Issue 575

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Extension Agronomy

eUpdate

06/17/2016

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, or Curtis Thompson, Extension Agronomy State Leader and Weed Management Specialist 785-532-3444 cthompso@ksu.edu.

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1. Control weeds in wheat stubble before they set seed

Because of the excessively wet weather in May, among other reasons, many fields of wheat stubble in Kansas have rather large broadleaf and grassy weeds actively growing at this time. Also, where there was extensive hail damage, weeds may be growing quickly now in bare areas of the fields. These weeds are utilizing moisture and nutrients that would be available for a subsequent crop. It is a good idea to control these weeds while there is moisture and active growth, and before they set seed.

Kochia and Russian thistle are daylength sensitive and will begin to flower toward the end of July and into August, thus will need to be controlled before then. Controlling kochia and Russian thistle by mid-July is very important to prevent seed production.

Weeds growing now in wheat stubble fields, without crop competition, set ample seed -- which will result in weed problems for the following crops. It is especially important to prevent seed production from happening on fields that will be planted to crops with limited options for weed control, such as grain sorghum, sunflower, or annual forages. It is especially difficult to control broadleaf weeds in sunflower and grassy weeds in sorghum or annual forages when the weeds emerge after crop emergence. Preventing weed seed production ahead of these crops is essential. Seed of some weed species can remain viable for several years, so allowing weeds to produce seed can create weed problems for multiple years.

If the field will be planted to Roundup Ready corn or soybeans, producers may decide they can just wait and not control the weeds, allowing weed seeds to form and assuming the weeds that emerge next season can be controlled with a postemergence application of glyphosate in the corn or soybeans. However, with the increasing concerns over the development of glyphosate-resistant weeds, kochia, Palmer amaranth, and waterhemp, it would be far better to control these weeds now in wheat stubble. That way, herbicides with a different mode of action can be tank-mixed with glyphosate, or burndown herbicides other than glyphosate may be used to ensure adequate control of glyphosate-resistant weeds.

To control weeds in wheat stubble fields, producers should start by applying the full labeled rate of glyphosate with the proper rate of ammonium sulfate additive. As mentioned, it is also a good idea to add 2,4-D or dicamba (unless there is cotton or other susceptible crops in the area) to the glyphosate. Do not apply growth regulator herbicides around cotton. Tank mixes of glyphosate and either 2,4-D or dicamba will help control weeds that are difficult to control with glyphosate alone, and will help reduce the chances of developing glyphosate-resistant weed populations.

Often tankmixes of dicamba or 2,4-D with glyphosate may not perform well if pigweed populations are glyphosate-resistant or if the weeds are growing under the kind of dry conditions we can experience in Kansas. If weeds are glyphosate-resistant or growing under drought stress, a tankmix of Gramoxone with atrazine or metribuzin (triazines are synergistic with Gramoxone), or Gramoxone with Sharpen, have been a more effective treatment than either a glyphosate/dicamba or glyphosate/2,4-D tankmix.

If wheat is to be planted this fall, do not use atrazine or metribuzin in the tankmix. We observed significant injury to wheat in the spring of 2015 following a July 2014 application of 3/8 lb ai metribuzin tankmixed with Gramoxone (Figure 1). Perhaps utilizing Sharpen would be a safer and better option if the field is to be returned to wheat. Sharpen can be used in other tank mixtures and could help control glyphosate-resistant kochia.

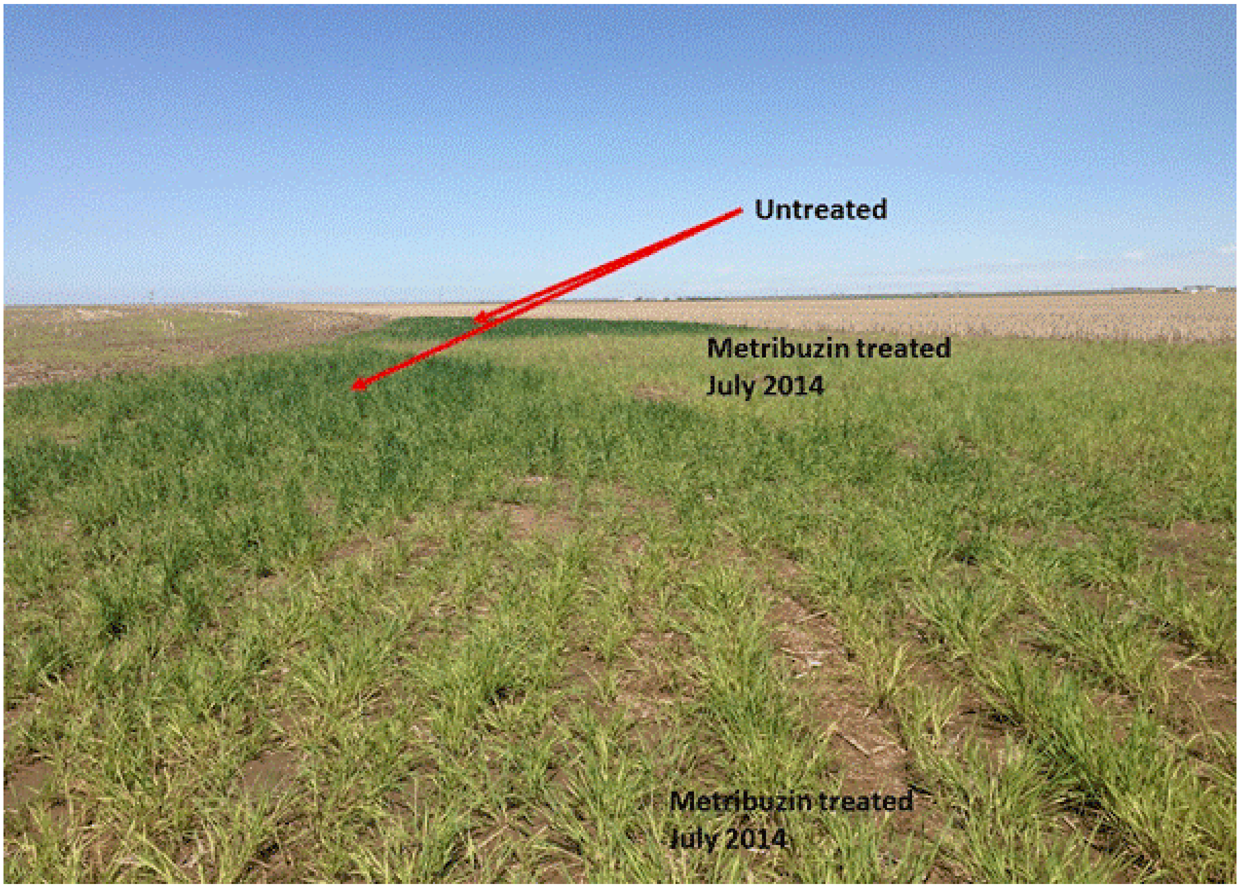

Figure 1. Metribuzin applied with Gramoxone on fallow July 2014. Wheat planted October 2014 and injury observed only during the spring (untreated areas are greener). Photo by Curtis Thompson, K-State Research and Extension.

Several have asked about the addition of atrazine for residual weed control in fallow. Although atrazine provides residual control of weeds, it is best applied later in the fall (November). At this time of year, atrazine residual is quite short and will not provide adequate control of fall-emerged weeds/winter annuals. An application of atrazine needs to be made in the fall (mid-October through November), depending on the weeds being targeted. Also, keep in mind that atrazine antagonizes glyphosate – just the opposite of the synergistic effect of atrazine and Gramoxone. Do not apply atrazine with reduced rates of glyphosate.

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2. The importance of early control of volunteer in hailed-out wheat

Producers often like to wait several weeks after harvest before making their first herbicide application to control volunteer wheat. This allows as much volunteer as possible to emerge before spraying it or tilling it the first time. Often, a second application or tillage operation will be needed later in the summer to eliminate the green bridge to wheat by making sure all volunteer is dead within ½ mile of wheat being planted in the fall.

