comparison
Late-Sept/Early-Oct 2014 Compared to Late-Sept/Early-Oct 2013

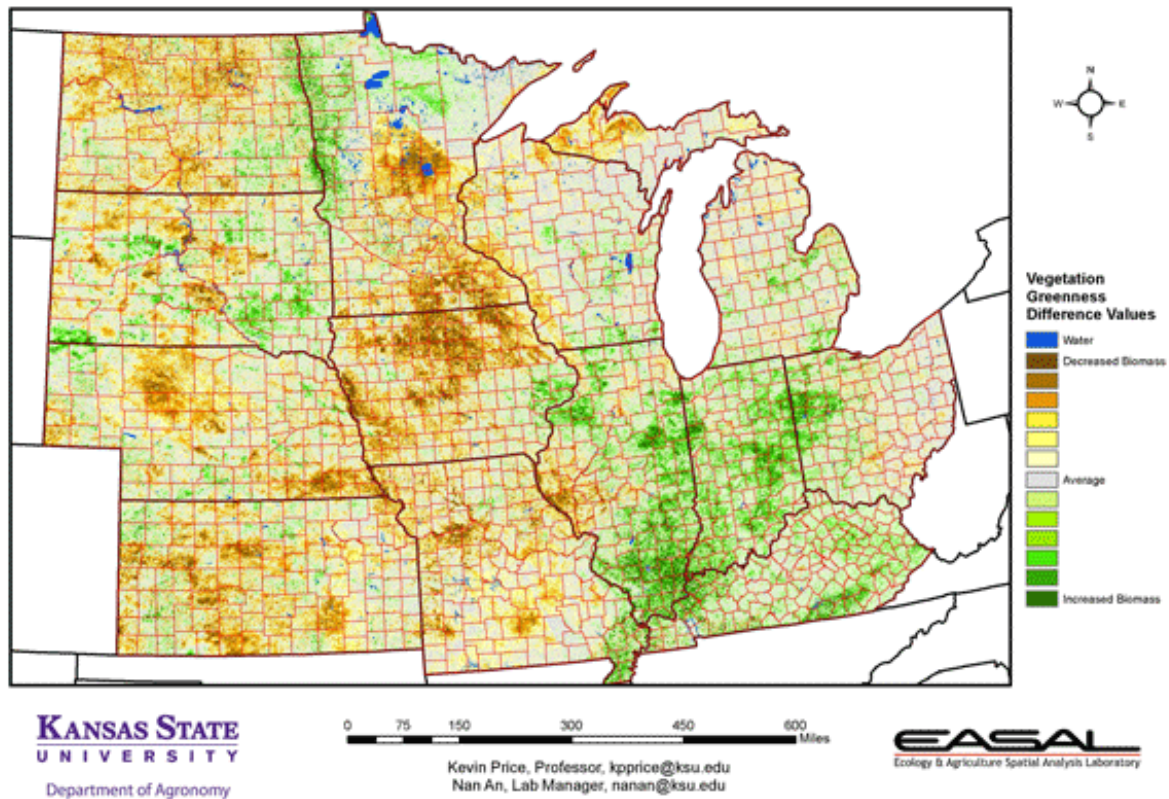


Figure 5. The comparison to last year in the Corn Belt for the period September 23 – October 6 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that while there are pockets of higher biomass production, most areas are at the same or lower levels of activity. The largest area of increased biomass production is in southern Illinois and Indiana. Last year, much of that area was in moderate to severe drought, while this year the area is largely drought-free.

U.S. Corn Belt Vegetation Condition Comparison
Late-Sept/Early-Oct 2014 Compared to the 25-Year Average for Late-Sept/Early-Oct

