K-STATE Research and Extension

Extension Agronomy

eUpdate

07/01/2016

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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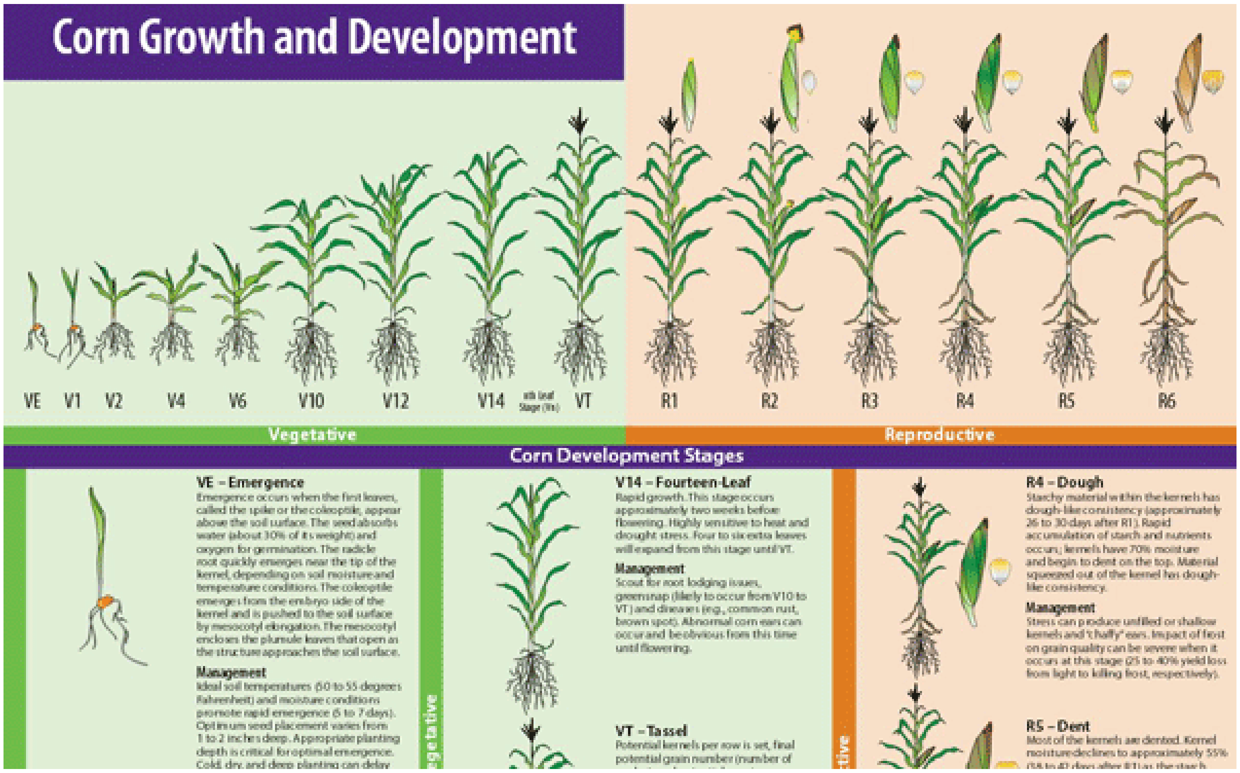
1. New corn growth and development poster from K-State

A new poster titled "Corn Growth and Development" has just been published by K-State Research and Extension. The poster can be seen at: http://www.bookstore.ksre.ksu.edu/pubs/MF3305.pdf

The poster lists the primary growth and development stages of corn, with illustrations of each stage. It describes the growth stage, and discusses some of the significant management considerations of each stage.



Authors of the poster include Ignacio Ciampitti, K-State Crop Production and Cropping Systems Specialist; Roger Elmore, Cropping Systems Agronomist, University of Nebraska-Lincoln; and Joe Lauer, Corn Specialist, University of Wisconsin. Supporters of the poster include the Kansas Corn Commission, National Corn Growers Association, K-State Research and Extension, University of Wisconsin, and University of Nebraska-Lincoln.

The following excerpts are from the poster, focusing on the growth stages occurring in Kansas corn fields at this time of the year.

V6 – Sixth-Leaf

Six leaves with collar visible. The first leaf with the rounded tip is senescent; consider this point when counting leaves. The growing point emerges above the soil surface. All plant parts are initiated. Sometime between V6 and V10, the potential number of rows (ear girth) is determined. Potential row number is affected by genetics and environment and is reduced by stress conditions. The plant increases in height due to stalk elongation; nodal roots are established in the lowest, below-ground nodes of the plant.

Management:

Scout for weeds, insects, and diseases. Rapid nutrient uptake begins at this stage. Timing nutrient applications to match this uptake enhances the potential for greater nutrient use efficiency, particularly for mobile nutrients such as nitrogen.

V10 – Tenth-Leaf

Brace roots begin to develop in the lower above-ground nodes of the plants. Until this stage, rate of leaf development is approximately 2 to 3 days per leaf.

Management:

Nutrient (potassium = K > nitrogen = N > phosphorous = P) and water (0.25 inch per day) demands for the crop are high. Heat, drought, and nutrient deficiencies will affect potential number of kernels and ear size. Scout for root lodging issues and diseases (e.g., common rust, brown spot). Weed control is critical since corn does not tolerate early-season competition for water, nutrients, and radiation well.

V14 – Fourteen-Leaf

Rapid growth. This stage occurs approximately two weeks before flowering. Highly sensitive to heat and drought stress. Four to six extra leaves will expand from this stage until VT.

Management:

Scout for root lodging issues, greensnap (likely to occur from V10 to VT) and diseases (e.g., common rust, brown spot). Abnormal corn ears can occur and be obvious from this time until flowering.

VT – Tassel

Potential kernels per row is set, final potential grain number (number of ovules), and potential ear size are being determined. Last branch of the tassel is visible at the top of the plant. Silks may or may not have emerged. The plant is almost at its maximum height.

Management:

Nutrient (K > N > P) and water (0.30 inch per day) demands for the crop are close to maximum. Heat and drought will affect potential number of kernels. Scout for insects (e.g., corn leaf aphid, western bean cutworm, corn earworm, fall armyworm) and diseases (e.g., gray leaf spot, southern rust, northern leaf blight). Total leaf defoliation severely affects final yields.