But where wheat was hailed out and volunteer has already emerged at the time of harvest, control should begin immediately after harvest if possible. This may require one more field pass than normal to control volunteer wheat, but will help prevent even bigger problems down the road. It should be noted that grazing volunteer is not an effective option because there is green wheat material left and the mites can be living in that material.

Why the need for early control of volunteer in hailed-out wheat? Where wheat suffered hail damage after heading, volunteer often emerges even before the existing field is harvested – as much as two to three weeks or more earlier than it would normally emerge after harvest. This volunteer wheat is especially likely to become infected with wheat curl mites and lead to problems later in the season if left uncontrolled.

Figure 1. Thick stand of volunteer wheat after wheat harvest. Photo by Stu Duncan, K-State Research and Extension.

Wheat curl mites will move off growing wheat as the green tissue dries down and dies. After moving off the existing wheat at or near harvest time, the mites need to find green tissue of a suitable host soon or they will die of desiccation.

Research has found that the mites can live quite a few hours off the plant, and up to 24 hours under low temperature conditions, so significant numbers of mites may be blown in from farther away than previously thought.

If there is young, volunteer wheat growing at the time the current wheat crop is being harvested in the nearby region, the mites can quickly infest those volunteer plants and survive.

If volunteer has emerged and is still alive shortly after harvest in hailed-out wheat, wheat curl mites could easily build up rapidly and spread to other volunteer wheat that emerges later in the season. On the other hand, if this early-emerging volunteer is controlled shortly after harvest, that will help greatly in breaking the green bridge. However, if more volunteer emerges during the summer, follow-up control will still be needed.

Volunteer wheat is not the only host of the wheat curl mite. Recent research has evaluated the suitability of wild grasses as hosts for both the curl mite and the wheat streak virus. Barnyardgrass topped the list in terms of suitability for both virus and mites, but is fortunately not that common in wheat fields. In contrast, green foxtail, although a rather poor host, could be an important disease reservoir simply because of its abundance. Take note of significant stands of these grasses in marginal areas and control them as you would volunteer wheat.

If volunteer wheat and other hosts are not controlled throughout the summer and are infested with wheat curl mites, the mites will survive until fall and could infest newly planted wheat at that time. Wheat curl mite infestations of wheat often lead to wheat streak mosaic infections.

Figure 2. Volunteer wheat on the edges of a sunflower field were infested with wheat curl mites and caused a wheat streak mosaic infection in the adjacent wheat crop that fall. Photo by Stu Duncan, K-State Research and Extension.

Figure 3. Closeup of wheat showing symptoms of a wheat streak mosaic virus infection in the fall. Photo by Jeanne Falk Jones, K-State Research and Extension.

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3. Stripe rust incidence in 2016 wheat plots

Stripe rust was the most significant disease on wheat for the 2016 growing season. The disease got an early start this year and was found at low levels in central and southeast Kansas by the middle of April. Dry conditions slowed the development of stripe rust early, but when the rains came, the disease spread rapidly.

The effects of stripe rust were evident in many of the variety demonstration plots we visited this year. In some cases, the severity of stripe rust was approaching 100% on susceptible varieties (Figure 1). This level of disease was common throughout the state, but many growers were aware of the threat and responded with fungicide applications. The visual evidence of fungicide application was striking at many locations. In some situations, it appeared the fungicide was applied a little too late and the leaves were already damaged by stripe rust. The fungicide still killed the fungus and prevented further spread, but the leaves had tan, dead areas that were damaged by the disease Figure 2.

Figure 1. Stripe rust damaged the leaves of many susceptible varieties this year. This image shows a susceptible variety that was severely damaged by disease during the early stages of grain development. Photo by Erick DeWolf, K-State Research and Extension.

Figure 2. Partial control of stripe rust with a fungicide. The fungicide killed the fungus, but the damaged cells on the leaves continued to die, resulting in tan, dead areas on the leaves. Photo by Erick DeWolf, K-State Research and Extension.

The benefits of genetic resistance were also evident this year (Figure 3). The stripe rust population this year was very similar to last year and most varieties with moderate or high levels of genetic resistance made it through the season with only minor damage to the leaves. Stripe rust developed much slower on varieties with intermediate levels of stripe rust resistance. Many growers reported that these varieties had enough disease to warrant a fungicide application, but the slower disease development provided some extra time to respond to the emerging threat of stripe rust and protect the crop with a fungicide treatment.

Figure 3. Comparison of wheat varieties with different levels of genetic resistance to stripe rust. The susceptible variety (right) has symptoms of severe stripe rust evident on the flag leaves. The disease is so severe that the leaves appear yellow even from a distance. Photo by Erick DeWolf, K-State Research and Extension.

Varieties with moderate or high levels of genetic resistance include some well-established varieties such as WB-Cedar and T158. Other relatively new varieties such as Gallagher, Oakley CL, SY Monument, TAM 114, WB4458, and WB-Grainfield also appeared to be holding up well this year. It was also encouraging to see recent releases with good levels of stripe rust resistance, including Larry, LCS Chrome, SY Grit, Tatanka, WB4721, and Zenda. Selecting varieties with genetic resistance to stripe rust could greatly reduce the risk of severe stripe rust in the future and reduce the need for extra costs associated with fungicide application.

Leaf rust, barley yellow dwarf, and tan spot were also present in some of the demonstration plots this year. Thankfully it appears the incidence of these diseases was low or occurred late enough in the growing season that they are not likely to cause severe yield losses this year. Fusarium head blight (head scab) was detected again this year. Most demonstration plots had less than 3% incidence of head scab and we remain cautiously optimistic that we may have escaped widespread significant losses from this disease. The full impact of these diseases will become clearer as we move further into harvest.

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4. Possible causes of yellow soybeans

When soybeans turn yellow at an early stage of growth, there are several possible explanations.

Nitrogen (N) deficiency. In fields that have been extremely wet or extremely dry, or under severe early heat stress, rhizobial nodule development can be delayed, resulting in N deficiency. As soil moisture levels return to more normal conditions (if a short-term stress), the nodule-forming bacteria will go to work and the deficiency symptoms will quickly disappear. With N deficiency, it is usually the lower leaves that are chlorotic or pale green. Within the plant, any available N from the soil or from N fixation within nodules on the roots goes to the new growth first.

Figure 1. Nitrogen deficiency in soybeans. Photo by Dorivar Ruiz Diaz, K-State Research and Extension.

Soybeans doublecropped after wheat can be N deficient for a short period of time shortly after emergence until the beans become well nodulated. As the wheat straw decomposes, some of the soil available N will be immobilized, making it unavailable to the young soybean plants. Applying a small amount of N (no more than 30 lbs acre) at planting time to soybeans planted into wheat residue is the best way to avoid early-season N deficiency.

Hail damage can also cause N deficiency in soybeans at times. If the foliage is damaged enough so that the plant can't provide enough food for the rhizobia on the roots, the rhizobia will slough off the roots or become temporarily inactive. If this happens, the plants may temporarily become N deficient. Plants normally recover from this as regrowth progresses and photosynthates are translocated to the nodules.

Nitrogen deficiency due to a failure of soybeans to nodulate properly has also been a problem at times where soybeans are planted into new acres with no history of soybean production. In recent years, there have been reports of inoculated soybeans planted on "virgin" fields that have failed to produce nodules, resulting in N deficiency. An examination of the root systems showed very few or no nodules. Previous studies show that a rescue application of 90 to 120 pounds of N per acre gave good returns in these situations. A rescue application should be considered only if N deficiency symptoms are confirmed, and applications should be made as soon as possible to increase N uptake.

