Issue 640

K-STATE
Research and Extension

Extension Agronomy

eUpdate

06/30/2017

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. Reasonable expectations for wheat varieties with resistance to wheat streak mosaic or wheat curl mite

To help reduce the chances of wheat being infected with wheat streak mosaic, producers may choose to plant a variety with resistance to the wheat streak mosaic virus or to wheat curl mites, the vector of the disease. It is important to understand what producers can reasonably expect from these varieties.

Wheat streak mosaic virus resistance

Wheat varieties adapted to Kansas with resistance to the wheat streak mosaic virus include Joe (white wheat), Oakley CL (a single-gene Clearfield variety), and Clara CL (a white, single-gene Clearfield variety). These varieties all have the same gene, wsm2, for wheat streak mosaic resistance. Temperature sensitivity varies a bit among these, but all will tend to lose wheat streak mosaic resistance at high temperatures.

The degree of resistance to wheat streak mosaic in these varieties will vary in the field. If temperatures are warm (average temperature greater than 68 degrees F) for extended periods (about 2-3 weeks in growth chamber studies) in the fall after these varieties have emerged, they can become infected with wheat streak mosaic. If this occurs, the plants can show symptoms as early as the fall (Figure 1) or more typically during the spring. Symptoms include typical stunting and prostrate growth, as well as bright yellow streaked leaves as the disease progresses during the season.

Figure 1. Aerial photo of three wheat fields showing wheat streak mosaic symptoms during the fall. The source of the wheat curl mites that vectored the disease was likely the field in the center of the photo, on which the volunteer wheat was not controlled. The wheat fields directly below, to the left, and above the center field in this photo are showing yellowing caused by wheat streak mosaic. Photo by Rick Horton, wheat producer in Wichita and Finney counties, taken December 6, 2016.

If temperatures are cool in the fall, producers can expect these varieties to show less severe disease symptoms than susceptible varieties. If a spring infection occurs when temperatures are warm, these varieties will show the yellowish mottling symptoms – although not the stunting seen with fall infections.

Producers should also be aware that these varieties remain susceptible to triticum mosaic virus and High Plains mosaic virus, diseases similar to wheat streak mosaic in both visible symptoms and yield reduction they cause. Plants infected with multiple viral diseases often experience greater yield loss than those infected by just one of these diseases.

If producers notice symptoms typical of wheat streak mosaic on these varieties, they could send samples in to the plant disease identification laboratory (see your local Extension office for directions). The disease may be either wheat streak mosaic, High Plains mosaic virus, triticum mosaic virus, or some combination thereof.

In 2017, these resistant varieties generally had less wheat streak mosaic disease than susceptible varieties where the disease was present, based on field observations. Still, it was not uncommon to see symptoms on these varieties. In many cases, these plants were co-infected with one of the other diseases.

Wheat curl mite resistance

Wheat varieties adapted to Kansas with resistance to the wheat curl mite include TAM 112, Byrd, Avery, and T158. All of these are hard red winter wheat varieties.

While these varieties are susceptible to the wheat streak mosaic virus (as well as the High Plains virus and triticum mosaic virus), they may escape these diseases because of their resistance to the wheat curl mite. The wheat curl mite is the vector for all of those virus diseases.

Based on field observations, producers can expect these varieties to hold up better than susceptible varieties against all three of these virus mosaic diseases under light to moderate wheat curl mite pressure. Under heavy pressure, such as when wheat is planted adjacent to a field that has had volunteer wheat growing on it all summer, these varieties can get overwhelmed by wheat curl mite pressure and become infected with these virus mosaic diseases.

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2. The time to make decisions for fungicide management of gray leaf spot is rapidly approaching

Some fields in far southeast Kansas are already well beyond the optimum time for fungicide application. Fortunately, there is very little gray leaf spot in that area of the state. For the rest of the state, tasseling time is getting near, especially in south central Kansas. Over the next few weeks, corn in the rest of the state will be at the critical juncture for making fungicide application decisions for gray leaf spot management. Gray leaf spot was already quite active in a recently visited field in Rice County and it would be expected to be equally abundant in areas that have seen regular rainfall over the past several weeks.

Factors that play a role in corn yield response to fungicide applications

Years of fungicide application research clearly demonstrates that the single best time to apply a fungicide to corn for gray leaf spot control is from VT to R1. A single application at V7 – V8 will not hold up against late-season pressure. Those who choose to put a fungicide down with their last herbicide treatment will most likely have to apply second cover at VT – R1 if there is any gray leaf spot pressure at all. A VT – R1 application may also provide some suppression of southern rust, should it arrive early enough to cause yield loss.

University fungicide trials also reveal that final disease severity plays a critical role in the magnitude and consistency of yield response to a foliar fungicide application. The tricky part is being able to predict before the VT to R1 stages what the disease pressure will be several weeks later. To make such a prediction, you need to consider "disease risk factors" and to scout for disease.

Disease risk factors include:

Susceptibility level of corn hybrid. Seed companies typically provide information on the susceptibility of their hybrids to gray leaf spot in their catalogs. In general, hybrids that are more susceptible to fungal foliar diseases will have a greater response to a foliar fungicide (if disease pressure is high enough).

Previous crop. Because gray leaf spot survives in corn residue, the risk of disease increases when corn is planted back into a field that was in corn the previous year.

Weather. Rainy and/or humid weather generally is most favorable to gray leaf spot. In growing seasons when these conditions prevail, the risk for disease development increases.

Field history. Some field locations may have a history of high foliar disease severity. Fields in river bottoms or low areas or surrounded by trees may be more prone to having gray leaf spot.

Begin scouting for gray leaf spot in corn about two weeks before expected tassel emergence. Gray leaf spot is characterized by rectangular lesions that are 1-2" in length and cover the entire area between the leaf veins. Early lesions are small, necrotic spots with yellow halos that gradually expand to full-sized lesions. Lesions are usually tan in color but may turn gray during foggy or rainy conditions. The key diagnostic feature is that the lesions are usually very rectangular in shape.

