



K-STATE
Research and Extension

Extension Agronomy

eUpdate

02/24/2017

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. Sorghum hybrids with resistance to sugarcane aphid.....	3
2. First hollow stem update: February 24, 2017	7
3. Alfalfa weevil status.....	10
4. New soybean growth and development poster from K-State.....	16
5. Two Yield Editor workshops scheduled: March 2 and March 3.....	24
6. Comparative Vegetation Condition Report: February 14 - 20	26

1. Sorghum hybrids with resistance to sugarcane aphid

A number of sorghum hybrids have now been identified which express variable, but quite significant, levels of resistance to sugarcane aphids (SCA).

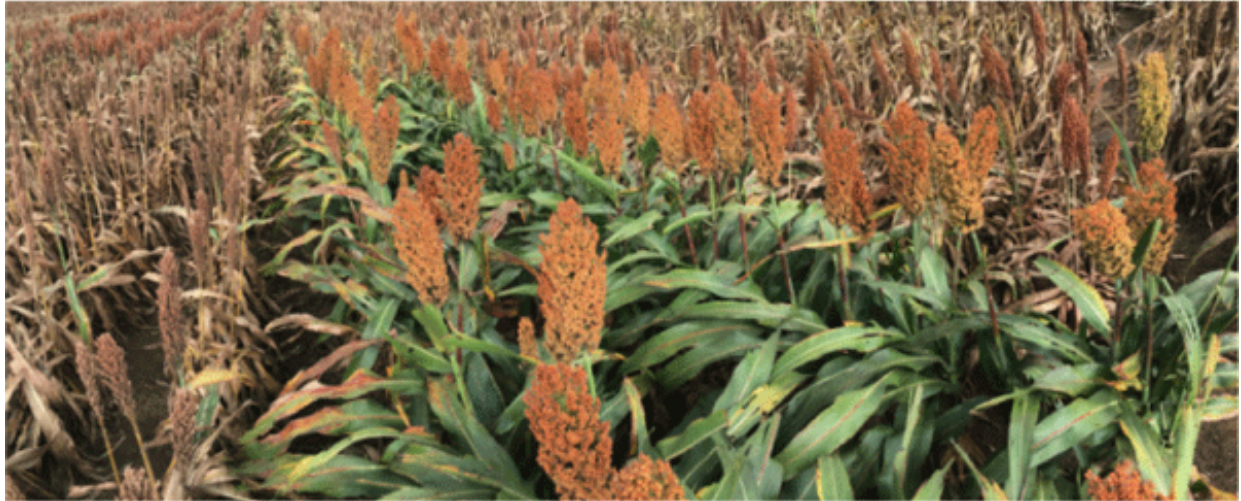


Figure 1. Sorghum hybrid with resistance to sugarcane aphid, surrounded by susceptible hybrids. Photo by J.P. Michaud, K-State Research and Extension.

Table 1. Hybrids with resistance to sugarcane aphid

(Note: These determinations were made by scientists from several states, not just Kansas. Seed companies have also provided some input. Not all hybrids in this list are adapted to Kansas, so check with seed company suppliers or company web sites for the adaptability of any given hybrid to your location.)

Alta

AG1201

AG1301

AG1203

B&H Genetics

BH4100

BH3400

Channel

6B02

5C42

DeKalb

DK37-07

DK Pulsar

Dyna-Gro

M60GB31

M60GB88

742C

M73GB55

M74GB17

Golden Acres

3960B

Heartland Genetics

HG35W

Phillips Seed

698

746

756

Pioneer

83P17

83P56

Richardson

Swift

Sprint W FG

RS260E

Jowar I

Sorghum Partners

SP 7715

SP 78M30

SP 73B12

Warner Seed

W-844-E

W-7051

Growers are encouraged to contact their seed suppliers for more detailed information on the agronomic characteristics of these lines. All of these hybrids express fortuitous resistance to SCA; that is, they happen to have traits that greatly reduce their suitability as a host plant for the aphid.

*** Do not expect resistant plants to be aphid-free; they will still get infested, but the aphids will not thrive.*
**

Conventionally, a source of aphid resistance is first identified in some odd land race of the crop and then intentionally bred into commercially acceptable parental lines, resulting in a wide range of hybrids that all express the same trait. Success with this approach is usually only temporary because reliance on a single trait exerts strong selection on the aphid population to evolve and overcome the host plant resistance. Often only a small genetic change in the aphid is required and the trait is no longer effective.

In contrast, every example of fortuitous resistance is most likely due to completely different traits that have a similar end result for the aphids, although through different mechanisms: reduced immature survival combined with slower rates of growth and reproduction. Because multiple host plant resistance traits are involved, there will be less selection pressure acting on the aphids to overcome resistance to all the different traits; a single genetic change is no longer enough. Thus, the outlook going forward is very positive as we would expect these traits to remain effective for some time.

The use of resistant hybrids is encouraged because this serves to synergize the impact of natural enemies and reduce the need for spraying. With slower aphid population growth, there is more time for predators to arrive in sufficient numbers and consume all the aphids before the aphids can reach densities sufficient to escape biological control. It also means that management control decisions such as insecticide applications are not quite so urgent as aphids approach threshold numbers.

Do not expect resistant plants to be aphid-free; they will still get infested, but the aphids will not thrive. There is no way to generalize about what you can expect to see with any given resistant hybrid. Each resistant hybrid in the list above is probably going to have very different effects on aphid growth, survival, and reproduction. Some will have more impact on development, others more on reproduction, and still others more on nymphal survival. It is not uncommon for a resistant plant to reduce any one of these performance factors, but not necessarily all of the factors, by much more than 50 percent.

In short, the overall effect of the SCA resistance in these grain sorghum hybrids will be quite noticeable but don't expect plants to be clean and free of aphids.

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2. First hollow stem update: February 24, 2017

Cattle should be removed from wheat pastures when the crop reaches first hollow stem (FHS).

Grazing past this stage can severely affect wheat yields (for a full explanation, please refer to eUpdate article "[Optimal time to remove cattle from wheat pastures: First hollow stem](#)" in the Feb. 22, 2017 issue).

First hollow stem update

In order to screen for FHS during this important time in the growing season, the K-State Extension Wheat and Forages crew measures FHS of 20 different commonly grown wheat varieties in Kansas. The varieties are in a September-sown replicated trial at the South Central Experiment Field near Hutchinson, in cooperation with Gary Cramer, Agronomist-in-Charge of the Field.

