



Extension Agronomy

eUpdate

07/21/2017

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. Drought stress in corn	3
2. Mid-summer control of volunteer wheat.....	9
3. New Canola Growth and Development publication from K-State.....	13
4. Kansas River Valley Experiment Field fall field day, August 8	15
5. East Central Experiment Field fall field day, August 16	16
6. Southwest Research-Extension Center field day, August 24.....	18
7. Comparative Vegetation Condition Report: July 11 - 17.....	19

1. Drought stress in corn

In most of the state, rains have been somewhat sporadic in recent weeks. Some of the dryland corn crop is experiencing a combination of heat and drought conditions. Moisture levels have varied from excessive in many areas early in the season to very dry now as corn is entering or already at the reproductive stages. Since the growing season is progressing very quickly, it is best to be prepared to take a close look for symptoms of potential drought stress.

Early-to-late vegetative stages

One of the first visible corn responses to insufficient water availability is leaf rolling. If the stress is severe, the leaf rolling process can be detected even very early in the morning. Leaf rolling is just a plant defense mechanism to reduce transpiration and plant canopy temperature, and with an overall improvement in water use efficiency. Under continuous drought for several days, reductions in leaf elongation and in plant height should be expected.





Figure 1. Leaf rolling in corn under drought stress. Photos by Ignacio Ciampitti, K-State Research and Extension.

Shorter, less leafy plants are also among the most visible symptoms of drought stress conditions. Plants may not be as green as usual if chlorophyll production is affected. In addition, root systems will be smaller under drought conditions since all below- and above-ground plant growth will be affected. Those symptoms are the outcome of plants that are less efficient in growing as photosynthesis is slowing down.



Figure 2. Effect of drought stress on root systems. On the left is a plant with a smaller root system and stalk diameter caused by drought stress. On the right is an unstressed corn plant, with greater root system, more nodal roots, and greater stalk diameter. Photo by Ignacio Ciampitti, K-State Research and Extension.

Critical period bracketing silking

At what stage of growth is corn most sensitive to drought stress? To answer the question, we need to know the most important growth stages for grain determination. The final number of kernels for corn is determined around the pollination period (2 weeks before and 2 weeks after flowering). Thus, corn is extremely sensitive to drought stress during that period. Drought stress directly affects the final number of kernels through different processes, such as:

1. Potential delays in silking (asynchrony between the development of male and female reproductive parts). This happens when the tassel is shedding pollen but the ear is not yet receptive (silks are not yet out of the husk).
2. Potential reductions in ear size (smaller ears with less physical space for bearing grains).
3. Shorter time for pollen receptivity. This occurs when the silks dry out very fast under warm temperatures, impeding a successful pollination.

4. Pollination is concentrated in just a few days. In general, pollination takes place earlier and with a short duration under drought stress. High temperatures can also potentially impact pollen viability.
5. Even when pollination is effective, kernel abortion or cessation can occur right after flowering, in the blister and milk stages, if drought stress continues.

Under extreme drought and heat stresses, plants may be barren, with no ears being formed at all, if conditions were severe well before pollination time.





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Figure 3. Leaf rolling in corn under drought stress during early reproductive stages. Photos by Ignacio Ciampitti, K-State Research and Extension.

Overall reductions in potential yield can be expected whether the stress occurs early (10-leaf to 15-leaf stages) or late (dough and dent stages) in the crop growing season.

Management practices and other factors

From a management practice perspective, situations that tend to make corn more susceptible to drought stress include high plant densities, narrow row spacing, and excessive applications of fertilizer or manure. Also, sandy soils are prone to the drought stress due to reduced water holding capacity.

Summary

Scout your acres for drought symptoms. The impacts of the drought stress on grain yield can be known with more precision right after flowering. If stress is impacting the potential kernel number, and if conditions for the coming weeks continue to be on the dry side, yield reductions can be expected. Continuing drought stress could potentially reduce yields further by lowering seed weight, on top of a reduction in kernel numbers.

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2. Mid-summer control of volunteer wheat

Where volunteer wheat has emerged, producers should consider beginning control measures soon, if possible, rather than waiting until closer to wheat planting time. This is especially important on fields where wheat was hailed out and volunteer wheat emerged at the time of harvest, or shortly afterward.

Controlling the first flush of volunteer wheat now may mean you'll need one more field pass than normal later in the summer 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 that wheat curl mites can survive on.

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 hauled-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 are the cause of infections of wheat streak mosaic, High Plains mosaic virus, and triticum mosaic virus. Wheat varieties with the wsm2 gene for resistance to wheat streak mosaic (Oakley CL, Joe, and Clara CL) remain susceptible to High Plains mosaic virus and triticum mosaic virus, so controlling volunteer wheat is still important even if you plant one of those varieties.