Iron (Fe) chlorosis. Soils that are too wet can also induce temporary symptoms of Fe chlorosis. With Fe chlorosis, the top most leaves will turn yellow, but the veins remain green. This problem is usually more serious in soils with highly alkaline pH. Additionally, soybean varieties have varying tolerance to Fe chlorosis so certain varieties may show more of the symptom than others.

Figure 2. Iron chlorosis on soybeans. The upper leaves become chlorotic. Photo by Doug Jardine, K-State Research and Extension.

Excess nitrate in the soil can exacerbate problems of Fe chlorosis in fields with high soil pH and prone to causing Fe chlorosis problems. This can be particularly noticeable during early soybean growth.

An interesting phenomenon that occasionally has been observed is that soybean plants in slightly more compacted soil (for example in the wheel tracks associated with the last tillage pass) will be greener and display less yellowing from Fe chlorosis than the rest of the field. Recent studies have shown that soil nitrate concentrations in these wheel tracks are typically lower, so Fe chlorosis symptoms are alleviated compared to the rest of the field. The areas of compacted soil have less oxygen, likely resulting in more denitrification. Areas of higher soybean population in the field can also show greener conditions. Higher plant populations and greater root density can reduce the negative effect of higher soil nitrate concentrations on Fe chlorosis in the volume of soil.

Figure 3. Field of soybeans with iron chlorosis, showing greener areas in the wheel tracks. Photo by Dorivar Ruiz Diaz, K-State Research and Extension.

Potassium (K) deficiency. Another cause of yellowing could be K deficiency. Contrary to Fe deficiency, K deficiency is typically more common later in the season. Deficiency symptoms include an irregular yellow mottling around leaflet margins. The yellow areas coalesce to form a more or less continuous, irregular yellow border. Again, as with N, you can see symptoms both in fields that are too wet or too dry. Most of the time, the symptoms will fade with improved soil conditions that allow good root growth, unless the field is truly deficient in K. Potassium deficiency can also be caused by soil compaction, which limits root growth and development.

Figure 4. Yellowing around leaflet margins from potassium deficiency. Photo by Dorivar Ruiz Diaz, K-State Research and Extension.

Figure 5. Chlorosis of the lower leaves from potassium deficiency shows up first on lower leaves.

Photo by Dave Mengel, K-State Research and Extension.

Rooting restrictions. Anything that restricts expansion of the root system (e.g. extremely wet or dry soil, compaction layers, sidewall compaction, root insects and disease etc.) can lead to reduced growth (Fig. 6) and potential leaf yellowing. With a restricted root system, the growing plant can't access the nutrients it needs to make more leaves. As a result, many of the nutrient deficiencies described above can show up in fields where you might not expect them based on a typical soil test.

Figure 6. Rooting restrictions during early growth for soybeans. Photos by Ignacio Ciampitti, K-State Research and Extension.

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(Editor's note: The following article is one in a series of articles in the Agronomy eUpdate that examines the historical climate observations in Kansas. The methods used to do this analysis are explained in the introductory article in this series, from eUpdate No. 571, May 20, 2016. – Steve Watson)

Drought and drought changes in Kansas

Droughts are one of the most devastating natural hazards. Severe droughts have had large impacts on Kansas water resources and economies. Kansas is one of the states most prone to drought. The 1930s drought is often considered Kansas' worst drought on record, which basically means that this was the driest series of years since our instrumental observations starting in late 1800s (although there were sporadic weather observations in the mid-1800s in Kansas). However, tree-ring reconstruction analysis could help us construct long-term drought information over 1,000 years.

Figure 1 displays the western Kansas droughts from the years 1000 to 2000. By going back this far in time, it becomes noticeable that the droughts in 1930s were not the worst in history in terms of either drought duration (consecutive drought period) or drought intensity (the magnitude of drought index). Since 1000, many multiple-year droughts have occurred, ranging from 5 years to 40 years.

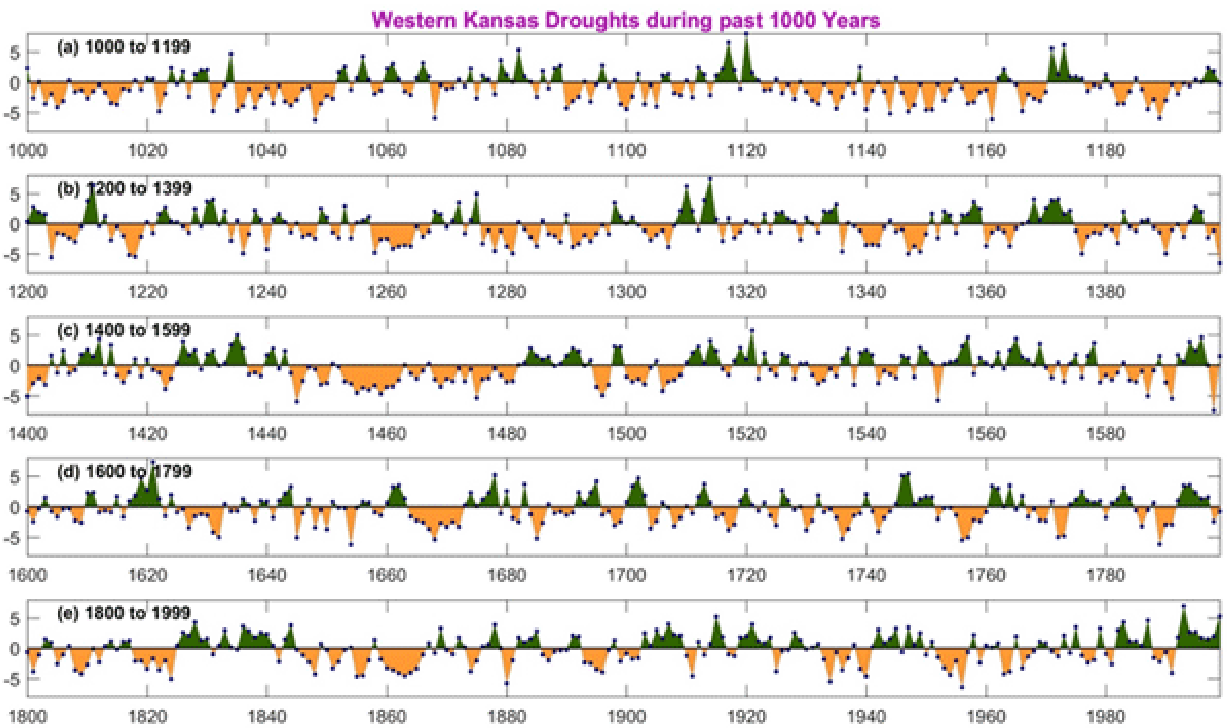

Figure 1. Western Kansas annual droughts during past 1,000 years. The vertical axis is the Palmer Drought Severity Index (PDSI). The more negative the PDSI, the drier (orange). On the opposite side, the more positive the PDSI, the wetter (dark green). Data obtained from Cook et al. 2004, Science 306 (5698):1015-1018.

Focusing in on the more recent period of 1895 to 2015 (Figure 2), when a record of instrumental readings is available, it is apparent that the drought events in 1930s and 1950s were the longest and most pronounced of all. These and subsequent droughts have caused significant environmental effects and have had a great impact on Kansas settlement patterns and agricultural operations. Viewed in this historical context, the droughts in 2011 to 2014 in parts of Kansas, while serious, were not anything unusual.

