



K-STATE
Research and Extension

Extension Agronomy

eUpdate

04/21/2017

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. Q&A on current wheat fungicide use issues

Stripe rust is an emerging concern for many wheat growers in the state. The threat of yield losses to stripe rust has many growers looking into fungicide options. Here are some common questions that others are asking about wheat fungicides and their use.



Figure 1 Stripe rust killed by fungicide. Photo by Erick DeWolf, K-State Research and Extension.

Q: How does the efficacy of the different fungicide products compare?

A: We provide an efficacy rating of fungicide products in *Foliar Fungicide Efficacy Ratings for Wheat Disease Management 2017*, K-State Research and Extension publication EP-130: <http://www.bookstore.ksre.ksu.edu/pubs/EP130.pdf>

In this publication, you can compare the efficacy ratings of many different products (including products that contain more than one mode of action) for stripe rust and many common wheat diseases. In general, wheat growers have many very good or excellent product options. In my experience, correctly identifying when a fungicide is needed and timeliness of the application are more important than which product is being used in most cases. Control of Fusarium head blight (scab) is the exception. For Fusarium head blight control, triazole fungicides are the best option. This includes products such as Prosaro, Caramba, and Folicur (or generic tebuconazole). See the fungicide efficacy publication mentioned above for more information.

Q: How do generic fungicides compare with other products options?

A: In tests conducted by universities throughout the Central Plains and Midwest in recent years, researchers have found no significant differences in the efficacy of products with identical active ingredients. In other words, the generic fungicides are equally effective when used at the same rates as other products with the same active ingredient.

Q: What about residual activity of the different fungicides?

A: Fungicide efficacy can be influenced by many different factors including product, rate of application, the method, the disease targeted and weather conditions following the application. Therefore, it is hard to nail the residual life down exactly. After years of testing, we can make some general statements about residual life that can help growers know what to expect from their fungicide application. In general, all the fungicides shown in the product efficacy publication provide at least 21 days of residual activity (including tebuconazole products). When the application is made between flag leaf emergence and heading, this 21 days of residual life is enough to get the crop well into the grain filling stages of development. The disease may begin to increase again after the fungicide effect has diminished, but this late season disease generally has little or no effect on yield. Some of the products containing mixed modes of action may provide a little longer residual life, but in research tests that extra residual life does not consistently translate into more yield.

Q: Are there other issues to consider when selecting a product?

A: Yes. There is a growing concern about fungicide resistance in some parts of the country. For a long time, those of us growing field crops didn't really have to worry much about this issue, but that is no longer the case. The development of fungicide resistance can be slowed by alternating modes of action between years, by using a product that contains multiple modes of action, or tank-mixing different modes of action. Products containing only strobilurin fungicides are most at risk for fungicide resistance.

Another factor to consider is the maximum amount of any one active ingredient that can be used per season. If an early application of tebuconazole is made, for example, you will not be able to apply the full rate of a product now if that product would put you over the limit for tebuconazole for the season. This is one of the potential downside risks of making an early-season application of a fungicide.

Q: What is the difference between a “curative” and “preventive” fungicide?

A: Honestly, I don't really like to use these terms when describing fungicides because I think they can lead people down a confusing path. All fungicides are best applied before the disease becomes established or very early in the development of disease within crop. From this perspective, all fungicides work best in “preventive mode”. The triazole fungicides are generally considered to have some limited curative activity but they cannot restore leaf tissue already damaged by the disease. It would also be a mistake to think that a fungicide with curative activity does not provide any preventive activity. The different fungicides just stop the infection at slightly different times in the infection process.

Q: Is it best to use a product that combines multiple modes of action?

A: Fungicide products like Absolute Maxx, Nexicor, Quilt Xcel, and TwinLine, that combine multiple modes of action offer very good to excellent efficacy against stripe rust and other important foliar diseases in Kansas. As mentioned previously, using a fungicide with a mixed mode of action can also help reduce the risk of fungicide resistance developing in a fungal population. It is hard to say these are the “best” options and, I think growers have a lot of product options with very good or excellent efficacy on stripe rust and other leaf diseases. I suggest that growers consider efficacy ratings, cost, and availability when selecting products to use on their farm.

Q: Which fungicides can be applied latest in the season on wheat?

A: Always consult the label on this since any label violations could have unwelcome consequences. In general, the triazole fungicides can be applied the latest. Tebuconazole products (Folicur and generic products), Caramba, and Prosaro can be applied through the flowering stage. But these products have a 30-day preharvest interval as well, so producers have to keep that in mind and make sure they're not applying it so late that they will have to delay harvest to meet the preharvest interval. Other fungicides have a growth stage cut off that prevents application during and after the flowering stages of growth.

Erick DeWolf, Extension Plant Pathology
dewolf1@ksu.edu

2. Soybean seeding rates and optimum plant populations

Deciding the right seeding rate is one of the most influential factors for increasing soybean profitability, as seed cost is one of the most expensive inputs.

Soybean seeding recommendations, row spacing, and planting date are tied together. The final number of seeds per linear foot of row decreases as row spacing narrows. For example, at a target population of 105,000 plants per acre and 85 percent germination, 30-inch rows will need twice the number of seeds per linear foot as 15-inch rows -- 6 vs. 3 seeds per linear foot (Table 1). Seeding rates will need to increase at later planting dates to compensate for the reduction in the growing season since more plants are needed to increase early light interception and biomass production.

The environment also exerts an influence on deciding the final seeding rate. Dry and hot conditions require fewer plants to maximize yields; while favorable environments need higher seeding rates to capture the maximum yield potential. Under high-yielding irrigated environments, the final seeding rate should be greater than 160,000 seeds per acre (assuming high % emergence) with a final plant population close to 150,000 plants per acre.

Table 1. Recommended soybean plant density and seed spacing.

	Target plants per acre (x 1,000)					
	<45	45-70	70-90	90-115	115-140	>140
	Seeds per acre (x 1,000; 85% emergence)					
	<50	50-80	80-100	100-130	130-160	>160
Row Spacing	Seeds per linear foot (assuming 85% field emergence)					
8-inch	<1	1	1	1-2	2	>2
10-inch	<1	1	1-2	2	2-3	>3
15-inch	<1	1-2	2-3	3	3-4	>4
20-inch	<2	2-3	3-4	4	4-5	>5
30-inch	<3	3-4	4-5	5-7	7-8	>8

In recent years, a summary of 21 on-farm strip trials and 5 replicated experiment station studies in Kansas prepared by Kraig Roozeboom, K-State Cropping Systems Agronomist, provided an opportunity to revisit current soybean recommendations. Most of the studies were performed in dryland environments (23 out of 26, with 3 studies under irrigation) and under no-till systems. All were in central and eastern Kansas counties: Butler, Harvey, Nemaha, Republic, Riley, Saline, and Shawnee.

As related to final field establishment, the current recommendations assume 80% emergence. Emergence in the studies ranged from less than 50% to 100%, illustrating the importance of knowing just how many dropped seeds will produce plants in each situation (Fig. 1). Studies that have compared planters and drills indicate that the 80% estimate is not far off for planters, but emergence for drills is usually closer to 65%. There is tremendous variability around both of these averages, but it illustrates the need to drop more seed per acre if field emergence is less than the 80% assumed for the current recommendations.

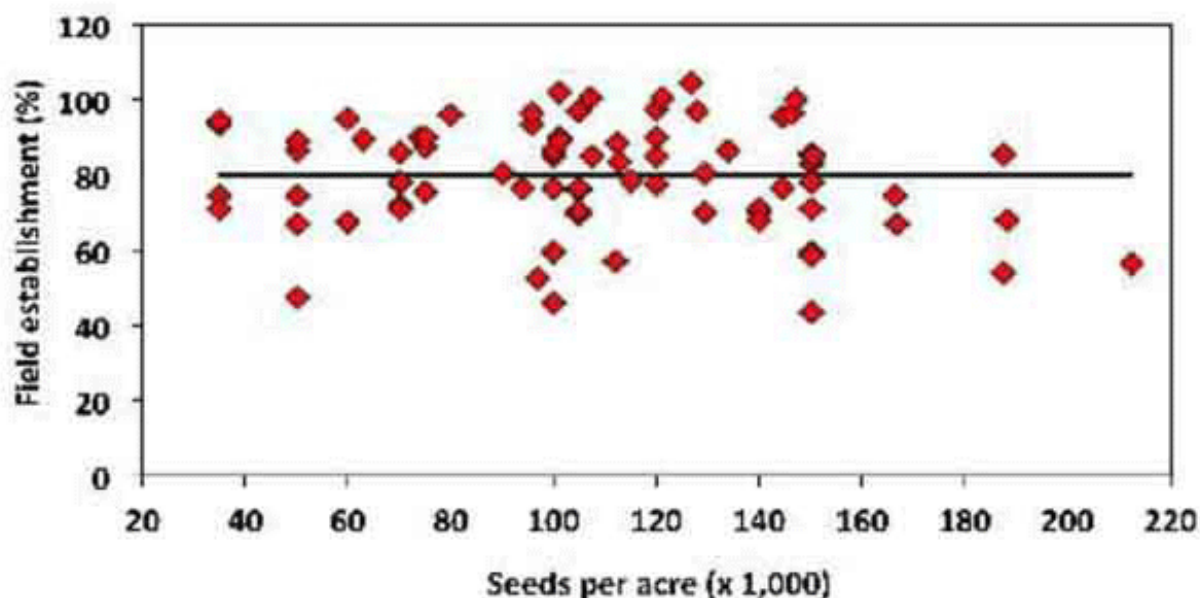


Figure 1. Percentage of field establishment and final seeding rate.

The primary conclusion from the summary of soybean seeding rate studies was that the optimum number of seeds per acre seemed to be highly dependent on the yield level attained at each location. Table 2 depicts the soybean seeding rate summary stratified by yield range.

Table 2. Recommended soybean plant density and seed spacing

	Yield range	Mean yield	Optimum population
Environment	bu a ⁻¹	bu a ⁻¹	plants a ⁻¹
Low	< 30	24	70-75,000
Medium low	30 - 40	36	75-80,000
Medium high	40 - 50	43	≈ 120,000
High	> 50	68	≈ 105,000
Average	12-78	42	

A) Low yielding environments (test average <30 bushels per acre):

Yields were maximized at plant populations of less than 80,000 plants per acre. Optimum final plant population was achieved around 70,000 to 75,000 plants per acre (Fig. 2). Thus, if we assume 80% emergence (as presented in Figure 1), the optimum seeding rate for this environment will range from

85,000 to 90,000 seeds per acre.