Ten stems are split open per variety per replication, for a total of 40 stems monitored per variety. The average length of hollow stem is reported for each varieties in Table 1. As of Feb.22, none of the varieties had yet reached first hollow stem but all varieties had started to elongate the stem.

Table 1. Length of hollow stem measured Feb. 22, 2017 of 20 wheat varieties sown mid-September 2016 at the South Central Experiment Field near Hutchinson. The critical FHS length is 1.5 cm (about a half-inch or the diameter of a dime).

Variety	Hollow stem length (cm)*
1863	0.26
Bentley	0.17
Doublestop	0.16
Everest	0.23
Gallagher	0.33
Iba	0.31
KanMark	0.22
KS061193K-2	0.33
KS080448C*102	0.06
Larry	0.16
OK11D25056	0.18
OK12716	0.20
OK12DP22002-042	0.19
Ruby Lee	0.20
Stardust	0.34
SY Flint	0.30
SY Grit	0.22
SY Llano	0.38
Tatanka	0.18
Zenda	0.30
* Critical hollow stem length to remove cattle is 1.5 cm, or roughly the diameter of a dime.	

Varieties are elongating stems at different rates. Some varieties are reaching close to 0.4 cm of hollow stem elongation (such as SY Llano, Stardust, and Gallagher). Others are just now starting and are

close to 0.1-0.2 cm (Bentley, Doublestop CL Plus, Larry, and Tatanka). While none of the varieties had yet reached first hollow stem as of February 22, this stage is generally achieved within a few days from when the stem starts to elongate, provided sufficient moisture and warm temperatures. Thus, producers should closely monitor first hollow stem status in their wheat pastures at this time. As mentioned in the [February 22 Agronomy eUpdate issue](#), some commercial fields in the region were already at first hollow stem and reaching jointing by February 20 (Figure 1).



Figure 1. Commercial wheat field in Rice County planted Sept. 27-30, 2016 showing first hollow stem on Feb. 20, 2017. Photo by Skylar January, Rice County wheat producer, courtesy of K-State Research and Extension.

The intention of this report is to provide producers a weekly update on the progress of first hollow stem development in different wheat varieties. Producers should use this information as a guide, but it is extremely important to monitor FHS from an ungrazed portion of each individual wheat pasture to take the decision of removing cattle from wheat pastures.

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3. Alfalfa weevil status

Thanks to the unusually warm winter, alfalfa weevil larvae are already present in some areas. Many more will no doubt be hatching in the next few days to weeks. Alfalfa weevils will continue to hatch and larvae continue to develop any time temperatures exceed 48°F.

Thus, it looks like larvae will be emerging, and damage progressing, relatively quickly. Whether this warm weather will compress the alfalfa weevil larval feeding so that the period of damage is not as stretched out as usual remains to be seen. There are also lady beetles active in the alfalfa fields, as well as a few pea aphids. The treatment threshold we use for alfalfa weevil insecticide applications is 30-50% infestation, i.e. 1 larva/2-3 stems.

Alfalfa weevils are cool-weather insects. Adults lay eggs in alfalfa fields in the fall or even the winter. Most of these eggs survive the winter. Eggs hatch and larvae emerge after accumulating enough degree days or thermal units, normally in early spring. Alfalfa weevil adults also lay eggs in the spring, but in many cases the first larvae to emerge are from eggs that were laid in the fall and overwintered.

That said, an anomaly we encountered in the fall of 2016 was a significant infestation of relatively large (2nd and 3rd instar) larvae from mid-November to mid-December. Alfalfa weevils normally overwinter as eggs or adults – not larvae. In the last week we could find none of these more mature larvae, or any pupae. So, hopefully they perished in the colder weather.



Figure 1. Alfalfa weevil larvae collected Nov. 16, 2016 in Dickinson Co. Photo by Holly Schwarting, K-



Figure 2. Alfalfa weevil larvae collected Feb. 22, 2017 in Dickinson Co. Photo by Holly Schwarting, K-State Research and Extension.

However, as of February 22 we did start finding newly hatched larvae in north central Kansas (Figure 2). Obviously the larvae hatching out now are coming from eggs deposited prior to Jan. 1, 2017. The return of below freezing temperatures may kill those very small, young larvae, especially if they stay in the plant terminals. But, they may survive if they crawl down the plant and get in the plant residue where they will be protected. So, scouting should continue as follows:

Early scouting for alfalfa weevil

Scouting for alfalfa weevil larvae should start after plants break dormancy – which means now. A degree day or thermal unit accumulation system can be used to predict when to initiate scouting. Insect development is controlled by temperature. This can be used to help manage these pests. Weevil activity has been tracked in Kansas for the past few years and has been used to generate

recommendations (Table 1).

Table 1. Approximate degree days required for alfalfa weevil development

Degree Days or Thermal Units	Stage	Importance
25–300	Eggs develop and hatch	In stems
301–450	1st and 2nd instars	Leaf pinholing – start sampling
450–600	2nd and 3rd instars	Defoliation
600–750	3rd and 4th instars	Defoliation
750+	Pupa to adult	Adults – some feeding – oviposition

To calculate a degree day, record the daily high temperature anytime it exceeds 48°F. For example, if there is only one day in January that the temperature exceeded 48°F, take that temperature and add the lowest temperature for that day, or 48°F, whichever is higher. Then divide by 2 to calculate the average temperature for that day. Next, subtract 48°F.

As an example, say there was one day in January when the high temperature was 60°F and the low was 35°F. You would use 48°F as the default value for the low instead of 35°F. The calculation in this case would be:

$$[(60 + 48)/2] - 48 = 54 - 48 = 6 \text{ degree days (or weevil development units)}$$

The following chart from K-State's Weather Data Library shows examples of the degree days that have accumulated for the period for Jan. 1 – Feb. 21, 2017 and for last fall:

Alfalfa Weevil GDD Totals:		
	Jan 1 - Feb 21	Oct 15 - Dec 14
Dodge City	208	574
Larned	175	525
Salina	167	568
Scandia	112	465
Hiawatha	98	445
Ottawa	157	542
Parsons	197	567

Do not be too quick to treat for alfalfa weevil. Wait until the field reaches the treatment threshold. Treating too early is not only unnecessary, it can also have detrimental effects by killing beneficial insects.