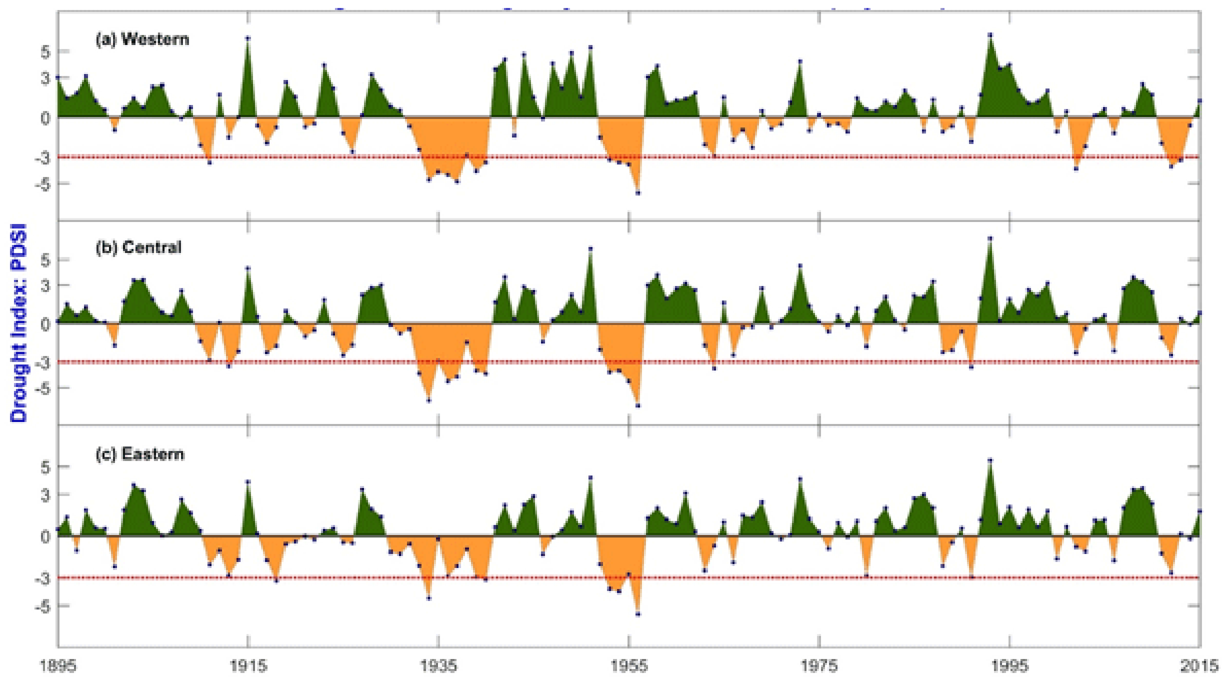

Figure 2. Average PDSI for Kansas growing season (May to October) over 1895 to 2015: (a) Western, (b) Central, and (c) Eastern third of Kansas. The orange shaded areas represent unusual dryness and the green shaded areas represent unusual wetness. The dotted red lines (PDSI = -3) are indicators of severe drought occurrence as defined by PDSI.

Multiple-year drought events have often occurred in Kansas. The state as a whole has not experienced more frequent or more extreme droughts than normal in recent years compared to either the last 1,000 years or the most recent 121-year period. We can parse the PDSI data a bit more finely by dividing the most recent 121-year period into two periods (1895 to 1955 vs. 1956 to 2015) for each of the three regions of Kansas. In doing so, we find only western Kansas had a slightly drier mean and drier median PDSI during the most recent 60-year period when compared to PDSI from 1895 to 1955 (Fig. 3). Both central and eastern Kansas had showed wetter tendencies in the most recent 60-year period. The drought information drawn from Figure 3 was consistent with precipitation trends in Kansas that we reported in this climate series.

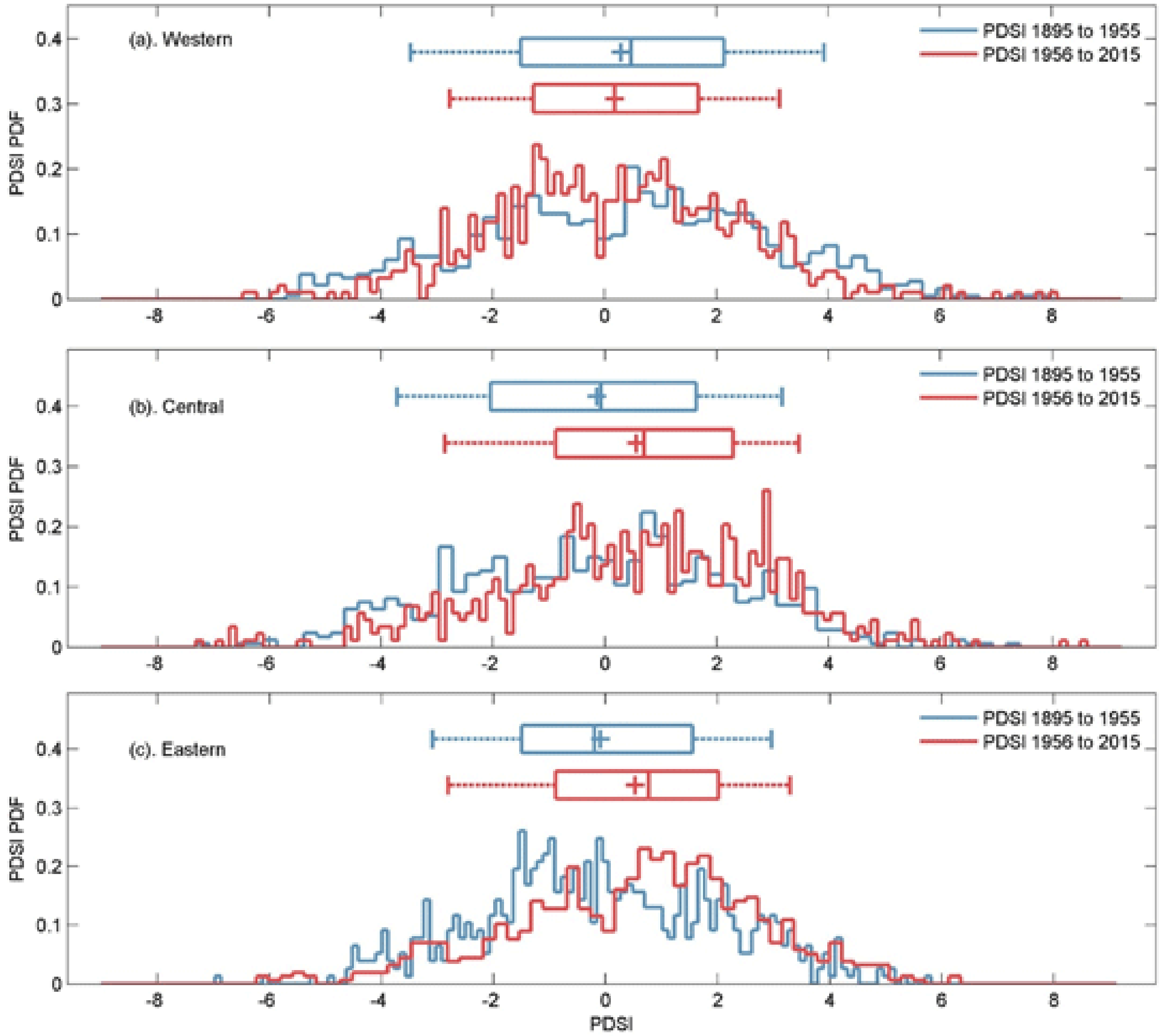

Figure 3. Probability density function (PDF) of Palmer Drought Severity Index (PDSI) during 1895-1955 vs. 1956-2015 in western (a), central (b) and eastern Kansas (c), respectively. The negative numbers to the left of "0" on the x axis represent drier-than-average conditions; the positive numbers to the right of "0" represent wetter-than-average conditions. Only in western Kansas is there a slightly drier-than-average trend in the 1956 to 2015 period (red lines) compared to the 1895 to 1955 period (blue lines). In central and eastern Kansas, the trend in the most recent time period has been slightly wetter-than-average.

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This time of year, a frequent feature of weather reports is the "heat index." The heat index is a combination of the temperature and relative humidity. It is an attempt to indicate how we will perceive the outdoor environment. When there is high temperature coupled with high relative humidity, there is a high heat index.