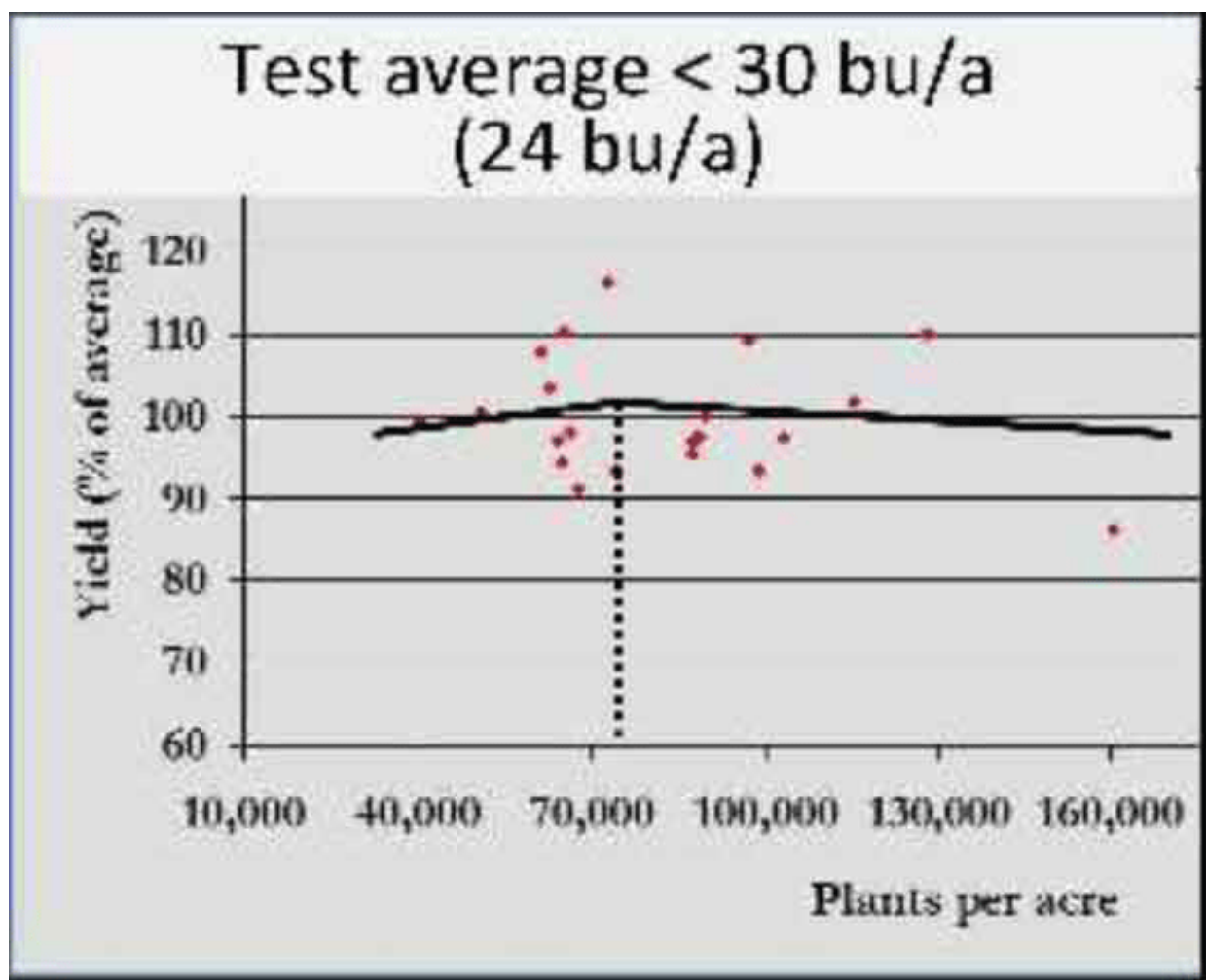


Figure 2. Optimum plant population, final plants per acre, for “low” yielding environments across Kansas, less than 30 bushels per acre.

B) Medium-low yielding environments (average ranged from 30 to 40 bushels per acre):

Yields were maximized with final plant populations around 75,000 to 80,000 plants per acre, presenting an evident plateau in maximum yield as the number of plants per acre increases beyond 80,000 plants per acre (Fig. 3). Seeding rates ranging from 90,000 to 95,000 plants per acre were required to achieve these final plant populations (assuming overall 80% emergence).

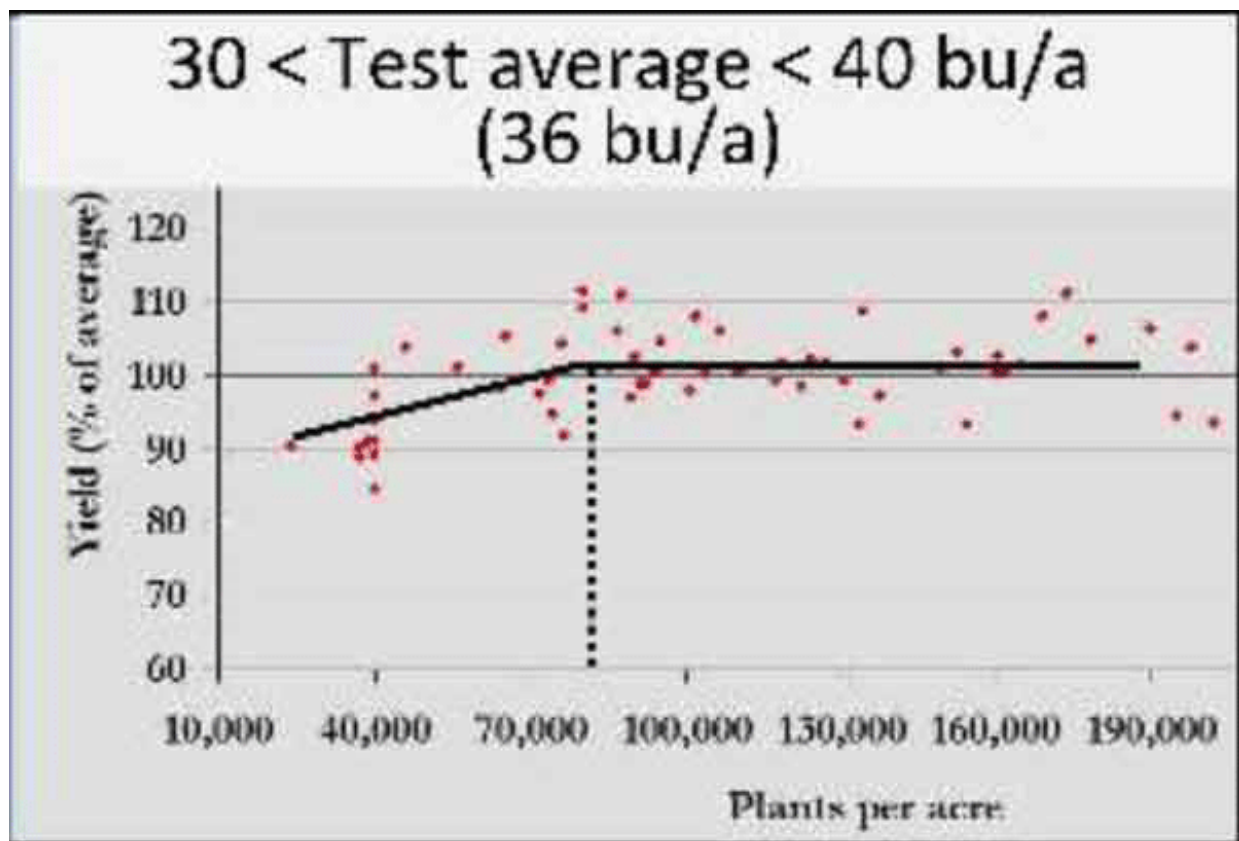


Figure 3. Optimum plant population, final plants per acre, for “medium-low” yielding environments across Kansas, ranging from 30 to 40 bushels per acre.

C) Medium-high yielding environments (average ranged from 40 to 50 bushels per acre):

Yields were usually maximized at populations of 105,000 to 120,000 plants per acre in this yield environment. The break-even point for the association between yield and plant population was set at around 120,000 plants per acre (Fig. 4). Increasing population above 130,000 plants per acre did not increase yields. Considering an average 80% field establishment, optimum seeding rate for this yield environment was 140,000 seeds per acre.

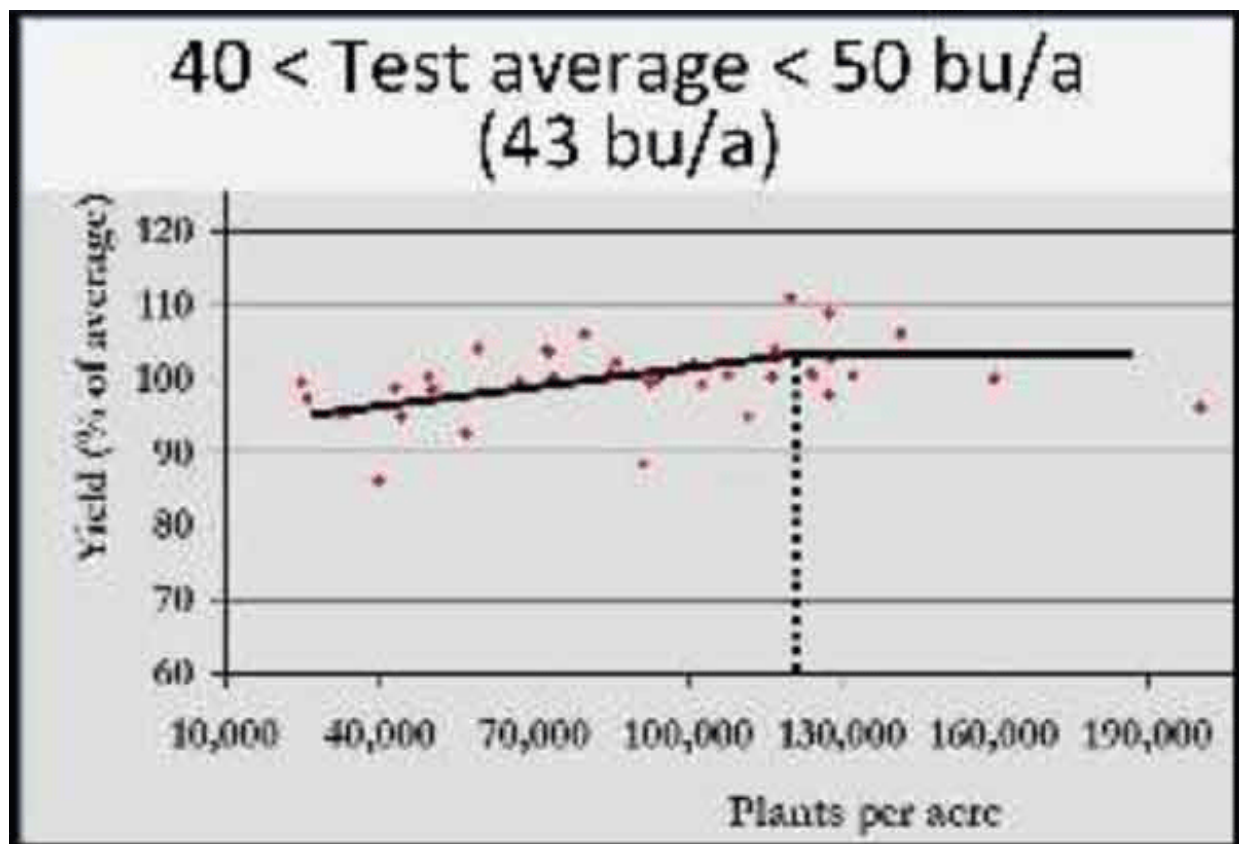


Figure 4. Optimum plant population, final plants per acre, for “medium-high” yielding environments across Kansas, ranging from 40 to 50 bushels per acre.