For more details, see *Alfalfa Weevils*, K-State publication MF-2999, at your local county Extension office, or <http://www.bookstore.ksre.ksu.edu/pubs/MF2999.pdf>

Other early spring alfalfa insects

While scouting for alfalfa weevils, you will probably also notice a few pea aphids. These are also early season potential pests. However, in the past few years pea aphids have seemed to be adequately controlled by adult lady beetles. This year seems to be starting that way as well, with a few pea aphids, but also many adult lady beetles present.



Figure 3. Pea aphid on alfalfa leaf. Photo by Holly Schwarting, K-State Research and Extension.

Also, producers need to keep an eye out for army cutworms as there were some reports of army cutworm activity last fall. Army cutworms start feeding again any time temperatures are above 50 degrees F. Armyworms are another potential problem, but probably a little later in the spring.

Those are the early season pests which have the most potential for damaging alfalfa prior to the first cutting. For more information on control, see K-State publication MF-809, Alfalfa Insect Management 2017, at: <http://www.bookstore.ksre.ksu.edu/pubs/MF809.pdf>

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4. New soybean growth and development poster from K-State

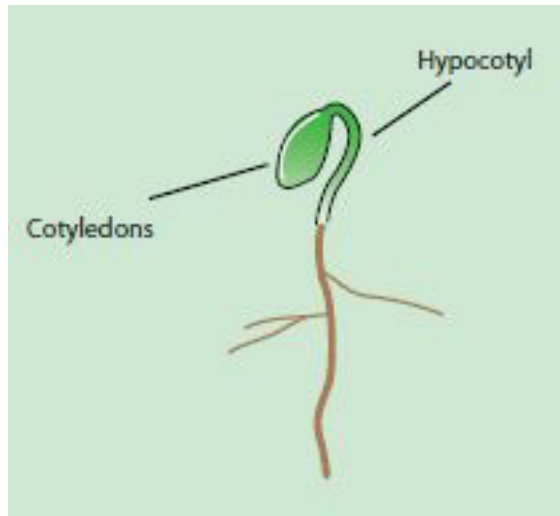
A new poster titled "Soybean Growth and Development" has just been published by K-State Research and Extension. The poster can be seen at:
<https://www.bookstore.ksre.ksu.edu/pubs/MF3339.pdf>

This publication was supported by the United Soybean Checkoff and Kansas Soybeans.

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

The author of the poster is Ignacio Ciampitti, K-State Crop Production and Cropping Systems Specialist. The following excerpts for some of the early season growth stages are from the poster:

Emergence (VE)

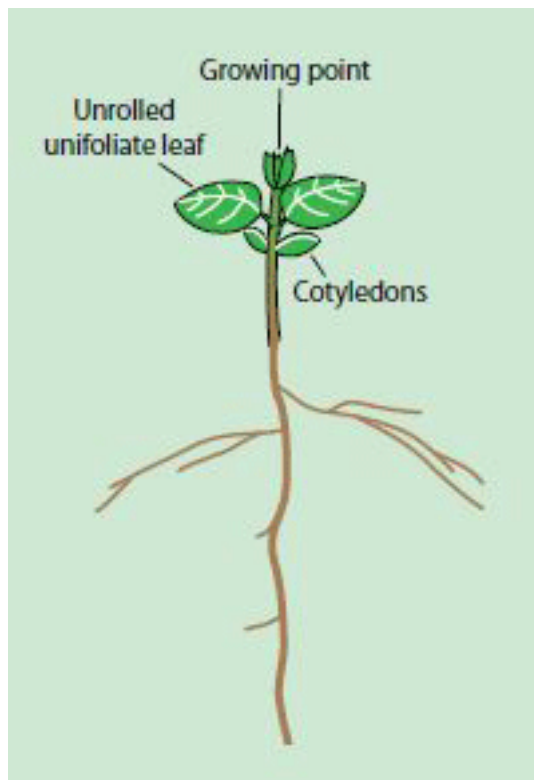


During germination and emergence, the cotyledon pokes through the soil and primary and lateral root growth begins. Functional root hairs develop shortly after planting. Root hairs are essential to nutrient uptake and water absorption when the plant is at this early stage.

Management:

Scout for proper emergence; check final stand and uniformity. Optimum seed placement varies from 1 to 2 inches deep. Deeper planting depth (greater than 2 inches) and lower soil temperatures jeopardize final emergence. If the stand is poor, replanting may be needed.

Cotyledon (VC)

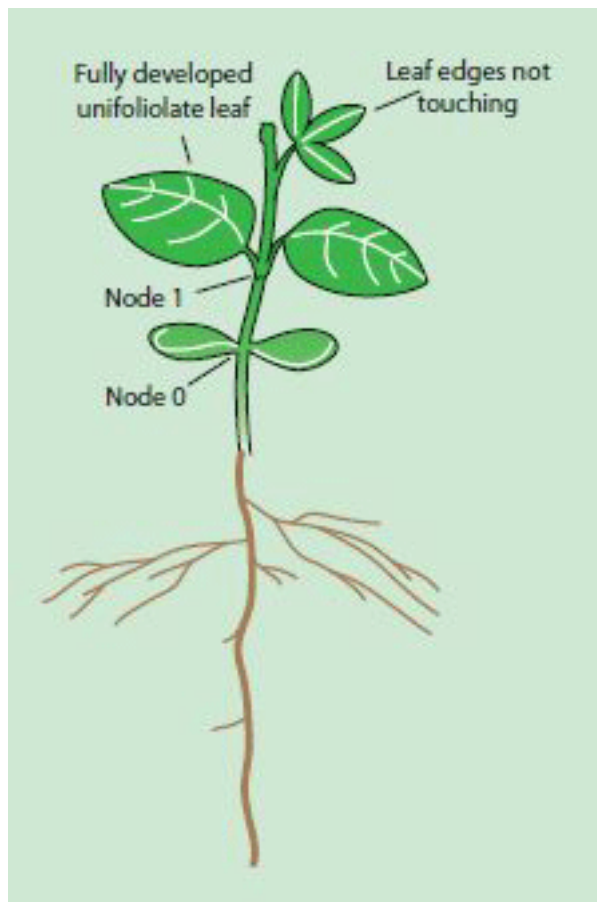


Unifoliate leaves expand (leaf edges are not touching). The cotyledons are the main nutrient reservoir for the young soybean plants (7 to 10 days after emergence). Damaged cotyledons can lower yields.

Management:

Scout for proper emergence. Weed control is important before and after soybeans emerge. If stand is poor, replanting may be needed.