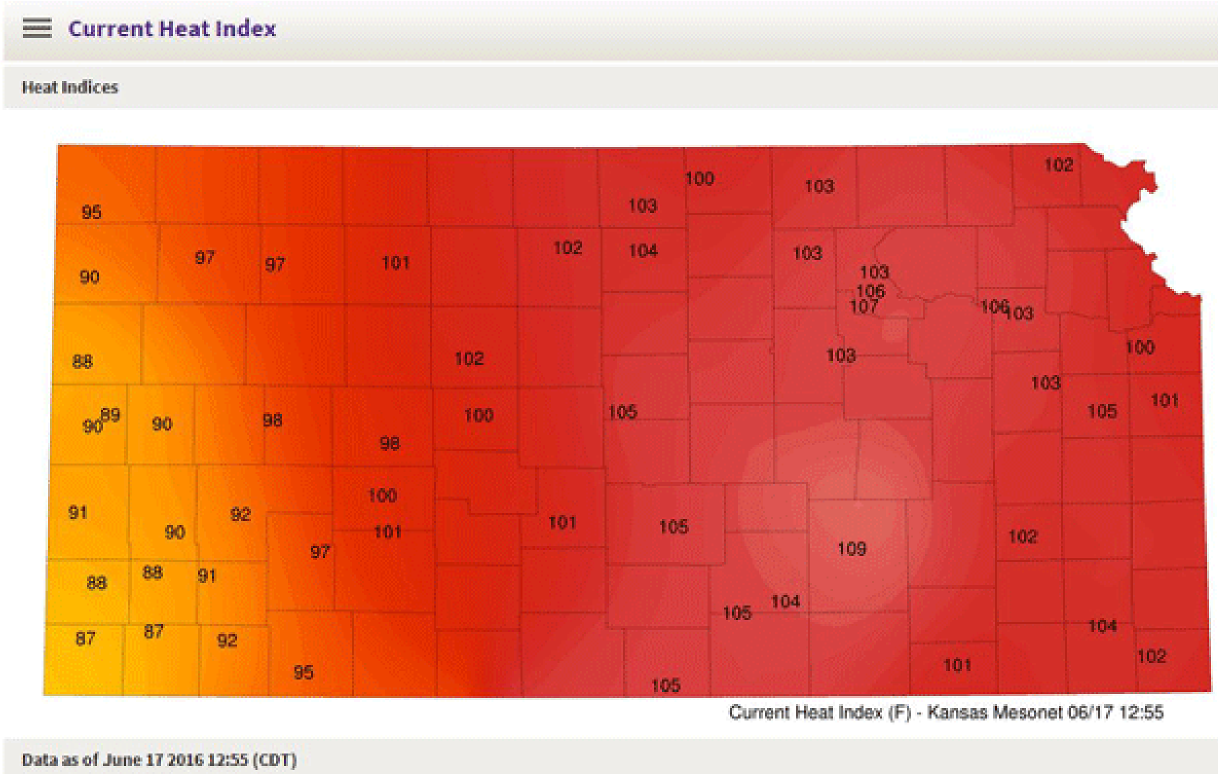
Because the human body cools itself through evaporation, factors that slow evaporation reduce the effectiveness of our natural cooling system. When temperatures are high, the cooling system works harder to maintain a desirable temperature level. That's why you often hear the phrase "It's not the heat; it's the humidity." At 105 degrees F and 30 percent humidity, the heat index would be 114 degrees F; at 105 degrees F and 10 percent humidity (as might be seen it the desert Southwest) the heat index is 100 degrees F, cooler than the actual air temperature.

Animals are also impacted by heat stress. The USDA Animal Research facility has a website that measures a cattle heat stress index. The URL is:
http://www.ars.usda.gov/Main/docs.htm?docid=21306

It notes that heat stress can be aggravated by various local conditions, including saturated soils (as from a leaking tank), nearby irrigated crops, lack of air movement, night temperatures above 70 degrees F , and conditions in the danger zone or worse for more than 2 consecutive days. As with people, the stress is cumulative.

The K-State Mesonet web site has a special page that tracks the current heat index at
http://mesonet.k-state.edu/weather/heat/

The data updates every five minutes when you refresh the page, and is available for all 55 stations.



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7. Heat burst along the Kansas River

A very rare event occurred in southern Geary and Riley counties overnight Wednesday and into Thursday, June 15-16, 2016. With all significant thunderstorms to the far south and east, a strong wind event occurred. Winds gusted up to 70 mph at the Manhattan Airport, 56 mph at Fort Riley Airport, and 52 mph at the Ashland Bottoms mesonet station. Damage to power lines and trees were reported by the Geary County Emergency Manager.

So what caused this unique event? Coinciding with the strong winds, a non-diurnal temperature change occurred, along with a drop in moisture. From 7:30 p.m. to 11 p.m., temperatures rose anywhere from 10-15 degrees F and relative humidities dropped more than 60-70% (see the below graph from the Ashland Bottoms Kansas Mesonet station). Typically as the evening progresses, temperatures should drop and relative humidity should climb. What caused this unusual change was a heat burst.

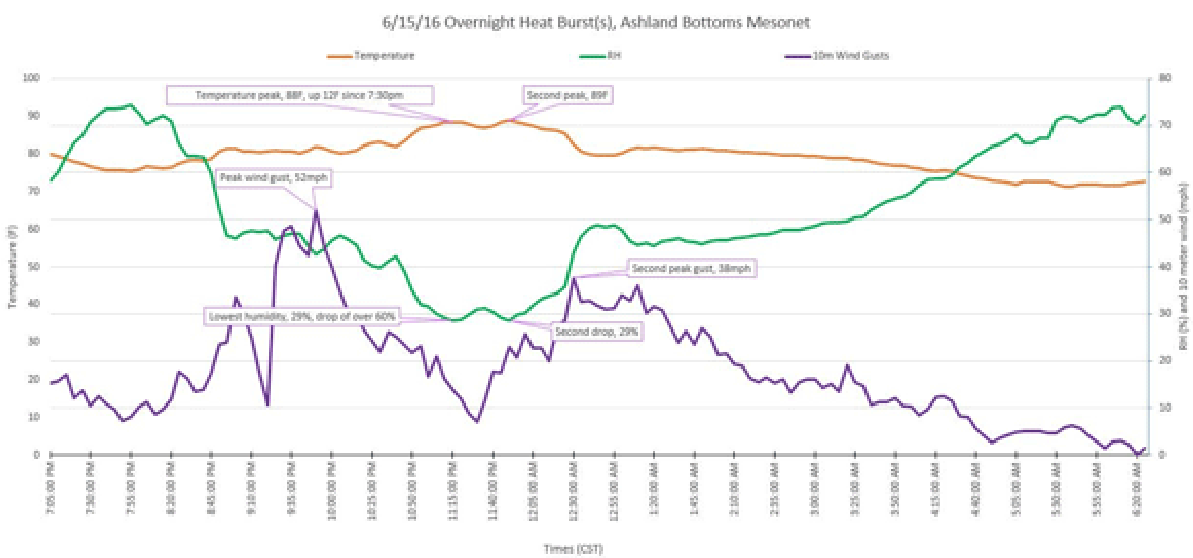

Figure 1. Temperature, relative humidity, and wind gusts at Ashland Bottoms Wednesday night into Thursday morning, June 15-16, 2016. Data source: www.mesonet.k-state.edu

Heat bursts: A heat burst is a rare phenomenon that occurs with dissipating thunderstorms. A thunderstorm downburst occurs when, due to latent heat of evaporation, precipitation cools as it falls and the denser air mass plummets to the ground. When a thunderstorm dissipates, all the moisture can be completely evaporated on the way to the ground. The air can no longer cool, due to the lack of precipitation, and adiabatic compression occurs as it falls. This compression heats the air (sometimes significantly) and coincidently decreases the moisture content. The hot air will often slow its progression to the surface due to lack of temperature difference between atmosphere and the downdraft. However, if sufficient momentum is built prior to the heating, it can reach the surface with very strong winds. Exactly what happened on the night of June 15-16!