R1 – Silking

Flowering begins when a silk is visible outside the husks. The first silks to emerge from the husk leaves are those attached to potential kernels near the base of the ear. Silks remain active until pollinated. Pollen falls from the tassel to the silks, fertilizing the ovule to produce an embryo.

Potential kernel number is determined. Maximum plant height is achieved. Following fertilization, cell division is occurring within the embryo.

Management:

Nutrient (N and P accumulation is still progressing, K is almost complete) and water (0.33 inch per day) demands are at the peak. Heat and drought will affect pollination and final grain number. Defoliation by hail or other factors such as insects will produce a large yield loss.

A hard copy of the poster, which is 20 inches wide and 30 inches long, can be ordered from K-State at no charge. There is a limited supply.

To order, see: http://www.bookstore.ksre.ksu.edu/Category.aspx?id=2&catId=221

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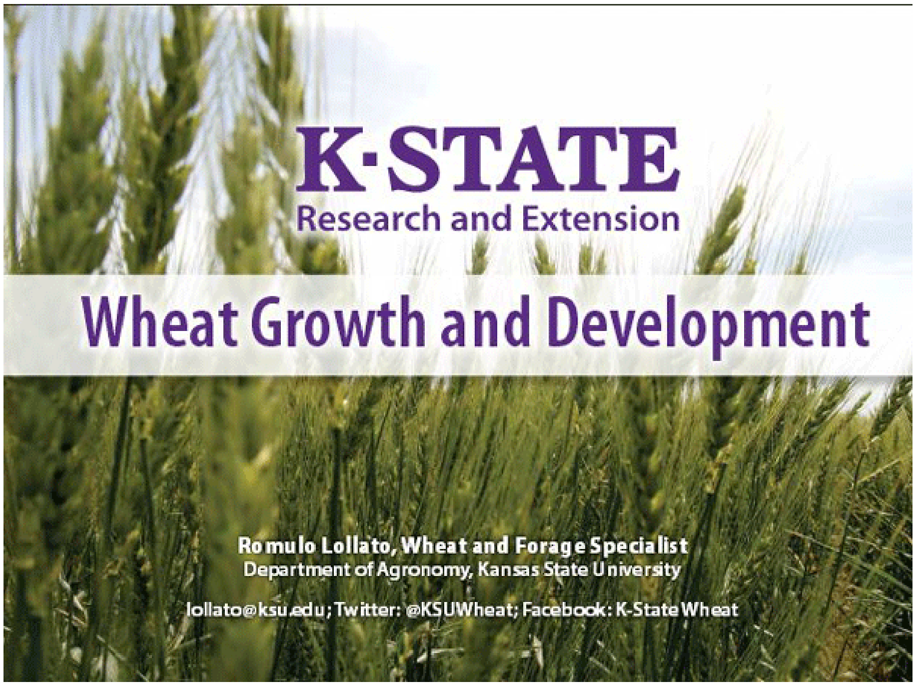
2. New wheat growth and development poster from K-State

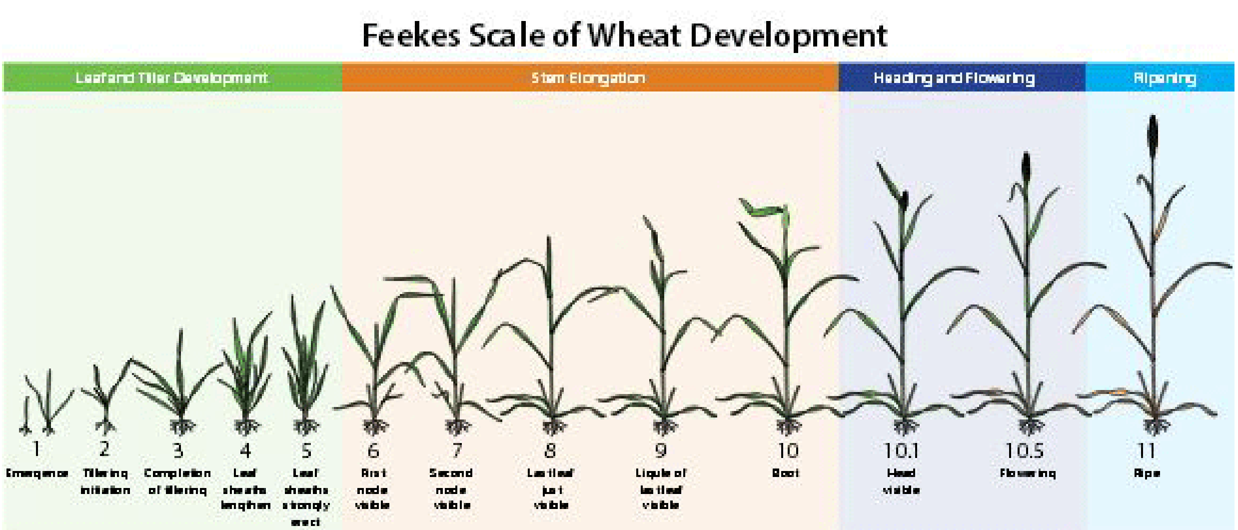
A new poster titled "Wheat Growth and Development" has just been published by K-State Research and Extension. The poster can be seen at: http://www.bookstore.ksre.ksu.edu/pubs/MF3300.pdf

The poster lists the primary growth and development stages of wheat, with illustrations of each stage. It describes the growth stage, and discusses what is happening physiologically.

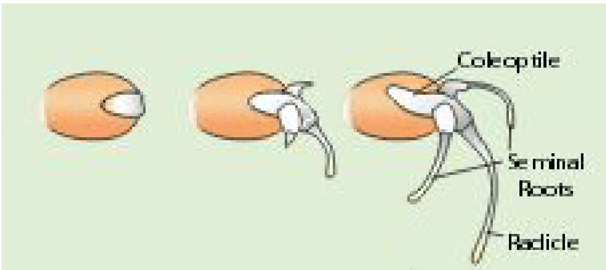


Author of the poster is Romulo Lollato, K-State Wheat and Forages Specialist. Kansas Wheat supported the production of this poster.

The following excerpts are from the poster, focusing on the stages of growth that occur in the fall, from germination to winter dormancy.