First Trifoliate (V1)

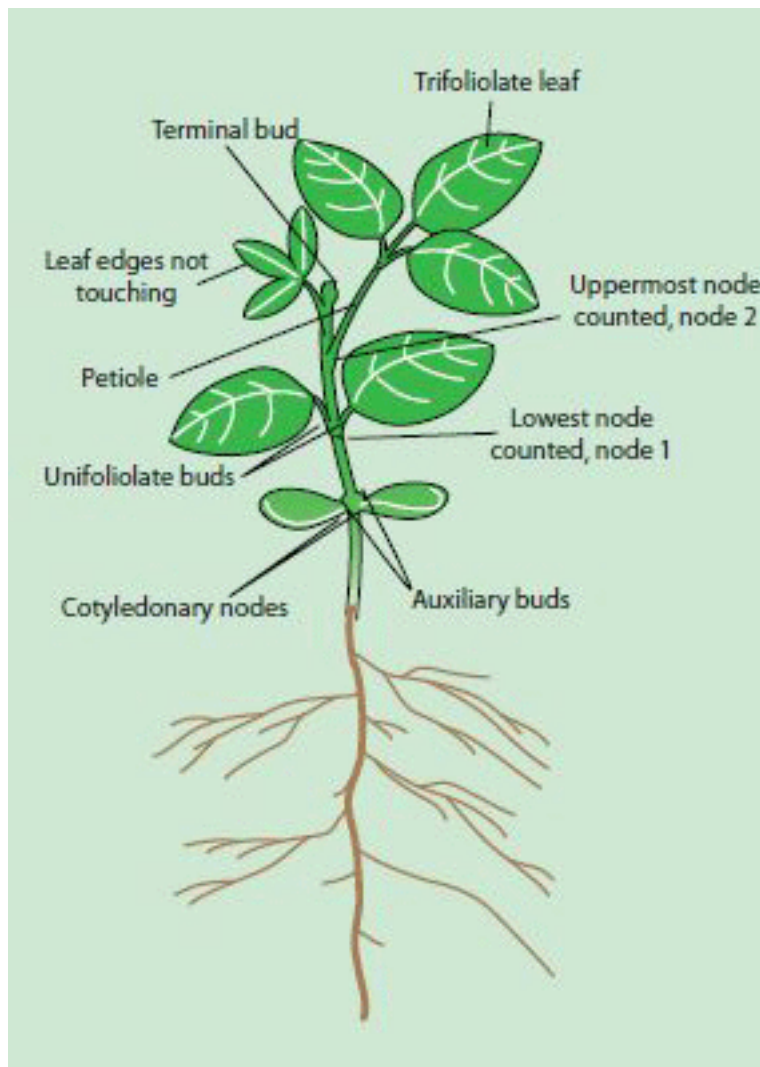


Trifoliate leaf unrolls (fully developed leaves at the unifoliate nodes). The plant becomes self-sustaining as newly developed leaves carry out photosynthesis. From this point onward, new nodes appear every 3 to 5 days until V5 stage (five-node stage), and then every 2 to 3 days until the last vegetative node.

Management:

Scout for early-season weeds, insects, and diseases.

Second Trifoliate (V2)

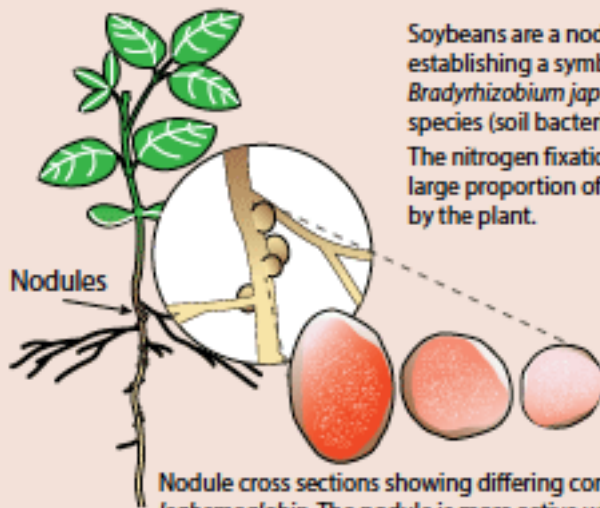


Two trifoliates unroll (fully developed trifoliolate leaves at node above the unifoliolate node). Check for effective nodulation. Nodules have been initiated on the roots at this stage and nitrogen fixation continues until late reproductive stages. Effective nodulation results in higher yields and more seed protein when compared with a non-nodulated soybean plant.

Management:

Scout for early-season weeds, insects, and diseases. Apply postemergence herbicides if needed. If nodulation has been established effectively, nitrogen fertilization is not recommended, and, if applied in large quantities, will inhibit nitrogen fixation activity.

Special Topics: Nitrogen Fixation and Pod Formation

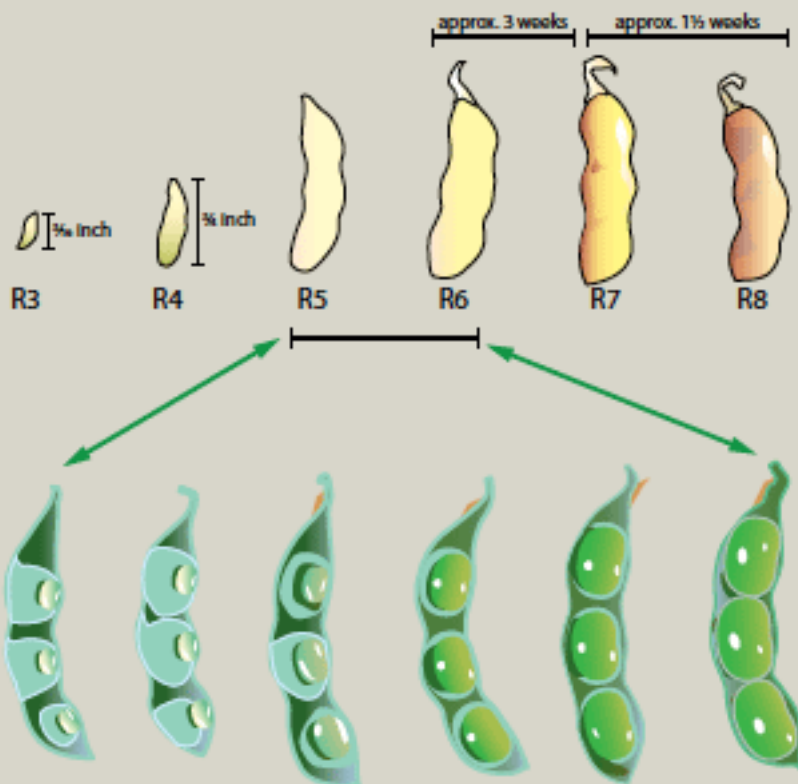


Soybeans are a nodulating legume, establishing a symbiotic relationship with *Bradyrhizobium japonicum* and *Sinorhizobium* species (soil bacteria). The nitrogen fixation process can contribute a large proportion of the total nitrogen needed by the plant.