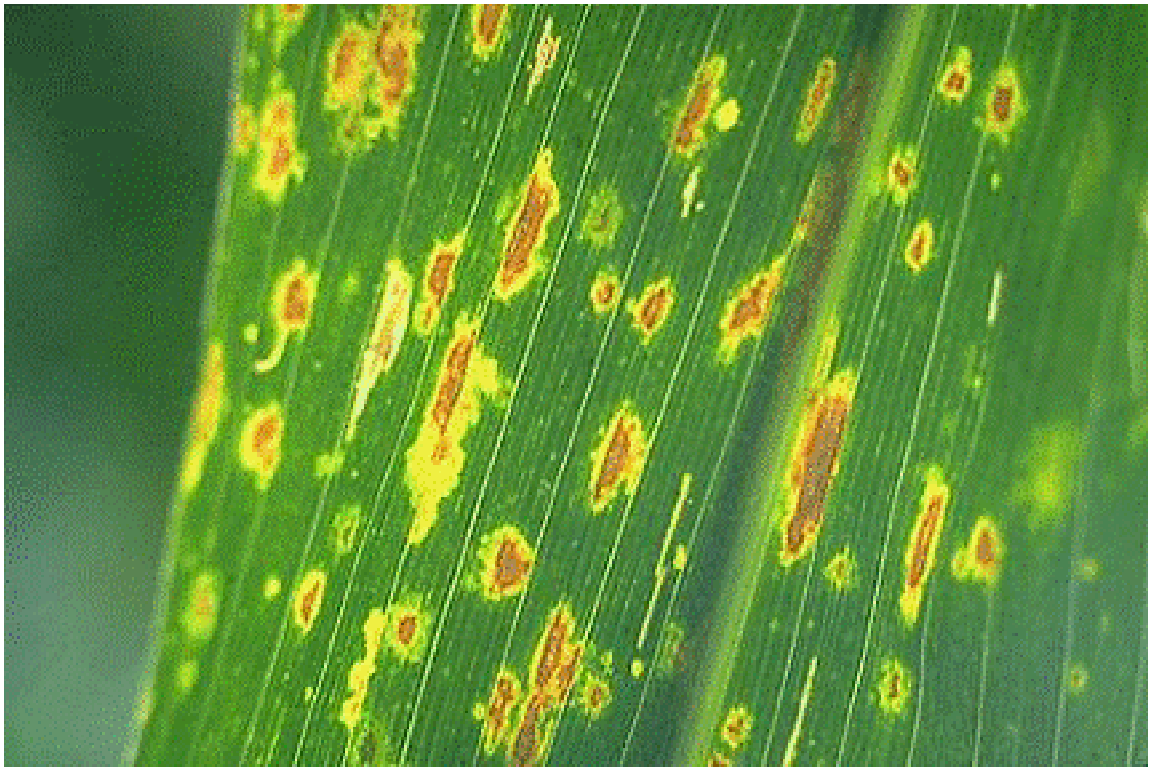

Figure 1. Early development of gray leaf spot lesions showing a distinct yellow halo. Photo courtesy of Doug Jardine, K-State Research and Extension.

Figure 2. Gray leaf spot on V7 corn in Harvey County, mid-June 2016. Photo by Doug Jardine, K-

State Research and Extension.

Current disease management guidelines suggest the following criteria for considering an application of foliar fungicide:

For susceptible hybrids (those with the lowest rating within a company's lineup): Fungicide applications should be considered if disease symptoms are present on the third leaf below the ear or higher on 50 percent of the plants examined.

For intermediate hybrids (those with an average rating within a company's lineup): Fungicide applications should be considered if disease symptoms are present on the third leaf below the ear or higher on 50 percent of the plants examined, if the field is in an area with a history of foliar disease problems, if the previous crop was corn, if there is 35 percent or more surface residue, and if the weather is warm and humid.

For resistant hybrids (those with the best rating within a company's lineup): Fungicide applications generally are not recommended.

According to the data from Illinois corn fungicide trials, if at least 5 percent of the ear leaf area is affected by disease at the end of the season, a foliar fungicide applied between VT and R1 would likely have been beneficial. Using the disease risk factors and scouting observations collected just before tassel emergence will help you predict how severe disease may be several weeks after the VT to R1 stages, and help you decide whether to apply a foliar fungicide.

Distinguishing between gray leaf spot and bacterial streak

Lastly, bacterial streak, identified as a new corn disease in the U.S. in 2016, is now active in many areas of the state. While yield loss potential for this disease remains unknown, we do know that it can be misidentified as gray leaf spot, resulting in unwarranted fungicide applications. Keep in mind that gray leaf spot typically has very sharp edges defined by the leaf veins, whereas bacterial streak will have a wavy edge that can cross the leaf vein (Figure 3). Also, when backlit with light, gray leaf spot lesions will have an opaque appearance while bacterial streak lesions are more translucent (Figure 4).

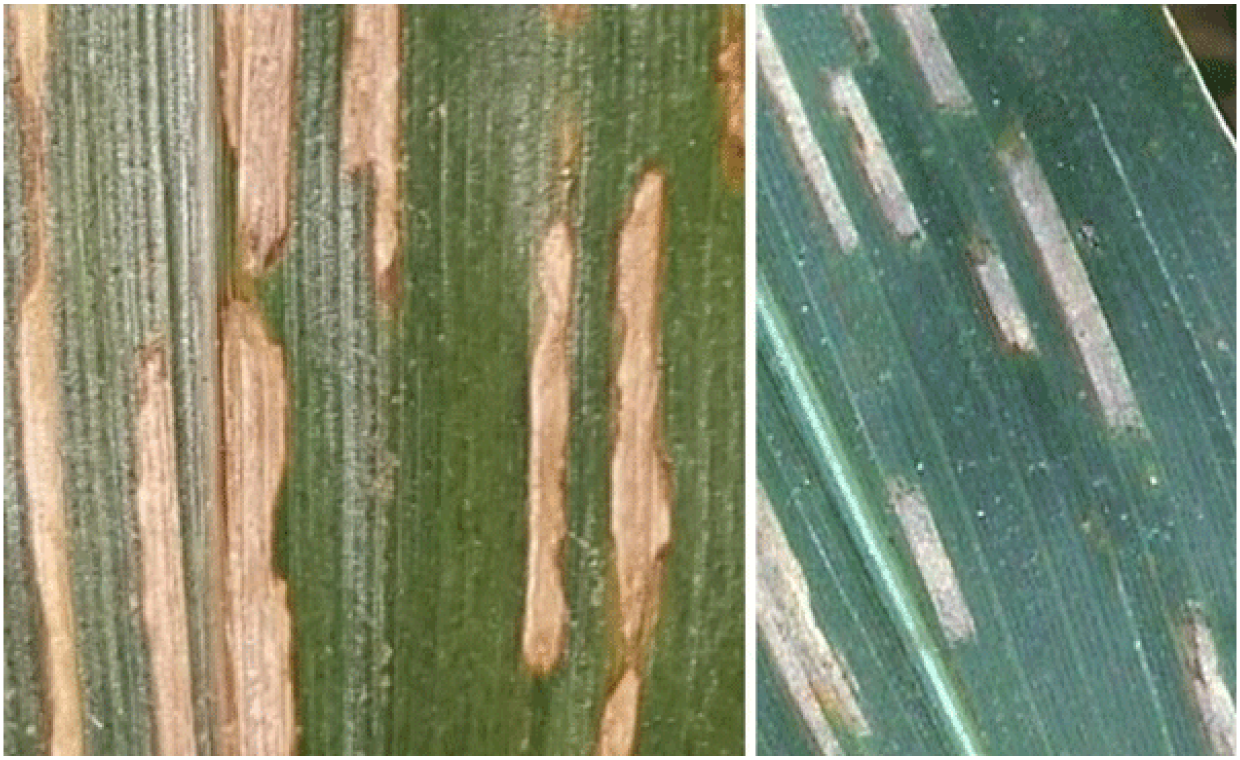

Figure 3. Comparison of sharp-edged gray leaf spot lesions (right) with wavy-edged bacterial streak lesions (left). Photo courtesy of the University of Nebraska.

