Issue 600

K-STATE Research and Extension

Extension Agronomy

eUpdate

11/11/2016

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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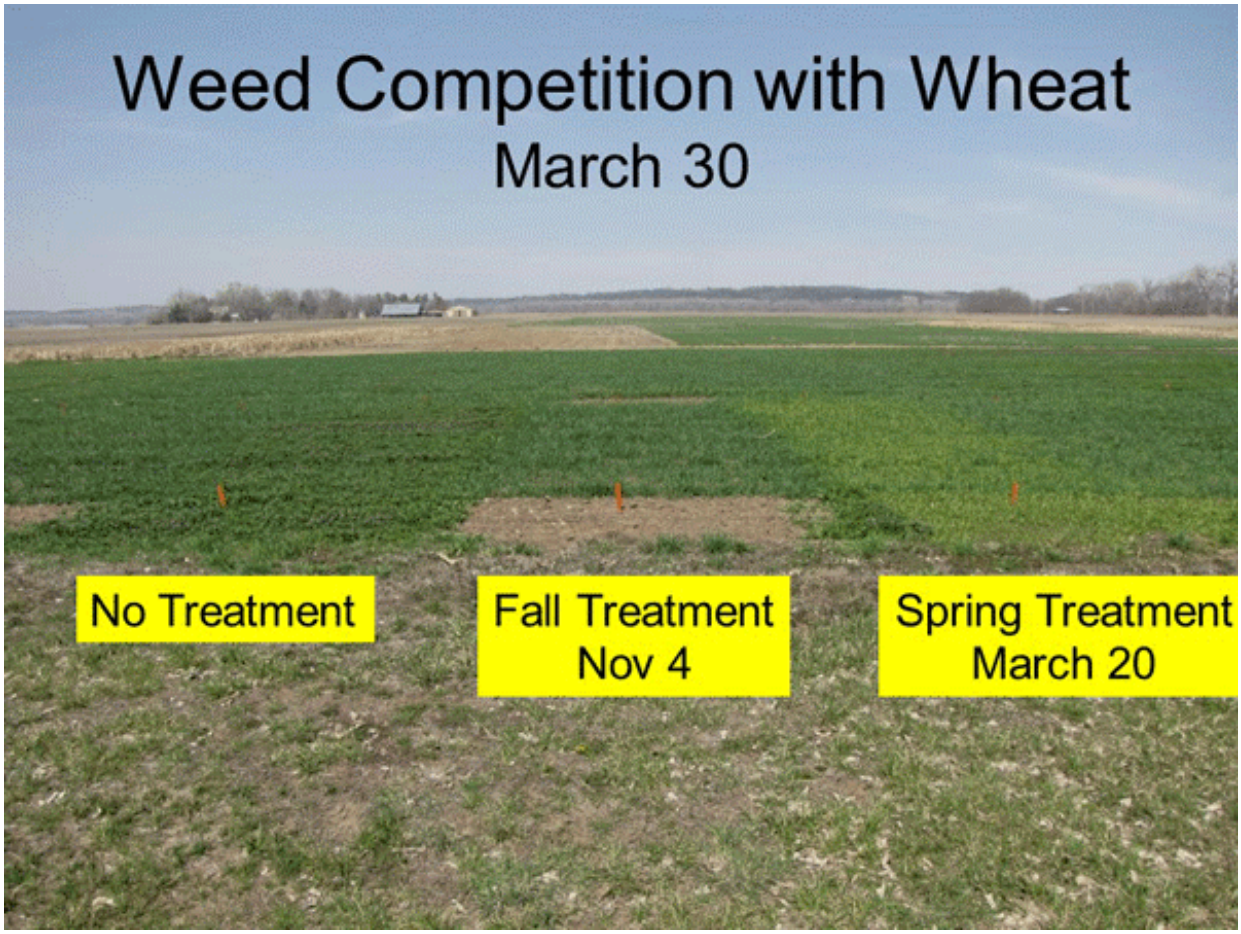
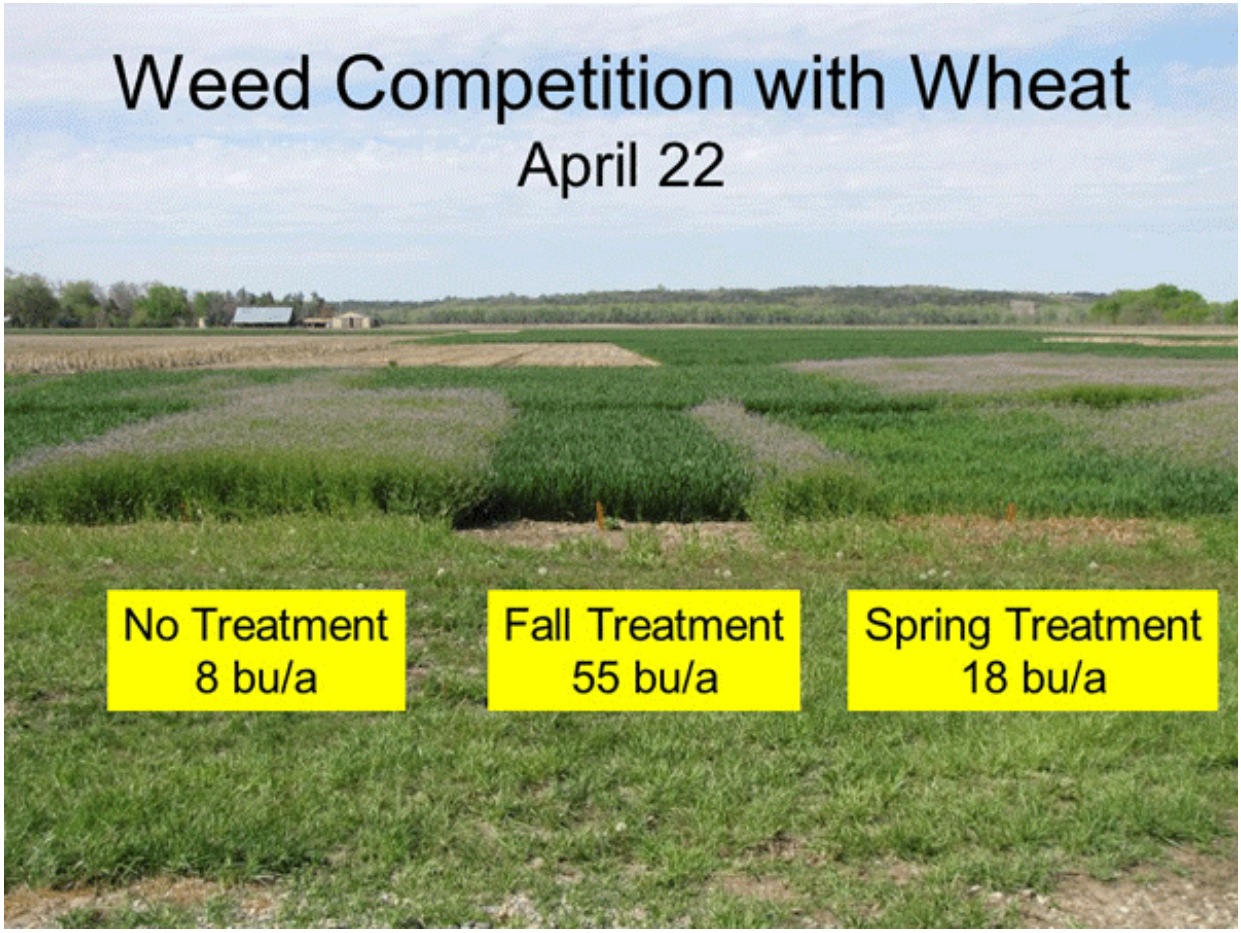
1. Control of mustards in wheat