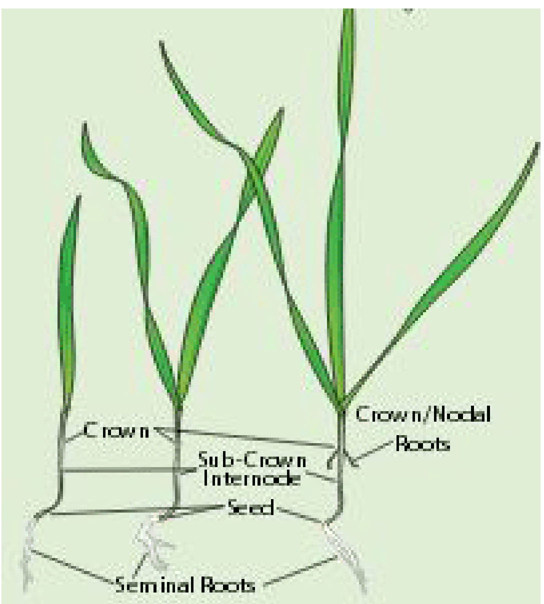


Germination



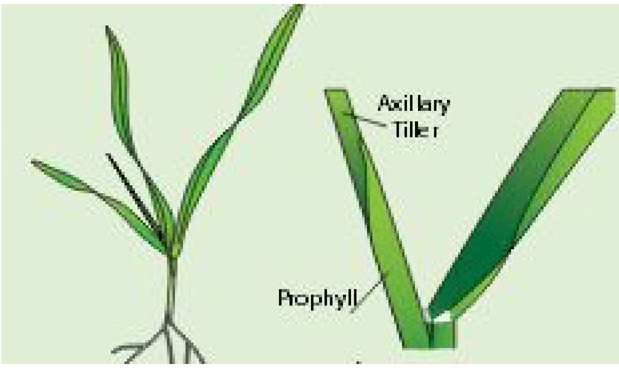
Seeds absorb water and oxygen. The radicle, seminal roots, and the coleoptile (leaflike structure enclosing the first true leaf) emerge from the seed. Temperatures between 54 and 77 degrees Fahrenheit are optimal for germination.

Feekes 1



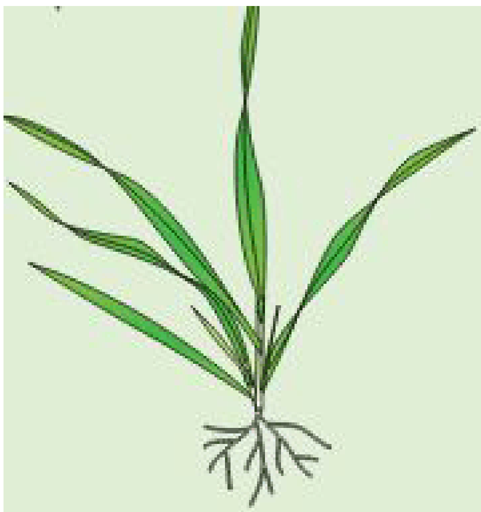
Emergence. Light above the soil stops coleoptile growth. The first true leaf emerges through the tip of the coleoptile. Three leaves fully develop before tillering initiation. The seminal rooting system develops. The crown forms between the seed and soil surface.

Feekes 2



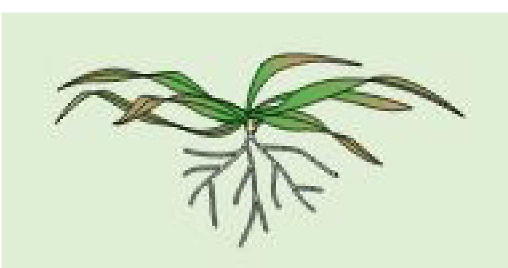
Tillering initiation. Tillers are initially encased in a protective structure called the prophyll. If there are three leaves visible, a tiller will be at the base of the first leaf. Fall-formed tillers contribute more to grain yield than spring-formed tillers. The secondary rooting system starts to develop.

Feekes 3



Continued tillering. Primary tillers develop in the axils of the first four or more true leaves of the main stem. Secondary tillers may develop from the base of primary tillers. Tiller development is prioritized based on their sequential formation. The development of the secondary rooting system increases extensively.

Winter dormancy



Vernalization. Gradually lowering temperatures induce winter hardiness in winter wheat. Vernalization requirements range from three to six weeks of temperatures below 50 degrees

Fahrenheit.

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To order, see: http://www.bookstore.ksre.ksu.edu/Category.aspx?id=2&catId=299

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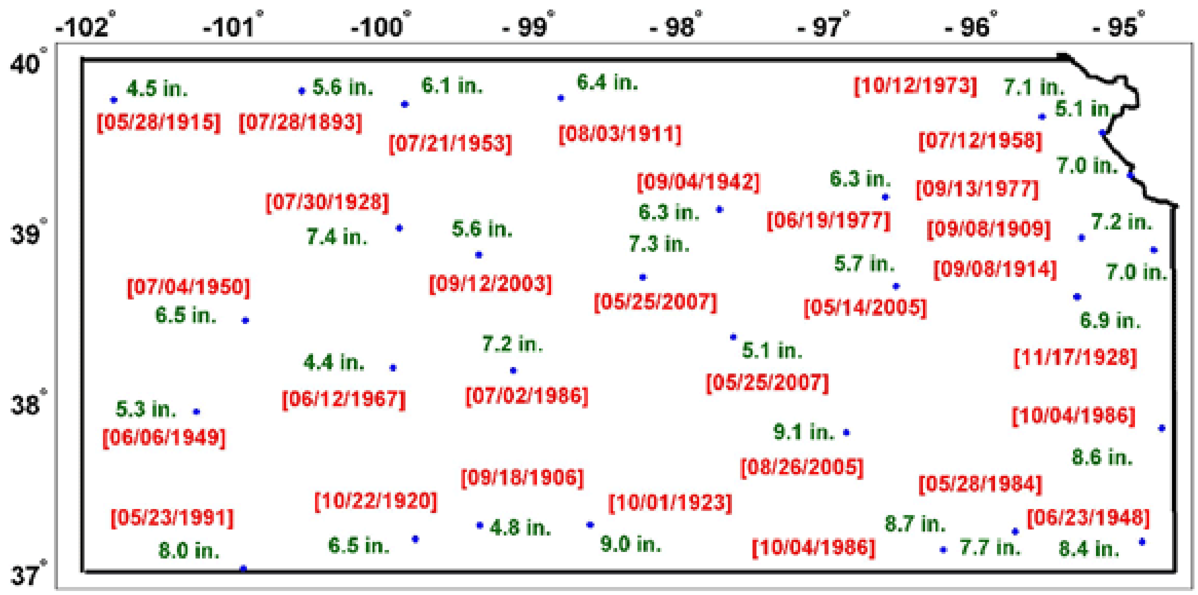
(Editor's note: The following article is one in a series of articles in the Agronomy eUpdate that examines the historical climate observations in Kansas. The methods used to do this analysis are explained in the introductory article in this series, from eUpdate No. 571, May 20, 2016. – Steve Watson)