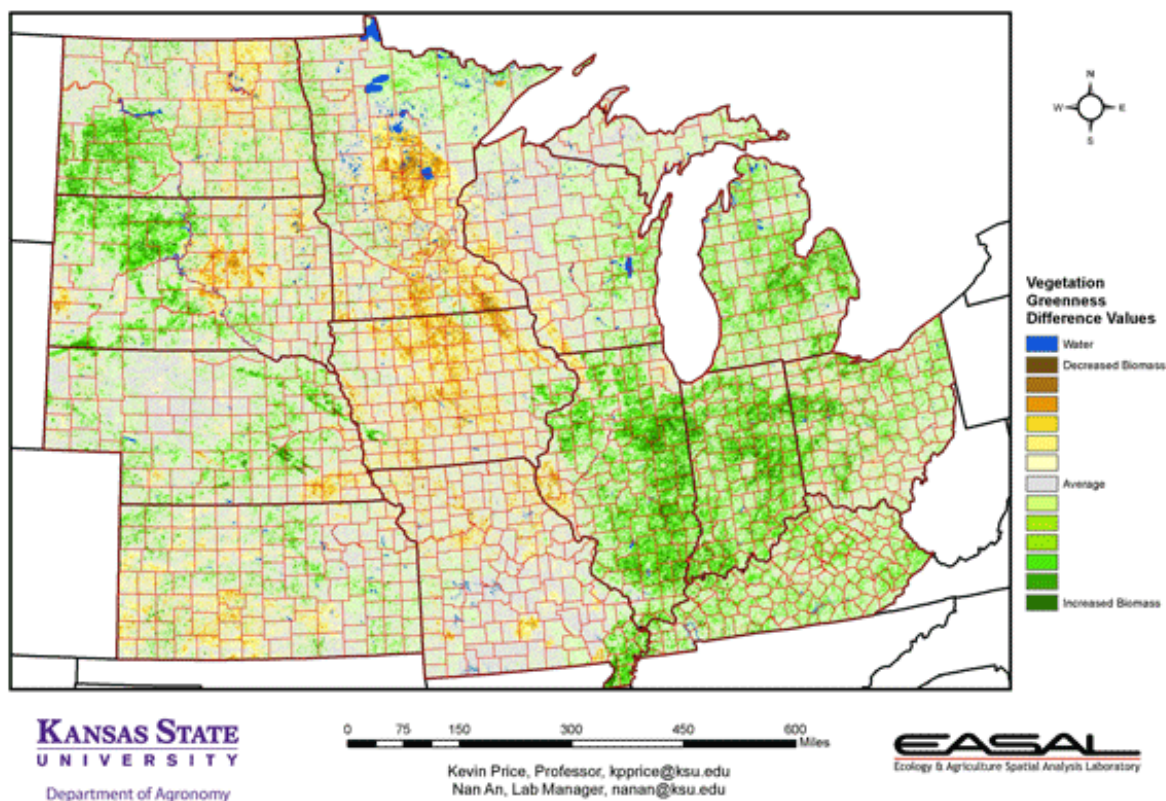


Figure 6. Compared to the 25-year average at this time for the Corn Belt, this year's Vegetation Condition Report for September 23 – October 6 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that Illinois and Indiana have the greatest increase in biomass production. In Illinois, harvest was delayed by heavy rains, but pastures are rated 68 percent good to excellent.