D) High yielding environments (test average above 50 bushels per acre):

The highest yields, under irrigation, were achieved with 105,000 plants per acre (or close to 130,000 seeds per acre with 80% emergence) (Table 2). There were relatively few experiments with yields in this range, so this may not represent a typical response. However, it does illustrate the tremendous ability of soybean plants to adjust the number of pods (and seeds) per plant to available resources. Other studies have shown that, given favorable growing conditions, yields of 80 to 90 bushels per acre can be achieved with 100,000 to 120,000 plants per acre.

Studies in 2012-2103 funded by United Soybean Board

Another series of studies funded by the United Soybean Board was conducted in 2012 and 2013 across the Midwest and Mid-South (including Kansas) to examine high-input soybean production practices. Initial results have shown that maximum yields were obtained between 100,000 and 165,000 seeds per acre across all nine states. In the southern states (Kansas, Kentucky, and Arkansas), seeding rates between 130,000 to 170,000 seeds per acre were needed to obtain maximum yields. This response was consistent across production systems regardless of whether they included a large number of yield-enhancing treatments (seed treat treatments, fungicides, growth promoters, etc.) or not.

Always take into consideration the yield potential for each environment when deciding soybean seeding rates. Yield potential is primarily defined by the weather conditions (before and after planting), genetic potential, soil type and supplemental fertility program, and use of best management practices for producing the crop (proper weed, insect, and disease control from planting until harvest). This summary confirms that the current recommendations are adequate, with the possible exception of extremely high-yield situations, which may require roughly 150,000 plants per acre to maximize yield. Using seeding rates higher than those recommendations seldom reduced yield, but did increase seeding cost.

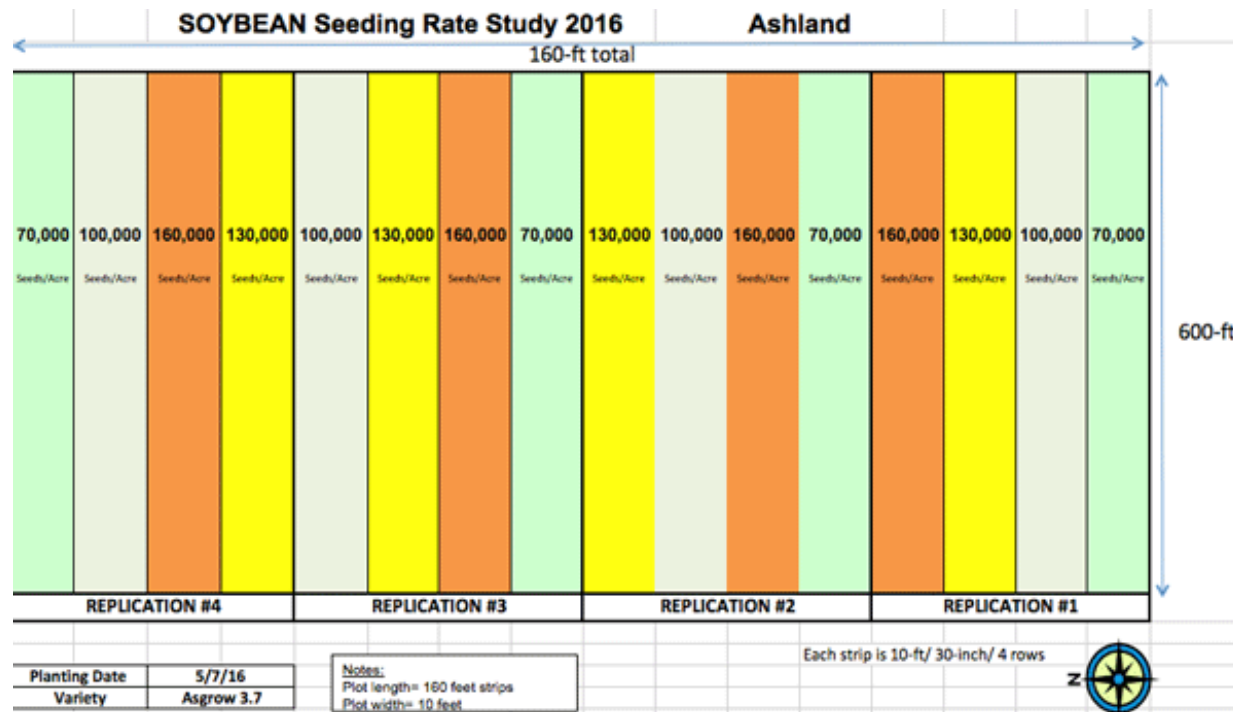
For more information, see *Kansas Soybean Management 2017*, MF-3154, available online at: <http://www.ksre.ksu.edu/bookstore/pubs/MF3154.pdf>

On-farm soybean seeding rate studies

During the 2016 growing season, several on-farm research studies were established in collaboration with Kansas Soybean, United Soybean Board (USB) and K-State Research and Extension. The experimental layout, field variability, and strip-trial position in the field for those studies are presented below.

Experimental layout

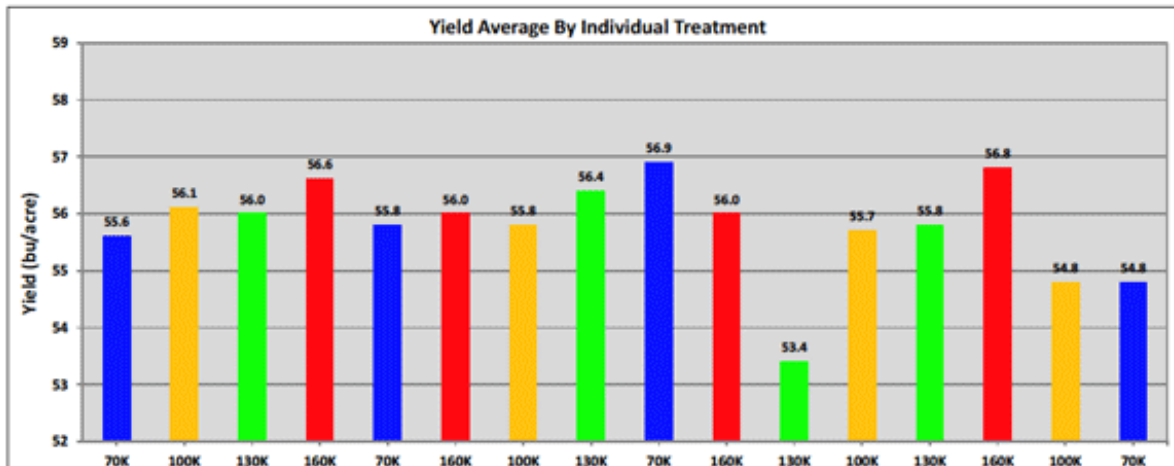
An example of the experimental design proposed for the 2016 soybean seeding rate trials is presented below. In this example, four seeding rate levels were investigated with four replications (completely randomized) in all 16 soybean strips.



Yield outcomes from a seeding rate study

Trial Results and Rainfall

Trial Type	Crop Management - Population
Trial Detail	High vs Low Population
Row Spacing	30 inch
Planting Date	5/7/2016
Harvest Date	10/21/2016 (Weigh Wagon)



Treatment	70K	100K	130K	160K	Least Significant Difference (LSD _{0.10})=3.1 bu/acre.
Yield Averages (bu/acre)	42.7 b	44.2 ab	46.1 a	45.5 ab	

Treatments with the same letter are not statistically significant at 10% significance level.

In this example, four seeding rates were evaluated in an east central Kansas location. Maximum soybean yield (single strip, replication) was about 57 bushels per acre, with a narrow variability among all treatments of 53 to 57 bushels per acre. At this site, increasing seeding rates did not significantly promote an improvement in yields, with a yield difference of 0.6 bushel per acre between the seeding rates of 70 thousand (55.8 bushels per acre) and 160 thousand (56.4 bushels per acre) seeds per acre.

Similar soybean seeding rate studies were performed in 2016 in collaboration with Extension agents and producers, resulting in diverse soybean yield responses to seeding rates.

The example above is just one study and one site. Thus, one should be careful in interpreting the results. The goal of this information is to motivate producers to perform more on-farm research evaluations and to understand the complexity of our soybean farming systems. In addition to this, the on-farm data emphasizes the need for further site-specific, on-farm evaluations on the response of yields to seeding rates and how management practices interact with the environment.

For more information of previous studies and other states, please visit:

<http://www.iasoybeans.com/USB/DataViewer/index.htm>

More information on the on-farm studies will be summarized in coming issues of the K-State Agronomy eUpdate. Stay tuned.

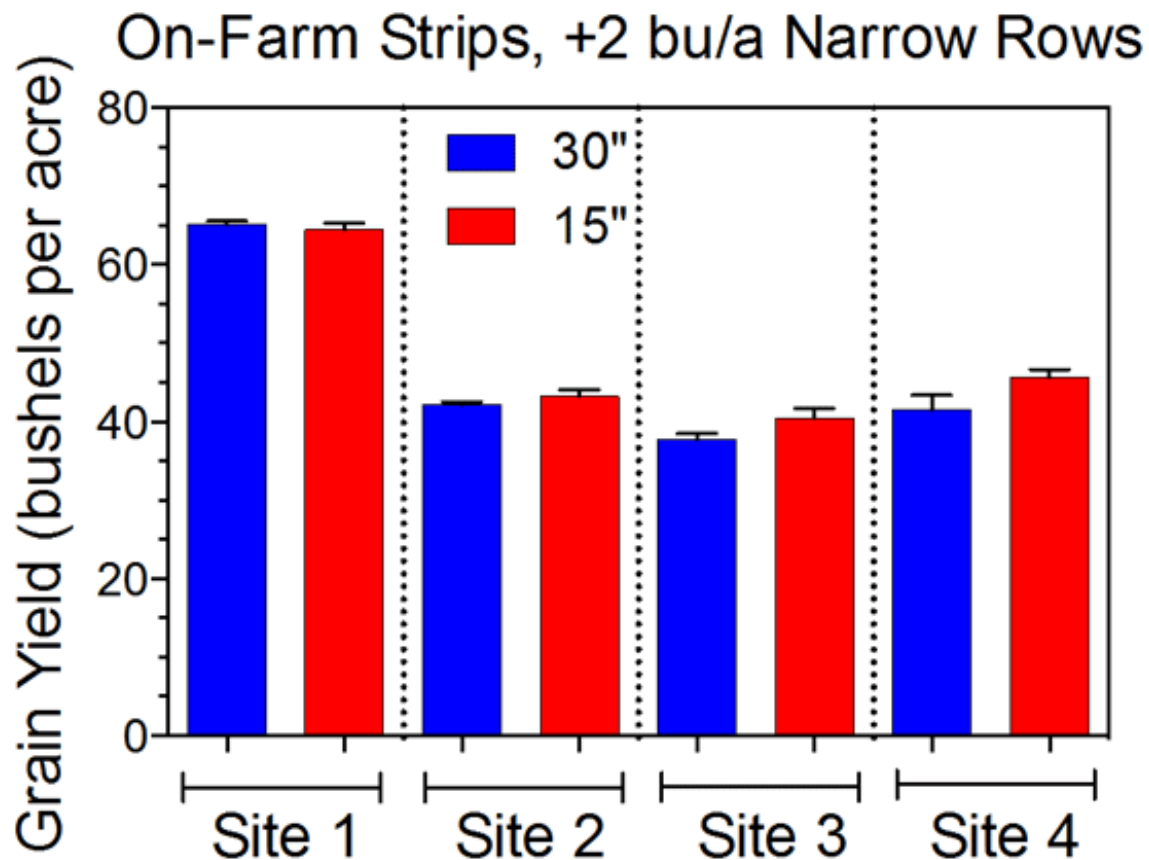
Ignacio Ciampitti, Crop Production and Cropping Systems Specialist
ciampitti@ksu.edu

3. Update on row width effects on soybean, K-State-USB-Kansas Soybean Project

There are still many questions about row spacing for soybean production. Our research information has found that narrow rows (15-inch or 7.5-inch) result in equal or greater yields compared to 30-inch rows when the yield environment is greater than 45-50 bushels per acre (regardless of planting date, seeding rate, or maturity). Below this yield threshold level, narrow rows tend to result in yields about equal to or slightly below (depending on the growing conditions, water status) yields in 30-inch row spacing. Narrow rows have several benefits such as early canopy cover, better light capture, improved weed control, and reduced erosion. Poor stands, however, are more common with narrow than with wider row spacing.