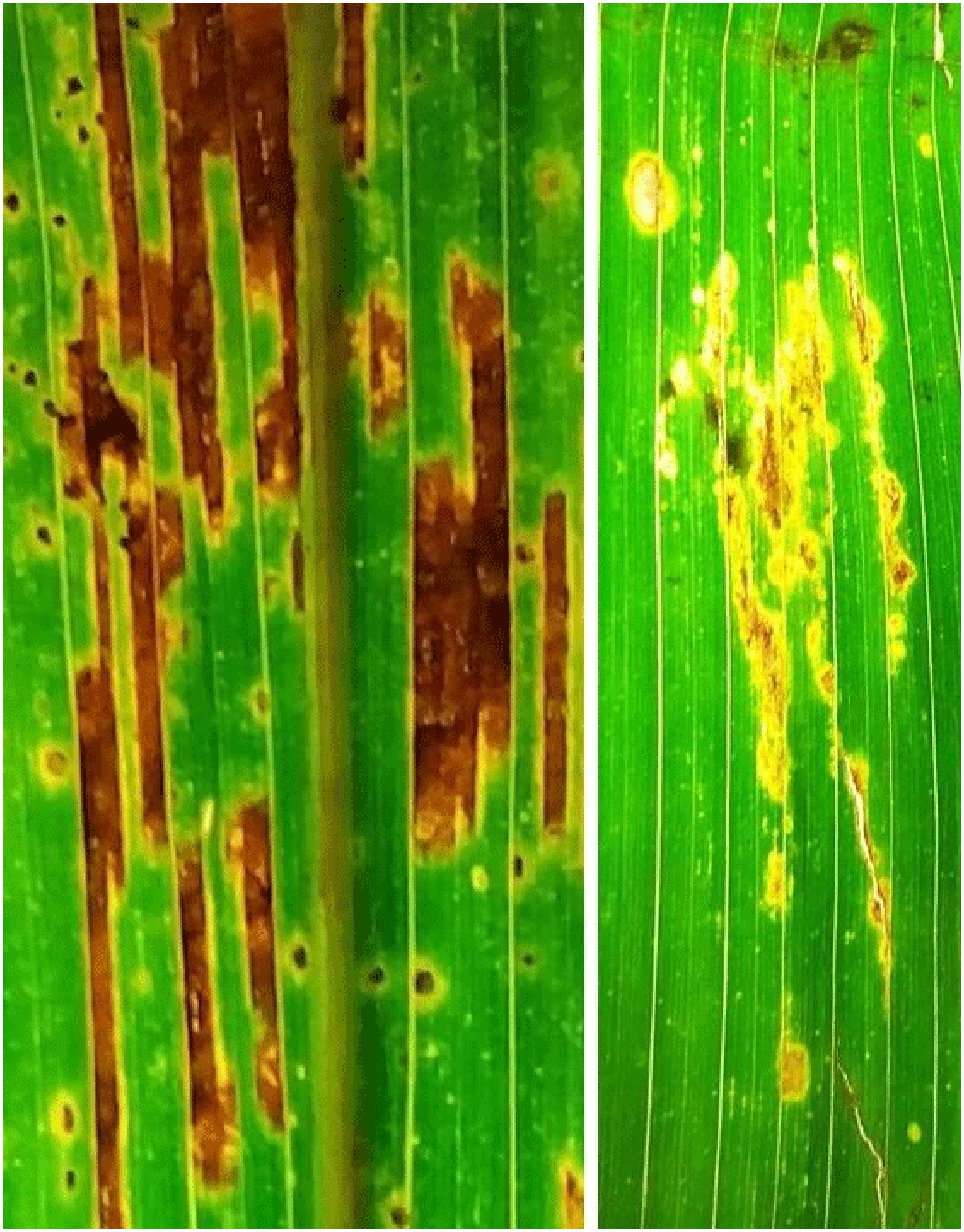

Figure 4. Gray leaf spot lesions (left) have an opaque appearance whereas as bacterial streak allows light to more easily pass through giving it a translucent appearance (right). Photo by Doug Jardine, K-State Research and Extension.

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3. 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 weed seed production on fields that will be planted to crops with limited herbicide 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 growing these crops is a key component to a successful weed control program. 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, waterhemp, and marestail, 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. Adding dicamba to a tank mixture containing AMS will increase the volatility of dicamba. 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 glyphosate/dicamba or glyphosate/2,4-D tankmixes.

If wheat is to be planted this fall, do not use atrazine or metribuzin in the tankmixture. 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.

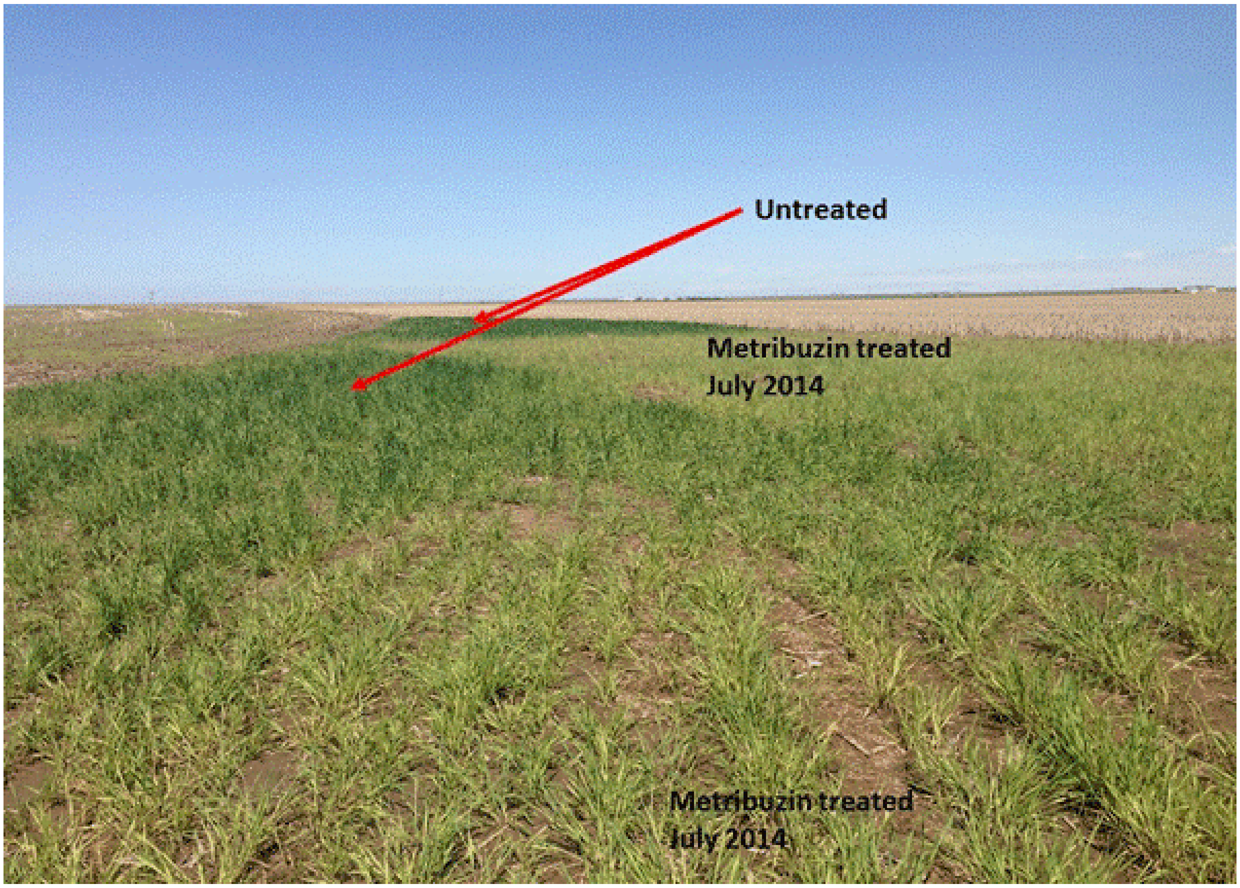

Figure 1. Metribuzin applied with Gramoxone on fallow July 2014. Wheat planted October 2014 and injury observed only during the spring (untreated areas are greener). Photo by Curtis Thompson, K-State Research and Extension.