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. New Canola Growth and Development publication from K-State

A new poster has just been published by K-State Research and Extension. The title is *Canola Growth and Development*. The KSRE authors are Mike Stamm, Canola Breeder, and Ignacio Ciampitti, Crop Production and Cropping Systems Specialist.

You can access the poster, MF3236, at: <https://www.bookstore.ksre.k-state.edu/pubs/MF3236.pdf>

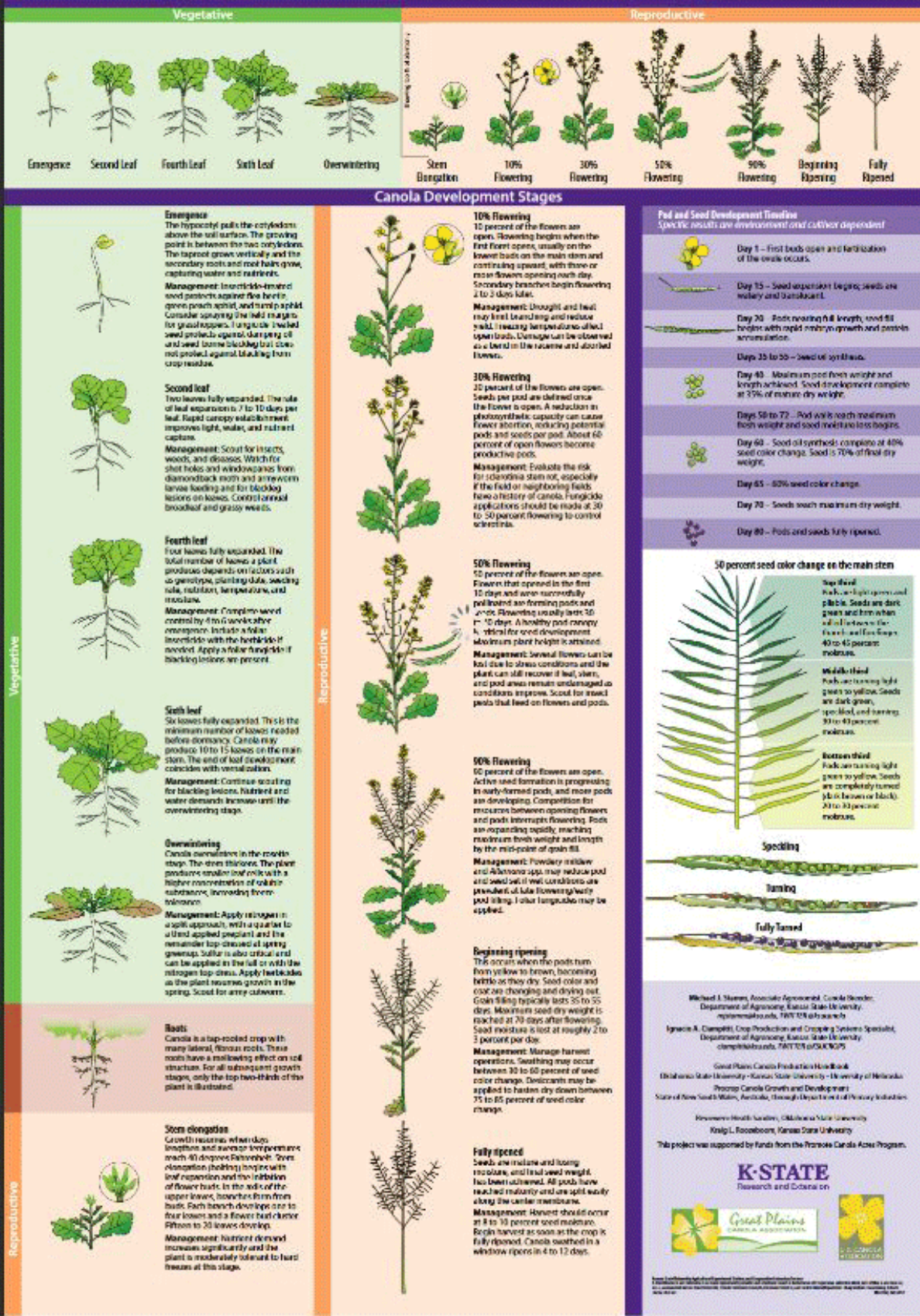
This poster describes and illustrates the stages of growth in canola, including:

- Emergence
- Second Leaf
- Fourth Leaf
- Sixth Leaf
- Overwintering
- Stem elongation
- 10% Flowering
- 30% Flowering
- 50% Flowering
- 90% Flowering
- Beginning ripening
- Fully ripened

The poster also discusses and illustrates pod and seed development, and seed color changes.