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8. Comparative Vegetation Condition Report: June 7 - 13

The weekly Vegetation Condition Report maps below can be a valuable tool for making crop selection and marketing decisions.

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 27-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.

The Vegetation Condition Report (VCR) maps were originally developed by Dr. Kevin Price, K-State professor emeritus of agronomy and geography. His pioneering work in this area is gratefully acknowledged.

The maps have recently been revised, using newer technology and enhanced sources of data. Dr. Nan An, Imaging Scientist, collaborated with Dr. Antonio Ray Asebedo, assistant professor and lab director of the Precision Agriculture Lab in the Department of Agronomy at Kansas State University, on the new VCR development. Multiple improvements have been made, such as new image processing algorithms with new remotely sensed data from EROS Data Center.

These improvements increase sensitivity for capturing more variability in plant biomass and photosynthetic capacity. However, the same format as the previous versions of the VCR maps was retained, thus allowing the transition to be as seamless as possible for the end user. For this spring, it was decided not to incorporate the snow cover data, which had been used in past years. However, this feature will be added back at a later date. In addition, production of the Corn Belt maps has been stopped, as the continental U.S. maps will provide the same data for these areas. Dr. Asebedo and Dr. An will continue development and improvement of the VCRs and other advanced maps.

The maps in this issue of the newsletter show the current state of photosynthetic activity in Kansas, and the continental U.S., with comments from Mary Knapp, assistant state climatologist:

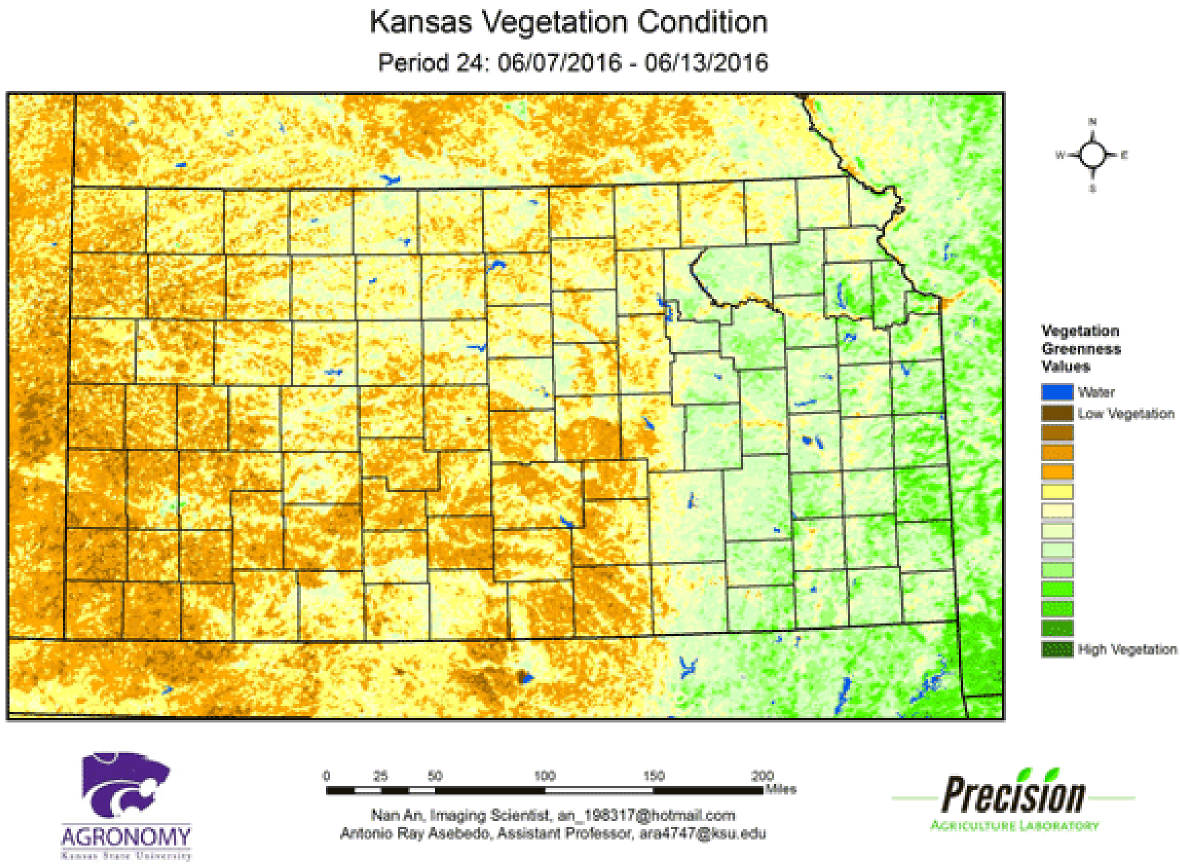

Figure 1. The Vegetation Condition Report for Kansas for June 7 – June 13, 2016 from K-State's Precision Agriculture Laboratory continues to show high NDVI values only in the eastern third of the state. The recent dry, warm weather has limited vegetative activity in the rest of the state. The impact of the warmer temperatures at the end of the period will be more visible in next week's map.

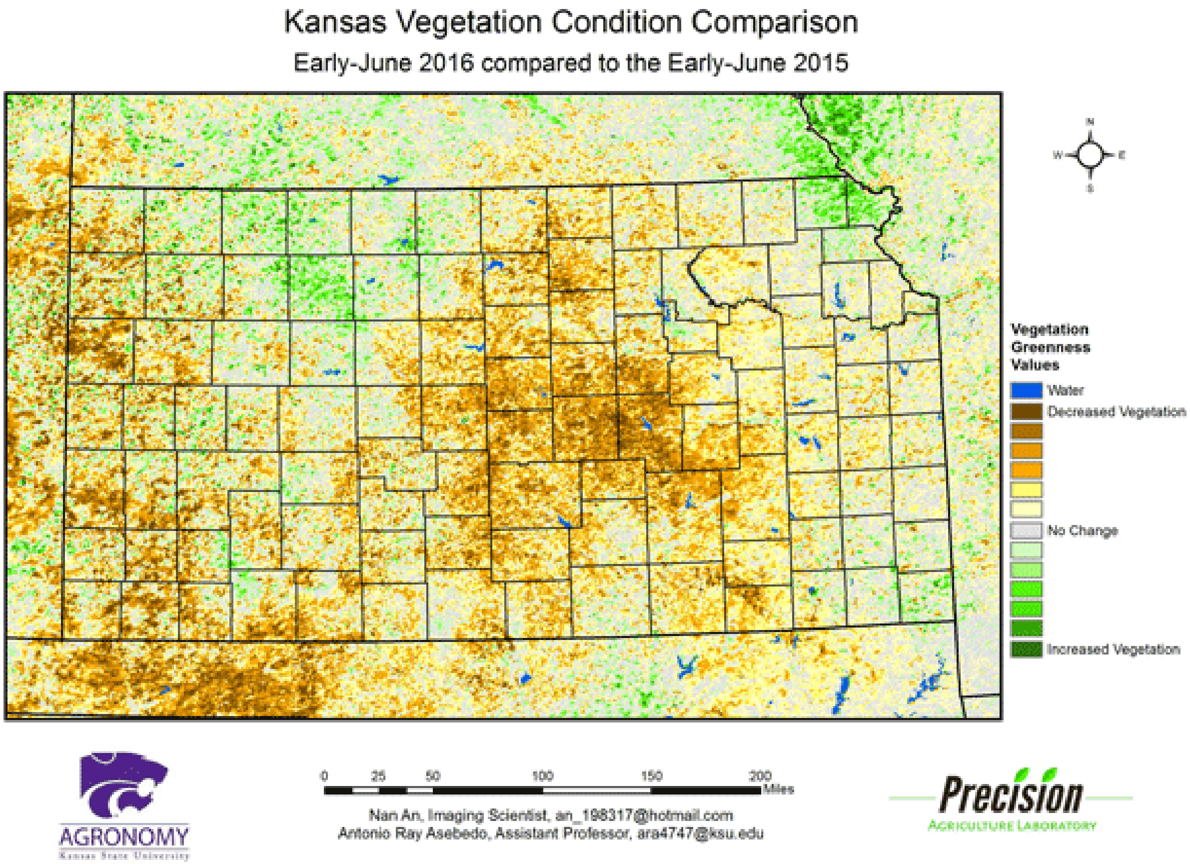

Figure 2. Compared to the previous year at this time for Kansas, the current Vegetation Condition Report for June 7 – June 13, 2016 from K-State's Precision Agriculture Laboratory shows vegetative production much lower across much of the state. The greatest increase in photosynthetic activity is confined to extreme northeast Kansas. Although May was wetter than average in most of the state, it didn't reach the extremes seen in 2015. Crop progress continues ahead of last year at this time.