For the 2015-16 seasons, on-farm studies (a collaboration between K-State, Kansas Soybeans, and the United Soybean Board) showed about a 2-bushel yield improvement with narrow rows (15-inch), with yields averaging 48 bushels per acre (Figure 1). Narrow rows have several benefits such as early canopy cover, better light capture, improved weed control, and reduced erosion. Poor stands, however, are more common with narrow than with wider row spacing.

Overall Summary



Kansas State University Department of Agronomy

2004 Throckmorton Plant Sciences Center | Manhattan, KS 66506

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Figure 1. Soybean yield, expressed in bushels per acre, for conventional (30-inch) versus narrow (15-inch) row spacings.

Overall, narrow rows provided a yield response ranging from -0.6 to +4.0 bu/acre at the four locations.

For more information see: <http://www.iasoybeans.com/USB/DataViewer/index.htm>

Ignacio Ciampitti, Crop Production and Cropping Systems Specialist
ciampitti@ksu.edu

4. Wheat disease update: Stripe rust, leaf rust, and powdery mildew

This week has brought more reports of stripe rust in Kansas. Stripe rust can be found in the lower and middle canopy of many fields in central Kansas, but the severity remains low (Figure 1). Stripe rust is more severe in the southeast region of the state and has moved to the upper leaves in some fields. The weather conditions the past 14 days have not favored the rapid spread of stripe rust. Stripe rust is favored by cool, wet weather and temperatures in recent weeks were too warm for the stripe rust fungus to function efficiently. For example, most areas of the state had more than 30 hours of temperatures above 75 F in the last two weeks (Figure 2). Some areas of southwest and south central Kansas had more than 50 hours of unfavorable temperatures. The threat of stripe rust has not passed, however. We know stripe rust is present at low levels in many fields in the state. The disease could increase rapidly if we get into another period of favorable weather with frequent rainfall and temperatures in the 40-50F range at night. I still think there is a moderate risk of Kansas having a serious problem with stripe rust this season.

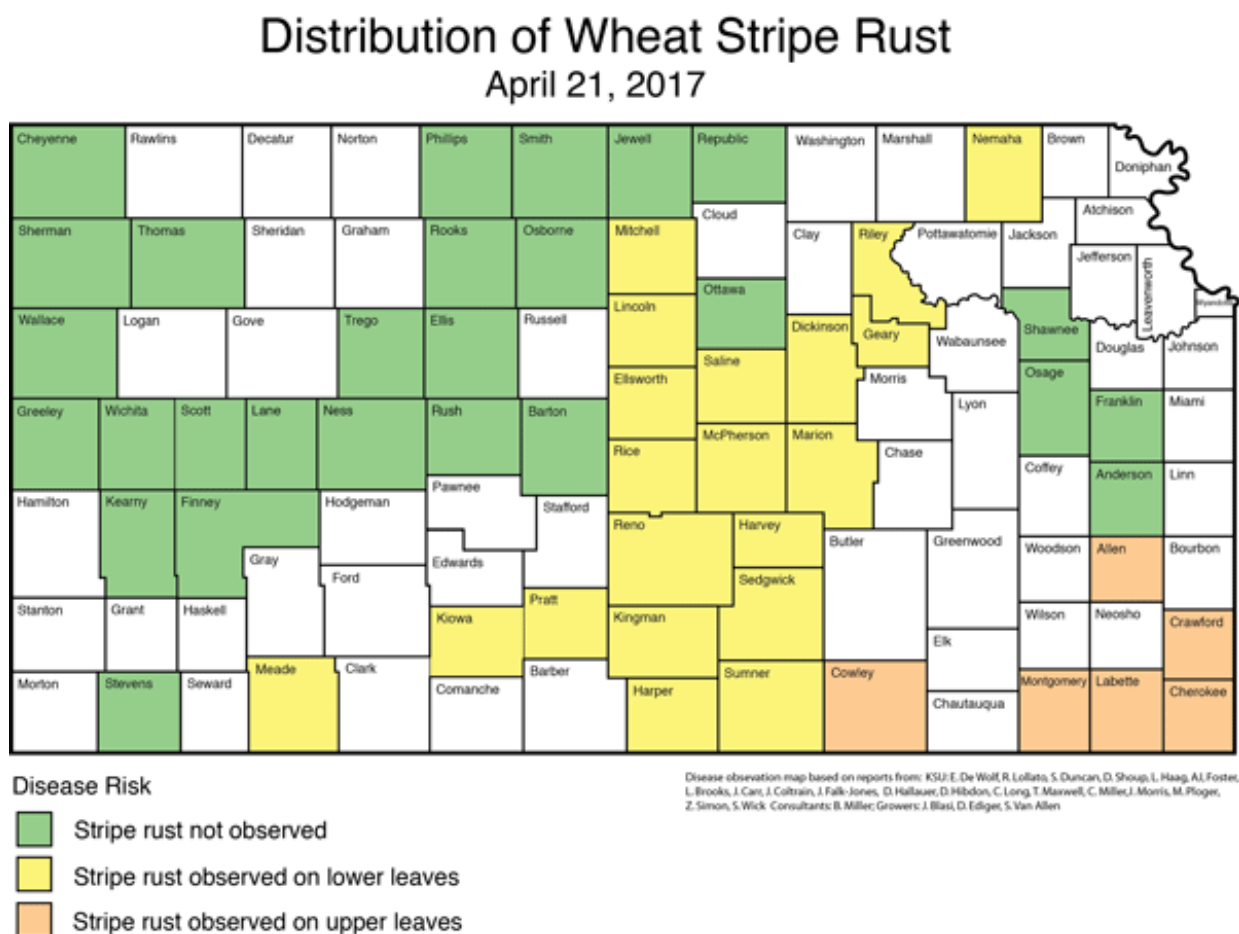


Figure 1. Distribution of wheat stripe rust in Kansas as of April 21, 2017.

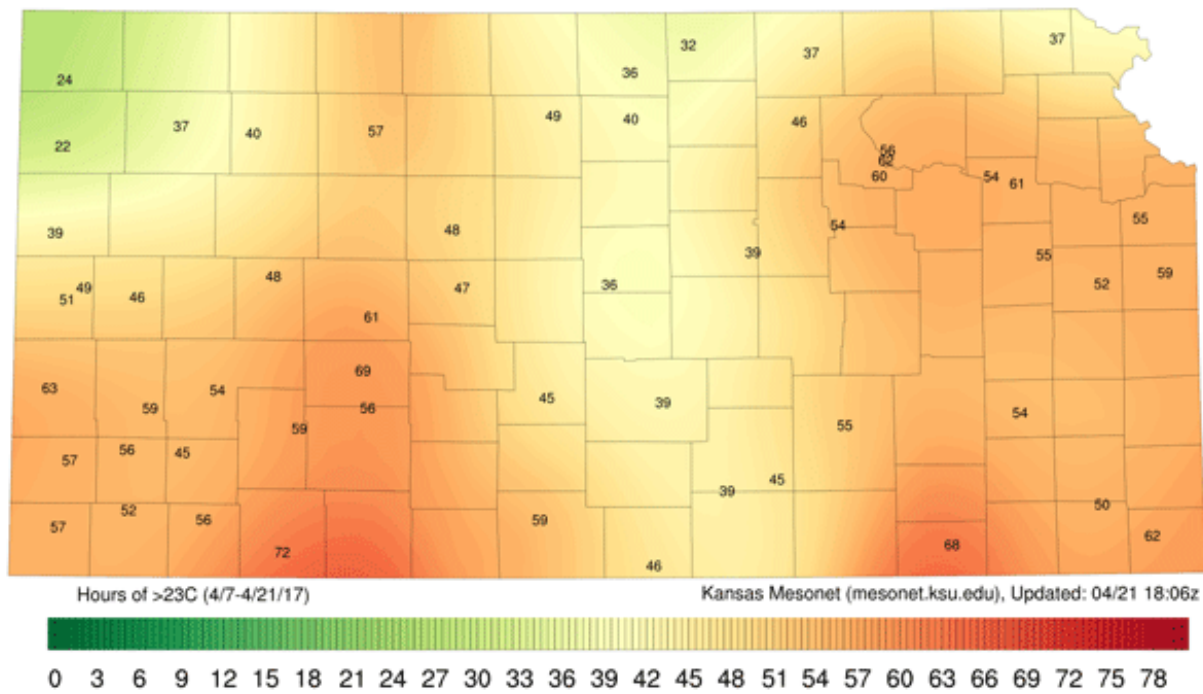


Figure 2. Duration of time that temperature was unfavorable for the development of stripe rust between April 7 and April 21, 2017.

Leaf rust was reported previously in south central and southeastern Kansas. This week brought a few new reports of leaf rust and indications that leaf rust has moved to the upper leaves in few areas (Figure 3). This movement of rust to the upper leaves is important because these leaves provide most of the resources the plants will use produce grain. Any damage done to the upper leaves increases the risk of yield loss.