State precipitation and snowfall records for a 24-hour period

Precipitation events. The frequency of extreme precipitation events in Kansas has increased from 1891 to 2015. More 24-hour precipitation records were set during the most recent decade than in any other decade since 1891 (Fig. 1a). The highest recorded 24-hour precipitation event was 9.1 inches in August, 2005 (Fig. 1). The range of station 24-hour precipitation records in Kansas is from 4.4 to 9.1 inches. The majority of record precipitation events have occurred in May, July, and September. Interestingly, there is a relatively lower probability to establish a record in August (Fig. 1b).



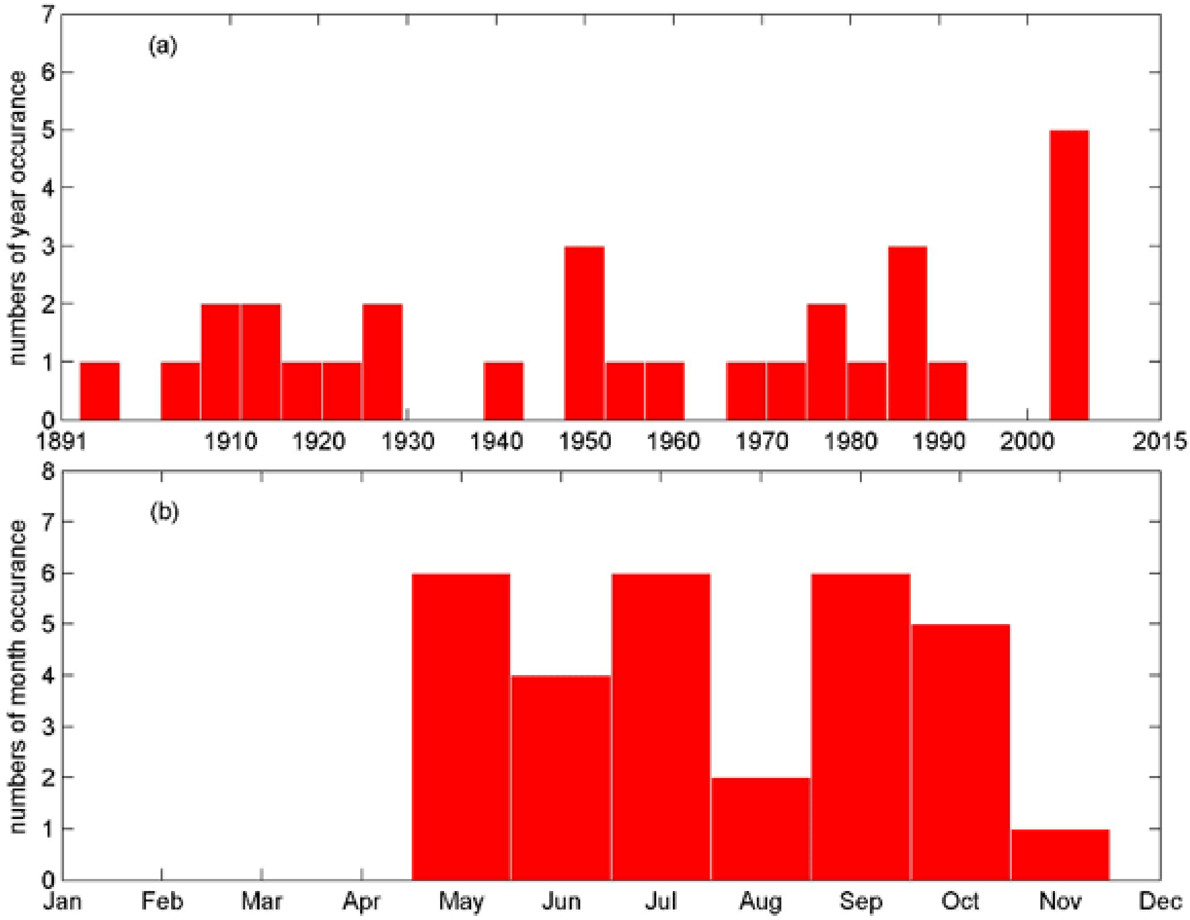


Figure 1. Top panel: 24-hour precipitation records (inches) and dates for 30 climate stations across Kansas over 1891 to 2015. Bottom panel: (a) histogram of years for 24-hour precipitation records in Kansas; and (b) histogram of months for 24-hour precipitation records in Kansas.

Snowfall events. For the 24-hour snowfall records across the state, the National Centers for Environmental Information documented a 30-inch snowfall event in Pratt in March, 2009. The station 24-hour snowfall records shown in Figure 2 range from 12 to 27 inches. The most frequent decade for establishing a snowfall record was the 1910s (Fig. 2a). March is the most frequent month in which record 24-hour snowfall events have occurred in Kansas.

