



K-STATE
Research and Extension

Extension Agronomy

eUpdate

04/22/2016

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, Jim Shroyer, Crop Production Specialist 785-532-0397 jshroyer@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 continues to be a serious 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.

Q: Are generic fungicides as effective as the more expensive products?

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. We provide an efficacy rating of fungicide products in *Foliar Fungicide Efficacy Ratings for Wheat Disease Management 2016*, 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: 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 to describe 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. So 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 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 a multiple modes of action?

A: 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. As mentioned previously, using a fungicide with a mixed mode of action can help reduce the risk of fungicide resistance. However, there are other ways to achieve similar results with respect to resistance.

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.

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2. Considerations for ground vs. aerial applications of fungicide

With the recent rains, many producers will not be able to make timely applications of fungicide using a ground rig. However, this may not be the case in all areas. As producers evaluate their options between ground vs. aerial application of fungicides they should keep several points in mind.

The IF and WHEN decisions of fungicide application are much more important considerations than the application method. Both methods, when performed correctly under good conditions, provide effective application of fungicides. Always use the surfactants and solution rates as described on the product label for the chosen application method.

A common question from those considering ground rig application is the potential yield loss from wheel tracks. The table below shows the percent of field area that will be trafficked for various boom and tire widths.

	Tire Track Width (inches)		
Boom width (feet)	12	18	24
	Tracked portion of field (%)		
60	3.3	5.0	6.7
90	2.2	3.3	4.4
100	2.0	3.0	4.0
120	1.7	2.5	3.3

It's important to realize, however, that percent of area trafficked is not necessarily equal to yield loss. There is still significant yield component flexibility in wheat plants. In other words, the wheat plants next to the wheel track will most likely have increased kernel weight and potentially increased number of kernels per head. Due to the increased resource availability, these plants next to the track will somewhat compensate for the lost plants in the trafficked area. Additionally, some of the plants that are trafficked may still contribute to grain yield.

When evaluating the economics of the decision, too often a producer may assign no cost to the operation of his own sprayer. A decision should revolve around the economics of aerial application vs. the true cost of the producer's ground rig.

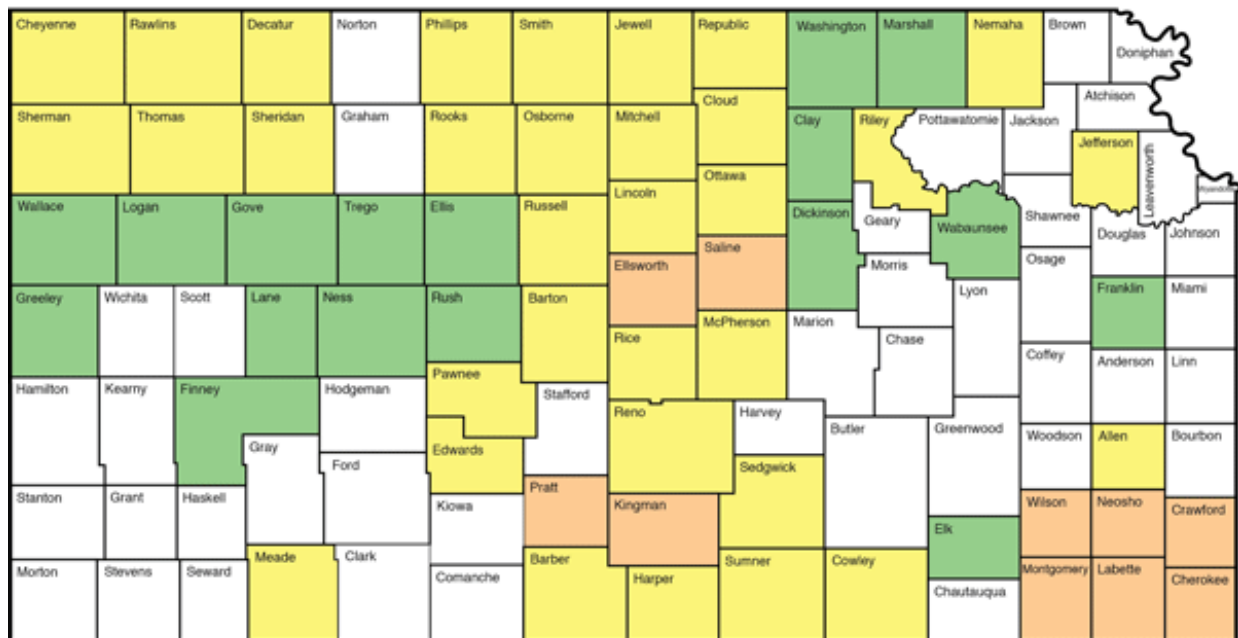
A likely range of machinery related cost (labor not included) for self-propelled sprayers is from \$2.50 to \$3.50/acre or \$135 - \$180/engine-hour. This variability in cost is mostly a factor of the number of acres covered per engine hour (in other words, field capacity). Variability in fuel cost is a relatively minor factor. Field capacity is affected by field size and shape, whether the sprayer is tendered at the field, time required to tender, and whether the sprayer is transported or driven between fields. Obviously, a true evaluation of cost should also include a labor charge for the operator and any labor associated with the tendering and transporting of the sprayer.

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3. Wheat stripe rust update

Reports of wheat stripe rust continued to roll in this week. The disease was already established in many parts of south central and southeast Kansas. Stripe rust has moved to the upper in some fields within these regions now. This movement to the upper canopy is important because these leaves contribute the majority of the energy used to make grain. The other key update comes from western Kansas where the disease was reported at low levels this week. The first reports came from irrigated fields but a few dryland fields were subsequently found to have stripe rust also.

Distribution of Wheat Stripe Rust April 22, 2016



Disease Risk

- Stripe rust not observed
- Stripe rust observed on lower leaves
- Stripe rust observed on upper leaves

Disease observation map based on reports from: E. De Wolf, R. Lollato, D. Shoup, L. Haag, S. Duncan, E. Adee, M. Buchanan, G. Cramer, A. J. Foster, S. Campbell, J. Carr, J. Coltrane, J. Falk-Jones, J. Green, D. Hallauer, R. Hein, J. James, A. Johnson, K. Larson, C. Long, T. Maxwell, C. Miller, M. Pflieger, Z. Simon, S. Wick.