Distribution of Wheat Leaf Rust

April 21, 2017

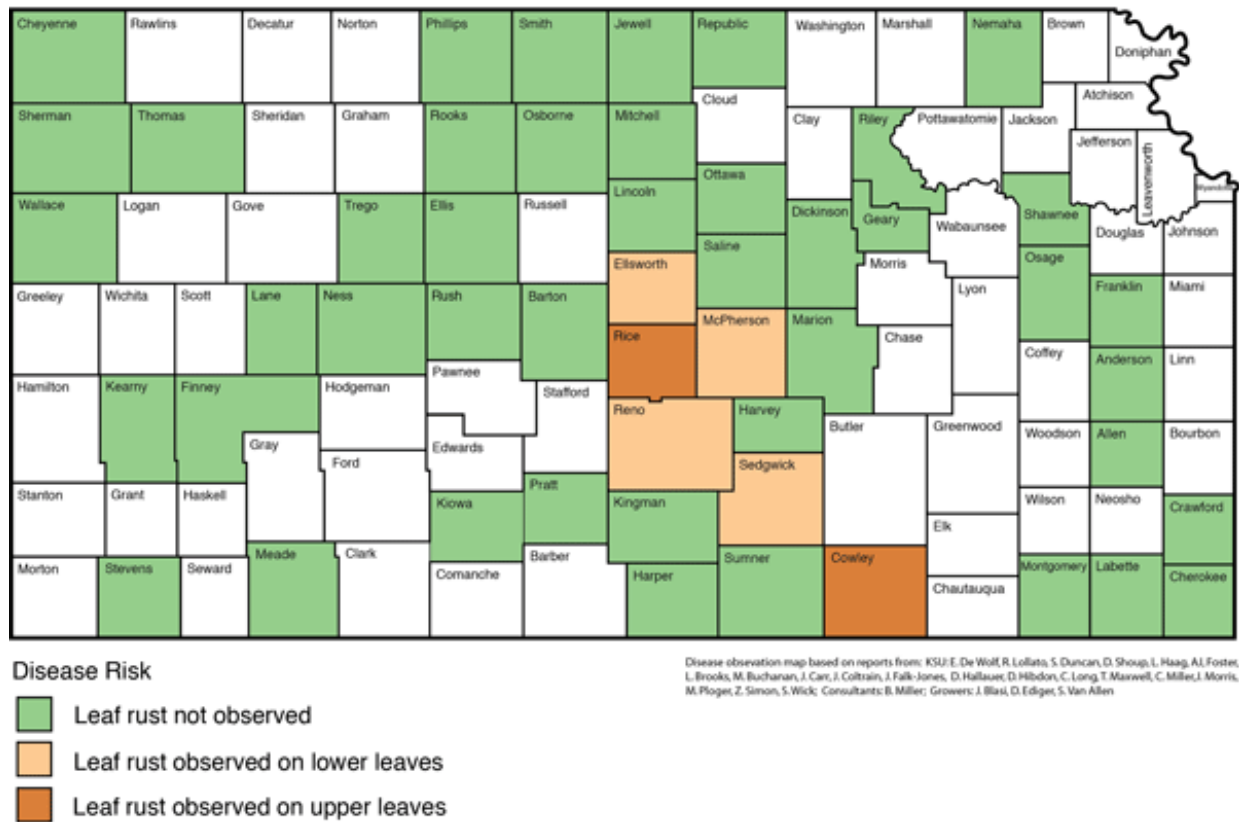


Figure 3. Distribution of wheat leaf rust in Kansas as of April 21, 2017.

Powdery mildew (Figure 4) is becoming severe in fields planted to moderately susceptible and susceptible varieties. 1863, Gallagher, KanMark, LCS Pistol, SY Flint, WB4458, WB-Grainfield, and WB-Redhawk are vulnerable to powdery mildew. In some fields, the powdery mildew has moved to the leaf just below the flag leaf prior to heading. This early establishment of the disease is cause for concern and growers should consider both rust and powdery mildew into their fungicide decisions. Fields with multiple diseases in the middle canopy and those where disease has moved to the upper leaves prior to heading have a more than 80% chance of experiencing a yield loss of >4.0 bu/a.



Figure 4. Wheat with symptoms of powdery mildew. Photo by Erick DeWolf, K-State Research

and Extension.

Erick De Wolf, Extension Plant Pathology
dewolf1@ksu.edu

Romulo Lollato, Wheat and Forages Specialist
lolato@ksu.edu

Mary Knapp, Weather Data Library
mknapp@ksu.edu

Chip Redmond, Kansas Mesonet
christopherredmond@ksu.edu

5. Wheat growing conditions: April 21, 2017

There is a southeast-to-northwest gradient in wheat development across Kansas. Wheat in far southeast is now around flowering, with some more fields even further along in the early stages of grain development (Fig. 1). The majority of wheat in the south central region is already at boot or heading. Wheat in parts of southwest Kansas and the majority of the central portion of the state is now at flag leaf emergence or at boot. Northern Kansas and northwest Kansas have the majority of the fields now past the second node, and approaching the flag leaf emergence.

Estimated Wheat Growth Stage April 21, 2017

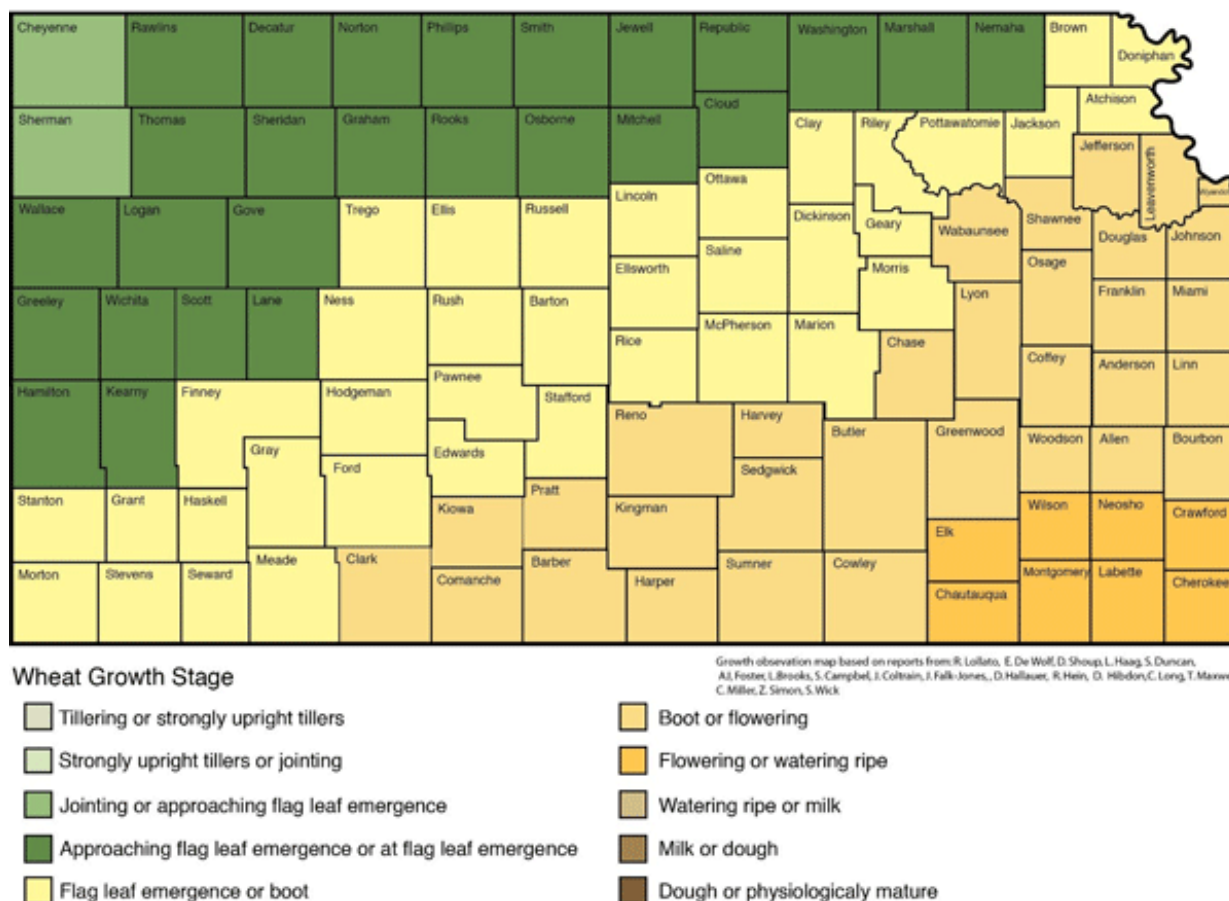


Figure 1. Estimated wheat growth stage as of April 21, 2017. Growth stage is estimated for each county based on temperatures accumulated in the season and adjusted by observations of crop stage by K-State personnel. Local growth stage may vary with planting date and variety.

Wheat condition update

This week, K-State Research and Extension agronomists have visited several different fields across the

state. The route is summarized in Figure 2. Many fields visited had good yield potential, especially in the central portion of the state. Fields in far northwest Kansas (Rawlins and Thomas counties) and in parts of southwest Kansas (Wichita, Finney, and Meade counties) also had good yield potential when not infected by wheat streak mosaic virus (Figure 3).

The major issues being faced across Kansas in the current wheat crop involve viral diseases (mostly wheat streak mosaic in western Kansas), stripe rust (please see accompanying eUpdate on stripe rust), some scattered poor emergence in parts of northwest Kansas, and some nitrogen and sulfur deficiencies.

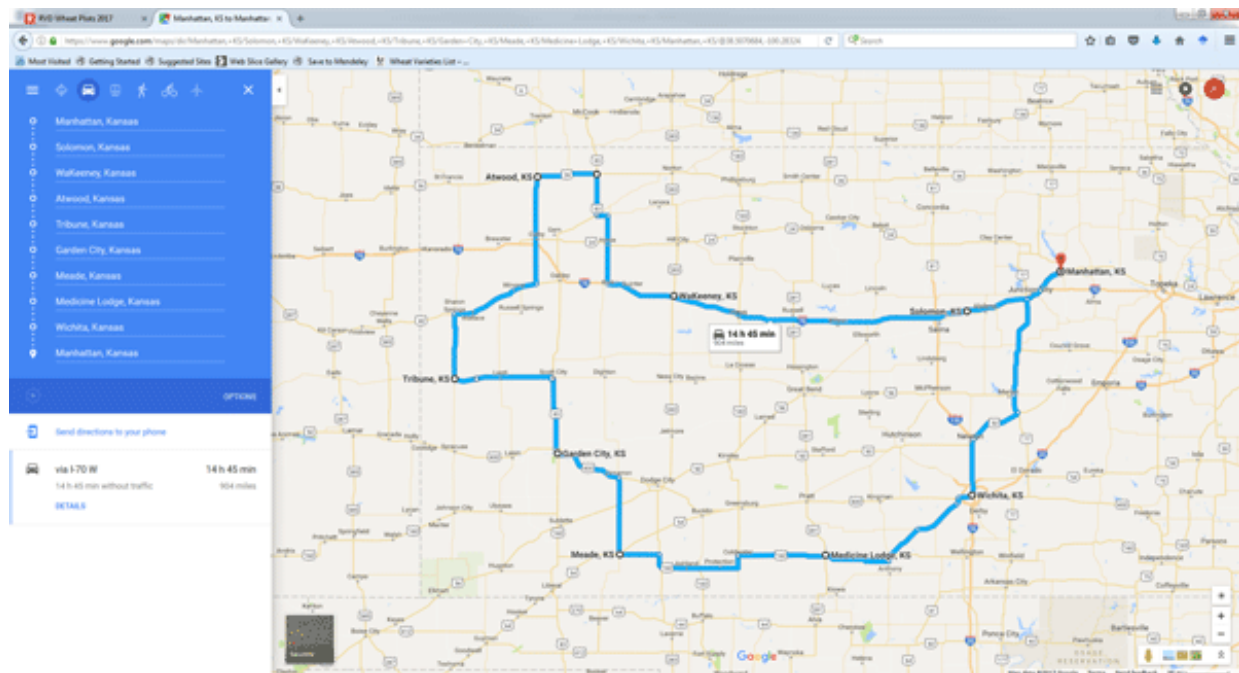


Figure 2. Route representative of the field visits performed during April 18-19 2017.