Too often, producers do not notice mustard weeds in their wheat fields until the mustards start to bloom in the spring. As a result, producers often don't think about control until that time. Although it is still possible to get some control at that time with herbicides, mustards are much more difficult to control at that stage and often have already reduced wheat yields by then.

To keep yield losses to a minimum, mustards should be controlled by late winter or very early spring, before the plants begin to bolt, or stems elongate. If winter annual broadleaf weeds are present in the fall, they can be controlled with any number of ALS-inhibiting herbicides, including Ally, Amber, Finesse, Affinity, Rave, Olympus, or PowerFlex. Huskie, Quelex, 2,4-D, and MCPA can also provide good control of most mustards if the weeds are at the right stage of growth and actively growing, and if the wheat is at the correct growth stage. Dicamba and Starane are not very effective for mustard control.

In the later winter or early spring, blue mustard is perhaps the most difficult of the winter annual broadleaf weeds to control because it bolts very early. To be effective on blue mustard, herbicides typically need to be applied to blue mustard in late February or early March. Blue mustard is more difficult to control than tansy mustard with 2,4-D because blue mustard has often already bolted by the time 2,4-D can be safely applied to wheat. Thus, 2,4-D often is applied too late to be effective on blue mustard.





Figures 1a and 1b. Effect of timing of blue mustard control in wheat: K-State research, 2014. Photos by Dallas Peterson, K-State Research and Extension.

Flixweed and tansy mustard should be treated when they are no larger than two to three inches across and two to three inches tall. As these plants become larger the control decreases dramatically. Ester formulations of 2,4-D and MCPA are more effective on tansy mustard and flixweed than amine formulations. Field pennycress is easier to control than tansy mustard or flixweed. Herbicide applications made before the pennycress bolts are usually effective. Wheat should be fully tillered before applying 2,4-D or tillering will be inhibited and wheat yields may be decreased.

Most ALS-inhibiting herbicides control winter annual mustards very well, although there are populations of treacle mustard and flixweed in Kansas now that are ALS-resistant, and cannot be controlled by these products.

Alternative control measures will be needed to control these populations. The best approach is to use other herbicides such as 2,4-D, MCPA, or Huskie as an alternative or in a tank-mix with the ALS herbicides. MCPA can be applied after the wheat is in the 3-leaf stage; but as mentioned above, 2,4-D should not be applied until after wheat is fully tillered -- which often doesn't occur until spring. Huskie can be applied between the 1-leaf and flag leaf stage of growth. None of these herbicides has

much residual control, so the majority of weeds need to be emerged and actively growing at the time of treatment.

Quelex is a new product from Dow AgroSciences that is a premix of a short-lived ALS herbicide and a new auxin-type herbicide called halauxifen. It generally can provide good control of most mustard species. Quelex can be applied from the 2-leaf up to flag leaf emergence growth stages of wheat and should be applied in combination with nonionic surfactant or oil concentrate for control of small actively growing weeds.

Some producers commonly apply ALS herbicides with fertilizer in January or February. Unfortunately, MCPA, 2,4-D, and Huskie are most effective when applied to actively growing weeds, so application when weeds are dormant may not provide good control. As a result, if an ALS-inhibitor tank-mix with one of these herbicides is applied to dormant ALS-resistant mustards in the winter, poor control could occur.

ALS-resistant bushy wallflower seems to be present in a number of fields in central Kansas. ALS-resistant flixweed has only been confirmed in the Saline county area, but may start to show up elsewhere. Producers should watch for cases of poor control, and consider alternative herbicides or herbicide tank-mixes to help prevent or manage ALS-resistant weeds.

Crop rotation with corn, grain sorghum, soybeans, cotton, or sunflowers is a good way of managing mustards as long as they are controlled in the spring prior to producing seed. Crop rotation will usually result in a gradual reduction of mustard populations in the future as the seedbank in the soil gradually decreases.