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4. How much yield potential did the latest round of precipitation add to the wheat crop?

What is yield potential?

Yield potential of a crop is defined as the grain yield achieved under optimum management conditions, where the crop is limited only by weather and soil physical constraints rather than by diseases, pests, nutrition, or any suboptimal management practice.

Therefore, yield potential is often limited either by water or by solar radiation. Previous studies looking at 30-year weather data and wheat yield potential have shown that about 70-80 percent of the variability in wheat yield potential in western Kansas and Southern Plains is explained by plant-available water at sowing plus in-season precipitation. This means that wheat yields are often limited by water in this region. Meanwhile, a large proportion of the wheat yield potential variability in eastern Kansas is explained by cumulative solar radiation between anthesis and physiological maturity. In other words, cloudy days in the eastern region often limit the amount of incident solar radiation during a critical period of grain yield determination and this often becomes a more significant factor in determining yields than water.

How efficiently can wheat use available water?

In regions where yield is limited by water, water is generally used more efficiently and yield potential can be calculated using a water-use efficiency coefficient. This is true for regions where growing season precipitation is generally less than about 13-15 inches, and precipitation distribution plays a very important role in determining the crop's water-use efficiency.

Previous studies performed in the Southern Plains and other water-limited regions of the world, such as Australia, have shown that wheat can yield as much as 8.3 bu/acre for every additional inch of precipitation in the growing season when water is used most efficiently (Figure 1). This very effective use of water occurs only when precipitation is very timely and falls during critical periods for grain yield determination -- such as stand establishment and tillering, spring greenup, and grain filling.

Although 8.3 bu/acre/inch is the potential transpiration efficiency of wheat, this extremely high water-use efficiency value only occurs when all conditions (management- and weather-related) lead to increased grain yields. This is very seldom observed under field conditions. For instance, any limitation due to suboptimal management, such as disease or pest incidence, nutrient deficiency, or weed pressure, will decrease the efficiency with which wheat uses the available water. Likewise, heat stress during later stages of grain filling will result in shriveled grains and will reduce the crop's water use efficiency.

As a consequence, wheat water-use efficiency values in the 3 to 5 bu/acre/inch are more often observed under field conditions. A long-term study in Tribune evaluated wheat water-use efficiency during the 1974-2004 period, and indicated that average water-use efficiency in the region during the mentioned period was 3.8 bu/acre/inch. Likewise, another study looking at 11 site-years in central Oklahoma resulted in water-use efficiency ranging from 2.9 to 4.8 bu/acre/inch, meaning that an average water-use efficiency of about 4 bu/acre/inch may be a fair number to use for wheat in the region.

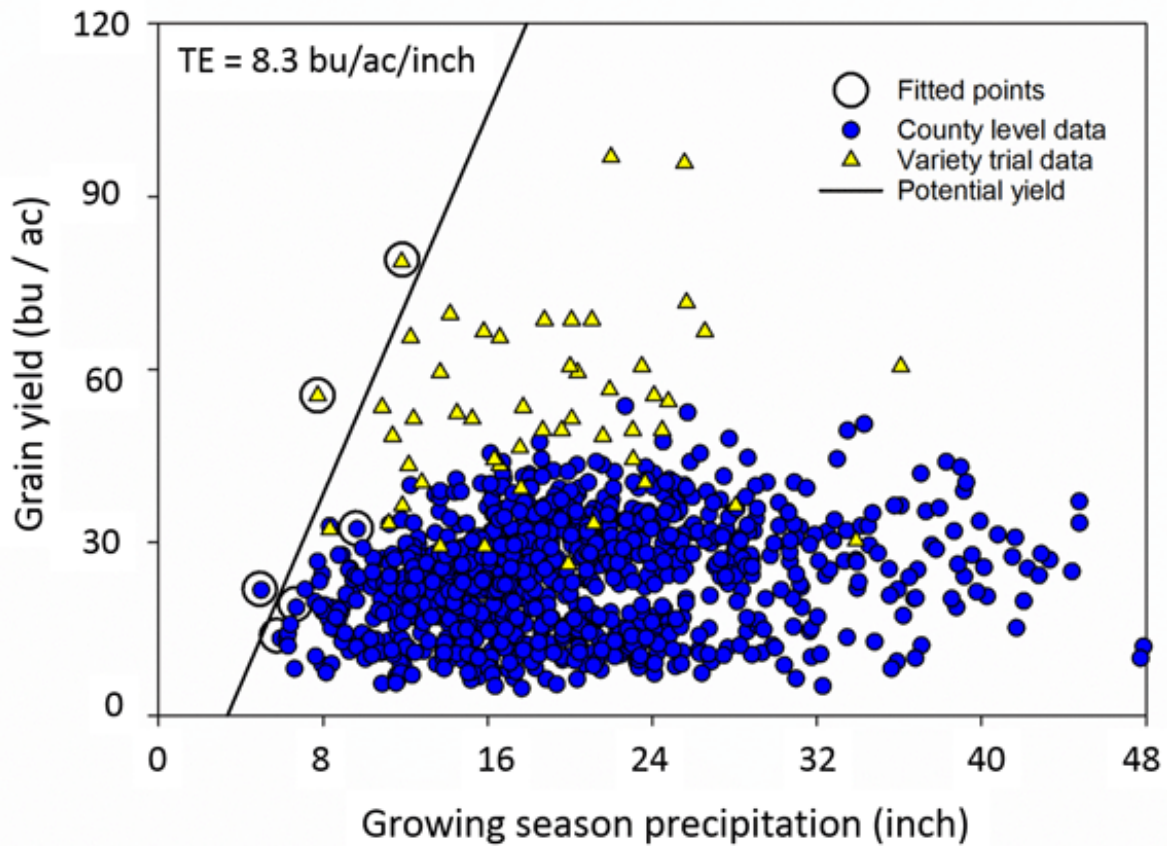


Figure 1. Wheat grain yield versus growing season precipitation. Blue dots represent county-level yield data and yellow triangles represent variety performance test data. Transpiration efficiency (TE) is calculated using a linear regression approach of the most efficient observations. Figure adapted from Patrignani et al. (2014), data represents wheat production in central and eastern Oklahoma.