Continental U.S. Vegetation Condition

Period 40: 09/23/2014 - 10/06/2014

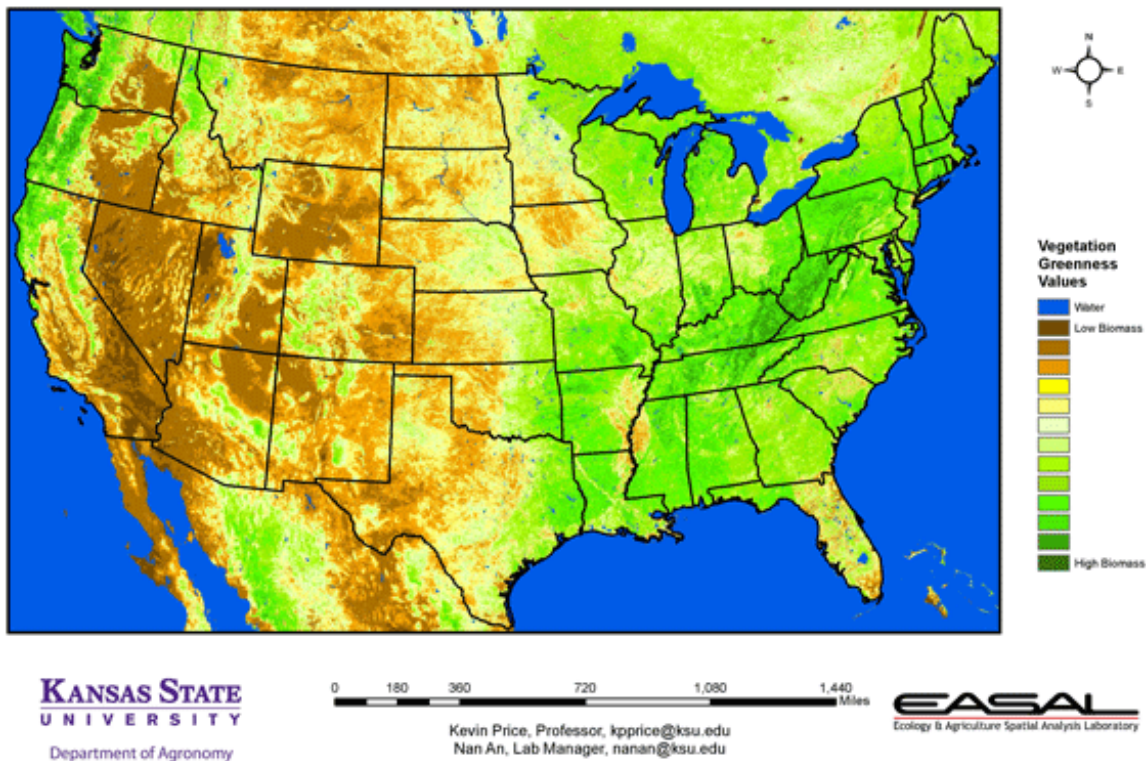


Figure 7. The Vegetation Condition Report for the U.S. for September 23 – October 6 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that as the growing season comes to an end, the highest photosynthetic activity is in the Appalachians in eastern Kentucky and West Virginia. Significant photosynthetic activity is also visible in the desert Southwest, where continued moisture from a series of tropical systems has enhanced vegetative activity.

Continental U.S. Vegetation Condition Comparison
Late-Sept/Early-Oct 2014 Compared to Late-Sept/Early-Oct 2013