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2. Mustard species in Kansas

Tansy mustard and flixweed

Tansy mustard and flixweed are two similar mustard species common in central and western Kansas. These weeds emerge in the fall and grow as a rosette with finely lobed compound leaves. Tansy mustard and flixweed bolt in the spring. Small orange seeds are produced in long, narrow seed pods. Seed pods of tansy mustard are usually about 1/2 inch long and thicker than flixweed seed pods, which are generally 1 to 1 1/2 inches long.

Tansy mustard **(***Descurania pinnata*) is a native winter annual. The plant is covered with fine hairs. The stem is erect, branched and 4 - 30" high. The flowers are small, pale yellow, and occur in small clusters. Tansy mustard spreads by seed from early to late summer.

Figure 1. Tansy mustard. All photos by Dallas Peterson, K-State Research and Extension.

Flixweed (*Descurainlia sophia*) is very similar to tansy mustard, and often confused with it. It is an introduced annual or winter annual species from Eurasia which reproduces by seed. Stems are erect, branched, and 4 - 40" high. Flixweed often grows taller than wheat, while tansy mustard generally does not. Leaves have a lacy appearance. The stem and leaves are covered with fine hairs. Flowers are small, pale yellow, and grow in small clusters. Although tansy mustard is native to the area and flixweed is introduced, flixweed is probably the more common weed problem in wheat fields.

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Figure 2. Flixweed.

Bushy wallflower (treacle mustard)

Bushy wallflower, or treacle mustard, (*Erysimum repandum*) is a common weed in central and eastern Kansas. It is native to Eurasia. It usually emerges in the fall and forms rosettes with long narrow leaves and irregular leaf margins. Most vegetative growth occurs during the spring. Bushy wallflower rosettes bolt in the spring and bear bright yellow flowers at the top of the plant, which only grows to about 12 – 18" tall. Seeds are produced in long, narrow seed pods.

Figure 3. Bushy wallflower, or treacle mustard.

Field pennycress

Field pennycress (*Thlaspi arvense*) is native to Eurasia. The seedling develops as a compact, vegetative rosette. If it emerges in the fall, it overwinters either as seedlings or vegetative rosettes. It can also emerge from seed in the spring. It bolts in the spring and bears white flowers at the top of the plant, which may grow from 1 to 2 feet tall. Field pennycress has a flat, broadly winged seed capsule that looks something like a penny. Field pennycress reproduces solely by seed. It is often found in grain fields, roadsides and other disturbed areas. Once this weed is established in a field, the

soil will soon become contaminated with its seeds. It is an aggressive competitor with crops, and can cause significant yield reductions. Field pennycress may produce from 1,600 to 15,000 seeds/plant. The seed shatters readily. Seed dispersal is chiefly by wind. Seeds can remain viable for as long as 6 to 10 years or more in the soil. This persistent viability of field pennycress seeds in the soil, their capacity to germinate when brought to the surface by cultivation, and the very large reservoir of dormant seeds present in the soil of a heavily infested area are all factors that contribute significantly to the persistence of this troublesome weed. Field pennycress has a strong, foul odor, even causing cows to produce bitter flavored milk after eating it. It is sometimes called stinkweed.

Figure 4. Field pennycress.

Blue mustard

Blue mustard (*Chorispora tenella*) is a winter annual that germinates in the late summer and fall, and produces a rosette similar in appearance to a dandelion. The plant overwinters as the rosette. Blue mustard bolts in the spring. With mild February weather the flower stalk may elongate in early March. Cold weather in February results in late March elongation. It bears purple or blue flowers at the top of the plant, which may grow from 12 to 18" tall. Seeds are produced in long, narrow seed pods 1 to 2 inches long. Viable seed can be produced approximately 10 days after bloom. Blue mustard is a problem in winter annual crops, such as winter wheat, throughout Kansas. Blue mustard was introduced into the U.S. from Siberia. Uncontrolled blue mustard can be extremely competitive with wheat, causing as much as 85% yield loss from season-long competition. In 2014 K-State research, we found more than 65% yield loss where blue mustard was not controlled until spring.

Figure 5. Blue mustard.

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3. New K-State patent for genetically shutting off soybean cyst nematodes

(Note: The following article is an edited version of a short K-State Research and Extension YouTube video produced by Dan Donnert, KSRE videographer. The link to this video is: https://youtu.be/lyknx7pJoGI – Steve Watson, Agronomy eUpdate Editor)

Harold Trick and Tim Todd in the Department of Plant Pathology have looked at trying to enhance soybeans for resistance against soybean cyst nematodes. In a K-State Research and Extension video, Trick explained their research:

Figure 1. Soybean cyst nematode. https://youtu.be/lyknx7pJoGI

The way we did this was to genetically modify soybeans with molecules that will turn specific genes off in the nematode. In order to do that, we created genetically engineered vectors. We put those vectors into soybeans to deliver the molecules to the soybeans. The process in which these molecules act on the nematodes is called RNA interference, or RNAi. It's a way to turn genes in the nematodes off, or down-regulate them.

The idea behind this research is that when soybean cyst nematodes feed on the roots of these genetically engineered soybeans, they will be ingesting small molecules that will target and silence specific genes within the nematodes. The targeted genes within the nematodes will be turned off. As a result, the nematodes will either lose fitness or have reduced reproduction.

To target genes that would be effective against the soybean cyst nematodes, we first had to look for

specific traits that we thought was necessary for nematode survival and reproduction. After we found those specific genes in the nematodes, we then created vectors that would deliver molecules into soybeans that would specifically target those genes we identified in nematodes. This is a genetically engineered product.