How much precipitation did Kansas get?

Total precipitation during April 15 – April 21 ranged from 0.8 inches in eastern Kansas to as much as 9.23 inches in west central Kansas (Figure 2). Although the wheat crop was already showing signs of drought stress in some regions of the state, such as yellowing of lower leaves and leaf curling which may have slightly reduced its yield potential, this precipitation was very timely for many regions of

Kansas. Wheat crop development is anywhere from jointing stage in the northwest region to heading and anthesis in the southeast. For wheat in the more advanced stages of development, this precipitation may be directly translated into grain yield, provided other yield-limiting factors are controlled.

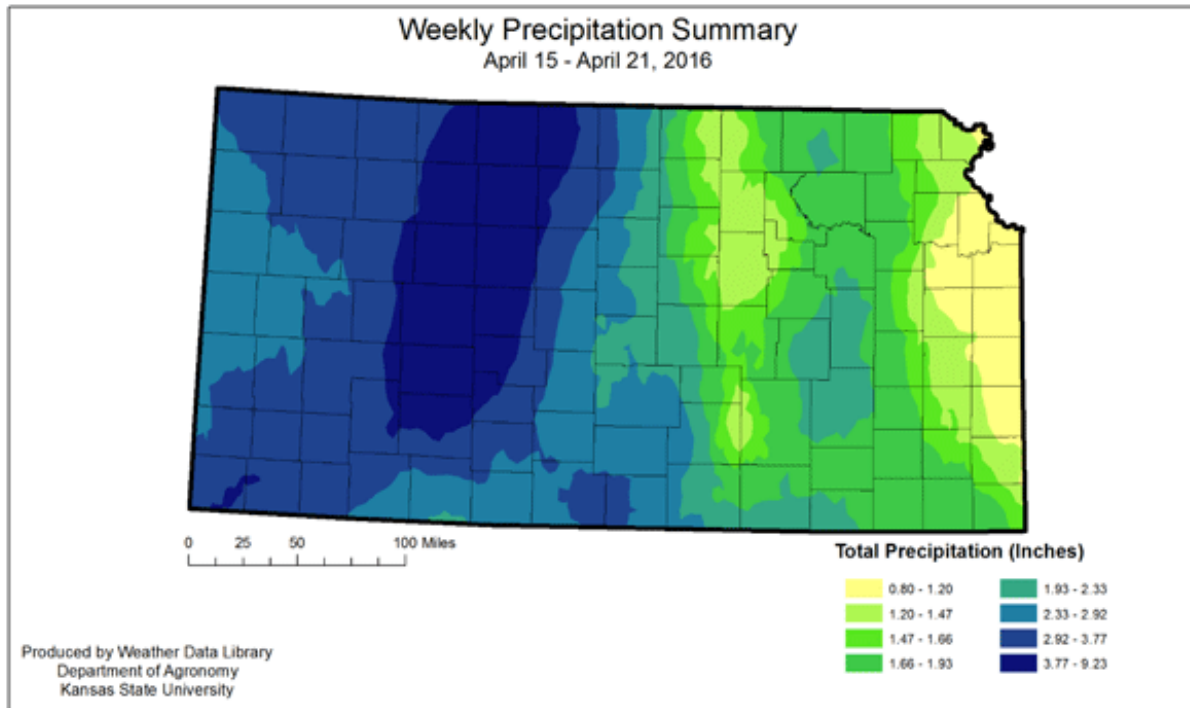


Figure 2. Weekly precipitation total from April 15 – April 21. Source: K-State Weather Data Library.

How much yield potential can be expected from the latest round of precipitation?

Based on the average wheat water-use efficiency of approximately 4 bu/acre/inch, wheat yield potentials in Kansas may have been improved anywhere from about 3 bu/acre in the east to as much as 36 bu/acre in west central Kansas, where the precipitation total approached 9 inches. If some of this precipitation was subjected to runoff, the potential yield increase will be reduced.

The timeliness of this precipitation event, though, may actually result in higher-than-average water-use efficiency by the crop in certain regions of the state. In the south central and southwest regions, where wheat is further along in development, as well as in the central and west central portions of the state, this precipitation matched very critical growth periods of the crop. Thus, the average water-use efficiency of 4 bu/acre/inch may be conservative in these regions, as the wheat water-use efficiency has been shown to be as great as 8.3 bu/acre/inch. Whereas the potential 8.3 bu/acre/inch may not be attained due to disease or weed pressure, the wheat crop could very well respond with a yield potential increase of more than 4 bu/acre per inch of precipitation received due to the timeliness of the rain.

It is very important to keep in mind that the recent precipitation events also increased the risk of

foliar diseases, especially stripe rust. Heavy disease pressure will decrease the attainable yield of the crop, reducing the efficiency with which the crop will use the available water. Producers are encouraged to be proactive in protecting their crops in years such as this, where the disease inoculum is already present and environmental conditions are conducive to the disease. For more information on disease pressure and fungicide options, see eUpdate 564 article: [Special Edition: Stripe Rust Alert](#).

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5. 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 (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 from 21 on-farm strip trials and 5 replicated experiment station studies in Kansas prepared by Kraig Roozeboom 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.