Canola Growth and Development

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4. Kansas River Valley Experiment Field fall field day, August 8

The Kansas River Valley Experiment Field near Rossville will host its fall field day on Tuesday, August

8. The field day begins at 5 p.m. sharp.

Field day topics and K-State presenters include:

- Starters and Late Nitrogen Application – Dorivar Ruiz Diaz, Nutrient Management Specialist
- Field Crop Pest Activity Happening Now and in the Near Future – Jeff Whitworth and Holly Schwarting, Extension Entomology
- Getting the Most from Your Drone Experience – Ashley Lorence and Andy Newsum, Graduate Students, Precision Agriculture
- The Learning Curve During the First Year of Xtend Soybeans – Dallas Peterson, Weed Management Specialist

The field is located 1 mile east of Rossville on U.S. Hwy 24, on the south side of the road.

A BBQ meal will be provided after the field day, sponsored by Wilbur-Ellis. To pre-register, call Michelle Wilson at the Shawnee County Extension office at 785-232-0062, ext. 100 by 5 p.m. on Monday, August 7. Commercial pesticide applicator continuing education credits have been applied for.

5. East Central Experiment Field fall field day, August 16

The East Central Experiment Field in Ottawa will host its fall field day on Wednesday, August 17. The field day begins at 9 a.m. with registration, coffee and doughnuts, and the program starts at 9:30 a.m. A complimentary lunch will be served.

Field day topics and K-State presenters include:

- Increasing the Rate of Genetic Gain for Yield in Soybean Breeding Programs – Bill Schapaugh, Soybean Breeder
- When Corn Fungicides Are a Good Investment – Eric Adey, Agronomist-in-Charge, East Central Research Field and Kansas River Valley Research Field
- Row Crop Management Strategies – Ignacio Ciampitti, Crop Production and Cropping Systems Specialist
- New Research on Pigweed Control – Marshall Hay and Nate Thompson, Graduate Students

From I-35 at the Ottawa exit, the East Central Experiment Field is south 1.7 miles on Kansas Highway 59, then east 1 mile, and south 0.75 mile.

More information, including Certified Crop Advisor Credits, is available by contacting the East Central Experiment Field at 785-242-5616.