So we put those molecules into a specific line of soybeans. Then we needed to move those traits into cultivars adapted to Kansas and eventually we hope to deploy these in the field to make sure they are well adapted.

Figure 2. Creating the new line of transgenic soybeans in the lab. https://youtu.be/lyknx7pJoGI

After these new lines of soybeans were grown in the greenhouse, we sampled soybean cyst nematodes from the roots of the transgenic soybean plants and ground them up. We looked specifically at the genes, and the regulation of those genes within the nematodes. We found that we are in fact suppressing those genes we were targeting within the nematodes. We also noticed that within some of these plants, we have up to 85% reduction in the number of nematodes.

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4. Cover Crop Road Show planned Nov. 17 in southwest Kansas

Producers can get an up-close look and discussion about cover crops in several southwest Kansas settings at K-State Research and Extension's Cover Crop Road Show, Thursday, Nov. 17. The U.S. Department of Agriculture-Natural Resource Conservation Service is the tour's co-sponsor.

The tour starts near Jetmore at the Brit Hayes Farm and ends with lunch and discussion in Ford.

The goal of the program is to foster dialogue between producers, university researchers and specialists, government officials, and industry.

The schedule includes:

8:30-9 a.m. - Registration – Brit Hayes Farm, 22918 N. Hwy 156, Jetmore.

9-10 a.m. – Cover Crops in a Cow-Calf System, including Q&A and presentation on cover crop choices – Brit Hayes Farm.

10:30-11:30 a.m. – Cover Crops in a Stocker System, including Q&A and presentation on maximizing the benefit of cover crops – Dennis Bradford Farm, 28326 S.E. D. Rd., Jetmore.

Noon-1 p.m. – Grazing Cover Crops, including a Q&A and presentation on the multiple reasons for using cover crops – 128 Rd. & Warrior Rd., Bucklin.

1-2 p.m. – Lunch and discussion – The Blue Hereford, 807 Main, Ford.

Participants are asked to register by Nov. 11 at www.southwest.k-state.edu or contact Norma Cantu at cantu@ksu.edu or 620-275-9164.

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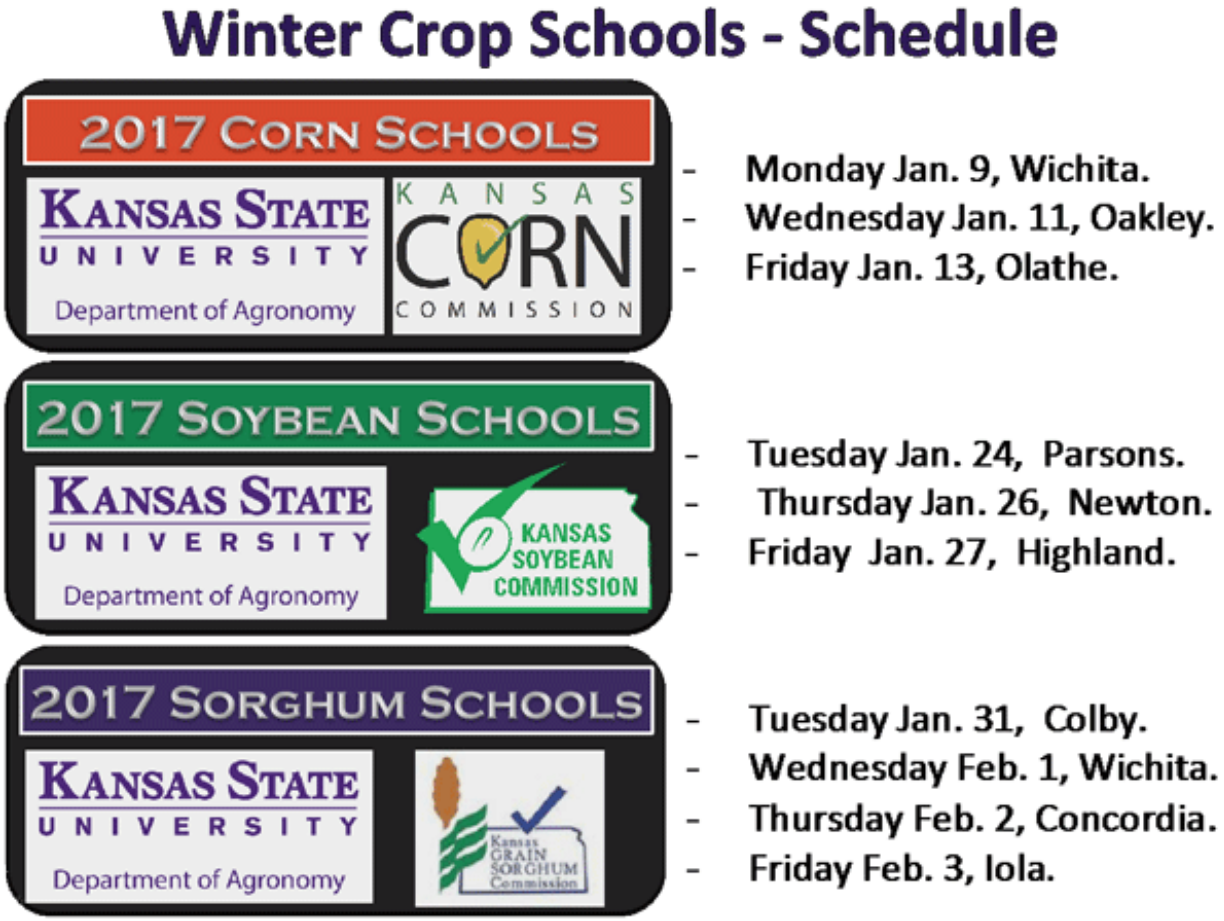
5. K-State Crop Production Schools scheduled for 2017

Ten K-State Crop Production Schools will be offered from early January to early February 2017 across the entire state. Each school will provide in-depth training targeted for corn, soybean, or sorghum producers.