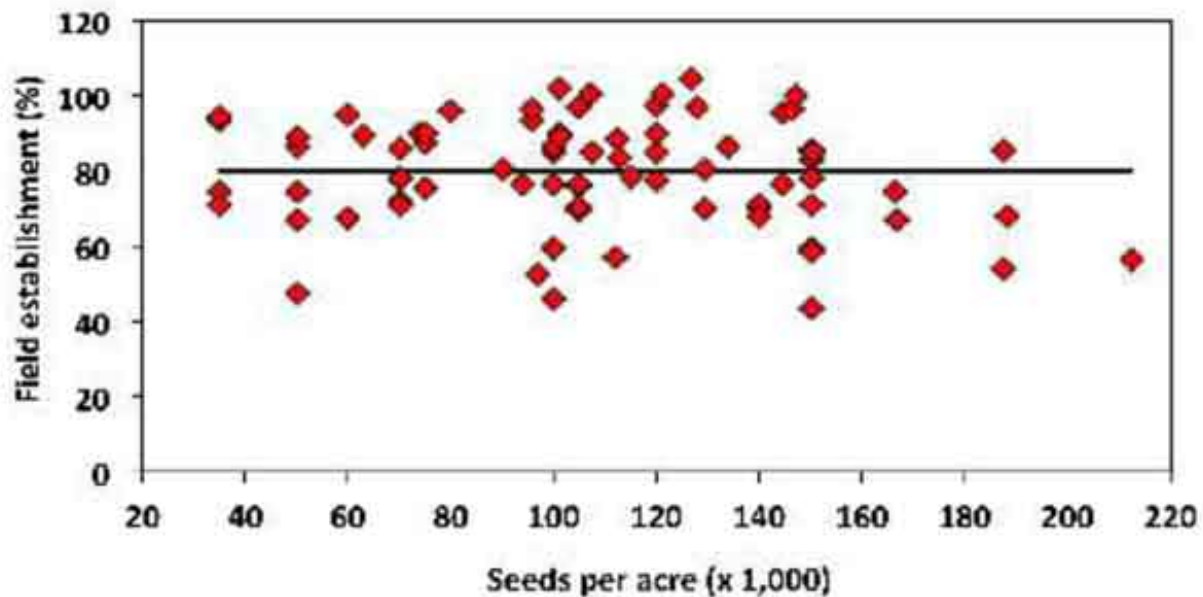


Figure 1. Percentage of field establishment and final seeding rate.

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), then the optimum seeding rate for this environment will range from 85,000 to 90,000 seeds per acre.

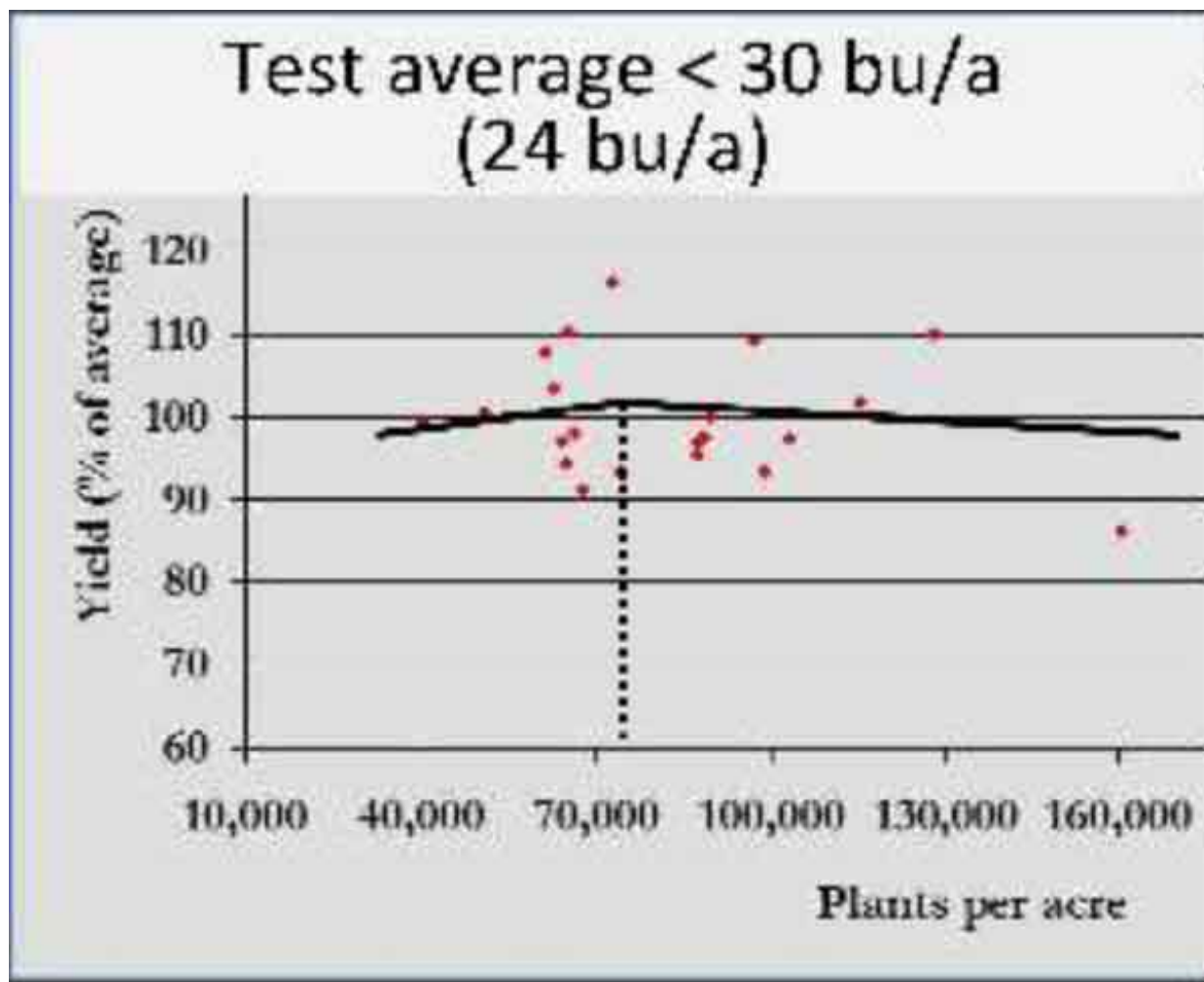


Figure 2. Optimum plant population, final plants per acre, for “low” yielding environments across Kansas, less than 30 bushels per acre.

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).