Nodule cross sections showing differing concentrations of leghemoglobin. The nodule is more active when it is blood red or intense pink, losing activity when pale pink and not functional when light brown.

Pod Formation and Maturation

R3 is the beginning of pod formation, achieving maximum pod size at R5. Change in pod color from green to light yellow occurs from R6 to R7, turning to brown at full maturity (R8).



From R5, seed size increases until pod cavity filled at R6. At R5, seeds are attached to the pod wall and detach at R6.

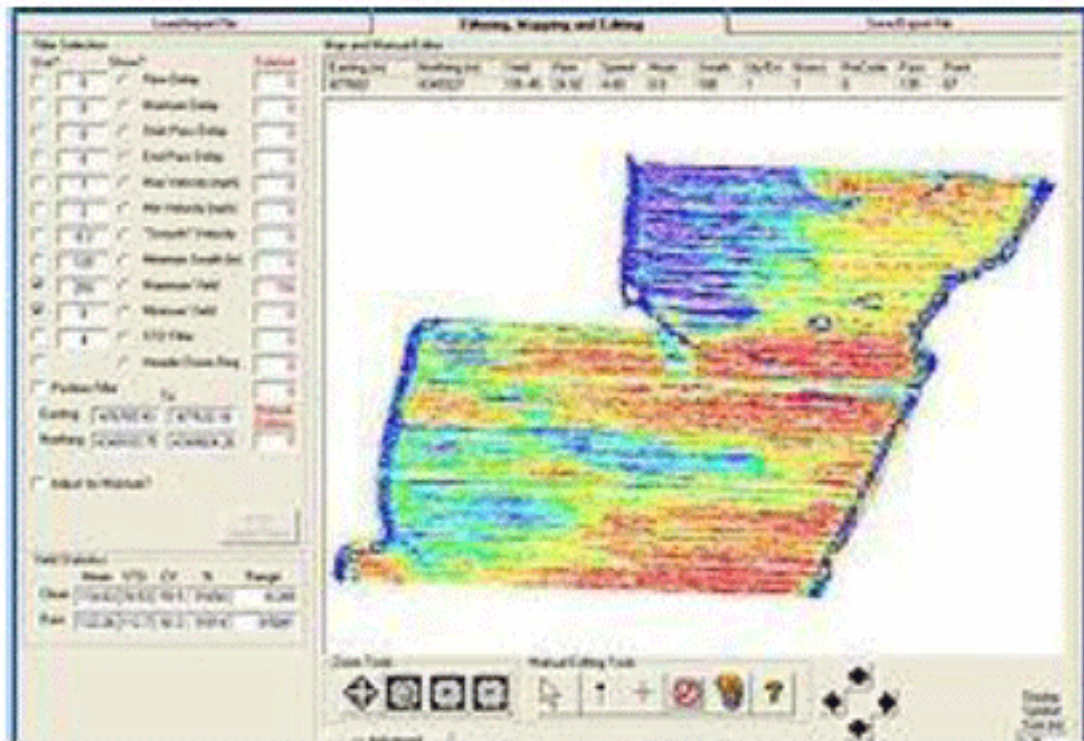
A hard copy of the 20x30 inch poster can be ordered from K-State at no charge. There is a limited supply. To order, see: <http://www.bookstore.ksre.ksu.edu/Category.aspx?id=2&catId=286>

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5. Two Yield Editor workshops scheduled: March 2 and March 3

Two Yield Editor workshops from K-State Research and Extension are scheduled:

- March 2nd in Garden City at 10:00 a.m. CT at the K-State Southwest Research-Extension Center
- March 3rd in Goodland at 10:00 a.m. MT at the 4-H building



Local K-State contacts for these workshops are:

Garden City --

Katelyn Barthol, Finney County Extension Agent (620) 272-3670

Kurt Werth, Gray County Extension Agent (620) 855-3821

A.J. Foster, Southwest Area Crops and Soils Specialist (620) 276-8286

Goodland --

Jeanne Falk-Jones, Sunflower District Extension Agronomist (785) 462-6281

Lucas Haag, Northwest Area Crops and Soils Specialist (785) 462-6281

Presentation topics include:

- Understanding sources of error in yield monitor data

- Importing data into USDA-ARS Yield Editor
- Detecting and flagging erroneous data
- Properly optimizing settings
- Exporting cleaned data

Participants should bring their own laptop computers. Yield Editor software and sample data will be provided, although participants are also free to bring some of their own data to work with.

Registration is free for members of KARTA (Kansas Ag Research & Technology Association) and \$25 for non-members. To register, visit www.kartaonline.org/events

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6. Comparative Vegetation Condition Report: February 14 - 20

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 08: 02/14/2017 - 02/20/2017