The one-day schools will cover several current crop-related topics relevant to corn, soybean, and sorghum producers in Kansas.



Further details on the final agenda (speakers/topics), schedule, registration, and contact information for each Crop School will be available in the coming weeks.

Stay tuned for more information on all Crop Schools!

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6. Comparative Vegetation Condition Report: November 1 - 7

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:

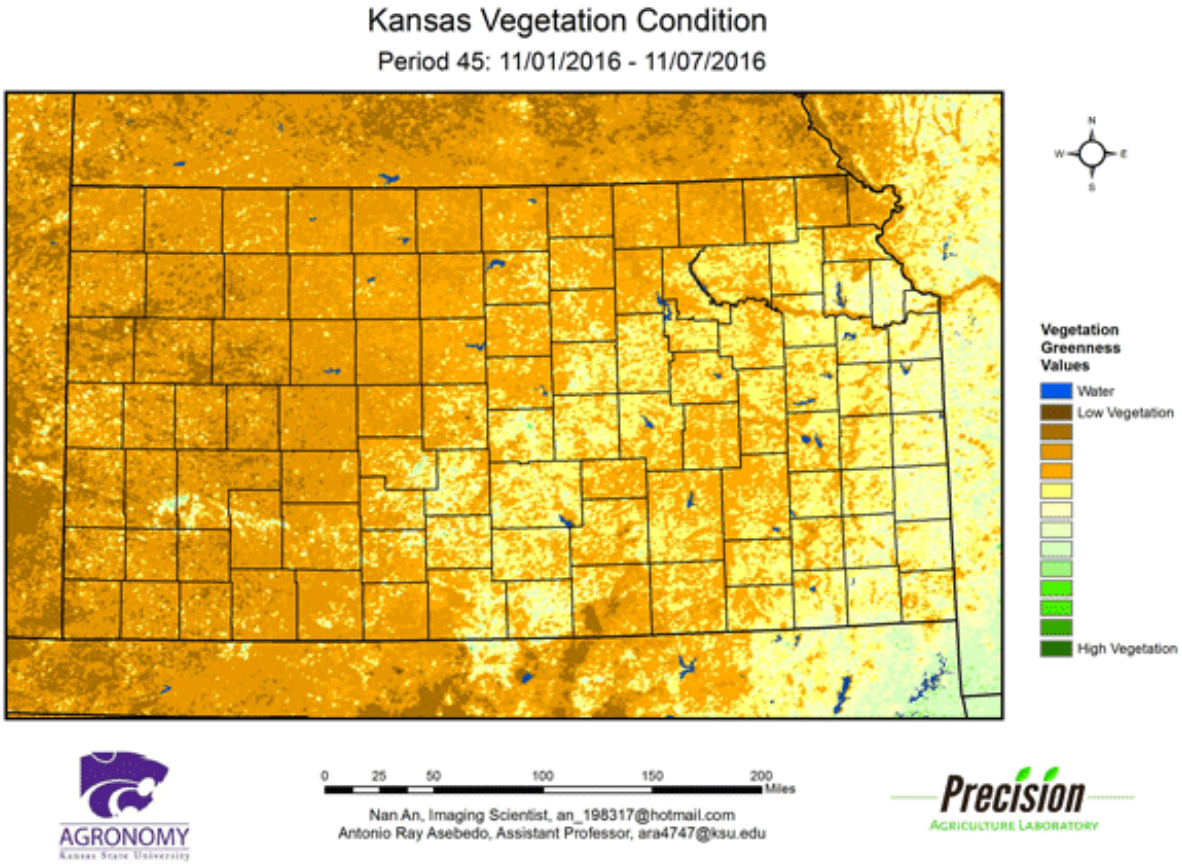

Figure 1. The Vegetation Condition Report for Kansas for November 1 – November 7, 2016 from K-State's Precision Agriculture Laboratory shows only light photosynthetic activity. As the summer growing season comes to an end, the highest NDVI values are in the Arkansas River basin, where irrigated alfalfa is common.