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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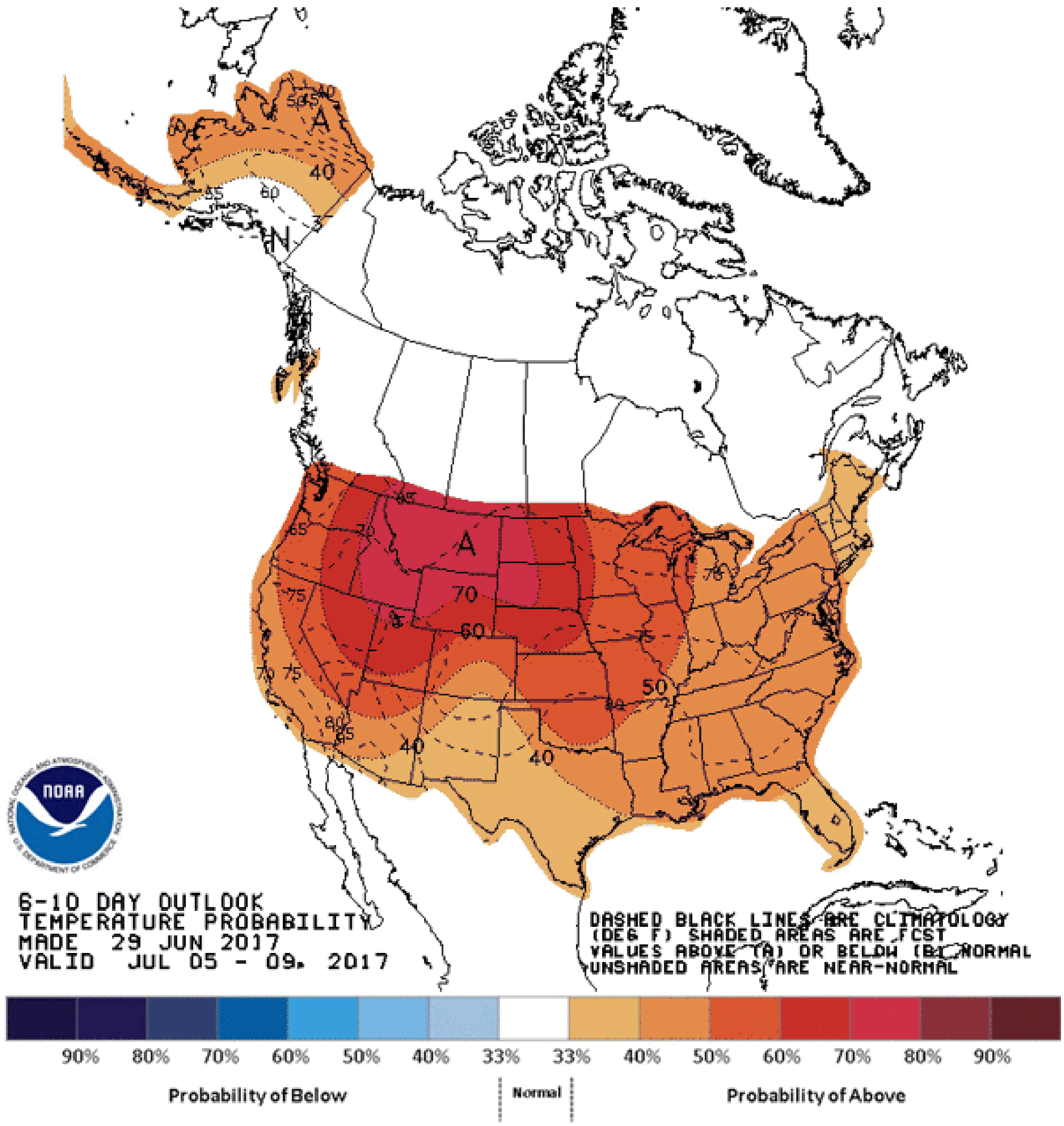
4. Weather outlook for summer row crops

Summer row crops progress is proceeding at different rates based on the planting date and early-season growing environment (temperature, moisture) this spring. Corn is getting close to flowering in many areas and is already past the flowering stage in some areas, primarily in the southeast part of the state.

Weather-wise, warm temperatures are expected to return next week. The NOAA Climate Prediction Center's 7-10 day outlook calls for an increased chance of above-normal temperatures statewide, while precipitation is expected to be near normal in the west and above normal in the east.



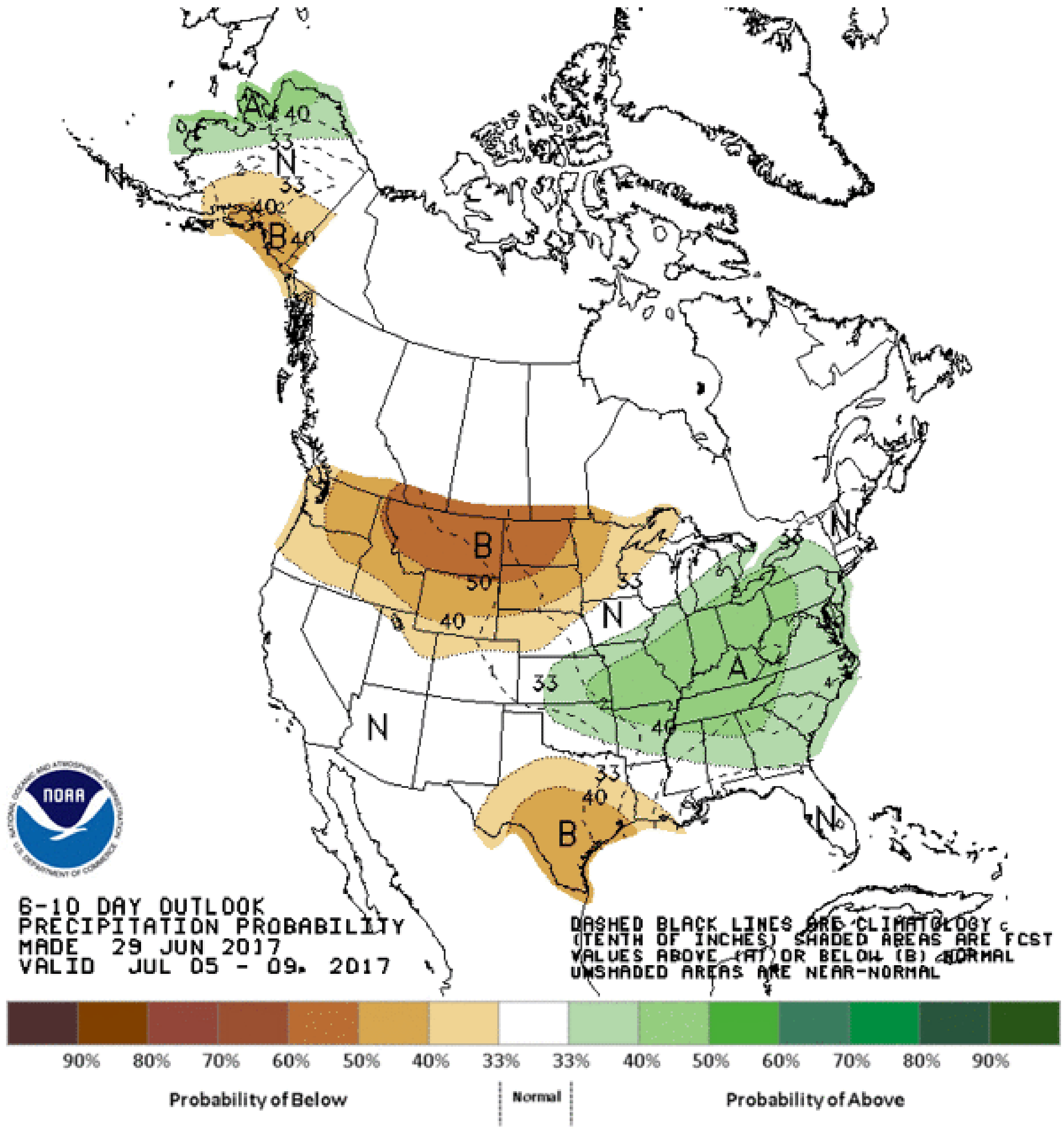


Figure 1. 7-10 temperature outlook (upper panel); 7-10 day precipitation outlook (lower panel). Source: NOAA Climate Prediction Center.

At this time of the year, normal highs are around 90 degrees F, with normal lows in the mid-60s. For Manhattan, the highs are expected to be near 90 degrees F, with the lows in the mid-60s. By Monday, highs in the Garden City area are expected to be in the mid 90's. Rain is favored in the eastern parts of the state through the weekend, with the quantitative precipitation outlook calling for as much as 2.50 inches in parts of east central and southeast Kansas.