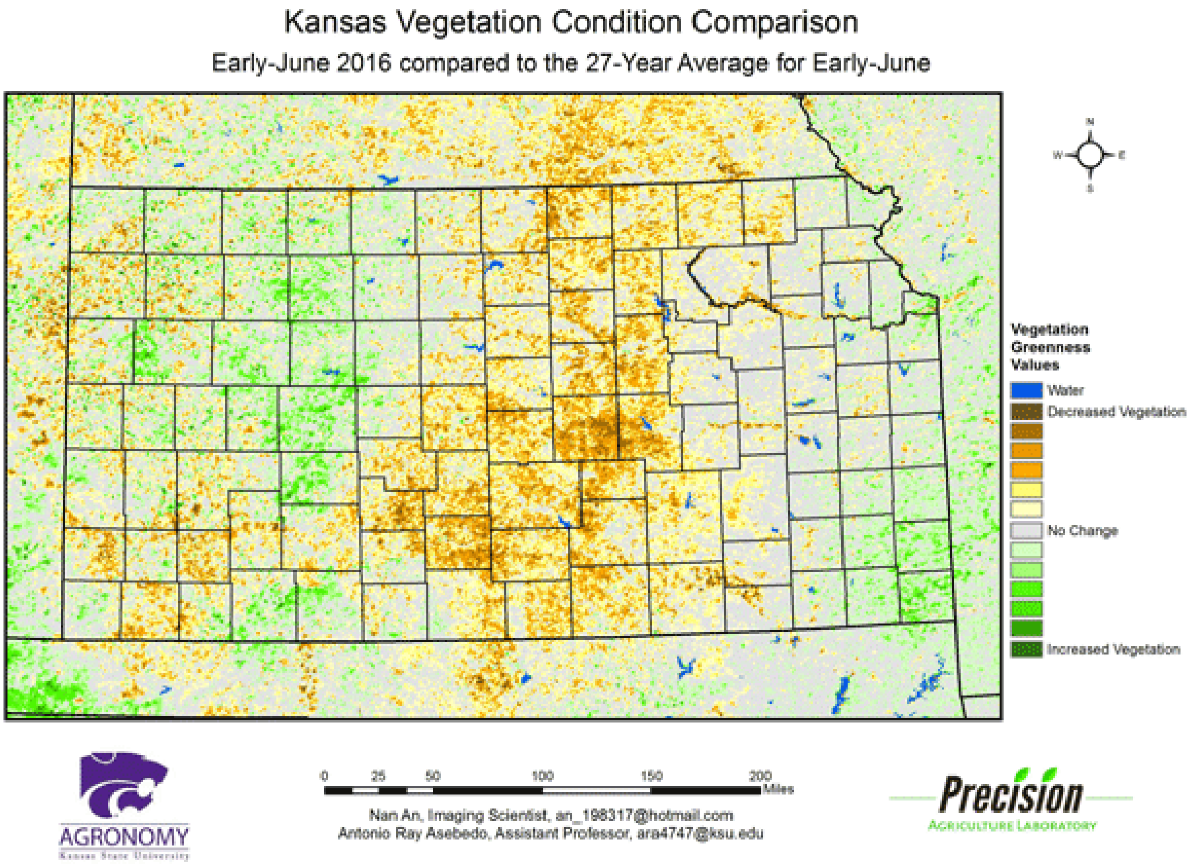

Figure 3. Compared to the 27-year average at this time for Kansas, this year's Vegetation Condition Report for June 7 – June 13, 2016 from K-State's Precision Agriculture Laboratory shows below-average vegetative activity in the central part of the state. The rapid change from wetter-than-normal to hotter, drier conditions has accelerated plant develop and stressed newly planted row crops.

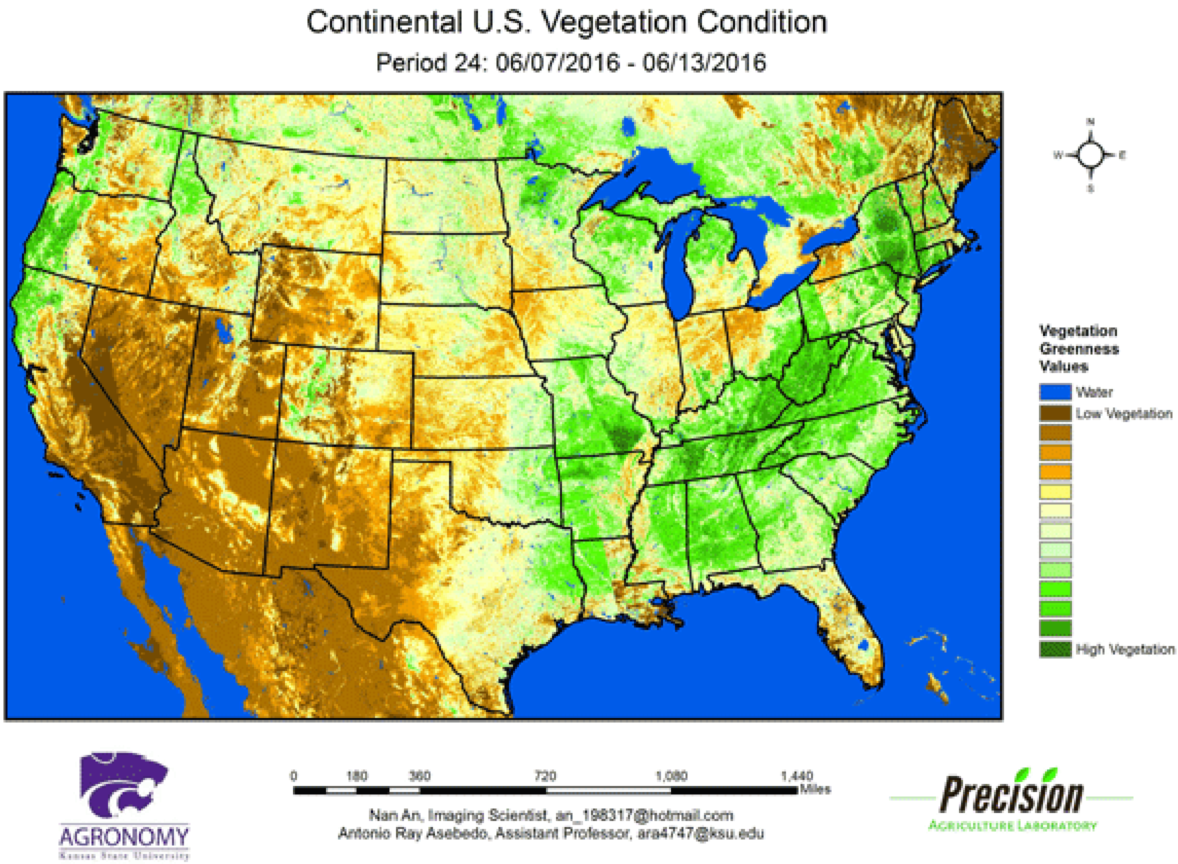

Figure 4. The Vegetation Condition Report for the U.S for June 7 – June 13, 2016 from K-State's Precision Agriculture Laboratory shows low NDVI values across central Iowa, Illinois, and Indiana. Much warmer temperatures are driving the downturn in conditions as parts of Midwest are reporting lower-than-average precipitation. In southeastern Missouri and northern Arkansas conditions are more favorable, but this is likely to decrease given the rapid change to hot, dry weather.