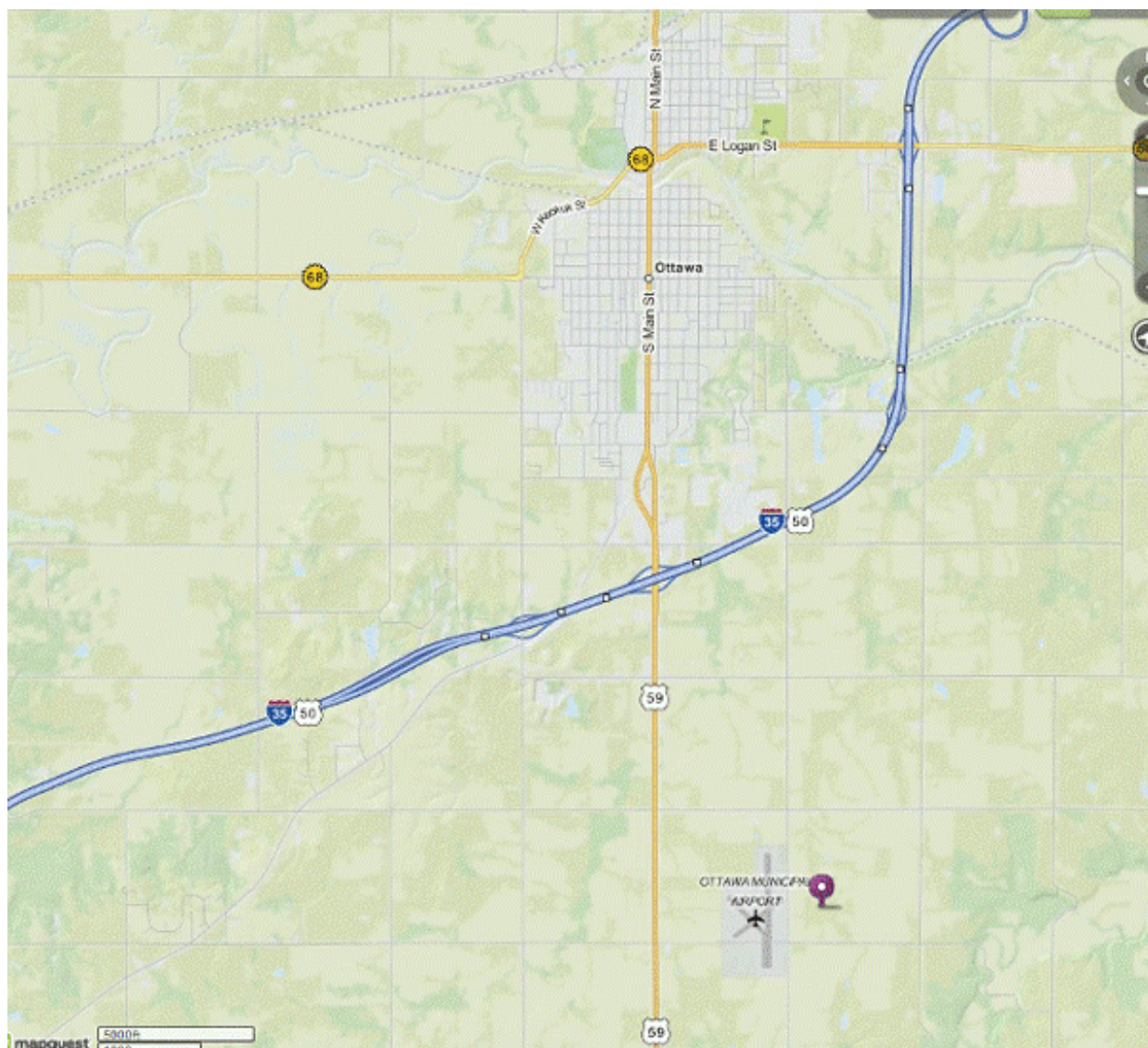


Figure 1. Location of East Central Experiment Field, south of Ottawa.

6. Southwest Research-Extension Center field day, August 24

The Southwest Research-Extension Center hosts its annual fall field day on Thursday, Aug. 24 at 4500 E. Mary St. in Garden City.

The field day includes field tours, seminars, and commercial exhibitor displays, plus a sponsored lunch. Registration begins at 8 a.m. with the program starting at 9:15 a.m.

One credit hour and one core hour will be available for commercial pesticide applicator licensing.

Field tour and seminar topics include:

- Corn and Sorghum Insect Control Update
- Weed Control in Irrigated Corn
- Weed Control in Dryland Sorghum
- The Effect of Humic Products on Sorghum Yield and Nitrogen Use Efficiency
- Integrating Cover Crops and Annual Forages into Wheat-Sorghum-Fallow Cropping Systems
- Wheat Health Management
- Core Hour for Commercial Pesticide License

More information is available by contacting Randall Currie at rscurrie@ksu.edu or by calling the center at 620-276-8286.

7. Comparative Vegetation Condition Report: July 11 - 17

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:

Kansas Vegetation Condition

Period 29: 07/11/2017 - 07/17/2017

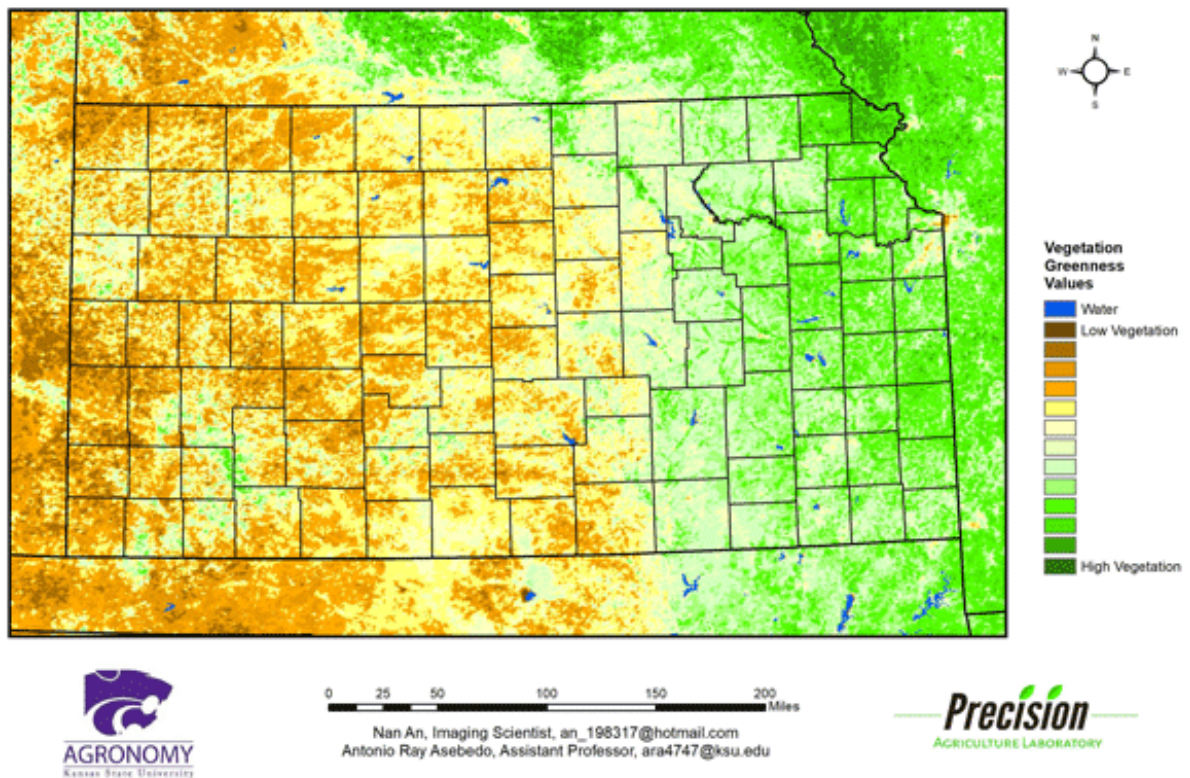


Figure 1. The Vegetation Condition Report for Kansas for July 11 – July 17, 2017 from K-State’s Precision Agriculture Laboratory shows the area of greatest vegetative activity is in eastern Kansas, extending into extreme northeast Kansas. Warm weather has slowed vegetative activity in the west, but a pocket of increased activity is visible in the Arkansas River Valley south of Garden City, where heavier showers occurred.

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Kansas Vegetation Condition Comparison

Mid-July 2017 compared to the Mid-July 2016

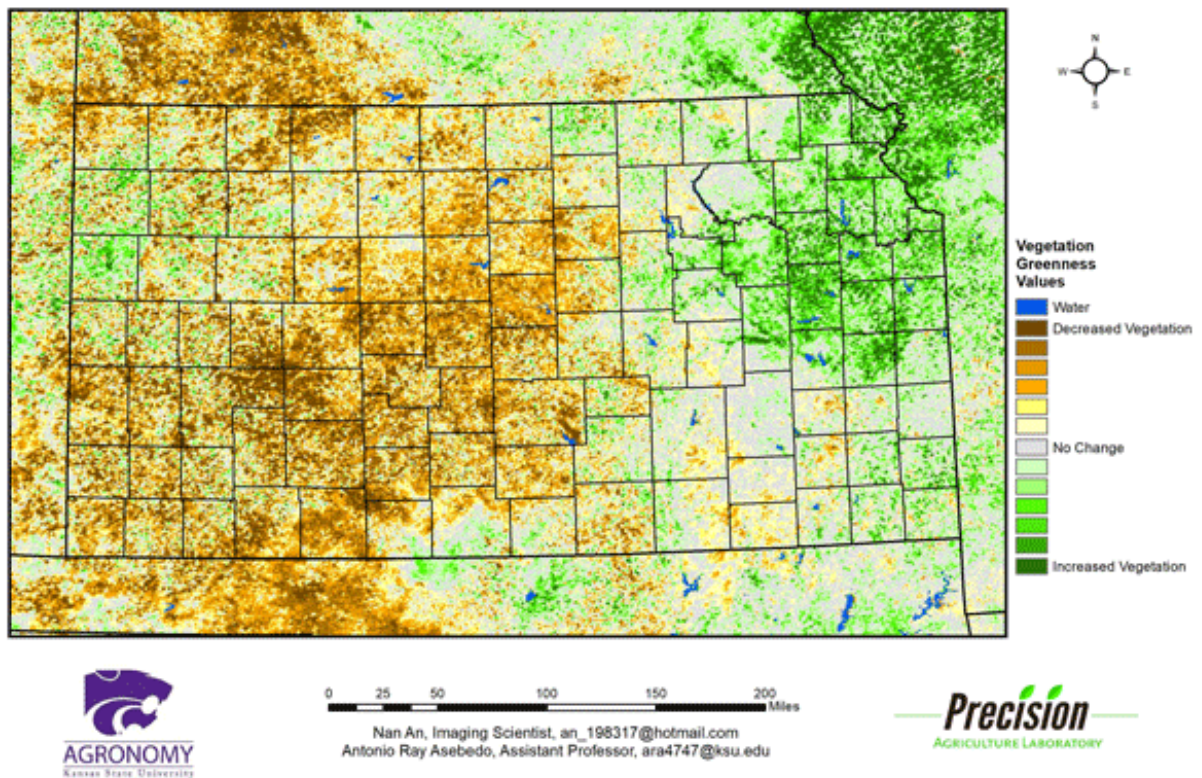


Figure 2. Compared to the previous year at this time for Kansas, the current Vegetation Condition Report for July 11 – July 17, 2017 from K-State’s Precision Agriculture Laboratory shows the greatest change in vegetative activity is in the Flint Hills area. Rainfall and temperatures have been favorable in the area, whereas western Kansas has hotter and drier conditions than this time last year.