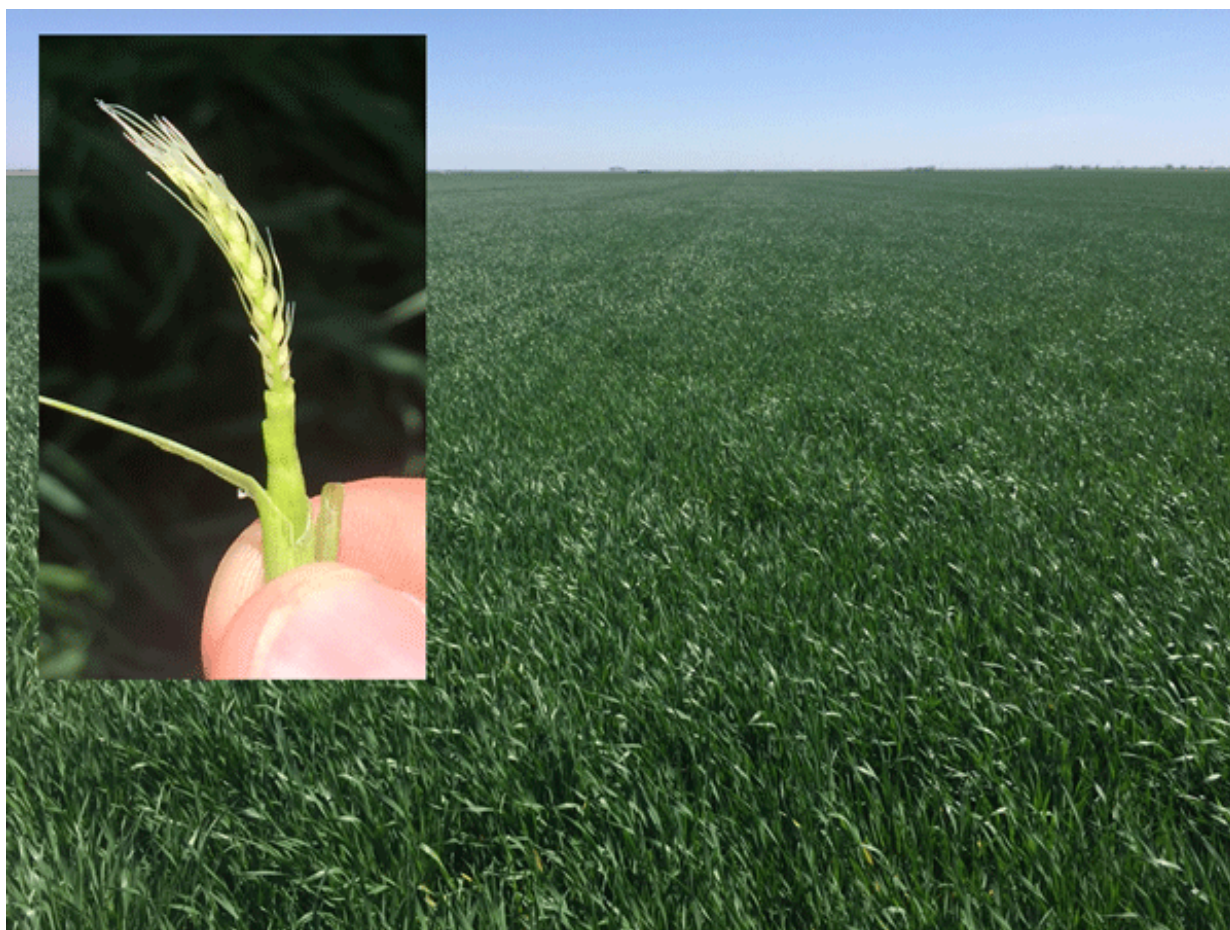


Figure 3. Wheat fields with excellent yield potential in Thomas (upper left), Meade (upper right), and Finney (bottom panel) counties, Kansas. Photos taken April 18-19, 2017 by Romulo Lollato, K-State Research and Extension.

Viral diseases

The most prevalent viral disease across the route shown above was wheat streak mosaic virus (WSMV), especially in the western portion of the state. While some fields were completely infected by the disease (Fig. 4, upper panel) and showing the typical spread pattern across the field (wide near the infection point, narrowing towards deeper portions of the field), many fields were actually only showing scattered plants or patches of infected plants across the field (Fig. 4). This patchy distribution is more typical of barley yellow dwarf, but is re-occurring in WSMV-infected fields this growing season. This patchy distribution in the field is likely the result of low levels of wheat curl mites blowing in from distant areas of higher mite populations. The mites began to feed and transmitted the virus but then died out locally. These scattered infections should be a minor issue in terms of crop yield if the disease remains isolated to the plants (often <1% of the plants showing symptoms) currently showing symptoms, because the remaining plants will compensate for the damaged plants. The level of infection varied from field to field, and symptoms ranged from a pale-yellow, light green streaking (typical infection) to a bright yellow response, depending on variety susceptibility.

Viral diseases were most likely favored by the warm conditions experienced in the fall, winter, and early spring, and by volunteer wheat not controlled before the growing season. Temperatures above 70°F were observed in February and March, which would favor both the aphids that transmit barley yellow dwarf virus and the wheat curl mite that transmits wheat streak mosaic virus. Warm temperatures might also shut down the genetic resistance to wheat streak mosaic virus of some varieties, such as Oakley CL.





Figure 4. Wheat field completely infested by wheat streak mosaic virus (upper panel) versus infected plant amidst healthy neighboring plants (lower panel). The field shown in the upper panel had volunteer wheat nearby, whereas the field in the lower panel did not. While the symptoms might look like barley yellow dwarf virus in the lower photos, close inspection of the leaves show streaky symptoms of WSMV. Photos taken April 19, 2017 in Wichita County by Romulo Lollato, K-State Research and Extension.

Scattered emergence

Some fields in the region encompassing Wakeeney, Hill City, and Oberlin had very scattered stands composed of a mixture of large fall-emerged plants and small spring-emerged plants (Figure 5). It was clear that those fields had limited fall precipitation, resulting in poor fall emergence. Yield potential in these fields will depend on what percentage of the plants emerged in the fall, and what the distribution uniformity of those fall-emerged plants. Previous K-State research has shown that a fall stand of about 50-60% can still result in good yield potential, provided the distribution of these plants is relatively uniform so that the individual plants can tiller out and compensate. However, if final stands are less than those percentages or plants are irregularly distributed, yield can be severely compromised. Plants which emerged during the spring will have about half of the potential of the fall-emerged plants, depending on weather conditions in the growing season.



Figure 5. Uneven fall emergence due to dry soils in northwest Kansas. Photo taken April 18, 2017 in Graham County by Romulo Lollato, K-State Research and Extension.

Nitrogen or sulfur deficiencies

Fields with symptoms of nitrogen or sulfur deficiencies are also present in the 2017 Kansas wheat crop. Nitrogen deficiency is characterized by a pale green color in the lower leaves, while sulfur deficiency results in light green upper leaves. Severe N deficiency will turn all leaves pale green and reduce plant size. Some fields were showing signs of N deficiency, which could be differentiated by the darker green portions of the field where there was some extra N available (Figure 6). In the specific field shown in Figure 6, the lighter green plants were also showing more streaky symptoms in the leaves, indicating possible infection by wheat streak mosaic. Plants are currently being tested for both N concentration and WSMV.

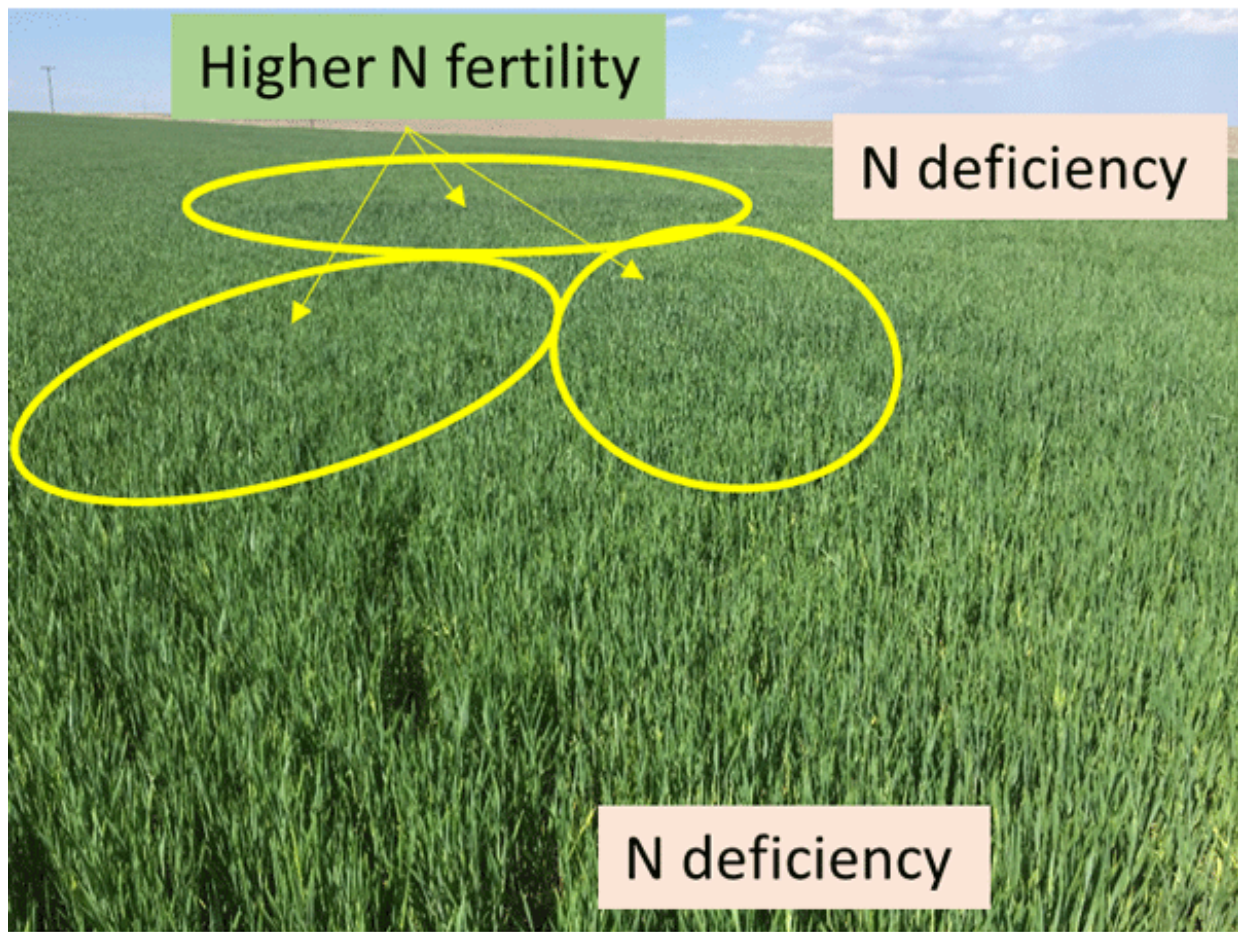


Figure 6. Wheat field in Meade County showing symptoms of N deficiency, where portions of the field had a lush and greener vegetative growth and the majority of the field had shorter, smaller, and lighter green plants. These also had some streaky symptoms in the leaves, possibly indicating WSMV. Photos taken April 19, 2017 in Meade County by Romulo Lollato, K-State Research and Extension.

Nitrogen applied late season has resulted in yield gains as late as Feekes 8-9 in K-State research. However, the yield gain from late-applied nitrogen is not as large as from early applications because it does not increase number of grains per head. The main effect of late-season N on wheat yield will come from reducing tiller abortion due to nitrogen deficiency or, in other words, maintenance of number of heads per area.