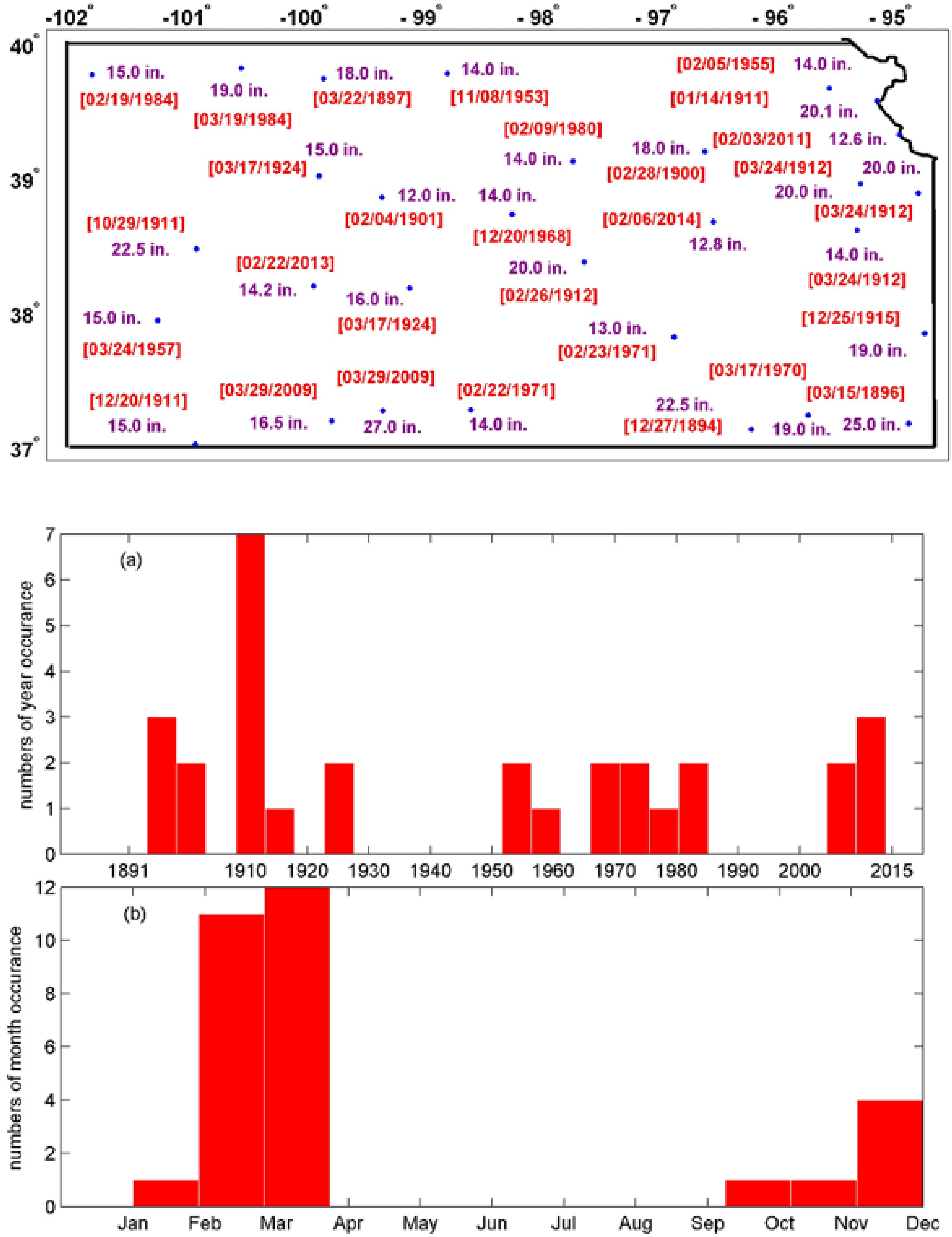


Figure 2. Top panel: 24-hour snowfall records (inches) and dates for 30 climate stations across Kansas over 1891 to 2015. Bottom panel: (a) histogram of years for 24-hour snowfall records in Kansas; and (b) histogram of months for 24-hour snowfall records observed in Kansas.

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4. 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. 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: :

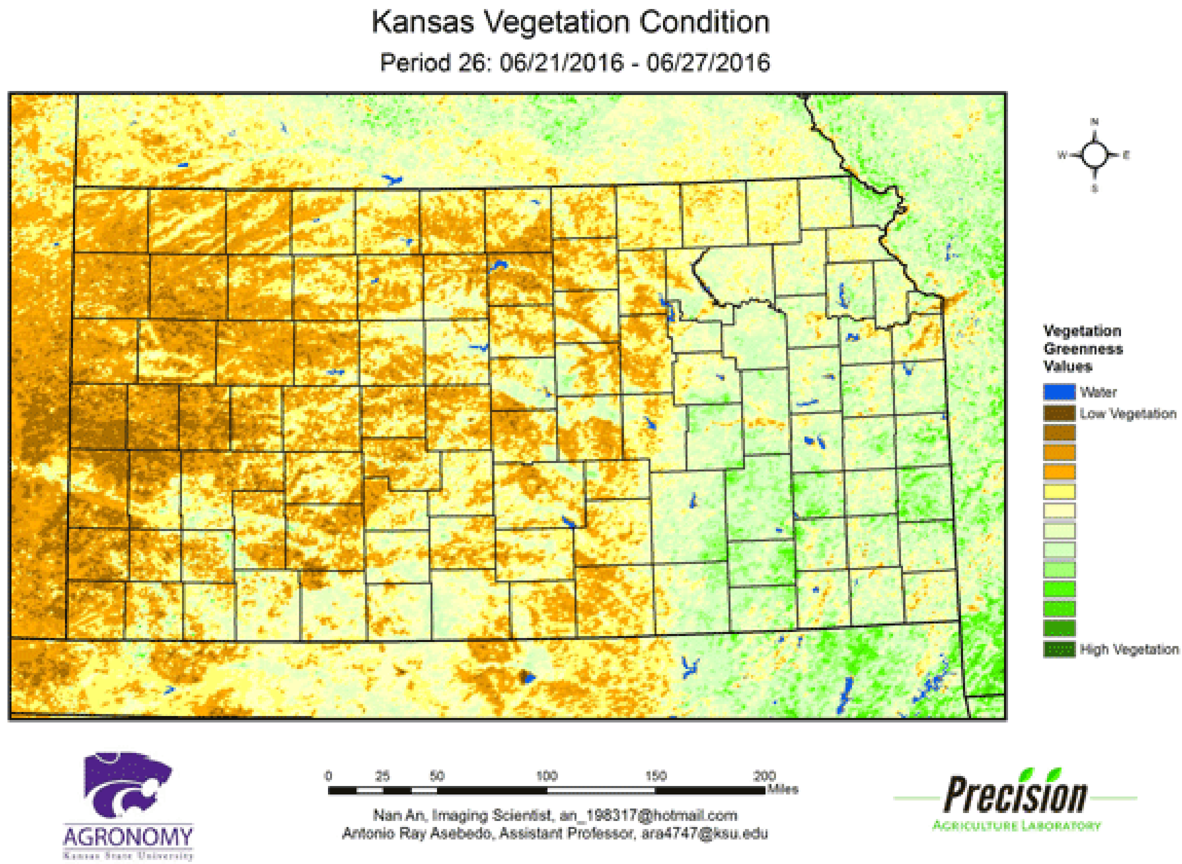

Figure 1. The Vegetation Condition Report for Kansas for June 21 – June 27, 2016 from K-State's Precision Agriculture Laboratory continues to show widespread low NDVI values in the western third of the state. Low NDVI values are also showing south of the Kansas River in eastern Kansas, where recent hot dry weather has had a negative impact on vegetation.