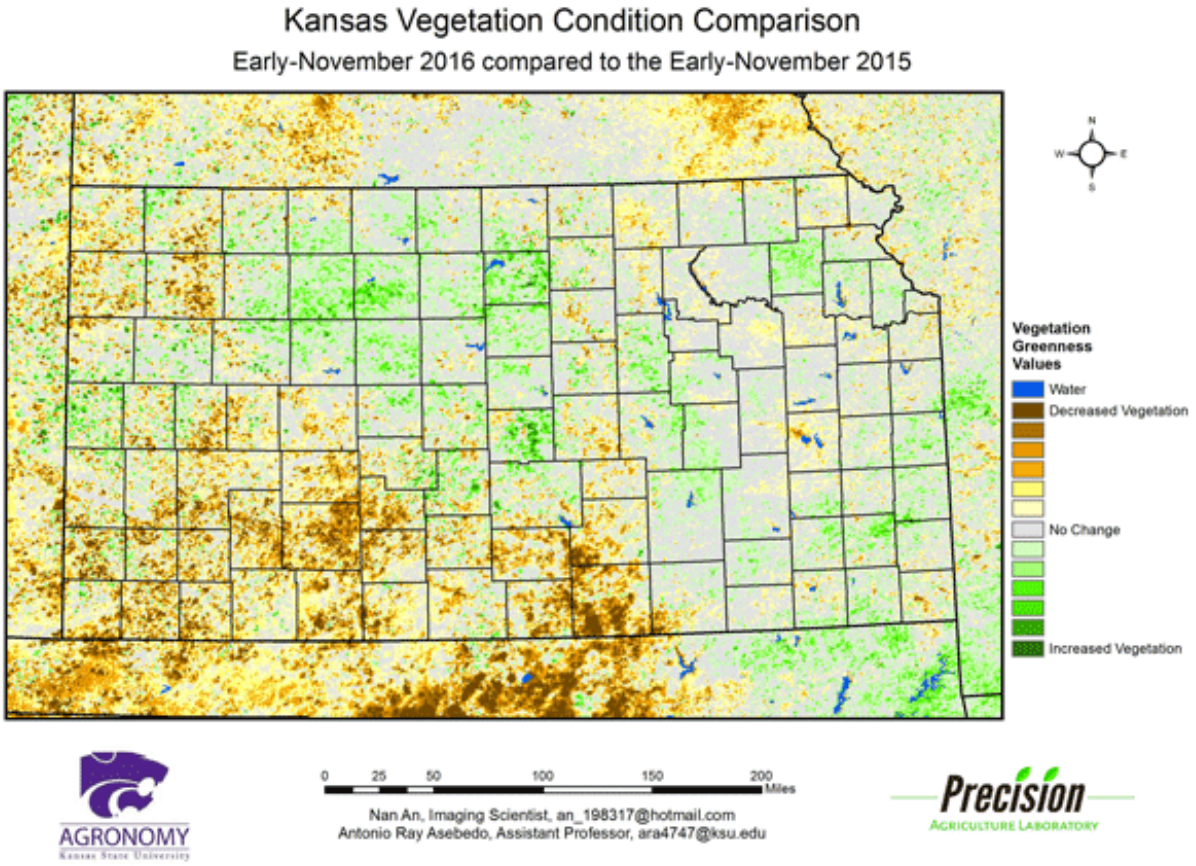

Figure 2. Compared to the previous year at this time for Kansas, the current Vegetation Condition Report for November 1 – November 7, 2016 from K-State's Precision Agriculture Laboratory shows the largest area of higher vegetative activity is in north central Kansas. Pockets of delayed development and favorable rainfall continue to be the major contributor to this higher vegetative activity. Expanding drought conditions and the slow establishment of winter wheat in the Southwest into the South Central Divisions are visible as reduced NDVI values there. A later first frost this season has extended the growing season in parts of eastern Kansas.

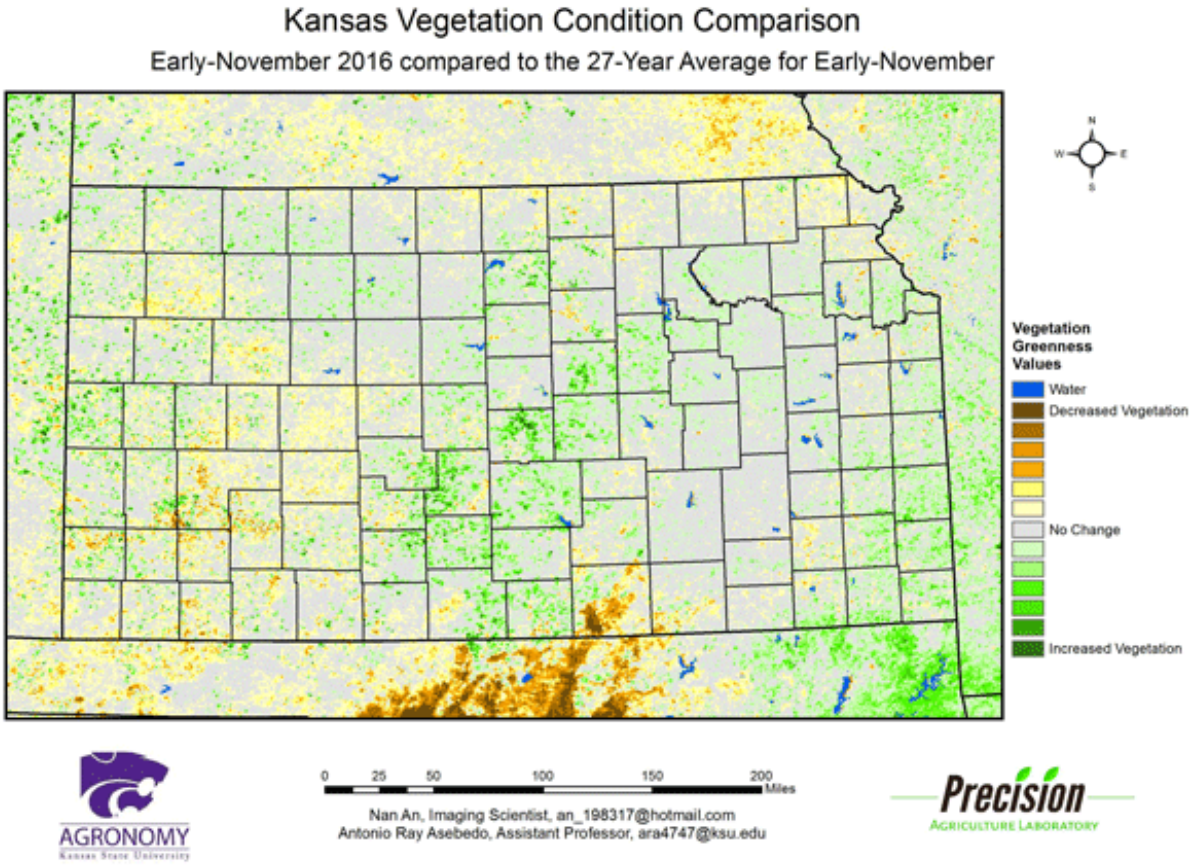

Figure 3. Compared to the 27-year average at this time for Kansas, this year's Vegetation Condition Report for November 1 – November 7, 2016 from K-State's Precision Agriculture Laboratory shows much of the state has close-to-average vegetative activity. Parts of central Kansas show above-average activity, thanks to favorable moisture and mild temperatures. The South Central Experiment Field Mesonet station near Hutchinson has not yet recorded a freeze this year. The very low NDVI values in extreme south central are due to persistent cloud cover in the region.