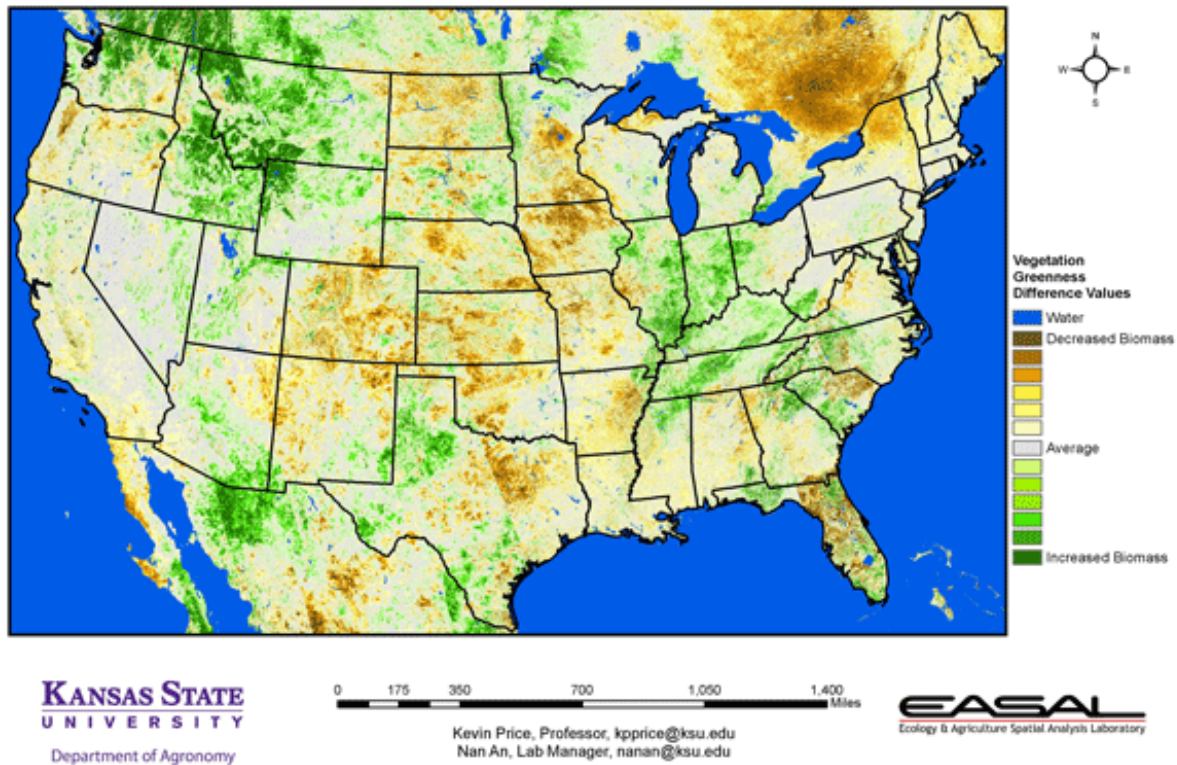


Figure 8. The U.S. comparison to last year at this time for the period September 23 – October 6 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that two areas have significantly higher photosynthetic activity. The largest is the area from northern Washington to Idaho, Montana, and northwestern Wyoming. The second area is in the Texas Panhandle. Moisture has been much more favorable this year in these regions.

Continental U.S. Vegetation Condition Comparison
Late-Sept/Early-Oct 2014 Compared to 25-year Average for Late-Sept/Early-Oct

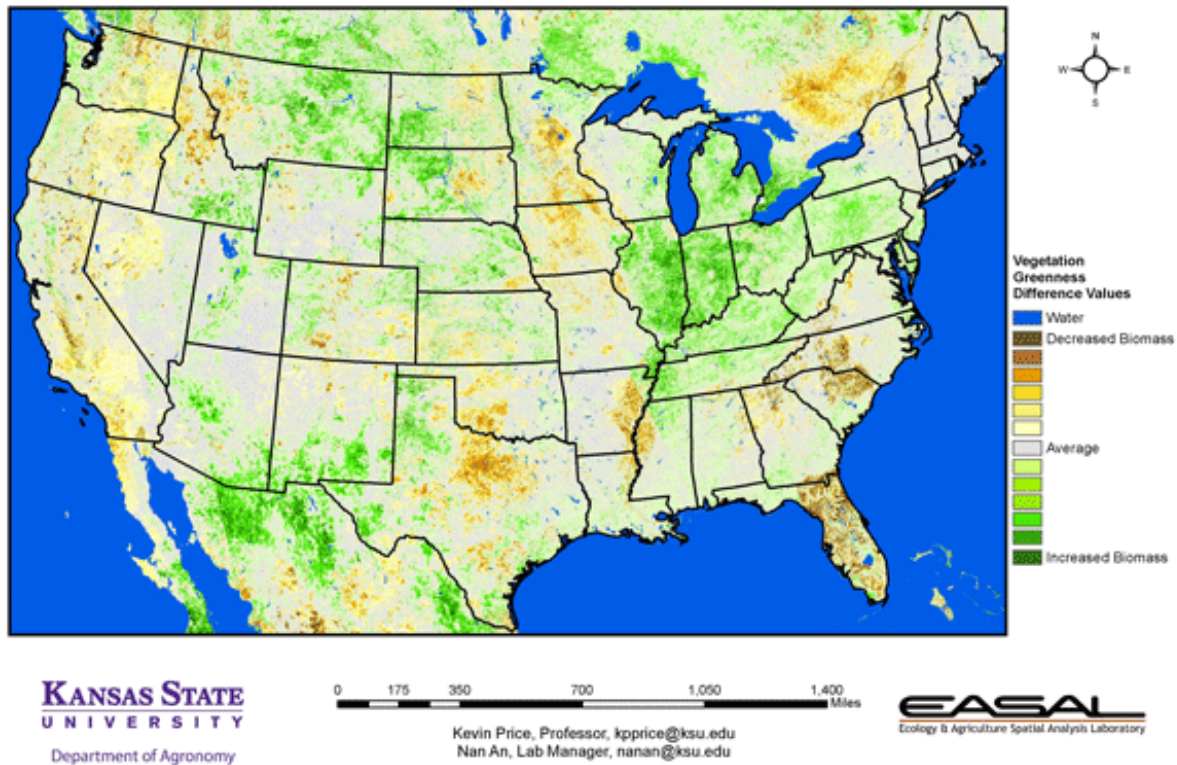


Figure 9. The U.S. comparison to the 25-year average for the period September 23 – October 6 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that much of the U.S. has at or above average photosynthetic activity. The most concentrated area of above-average activity is in the Ohio River Valley from Illinois to Indiana. The largest area of below-average activity is in Florida. Excess moisture is the problem there. There are reports of disease problems in vegetables and standing water in pastures. Soil moisture statewide in Florida is reported at 28 percent excessive and 68 percent adequate.

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