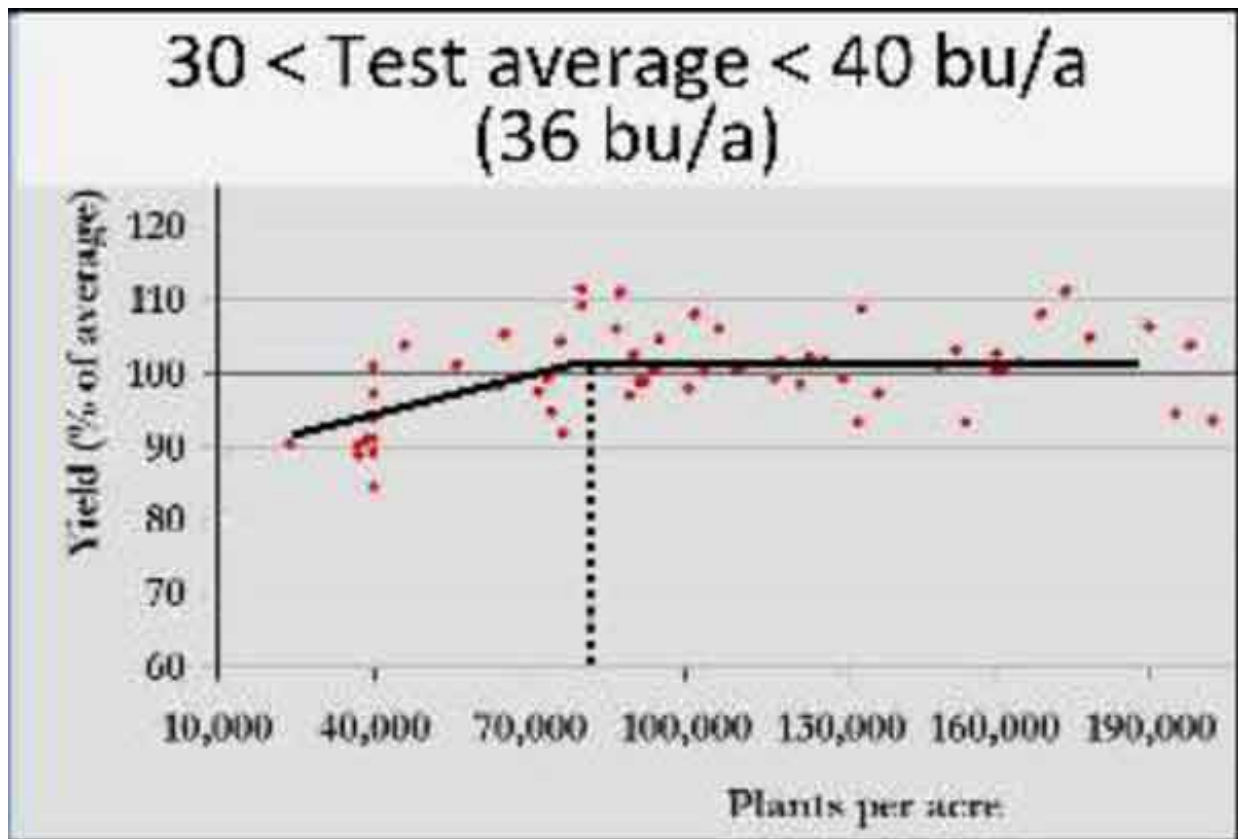


Figure 3. Optimum plant population, final plants per acre, for “medium-low” yielding environments across Kansas, ranging from 30 to 40 bushels per acre.

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. 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.

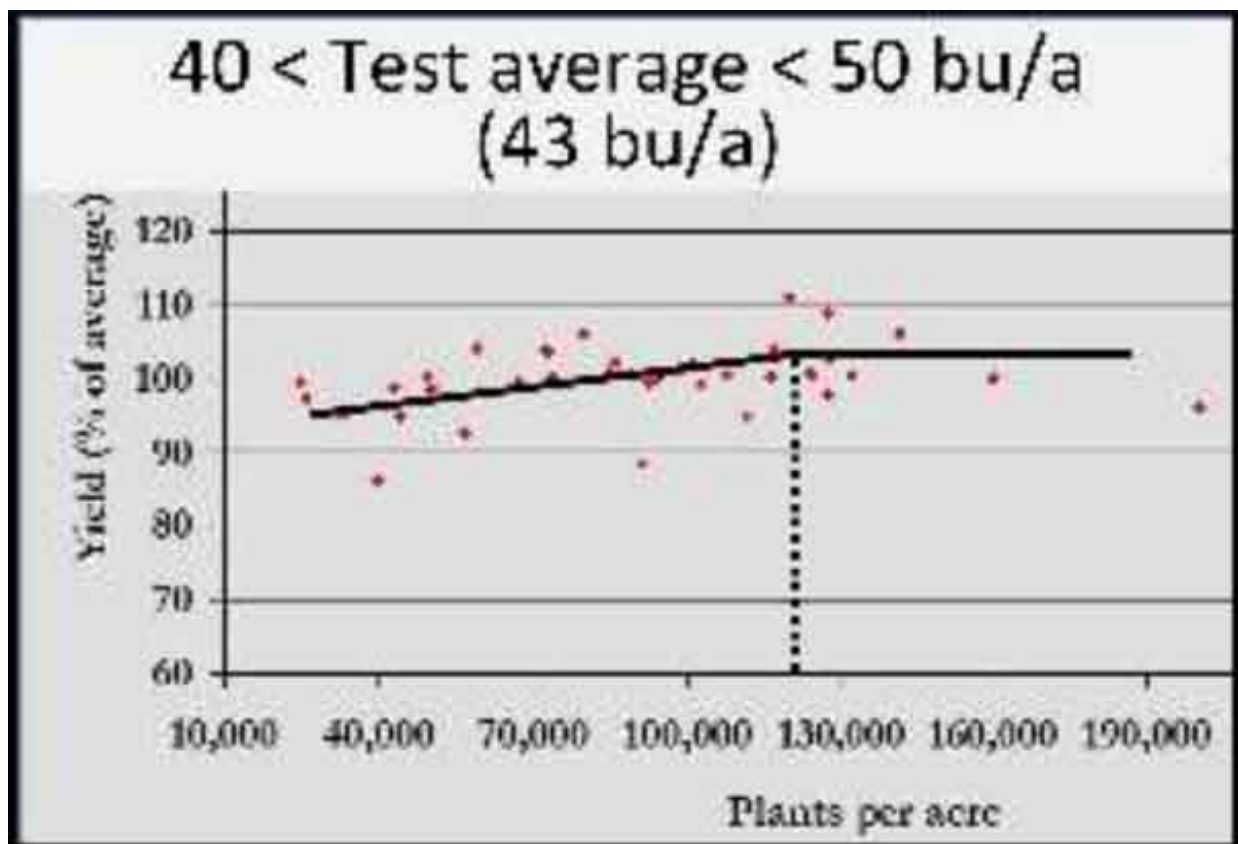


Figure 4. Optimum plant population, final plants per acre, for “medium-high” yielding environments across Kansas, ranging from 40 to 50 bushels per acre.