Romulo Lollato, Wheat and Forages Specialist
lolato@ksu.edu

Erick DeWolf, Extension Plant Pathologist
dewolf1@ksu.edu

6. 2017 In-Depth Wheat Diagnostic School in Hutchinson, May 10-11



K-State Research and Extension will hold its 2017 Wheat In-Depth Diagnostic School on May 10 and 11 at the South Central Kansas Experiment Field, 10620 S. Dean Road, Hutchinson. On May 10, the hours are 9 a.m. to 6 p.m. On May 11, the hours are 8 a.m. to 1 p.m.

Topics will include:

- Wheat Growth and Development
- Managing Wheat for Forage and Grain
- Wheat Fertility
- Disease Management
- Weed Identification
- Weed Management
- Entomology
- Wheat Breeding and new Technologies
- Precision Agriculture
- Summer Cover Crops After Wheat

Speakers (K-State Research and Extension unless otherwise noted):

- Romulo Lollato
- Stu Duncan
- David Marburger, Oklahoma State University
- Erick DeWolf
- Dorivar Ruiz Diaz
- Kevin Donnelly

- Dallas Peterson
- Allan Fritz
- Ray Asebedo
- DeAnn Presley
- Jeff Whitworth
- Holly Schwarting

This school is tailored to be a hands-on learning opportunity for agronomy professionals, farmers, and anyone interested in wheat production. It has approval for Certified Crop Advisor and Commercial Pesticide Applicator credits. The cost is \$140 for both days for those who RSVP by May 2. After that date and for walk-ins, the cost is \$180 for both days. The registration fee includes access to all speakers and an extensive take-home field book. Breakfast and lunch both days is also included in the fee.

To register for the school, register online at <http://www.global.ksu.edu/wheat-diagnostic>

For more information, contact registration@ksu.edu or call 785-532-5569.

Romulo Lollato, Wheat and Forages Specialist
lolato@ksu.edu

7. Comparative Vegetation Condition Report: April 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 16: 04/11/2017 - 04/17/2017

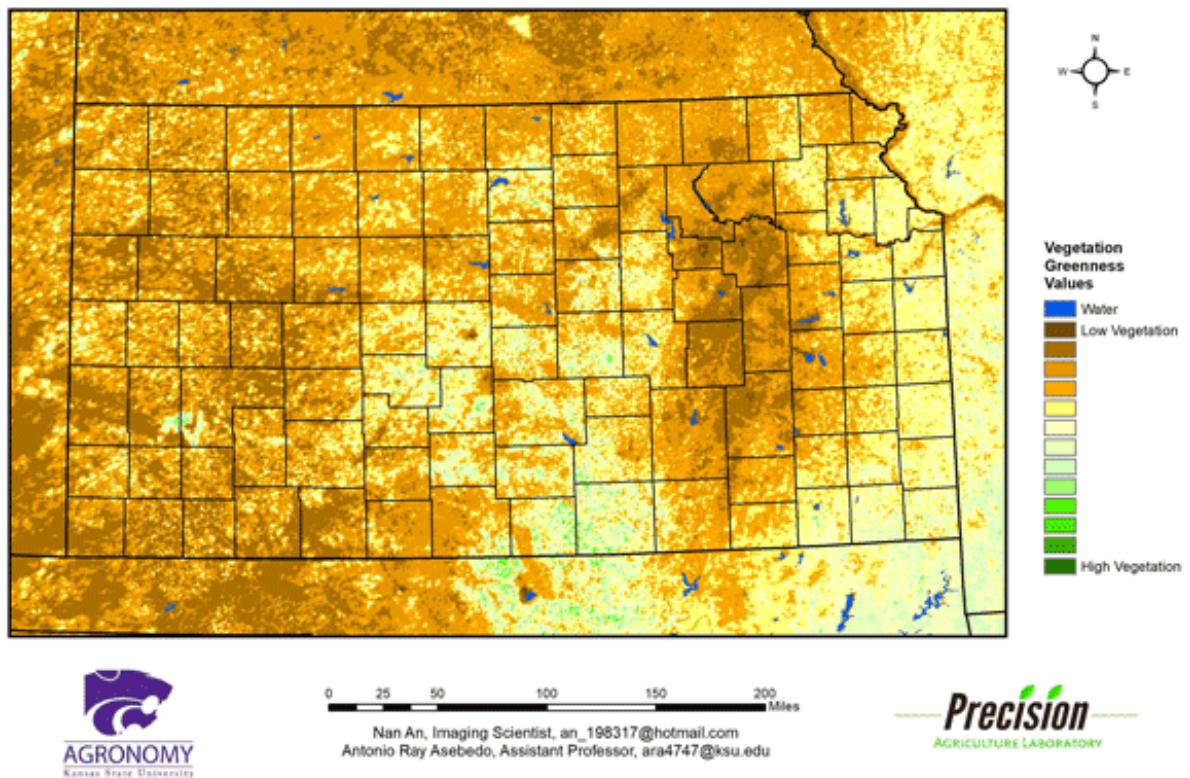


Figure 1. The Vegetation Condition Report for Kansas for April 11- April 17, 2017 from K-State's Precision Agriculture Laboratory shows a continued increase in vegetative activity along the Arkansas River in southwest Kansas into south central Kansas. Only light activity is visible to the east of the Flint Hills.

Kansas Vegetation Condition Comparison

Mid-April 2017 compared to the Mid-April 2016

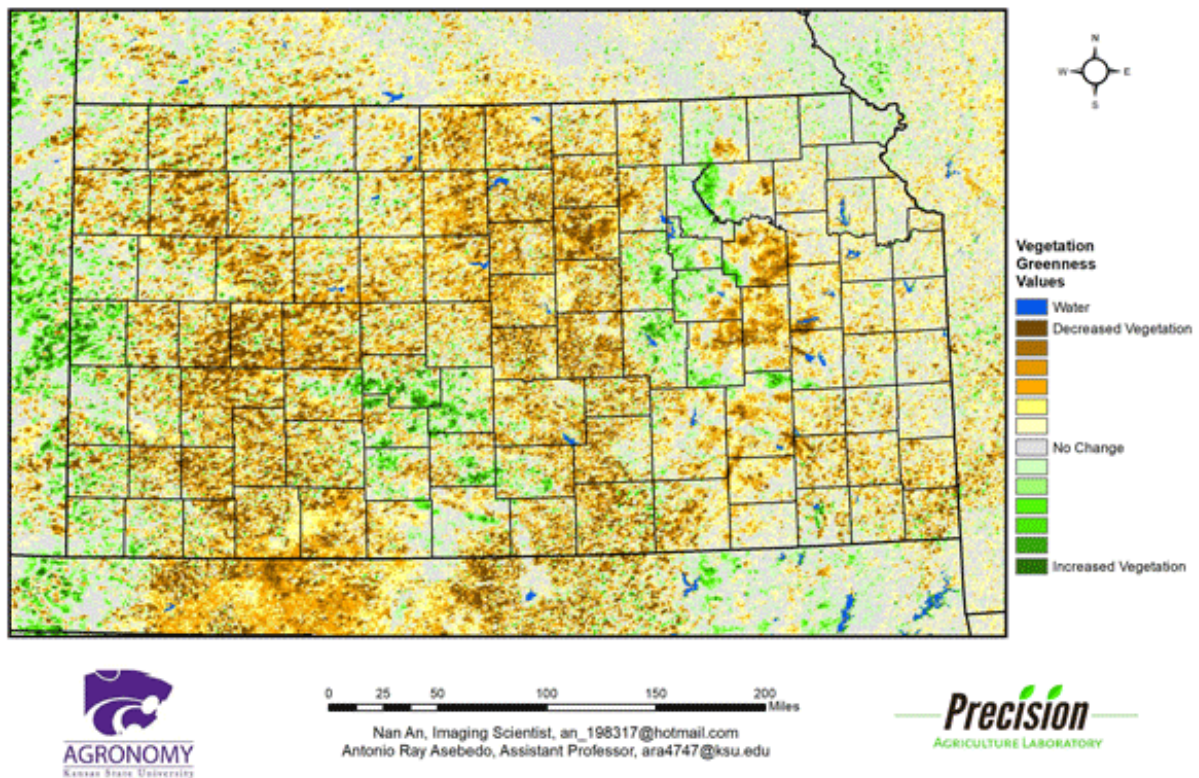


Figure 2. Compared to the previous year at this time for Kansas, the current Vegetation Condition Report for April 11 – April 17, 2017 from K-State’s Precision Agriculture Laboratory lower NDVI values across most of Kansas. The winter wheat is less advanced this year than last, particularly in western Kansas, where dry fall conditions hampered establishment. The greatest increase in vegetative activity is in northeast Kansas, and extreme west central Kansas.

Kansas State University Department of Agronomy

2004 Throckmorton Plant Sciences Center | Manhattan, KS 66506

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Kansas Vegetation Condition Comparison

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

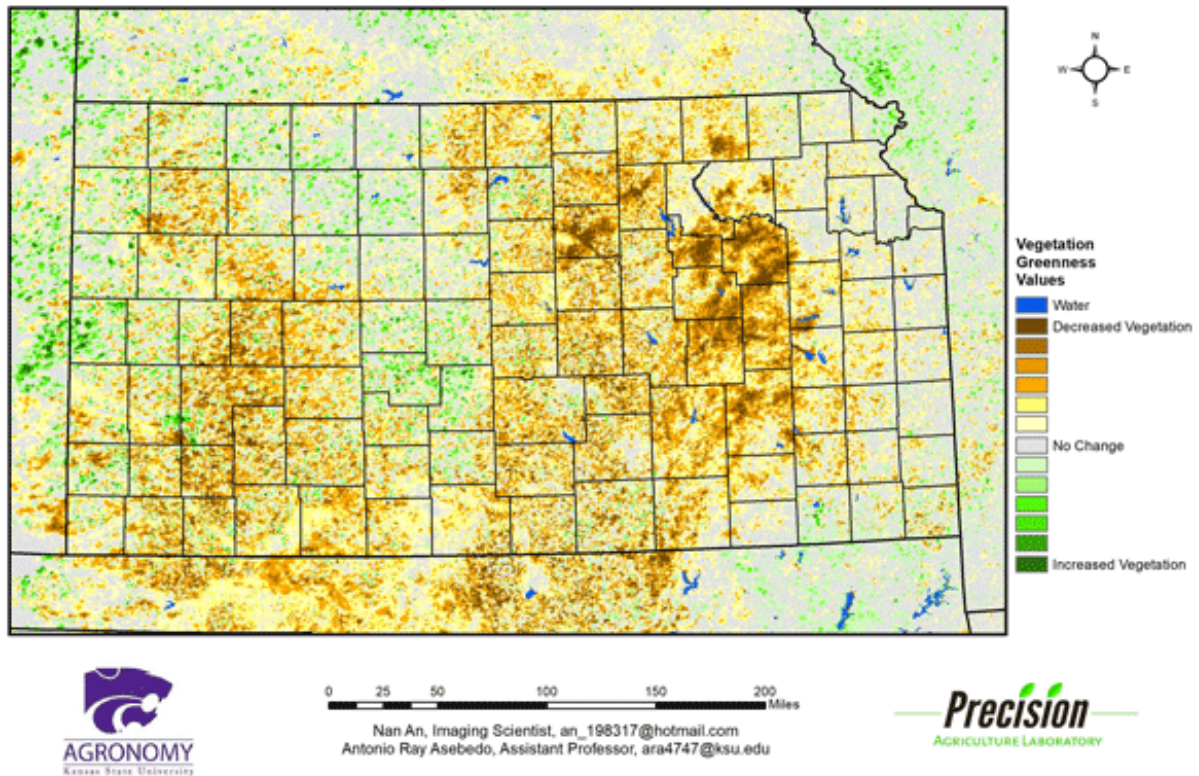


Figure 3. Compared to the 27-year average at this time for Kansas, this year's Vegetation Condition Report for April 11 – April 17, 2017, from K-State's Precision Agriculture Laboratory much of the state has below-average photosynthetic activity. The highest NDVI values are in the central and west central parts of the state, where precipitation has been more favorable. The lingering impact from the dry conditions last fall is most visible in southwest Kansas and in the Flint Hills in eastern Kansas.