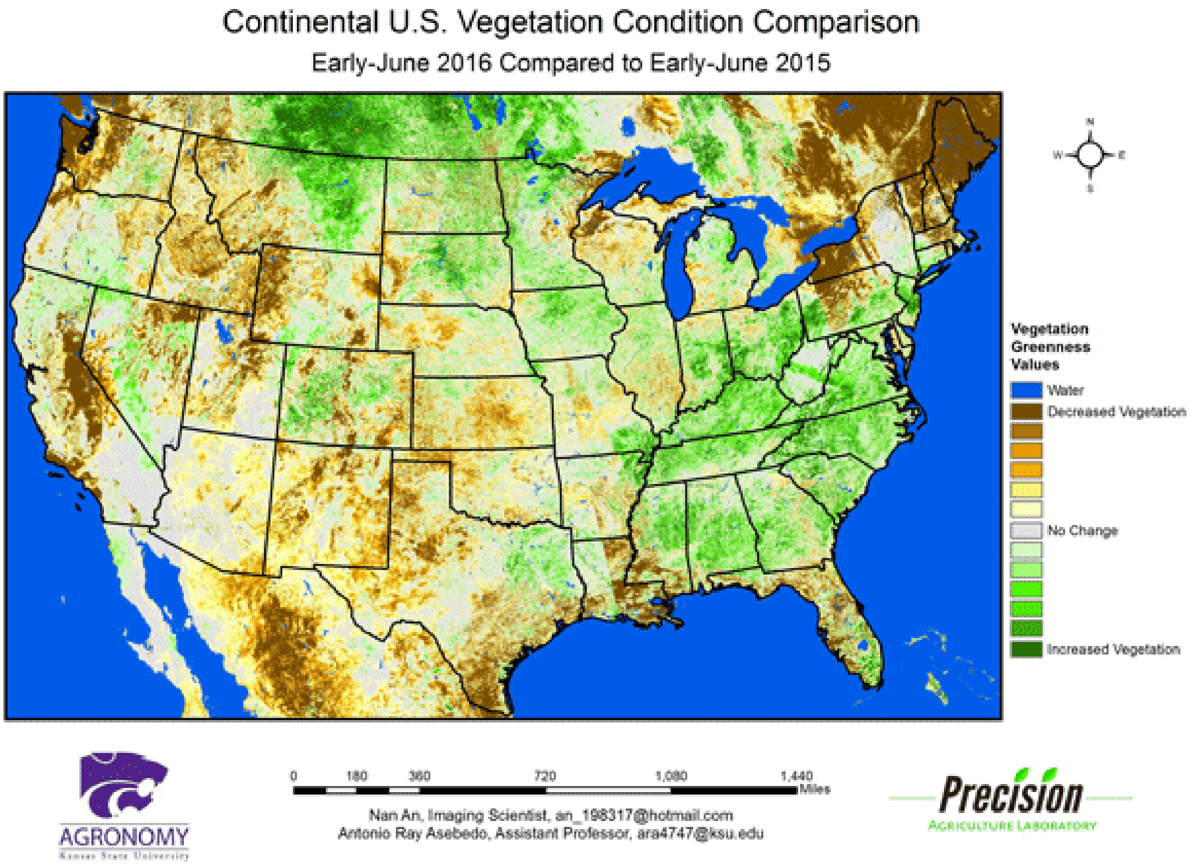

Figure 5. The U.S. comparison to last year at this time for the June 7 – June 13, 2016 from K-State's Precision Agriculture Laboratory shows that lower NDVI values are most evident in the central U.S. Drier-than-average conditions, coupled with extremely hot weather, have delayed vegetation compared to last year.

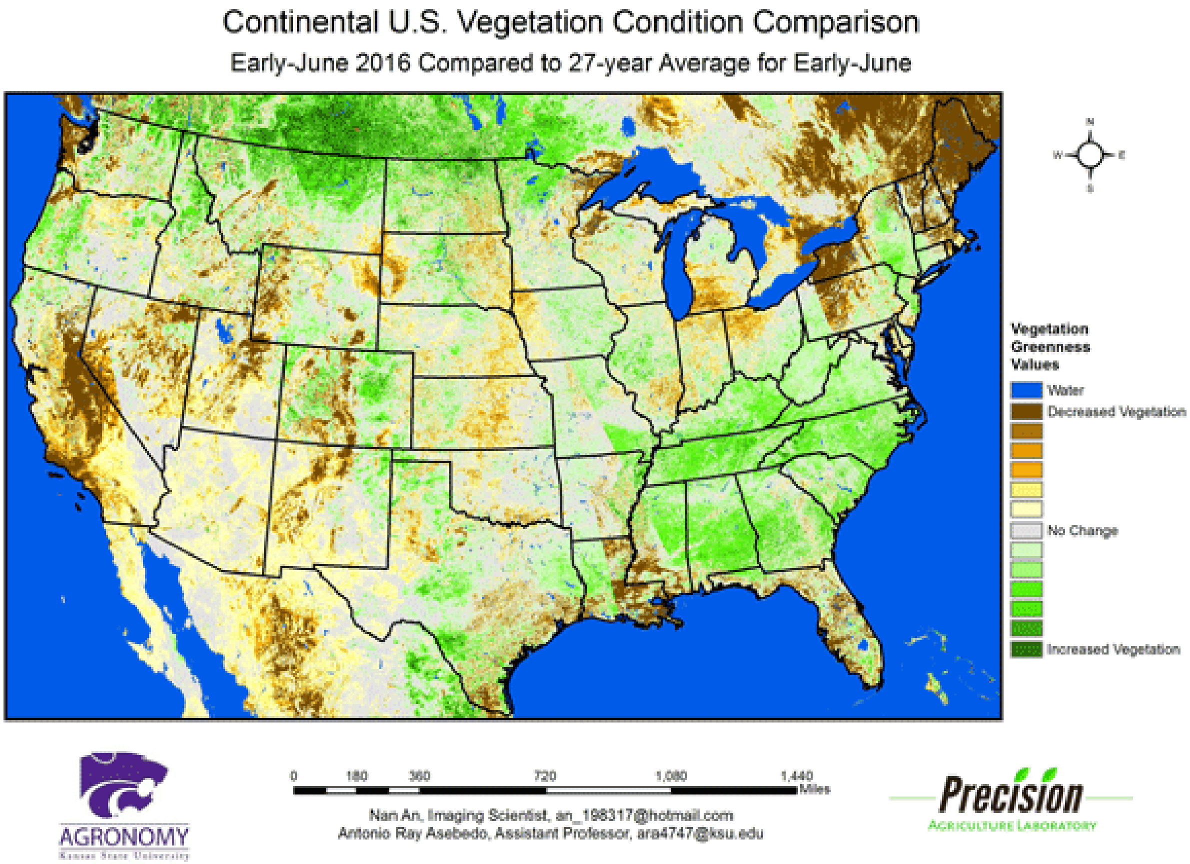

Figure 6. The U.S. comparison to the 27-year average for the period June 7 – June 13, 2016 from K-State's Precision Agriculture Laboratory shows increased areas of below-average photosynthetic activity. The boundary in Texas of favorably moist conditions in the west to excessively wet conditions in the east has shrunk. That wetter-than-normal pattern is the driver behind low photosynthetic activity in Louisiana.

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