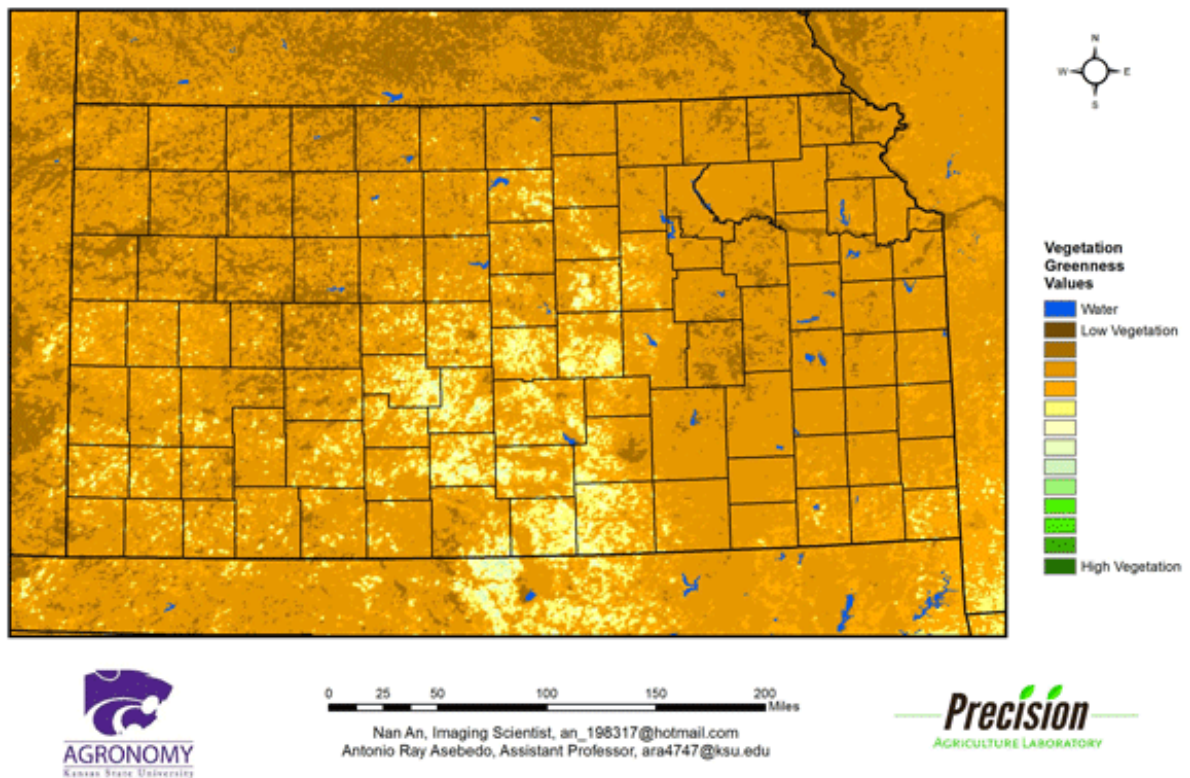


Figure 1. The Vegetation Condition Report for Kansas for February 7 – February 13, 2017 from K-State’s Precision Agriculture Laboratory shows a slight increase in photosynthetic activity. The areas of highest NDVI values are mainly in central and south central Kansas. This is not unexpected given the season.

Kansas Vegetation Condition Comparison
Mid-February 2017 compared to the Mid-February 2016

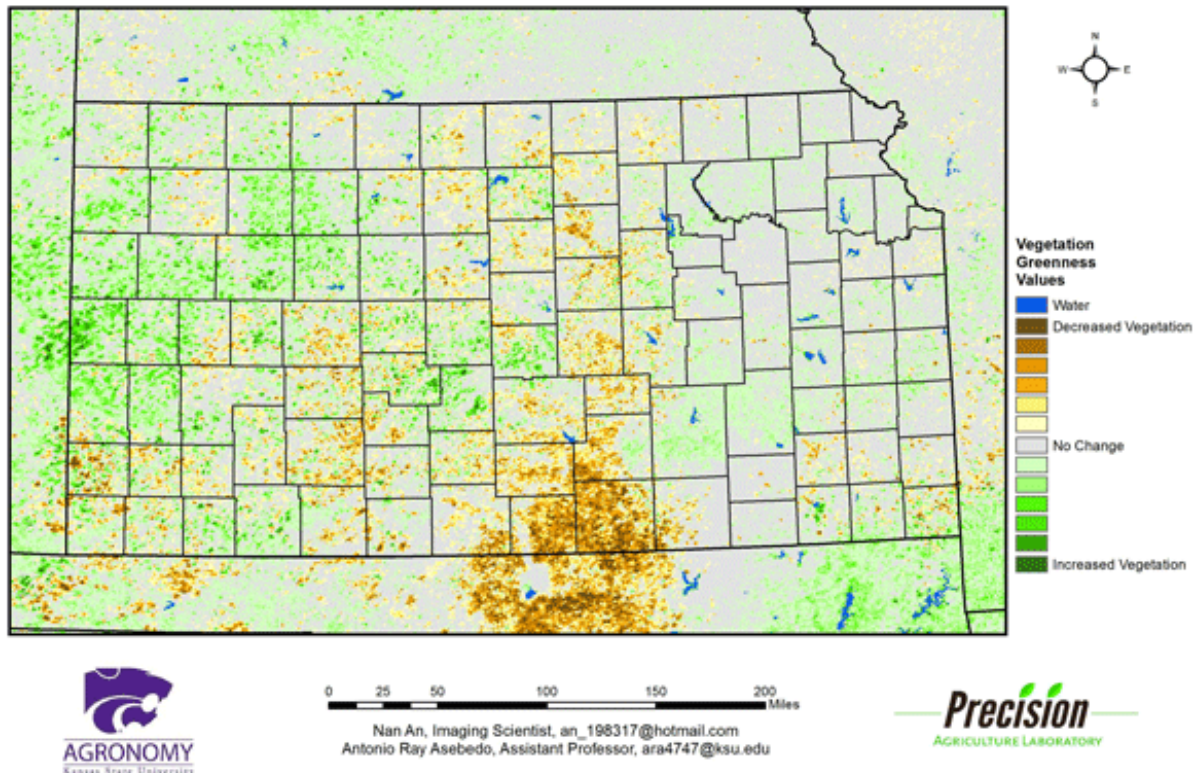


Figure 2. Compared to the previous year at this time for Kansas, the current Vegetation Condition Report for February 7 - February 14, 2017 from K-State's Precision Agriculture Laboratory shows much higher NDVI values ranging from northwest to north central Kansas. Last year at this time, much of the area was snow covered. Lower NDVI values are most prominent in southwest and south central Kansas, where the winter wheat continues to be less advanced than last year.