Continental U.S. Vegetation Condition

Period 16: 04/11/2017 - 04/17/2017

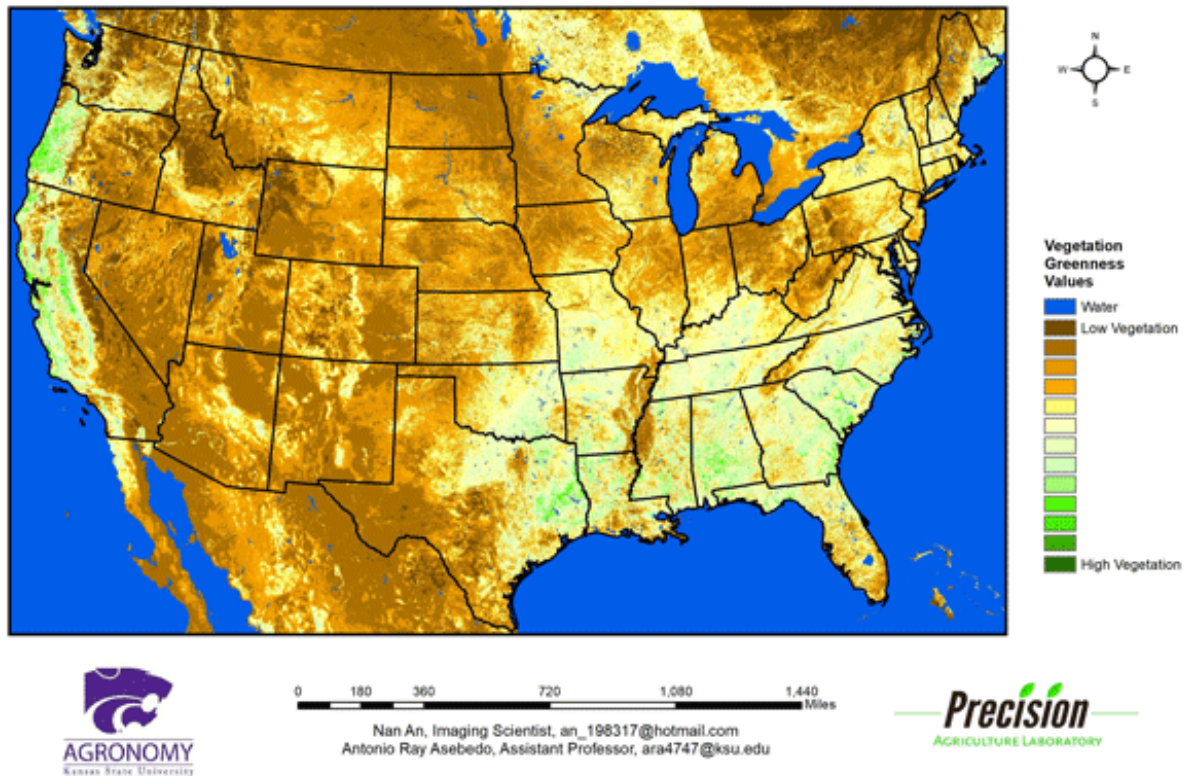


Figure 4. The Vegetation Condition Report for the U.S for April 11 – April 17, 2017 from K-State’s Precision Agriculture Laboratory shows the region of highest NDVI is confined to the South, particularly in east Texas and Louisiana. A second area of higher vegetative activity is also visible along the West Coast, where wet conditions continue. Low NDVI values are visible along the central Mississippi River Valley. As of April 1st, the snow depiction has been dropped, since the snow season is largely over.

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

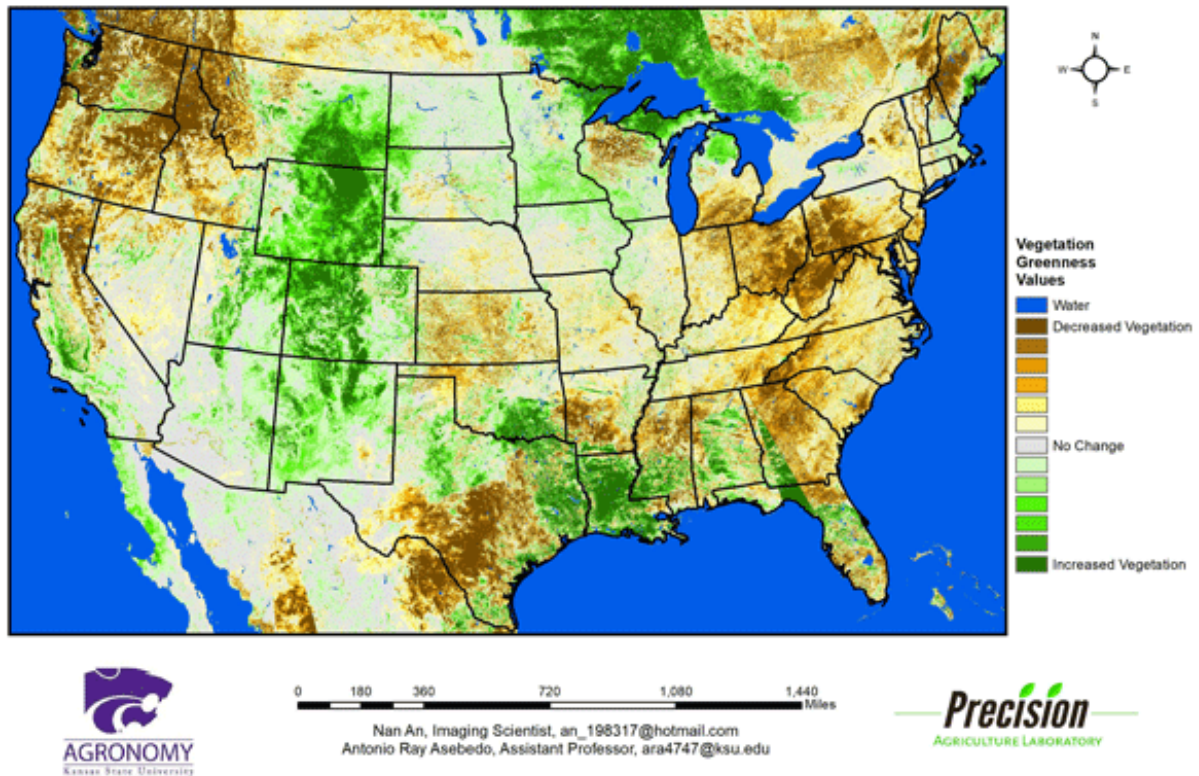


Figure 5. The U.S. comparison to last year at this time for April 11 – April 17, 2017 from K-State’s Precision Agriculture Laboratory again shows the impact that split in the snow cover has caused this year. Much lower NDVI values prevail in the Pacific Northwest. The northern Rockies are showing higher NDVI values as the snow pack is rapidly retreating. The South has much higher NDVI values, due to warmer-than-normal temperatures and favorable precipitation.

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

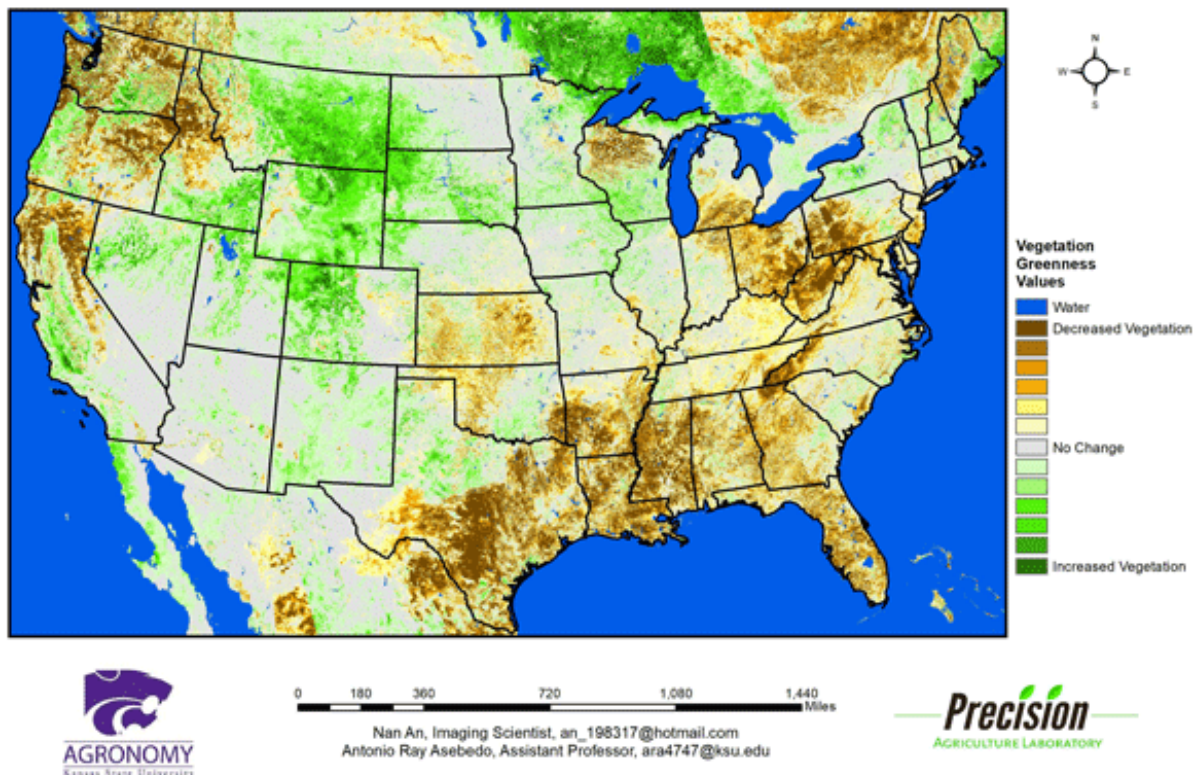


Figure 6. The U.S. comparison to the 27-year average for the period of April 11 – April 17, 2017 from K-State’s Precision Agriculture Laboratory shows below-average photosynthetic activity in the Pacific Northwest, where continuing storm systems have masked vegetative activity. Below-average NDVI values are also present in the South from Texas to the Ohio River Valley, where continued rain has masked vegetative activity. Higher-than-average vegetative activity is present in the Northern Plains and northern Rockies as the snow pack continues to retreat rapidly.

Mary Knapp, Weather Data Library
mknapp@ksu.edu

Ray Asebedo, Precision Agriculture
ara4747@ksu.edu

Nan An, Imaging Scientist
an_198317@hotmail.com