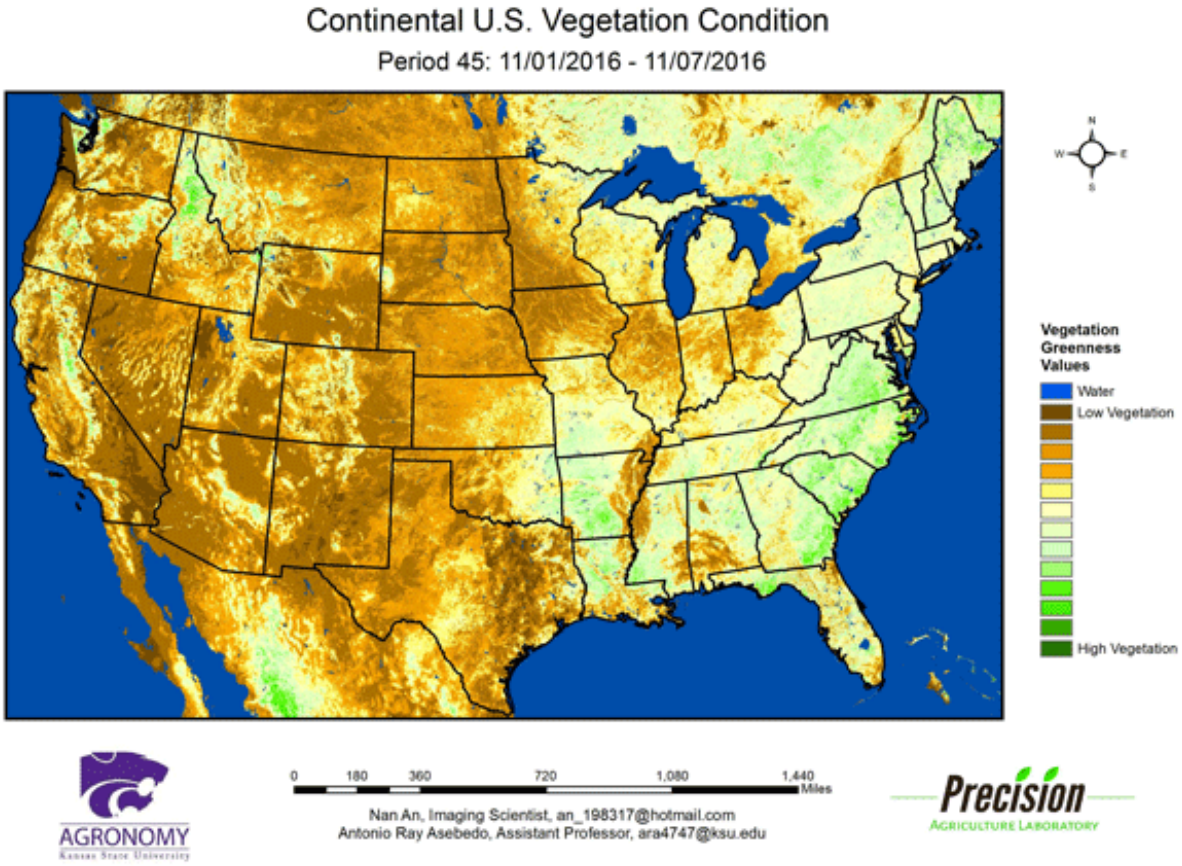

Figure 4. The Vegetation Condition Report for the U.S for November 1 – November 7, 2016 from K-State's Precision Agriculture Laboratory shows the highest NDVI values are in the Southeast as mild temperatures extend the growing season. Low NDVI values are visible in the Corn Belt and along the Mississippi River Valley, where crop maturity is ahead of average. The higher NDVI values in northern Idaho and along the Cascades are of concern, as it indicates low snow cover.