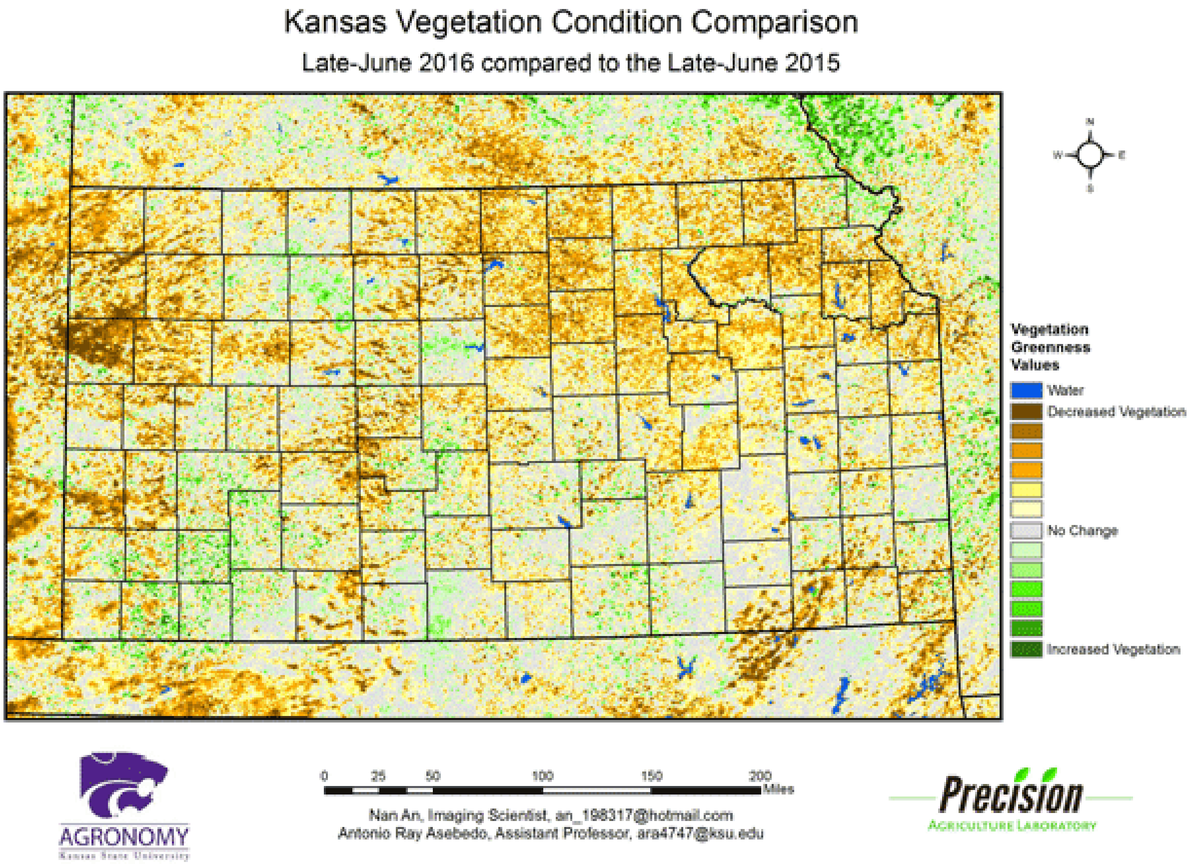

Figure 2. Compared to the previous year at this time for Kansas, the current Vegetation Condition Report for June 21 – June 27, 2016 from K-State's Precision Agriculture Laboratory shows vegetative production much lower across the northern areas of the state. Much of this is due less rainfall this year, as compared to last.