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Kansas Vegetation Condition Comparison
Late-June 2017 compared to the 28-Year Average for Late-June

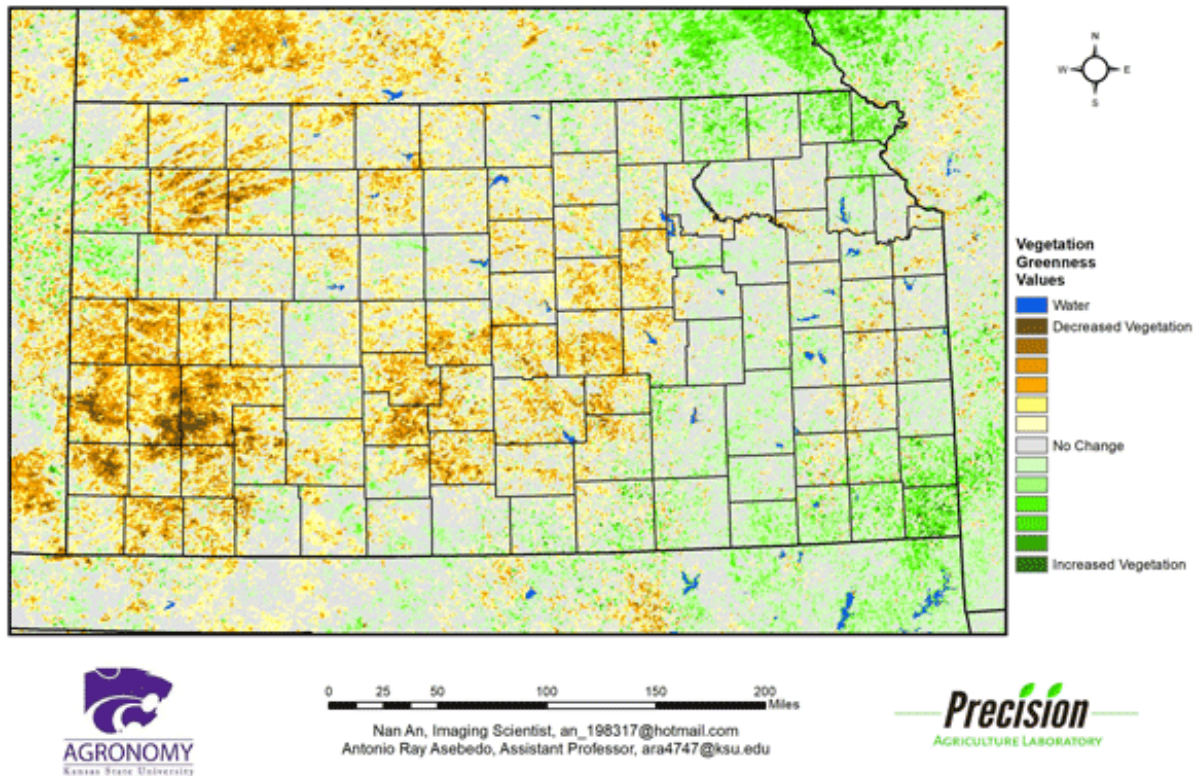


Figure 3. Compared to the 28-year average at this time for Kansas, this year's Vegetation Condition Report for July 11 – July 17, 2017 from K-State's Precision Agriculture Laboratory much of the state has close-to-average vegetative activity. Wetter-than-normal conditions have favored parts of the west, particularly Wallace County. Meanwhile continued hot, dry weather has stressed vegetation in the central parts of the state.