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.

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 treatments, fungicides, growth promoters, etc.) or not.

Always take into consideration the yield potential for that environment when deciding the final soybean seeding rate. 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 allows confirming 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 2015*, MF-3154, available online at: <http://www.ksre.ksu.edu/bookstore/pubs/MF3154.pdf>

On-farm soybean seeding rate studies

During the 2014 growing season, several on-farm research studies were established in collaboration with Kim Larson, Kansas River Valley Extension District Agent, and soybean producers in that district. The experimental layout, field variability, and strip-trial position in the field for those studies are presented below.

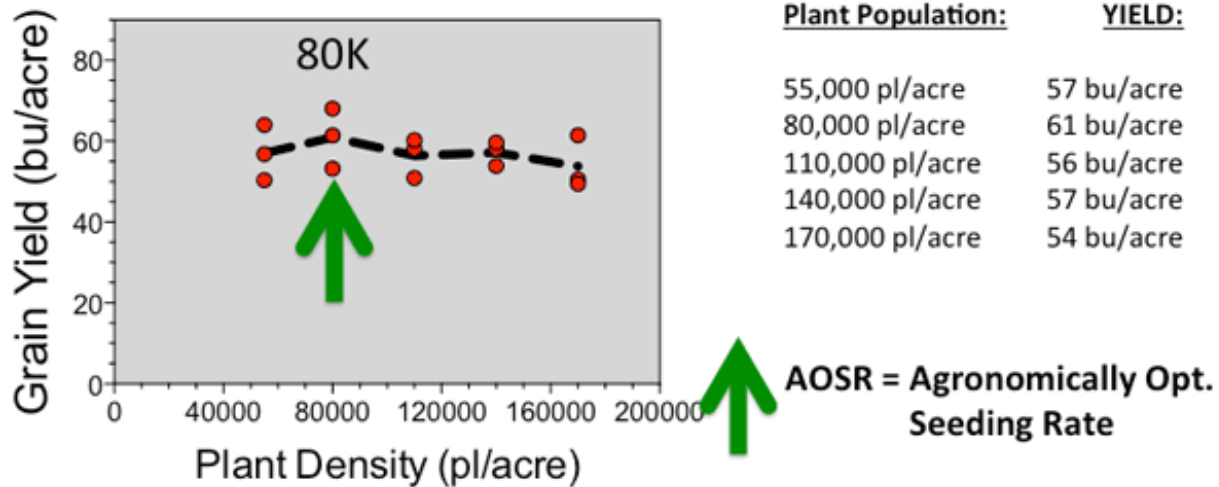
Experimental layout

An example of the experimental design proposed for the 2014 soybean seeding rate trials is presented below. In this example, five seeding rate levels were investigated with three replications (completely randomized) in all 15 soybean strips.



Yield outcomes from a seeding rate study

On-Farm Research Collaborations: North-Central Kansas Studies



On-Farm Research Network



In this example, five seeding rates were evaluated in a north central Kansas location. Agronomically, the optimum seeding rate and final plant population for this study was 80,000 plants per acre final stand count, which was equivalent to a seeding rate of 90,000 seeds per acre. Maximum soybean yield was about 60 bushels per acre, but there was quite a bit of variability around that 60-bushel average. The most consistent yield results were at the seeding rate of 120,000 per acre. In this specific site, increasing seeding rate over 90,000 seeds per acre did not promote an improvement in yields. Soybean productivity plateaued for the seeding rates 120, 150, and 180 thousand seeds per acre.

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

This is just one study and one site. Thus, one should be careful in interpreting the results. The goal of this information is to motivate soybean 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 soybean yields to seeding rates and how management practices interact with the environment.

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

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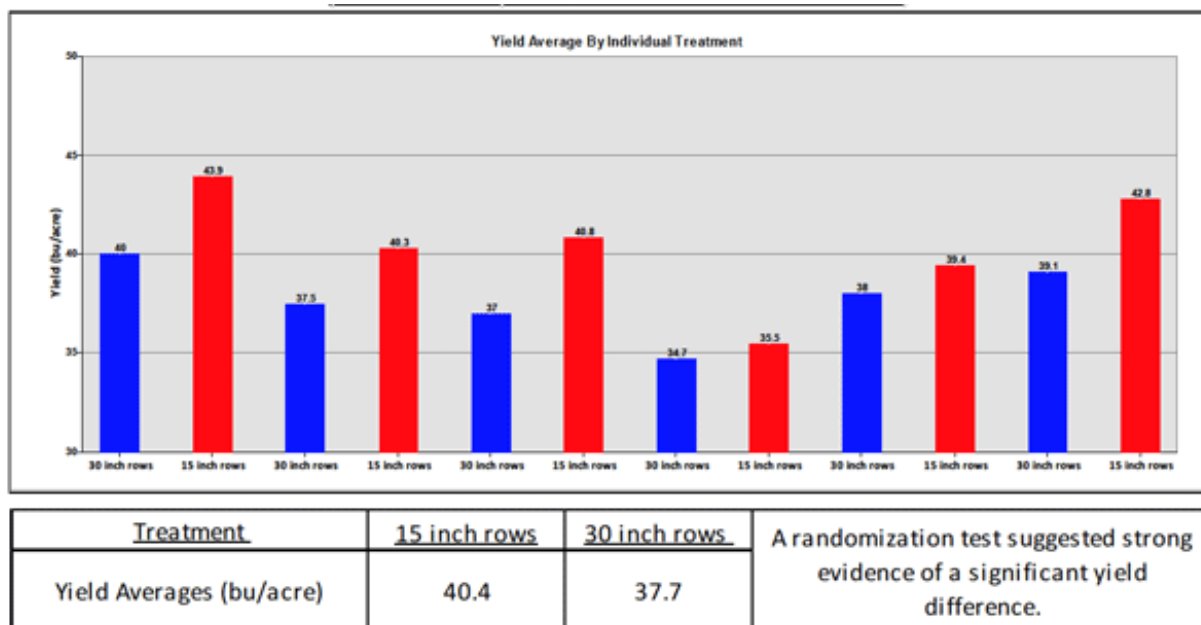
6. Update on row width effects on soybean, K-State-USB-Kansas Soybean Project

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 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.