Kansas Vegetation Condition Comparison

Mid-February 2017 compared to the 28-Year Average for Mid-February

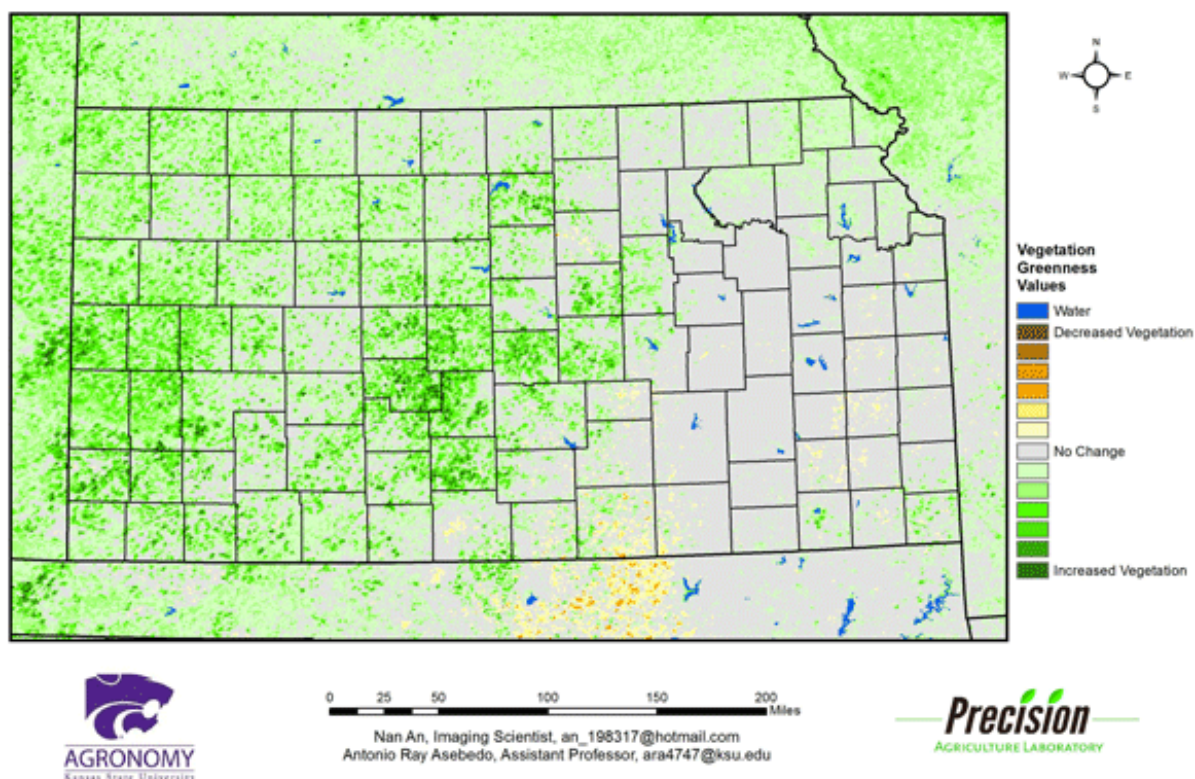


Figure 3. Compared to the 27-year average at this time for Kansas, this year's Vegetation Condition Report for February 7 – February 13, 2017 from K-State's Precision Agriculture Laboratory much of the state has near-normal vegetative activity. NDVI values continue to increase in the Central and South Central Divisions in response to warmer temperatures. The Southwestern Division isn't responding as much due to the drought conditions in the region.

Continental U.S. Vegetation Condition

Period 08: 02/14/2017 - 02/20/2017

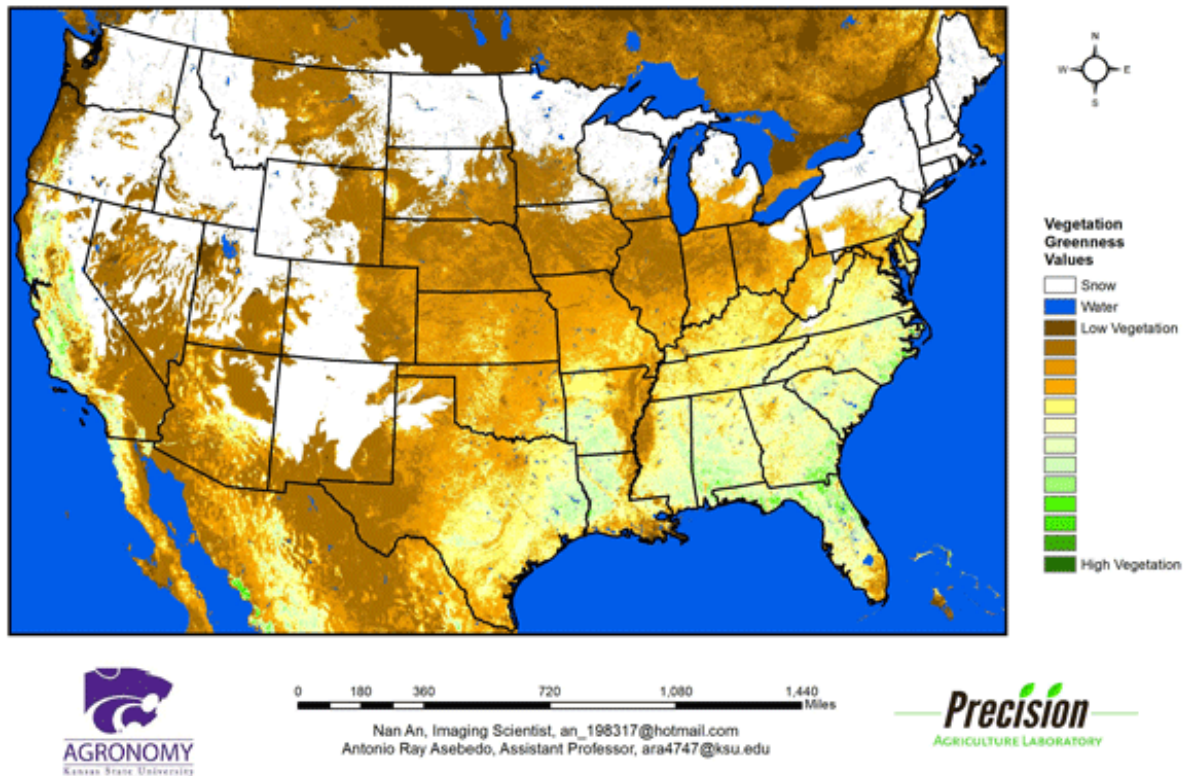


Figure 4. The Vegetation Condition Report for the U.S for February 7 – February 14, 2017 from K-State’s Precision Agriculture Laboratory shows the highest NDVI values are confined to the South, particularly in east Texas and Louisiana. Snow coverage has retreated to the Northern Plains, although there was a small pocket in central Kansas. The Kansas snow was light and melted within the day of falling. The Sierra Nevada of California continues with tremendous snowpack.