Continental U.S. Vegetation Condition

Period 29: 07/11/2017 - 07/17/2017

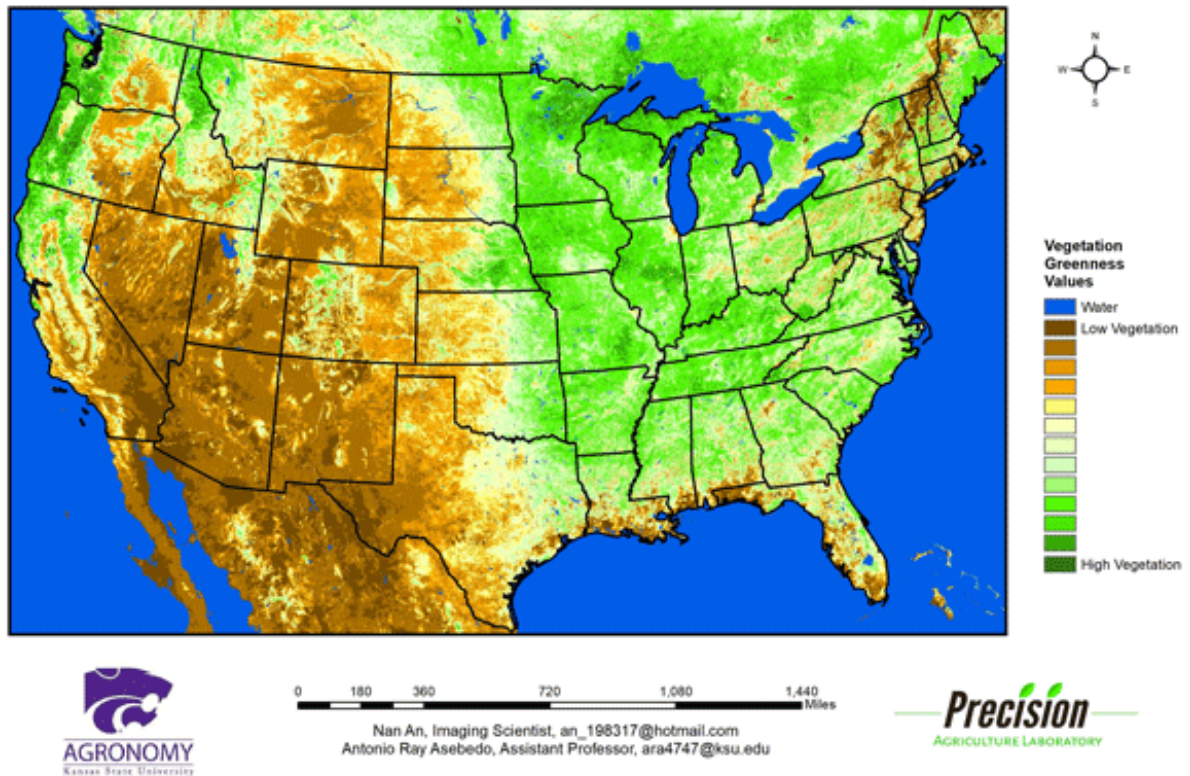


Figure 4. The Vegetation Condition Report for the U.S for July 11 – July 17, 2017 from K-State’s Precision Agriculture Laboratory shows the area of highest NDVI levels is centered in the Midwest, particularly in southern Missouri and central Illinois. A second area of higher vegetative activity is visible along the West Coast, where the wet winter continues to benefit vegetative growth. Extremely low NDVI values highlight the severe drought in eastern Montana and western South Dakota.

Continental U.S. Vegetation Condition Comparison
Mid-July 2017 Compared to Mid-July 2016