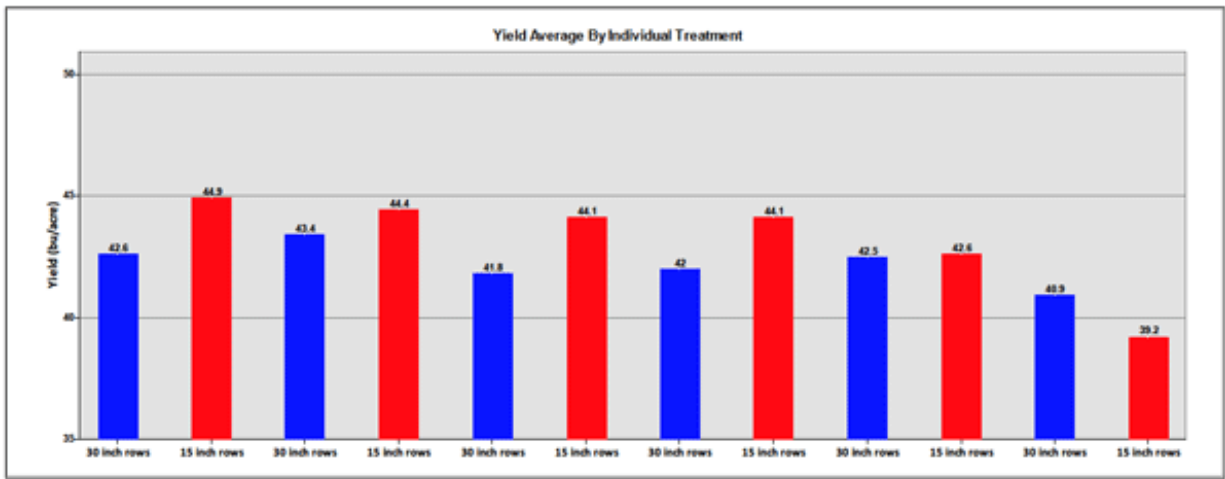
For the 2015 season, on-farm studies conducted in collaboration with the United Soybean Board and Kansas Soybean Commission showed a slight yield improvement with narrow rows (Fig. 1) in varying yield environments. Yields in narrow rows (15-inch) were higher at the Riley Co. (+2.7 bu/acre) and Franklin Co. sites (+1 bu/acre). Yields in narrow rows were slightly less at the Jefferson Co. site (-0.6 bu/acre).

At the Riley Co. site the overall stand counts were about 6,000 plants/acre lower in 15-inch rows than 30-inch (final plant population of 122,000 vs. 128,000 plants per acre for 15-inch vs. 30-inch, respectively). The opposite trend was found at the Jefferson Co. site, where the stand count in 30-inch rows was 104,000 vs. 86,000 plants per acre in 15-inch rows. For the third site, Jefferson Co., the stand counts for 15-inch was lower by approximately 10,000 plants per acre as relative to the 30-inch row width (final plant population of 119,000 vs. 128,000 plants per acre for 15-inch vs. 30-inch, respectively).

Riley County

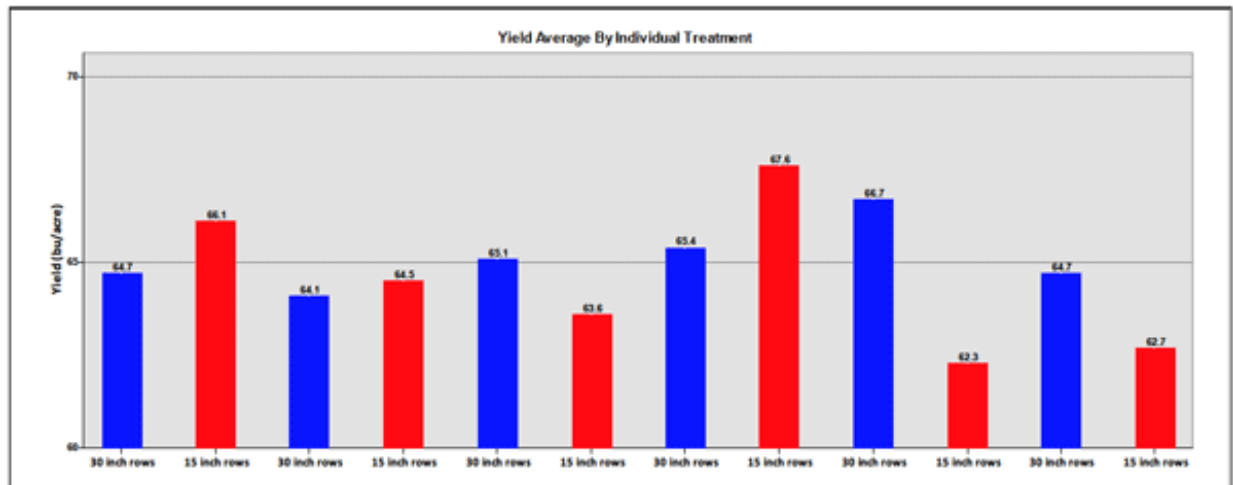


Franklin County



<u>Treatment</u>	<u>15 inch rows</u>	<u>30 inch rows</u>	A randomization test suggested some evidence of a significant yield difference.
Yield Averages (bu/acre)	43.2	42.2	