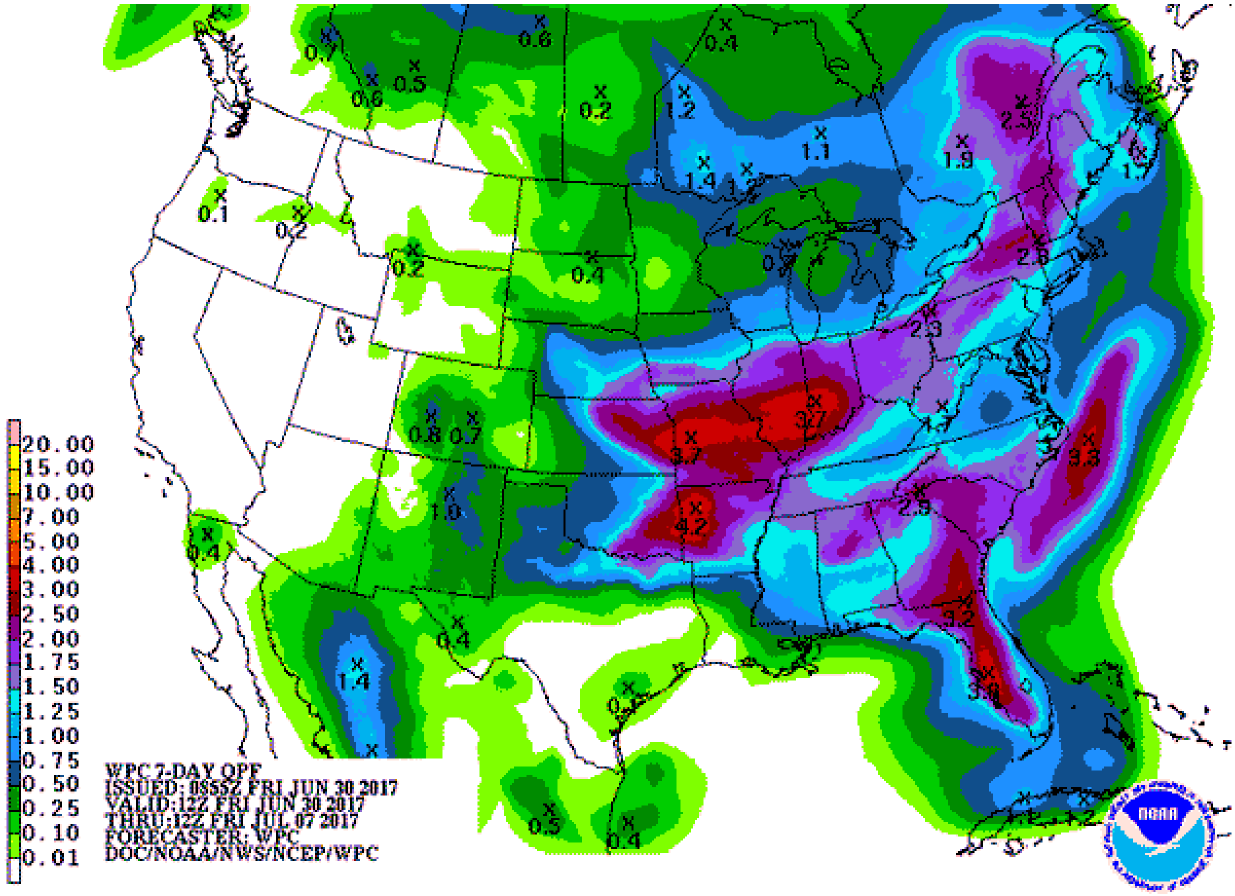


Figure 2. Quantitative Precipitation Forecast. Source: NOAA.

For corn, nutrient (K > N > P) and water (0.30 inch per day) demands for the crop are close to maximum when approaching to the VT (tassel) stage. Heat and drought in the coming days and week will affect the potential number of kernels.

Soybeans and sorghum are still progressing, but early-season conditions have generally led to very slow growth. These crops will catch up as soon as the heat returns in the coming weeks. Maximum water and nutrient demand will occur later in the growing season for these crops.

For the coming week, precipitation and temperatures will critically impact potential corn yield projected for this growing season.

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5. Alfalfa Growth and Development: New poster from K-State Research and Extension

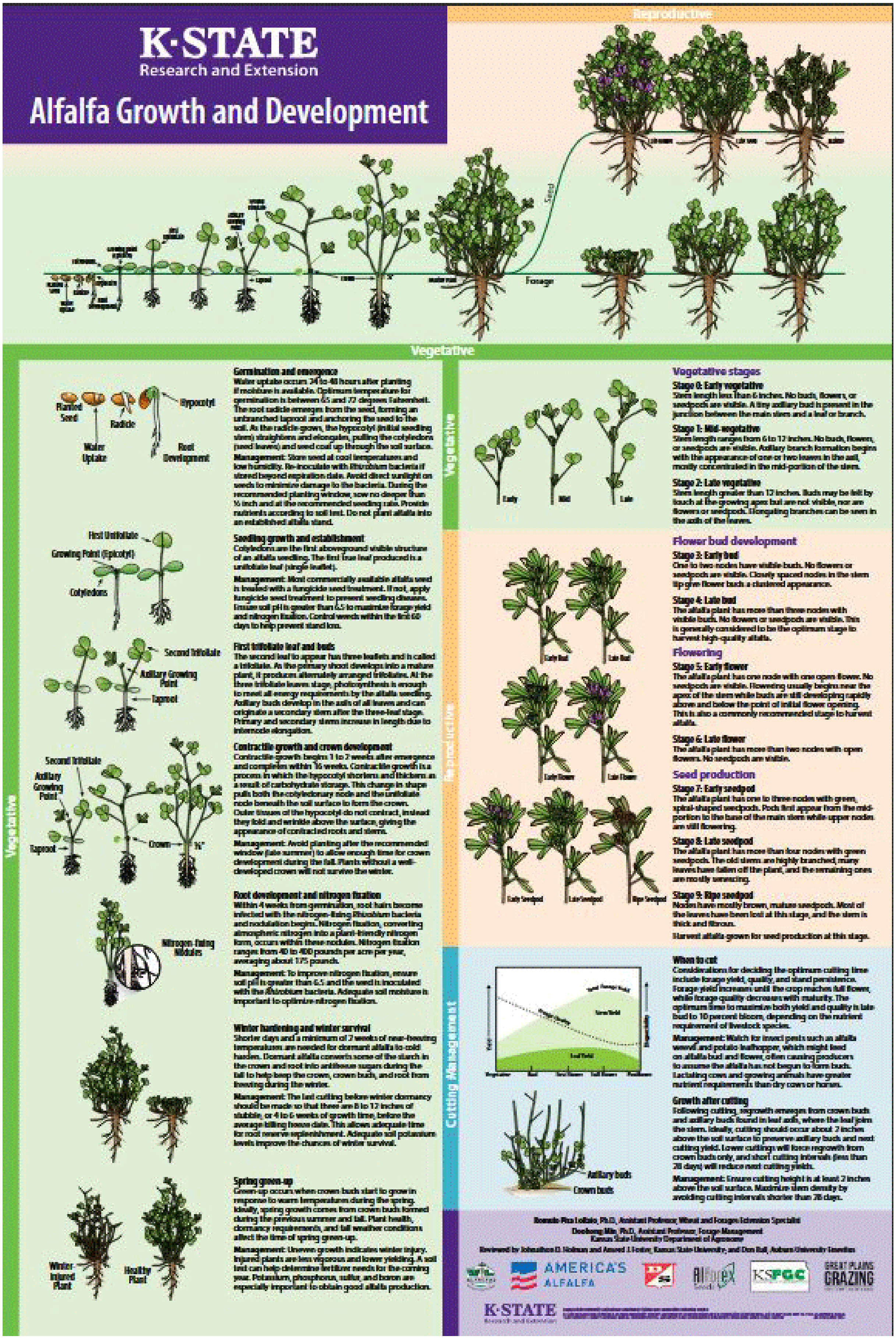
A new poster has just been published by K-State Research and Extension. The title is *Alfalfa Growth and Development*. The KSRE authors are Romulo Lollato, Wheat and Forages Specialist, and Doohong Min, Forage Management Agronomist.