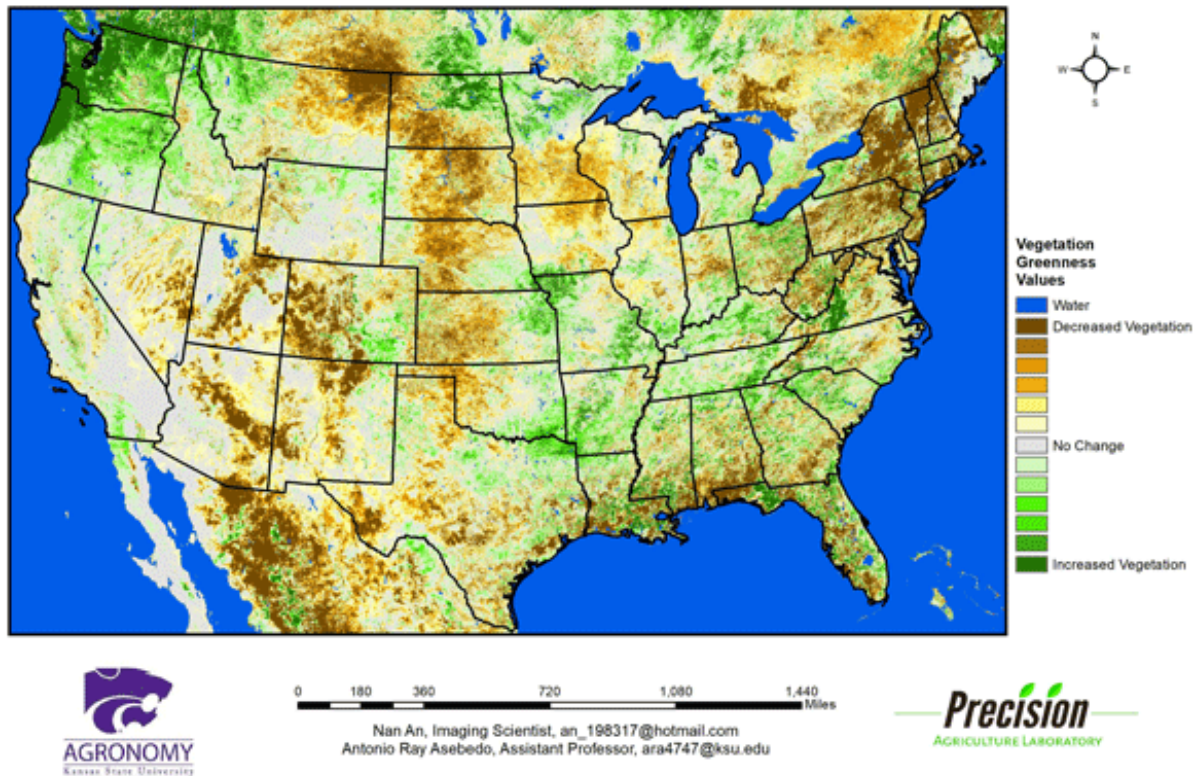


Figure 5. The U.S. comparison to last year at this time for July 11 – July 17, 2017 from K-State's Precision Agriculture Laboratory shows the impact that the split in moisture has caused this year. Much lower NDVI values are visible from eastern Montana through the Dakotas and into the Oklahoma Panhandle. In contrast, eastern North Dakota and northern Minnesota have much higher NDVI values than last year at this time.

Continental U.S. Vegetation Condition Comparison
Mid-July 2017 Compared to 28-year Average for Mid-July

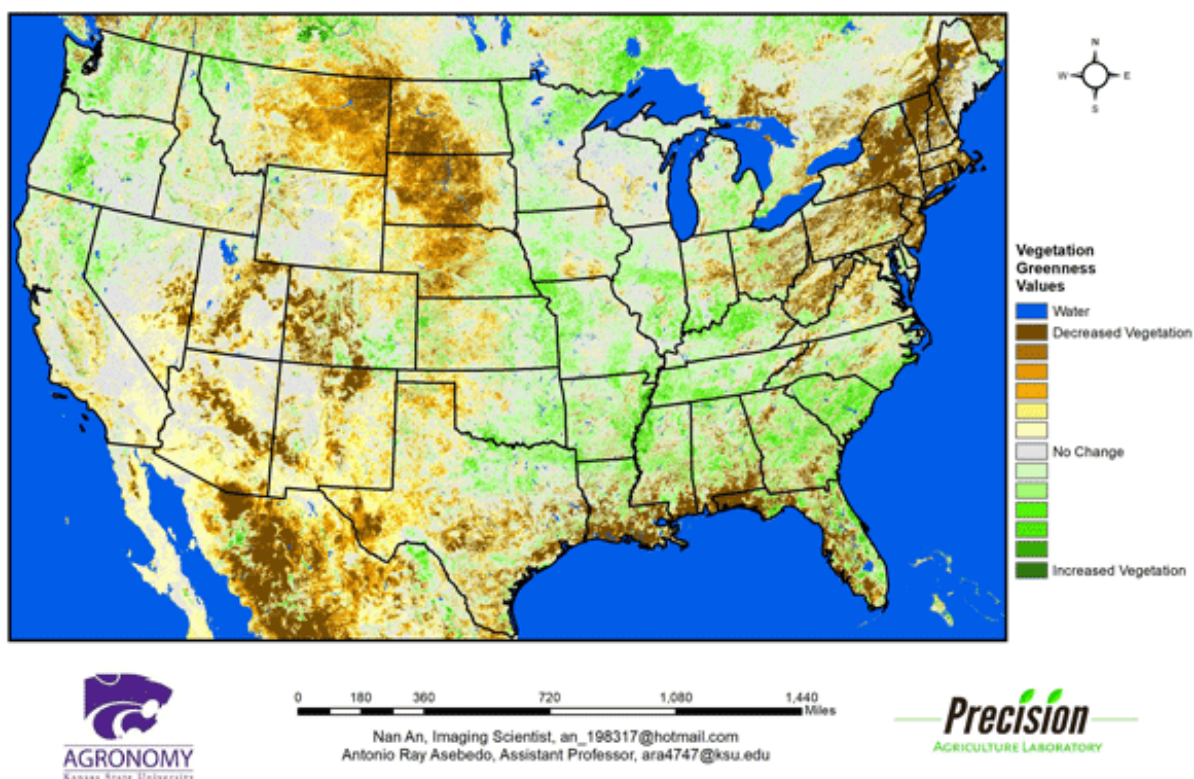


Figure 6. The U.S. comparison to the 28-year average for the period of July 11 – July 17, 2017 from K-State’s Precision Agriculture Laboratory shows an area of below-average photosynthetic activity in upper New England, where continuing storm systems and cloud cover have masked vegetative activity. Drought impacts in the Northern Plains are visible as below-average NDVI values as well. In Colorado, parts of Idaho, and the Sierra Nevada of California, below-average NDVI values are due to the lingering snowpack.

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