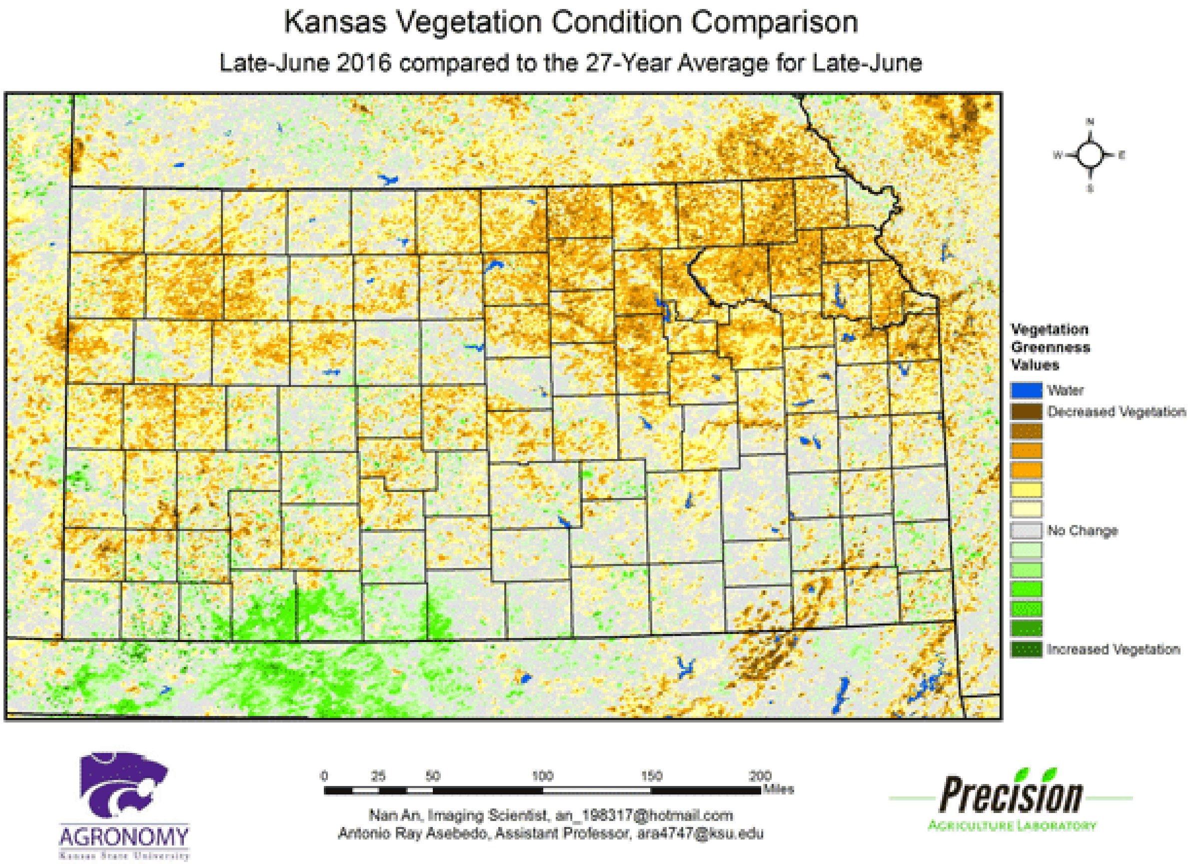

Figure 3. Compared to the 27-year average at this time for Kansas, this year's Vegetation Condition Report for June 21 – June 27, 2016 from K-State's Precision Agriculture Laboratory shows below-average vegetative activity continues in the northeastern areas of the state, where wet weather was quickly replaced by hot, dry conditions. Increased photosynthetic activity is most visible in the southwest divisions. Continued rains, and closer to normal temperatures have favored vegetative activity in this area.

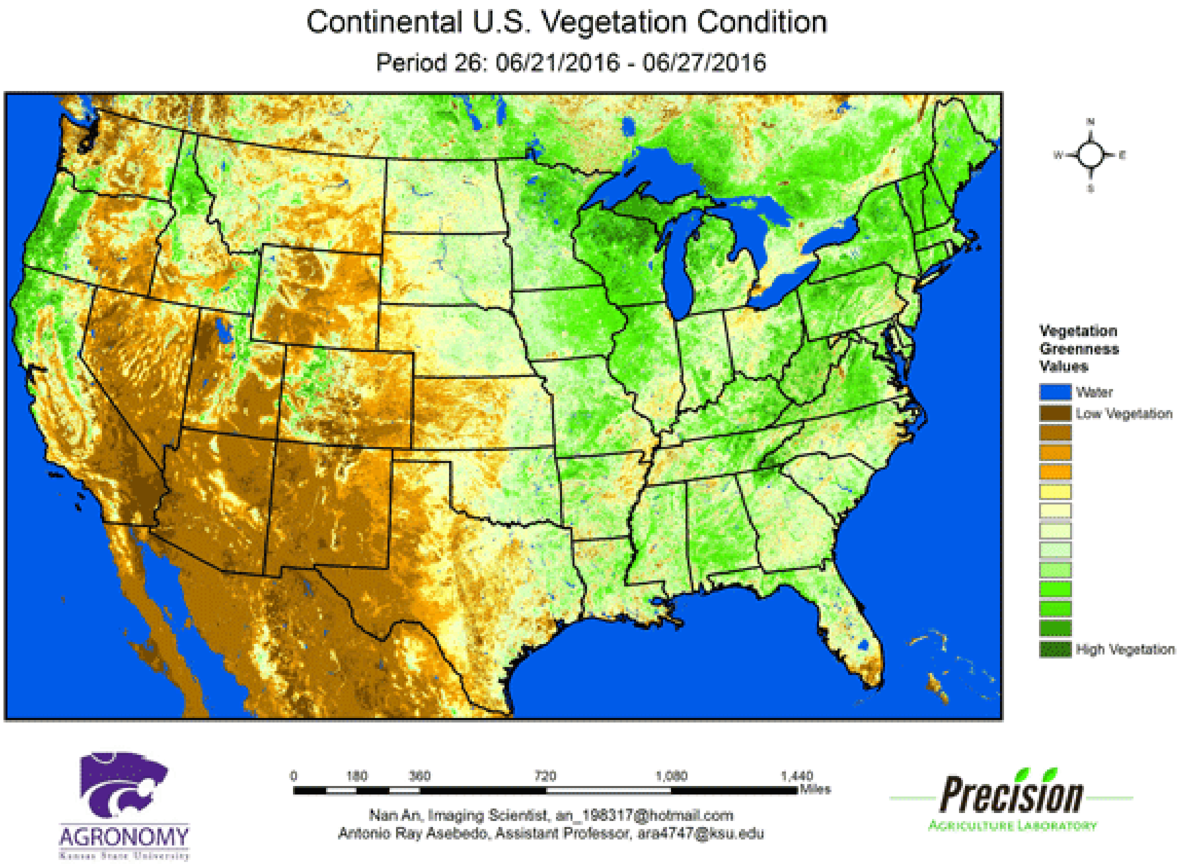

Figure 4. The Vegetation Condition Report for the U.S for June 21 – June 27, 2016 from K-State's Precision Agriculture Laboratory shows the highest NDVI values are in the upper Midwest/Great Lakes region. Favorable moisture continues to drive active photosynthesis in these areas. A pocket of lower photosynthetic activity continues to be visible along the lower Mississippi River, where flash drought conditions are an issue.