You can access the poster, MF3348, at: https://www.bookstore.ksre.k-state.edu/pubs/MF3348.pdf

This poster describes and illustrates the stages of growth in alfalfa, including:

Germination and emergence
Seedling growth and establishment
First trifoliate leaf and buds
Contractile growth and crown development
Root development and nitrogen fixation
Winter hardening and winter survival
Spring green-up
Vegetative stages
Flower bud development
Flowering
Seed production

The poster also discusses cutting management.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Reproductive
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Vegetative stages
Flower bud development
Flowering
Seed production
Cutting Management
AMERICA'S ALFALFA

6. Comparative Vegetation Condition Report: June 21 - 27

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, and 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:

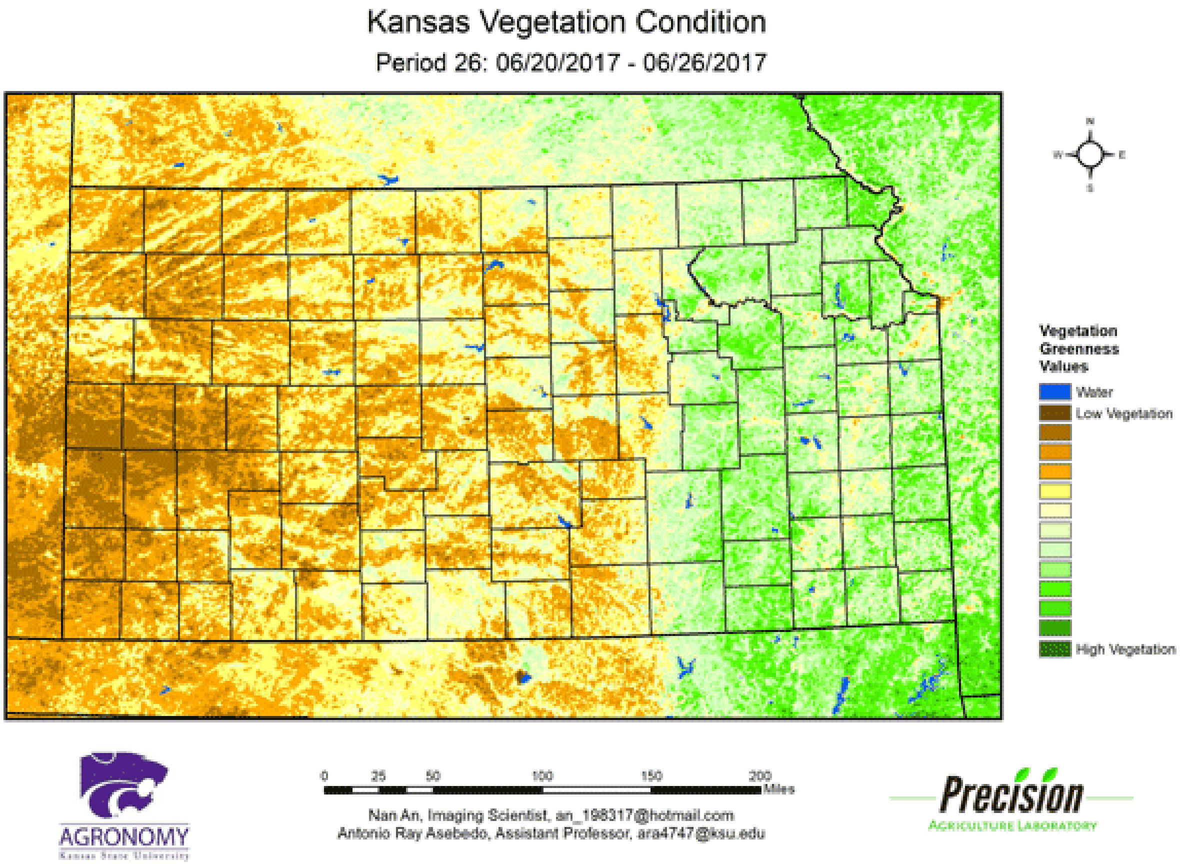

Figure 1. The Vegetation Condition Report for Kansas for June 21 – June 27, 2017 from K-State's Precision Agriculture Laboratory shows a moderate level of photosynthetic activity across much of the state. The greatest area of high photosynthetic activity is in the eastern third of the state, where temperatures have been favorable.

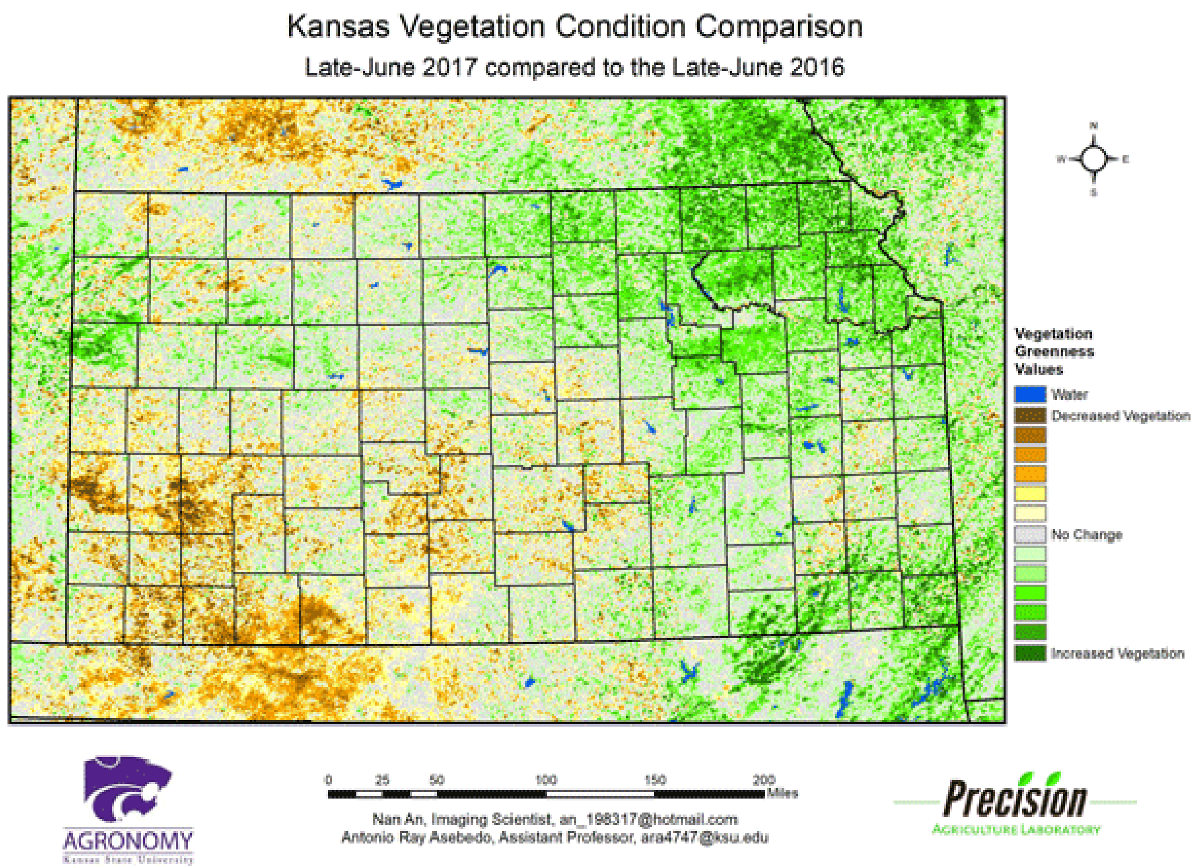

Figure 2. Compared to the previous year at this time for Kansas, the current Vegetation Condition Report for June 21– June 27, 2017 from K-State's Precision Agriculture Laboratory shows a mix of conditions. In west central Kansas, much lower NDVI values are visible. Higher NDVI values in the northeast reflect the more favorable moisture, coupled with warmer temperatures that have prevailed this year.