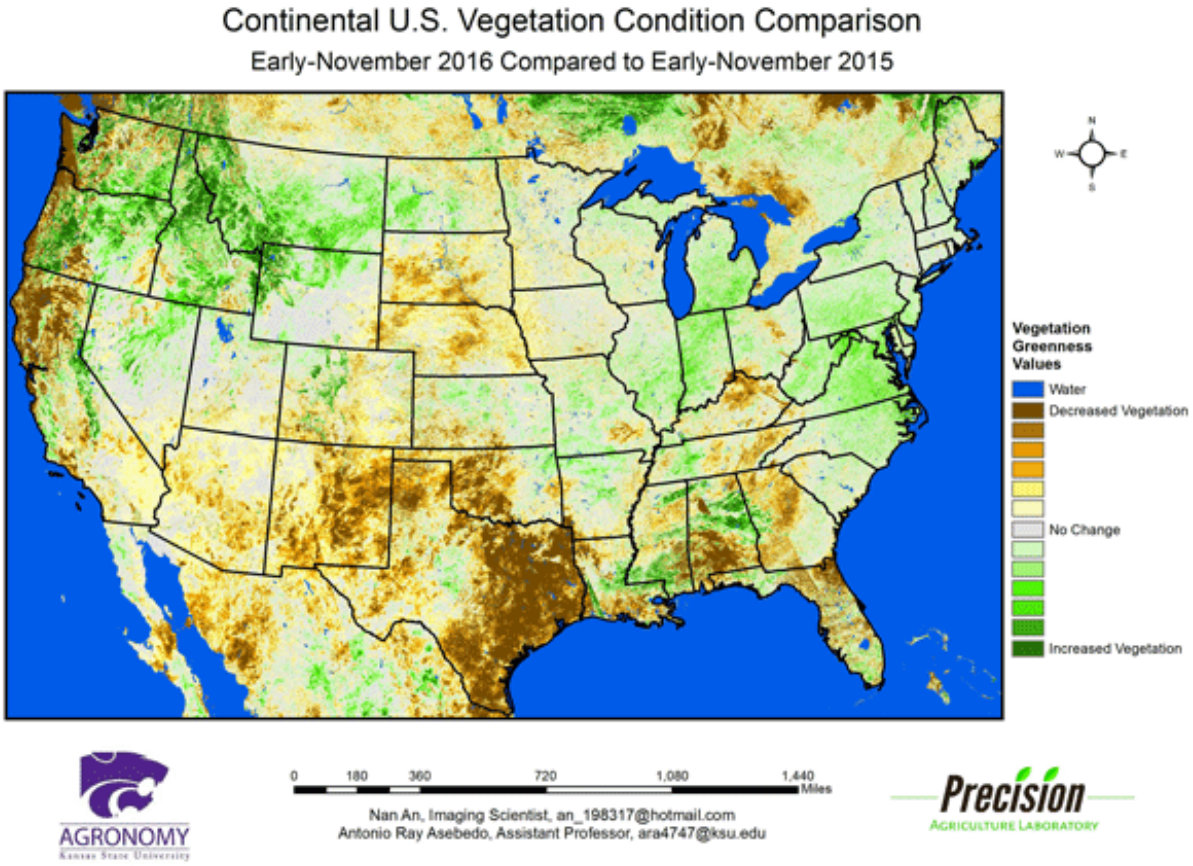

Figure 5. The U.S. comparison to last year at this time for November 1 – November 7, 2016 from K-State's Precision Agriculture Laboratory shows higher NDVI values in the Pacific Northwest. In northern Idaho, last year there was 79% snow cover at this time with an average depth of 7 inches. This year, the average snow cover is only 9 percent with an average depth of less than 2 inches.

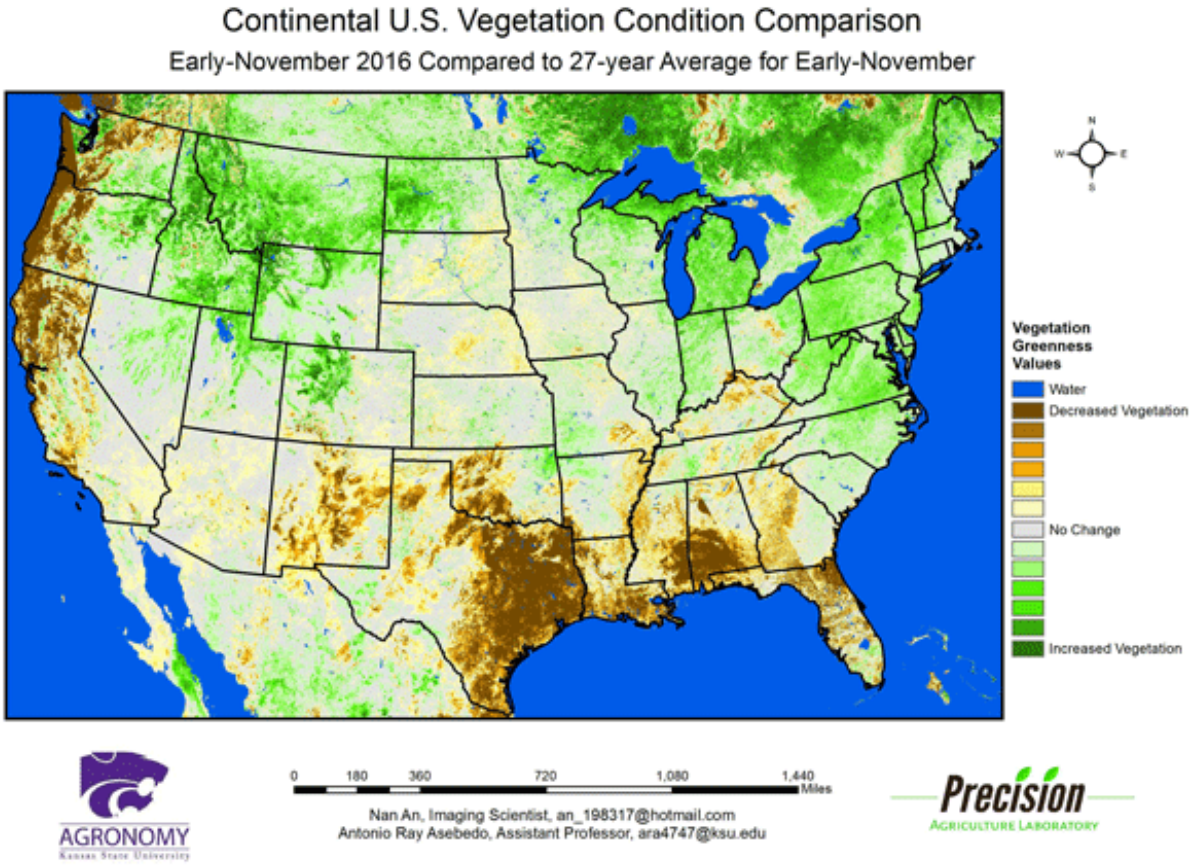

Figure 6. The U.S. comparison to the 27-year average for the period November 1 – November 7, 2016 from K-State's Precision Agriculture Laboratory shows below-average photosynthetic activity along the coast in the Pacific Northwest, and from east Texas along the Gulf Coast. Persistent rains and cloud cover are the major influence in the Pacific Northwest. The South continues to have persistent drought conditions, but as the typical activity is reduced anyway at this time of the year, as the map doesn't show as much difference from the long-term average at this point in that region as there would be in other seasons.

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