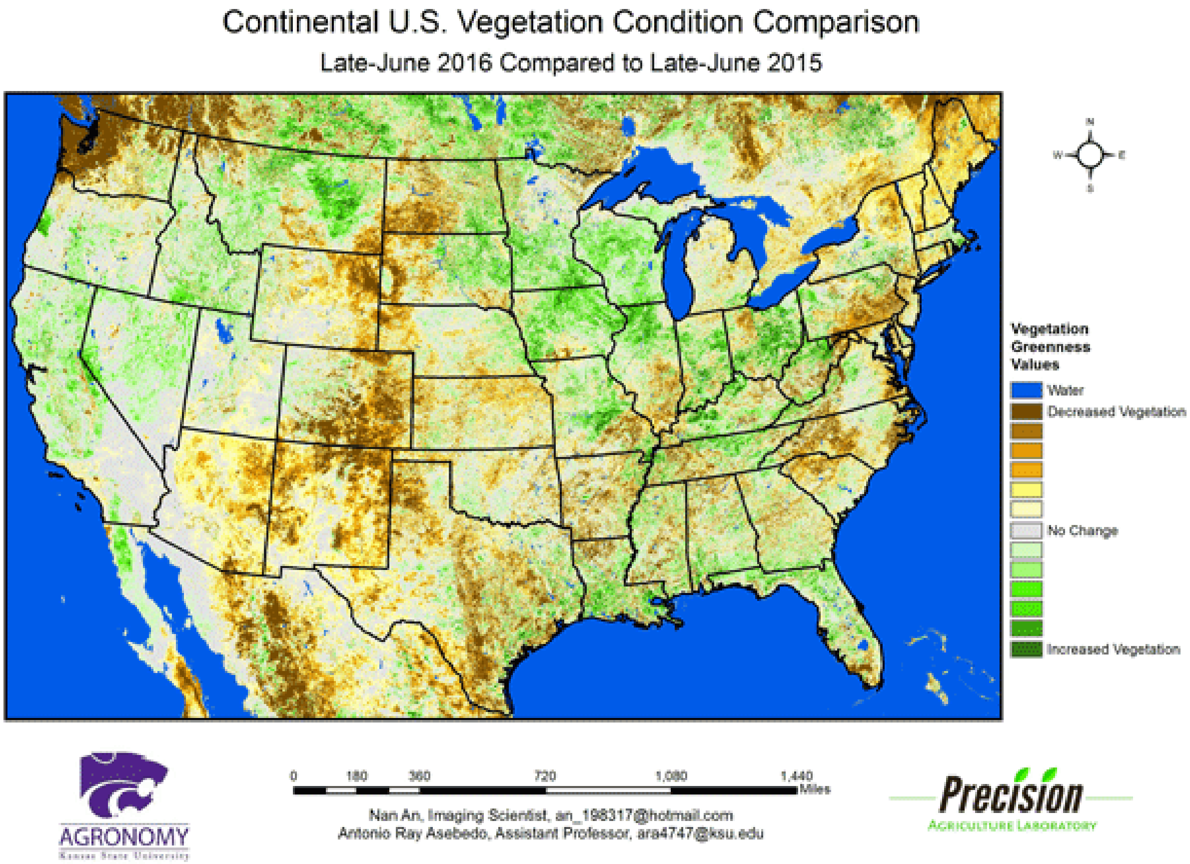

Figure 5. The U.S. comparison to last year at this time for the period June 21 – June 27, 2016 from K-State's Precision Agriculture Laboratory shows that lower NDVI values are most evident in western Great Plains. Drier conditions this year have delayed vegetation compared to last year. Western Washington state has much lower NDVI values this year, due largely to excessively wet weather. The weekly precipitation for western Washington is 200 to 400 percent of normal.

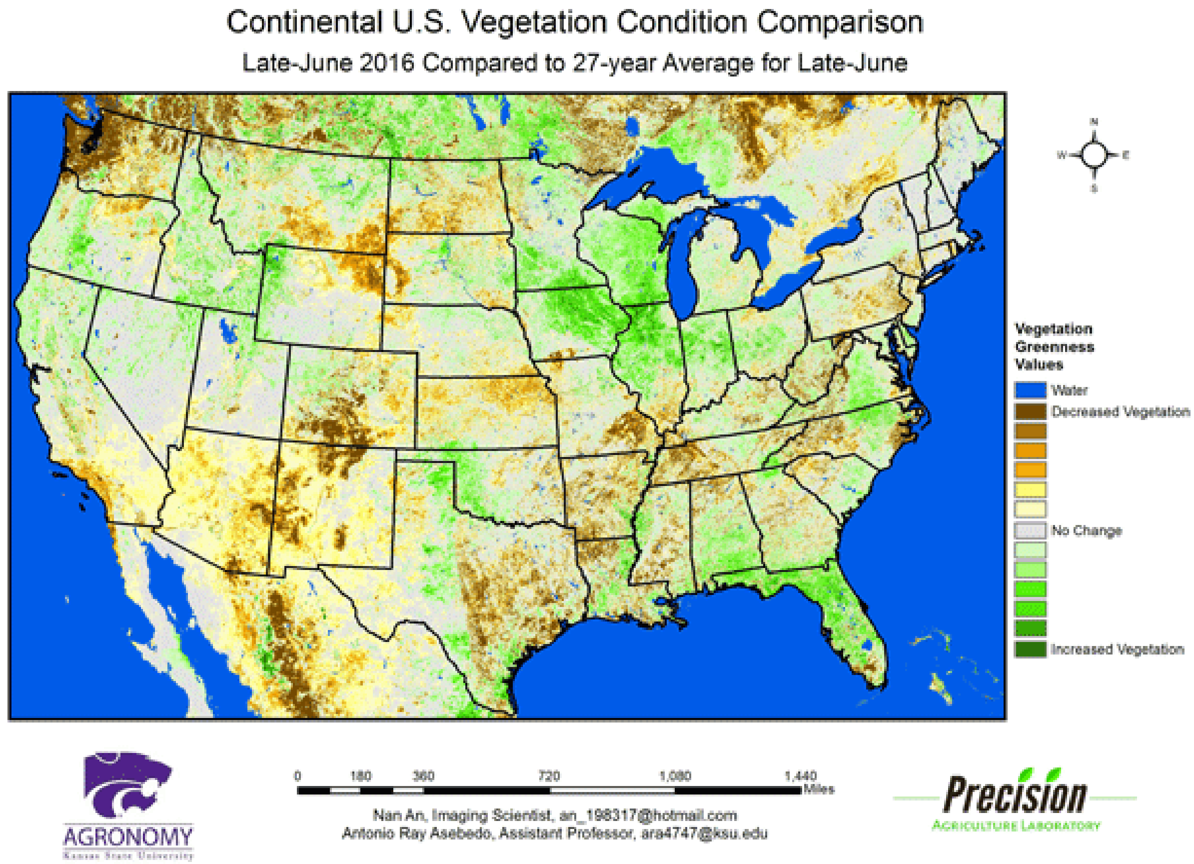

Figure 6. The U.S. comparison to the 27-year average for the period June 21 – June 27, 2016 from K-State's Precision Agriculture Laboratory shows below-average photosynthetic activity across the western Washington, where excessive moisture has limited biomass activity. Vegetative activity has rebounded in east Texas as the floods of April recede, but is still below average.

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