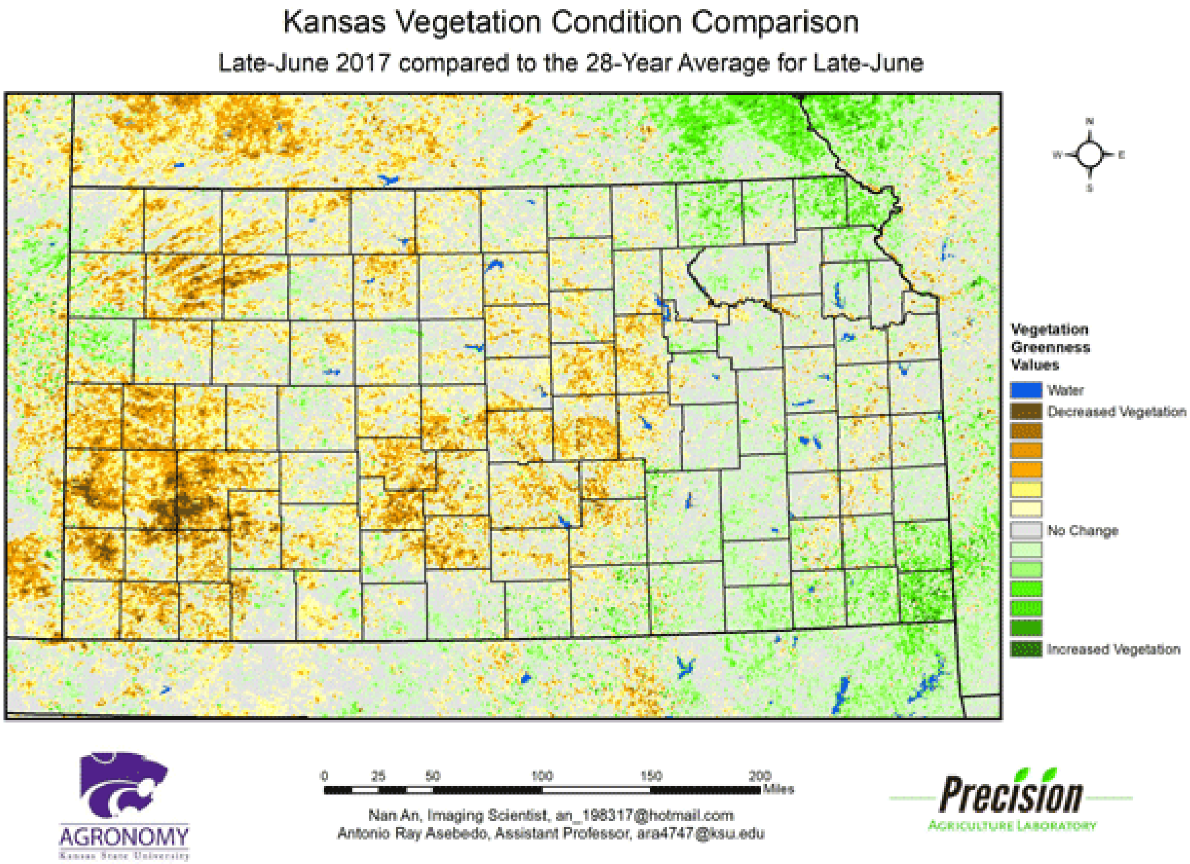

Figure 3. Compared to the 27-year average at this time for Kansas, this year's Vegetation Condition Report for June 21– June 27, 2017 from K-State's Precision Agriculture Laboratory near normal activity across eastern parts of the state. The rapid switch from wetter than normal to drier than normal conditions has resulted in crop stress in some areas.

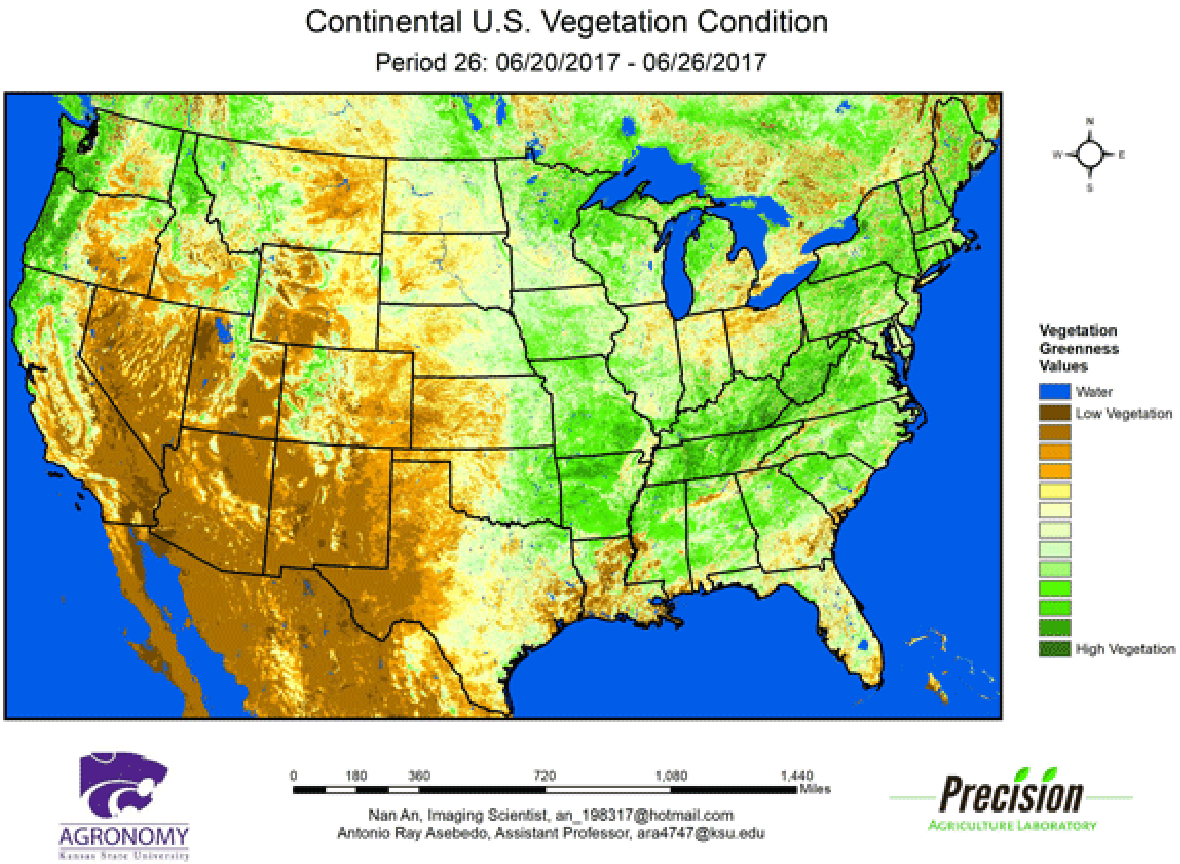

Figure 4. The Vegetation Condition Report for the U.S for June 21– June 27, 2017 from K-State's Precision Agriculture Laboratory shows the area of highest NDVI values is confined to the South, although lower-than-normal NDVI values are visible in east Texas and Louisiana. Heavy rains have impacted this region, while persistent snow pack has reduced vegetative activity in the mountains of the West.