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

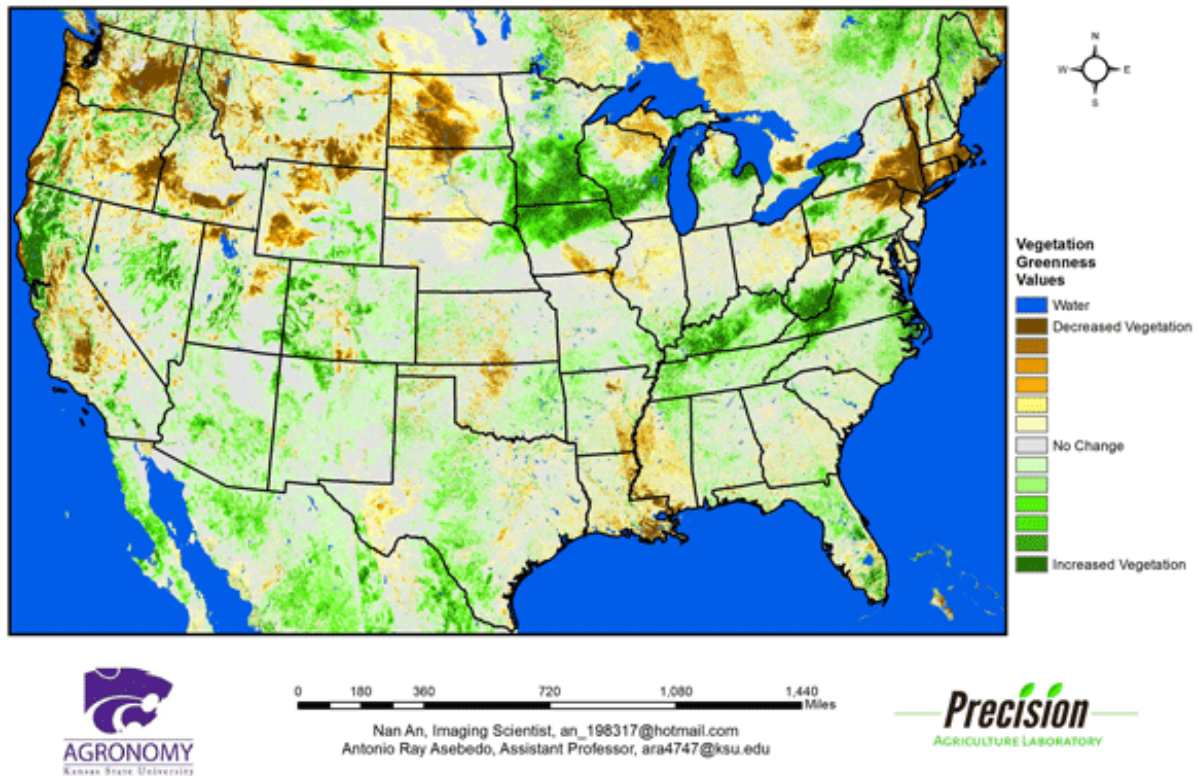


Figure 5. The U.S. comparison to last year at this time for February 7 – February 13, 2017 from K-State’s Precision Agriculture Laboratory shows the split in the snow cover, particularly in the Plains. Snow cover persists in the Northern Plains and is missing in the Southern Plains and the Ohio River Valley.

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

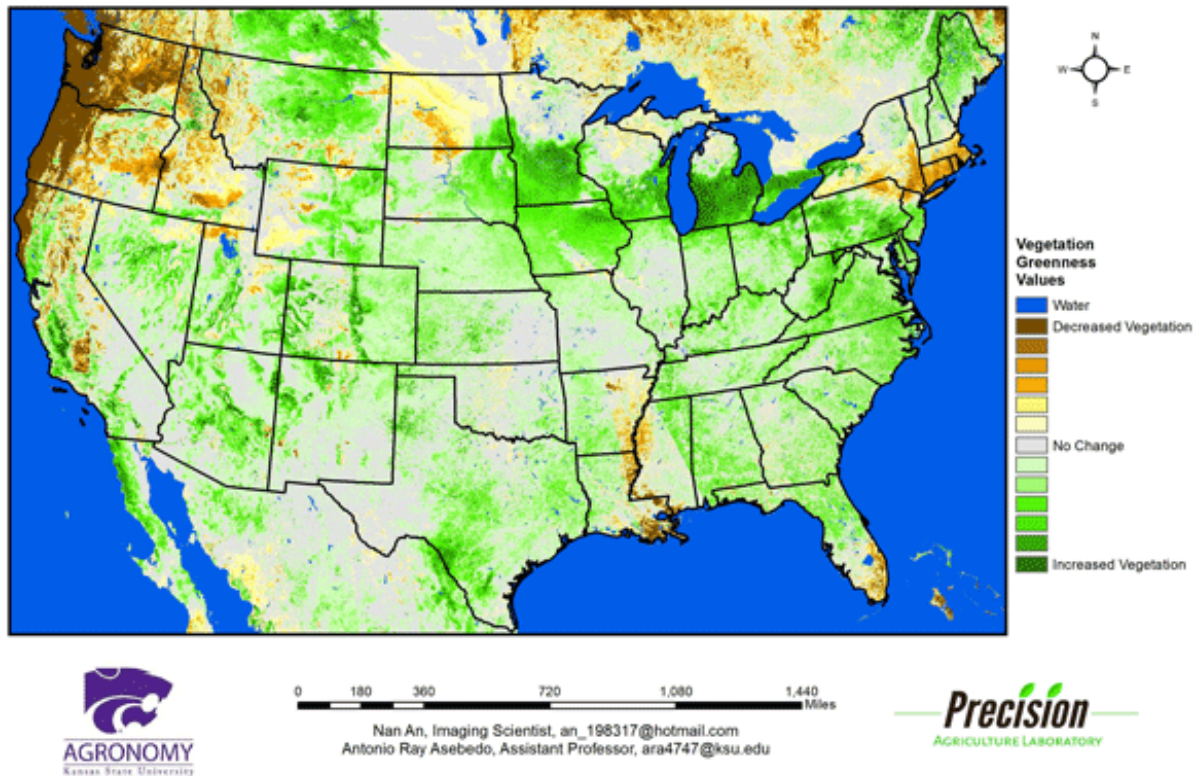


Figure 6. The U.S. comparison to the 27-year average for the period of February 7 – February 13, 2017 from K-State’s Precision Agriculture Laboratory shows an area of below-average photosynthetic activity in the Intermountain West and the Northern Plains, where snow cover is greatest. Above-average NDVI values are visible in the Midwest from Iowa through Pennsylvania, where snow cover is much more limited and temperatures have been warmer than normal.

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