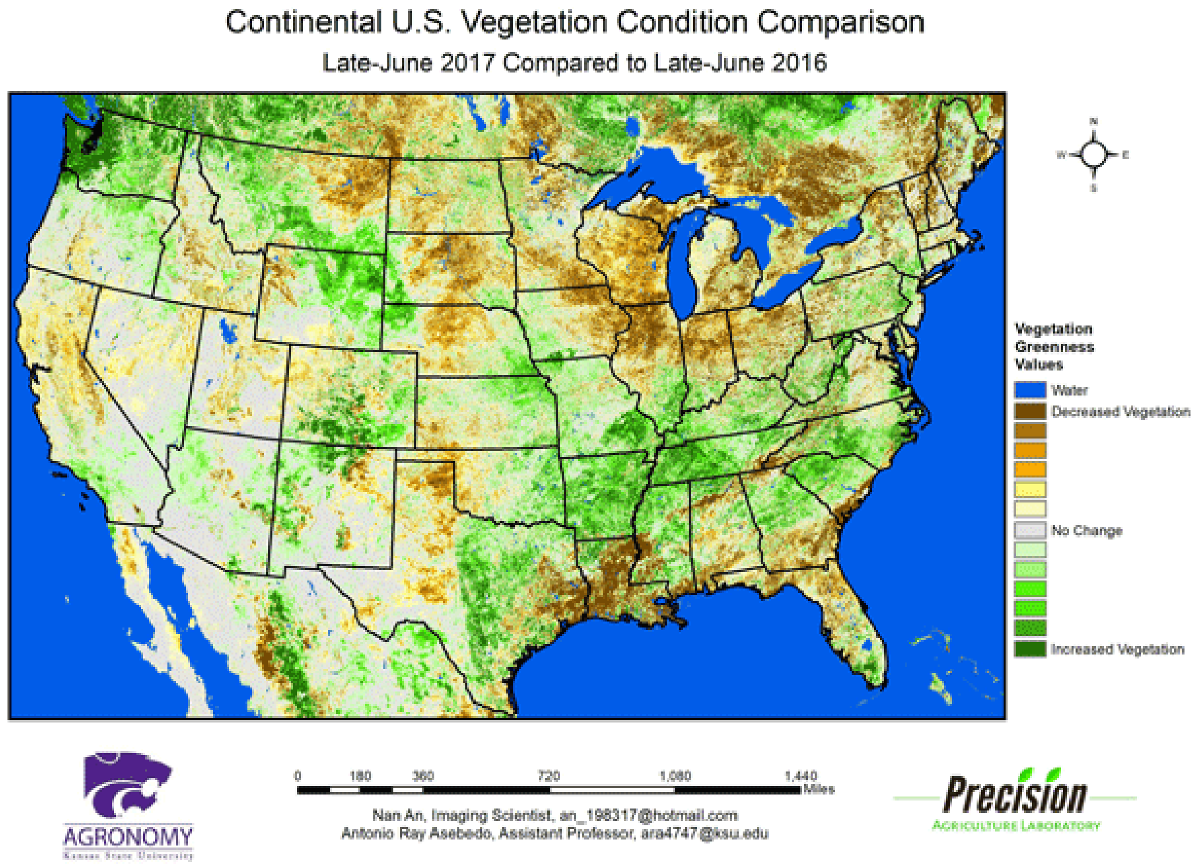

Figure 5. The U.S. comparison to last year at this time for June 21– June 27, 2017 from K-State's Precision Agriculture Laboratory shows the increasing drought in eastern Montana and the Dakotas. Warm, windy conditions have further stressed rangeland that never emerged from winter dormancy.

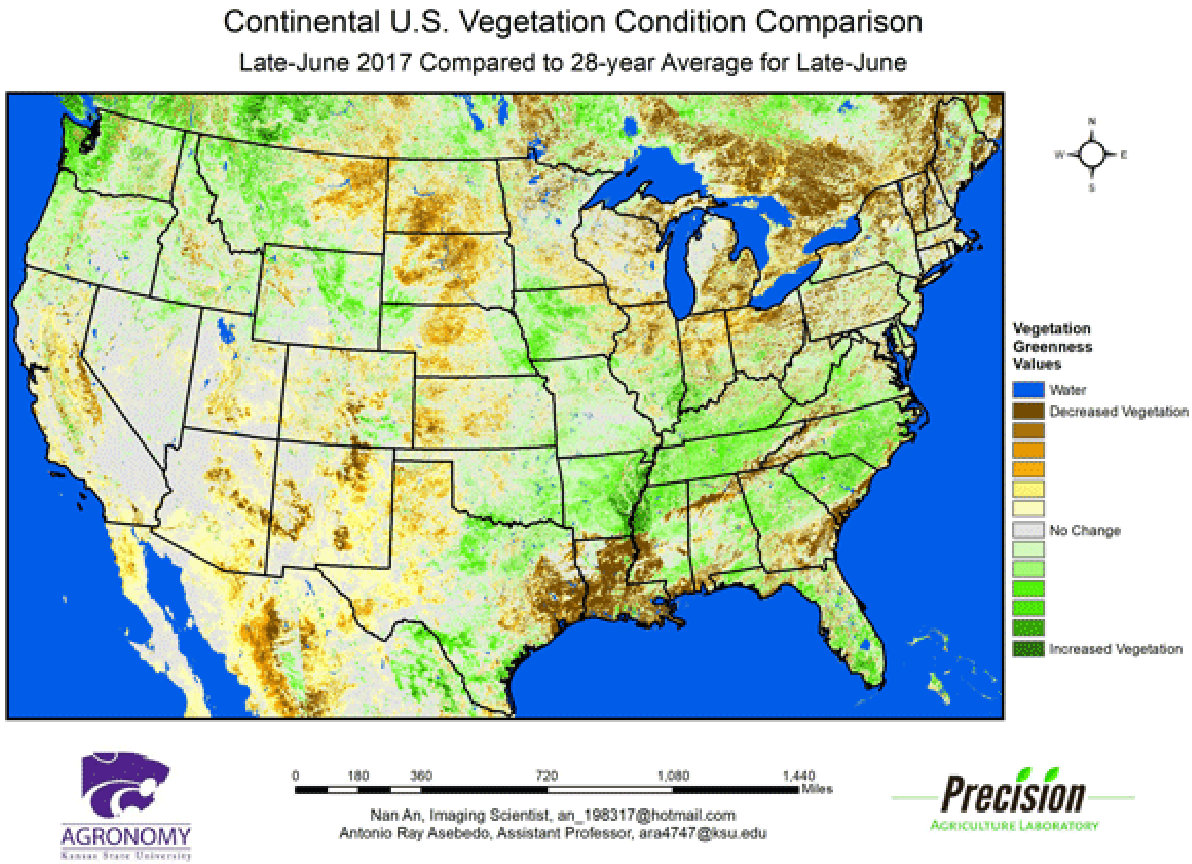

Figure 6. The U.S. comparison to the 27-year average for the period of June 21– June 27, 2017 from K-State's Precision Agriculture Laboratory shows an area of below-average photosynthetic activity has moved eastward and is now concentrated in the northern Plains. Areas from Montana through southwestern Minnesota are showing much below-average NDVI values due mainly to persistent dry conditions. Rainfall from late this week has not yet had an impact on the vegetation.

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