Jefferson County



<u>Treatment</u>	<u>15 inch rows</u>	<u>30 inch rows</u>	A randomization test suggested no evidence of a significant yield difference.
Yield Averages (bu/acre)	64.5	65.1	

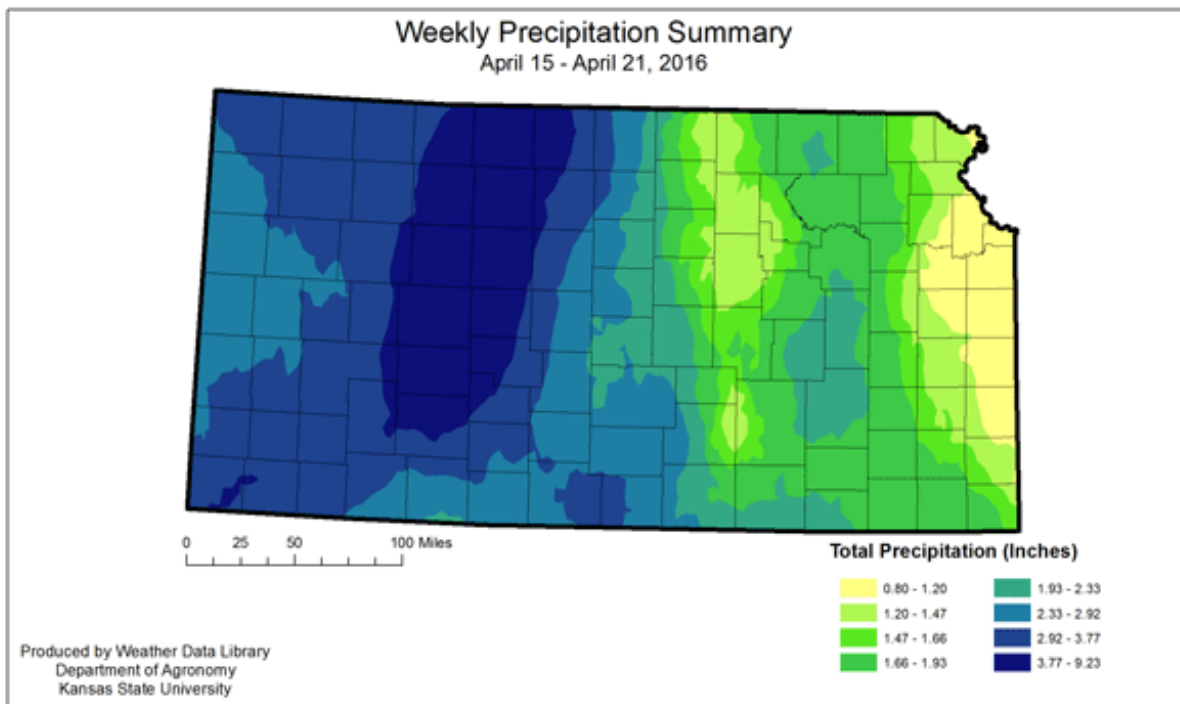
Figure 1. Yield average by individual replication for row spacing trial (15-inch vs. 30-inch) for three locations across the state of Kansas (Riley Co., Franklin Co., and Jefferson Co.) during the 2015 growing season.

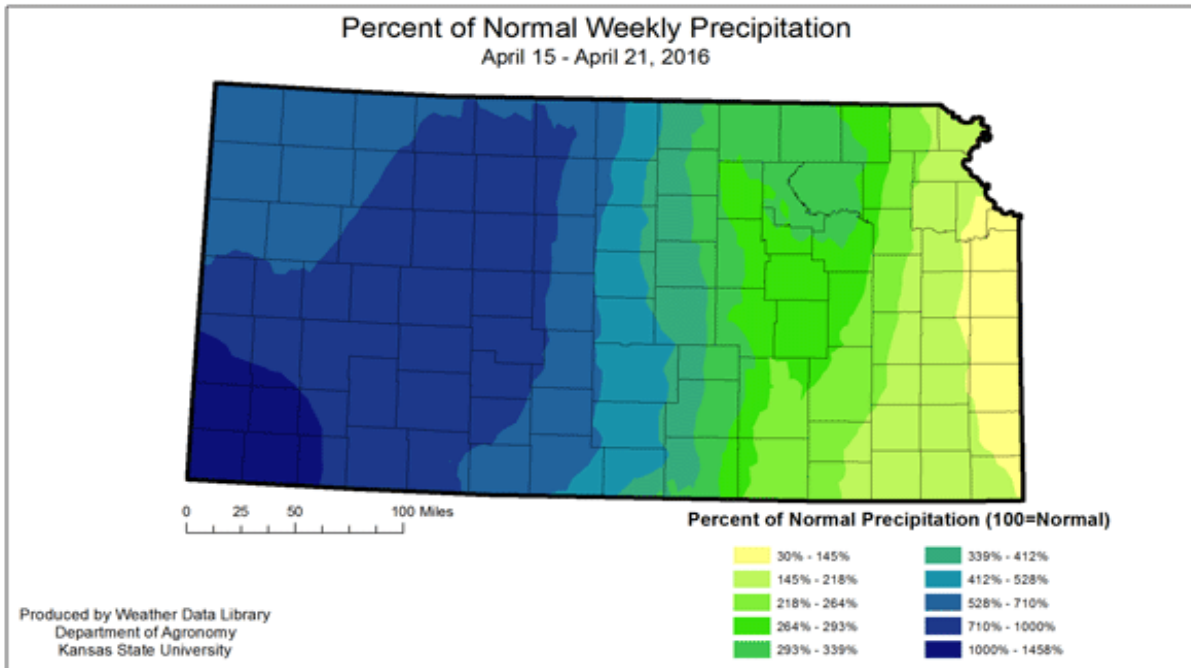
Overall, narrow rows provided a yield response ranging from -0.6 to +2.7 bu/acre. An additional benefit for narrow rows was enhanced early light interception and better weed control.

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7. Planting conditions as of late April

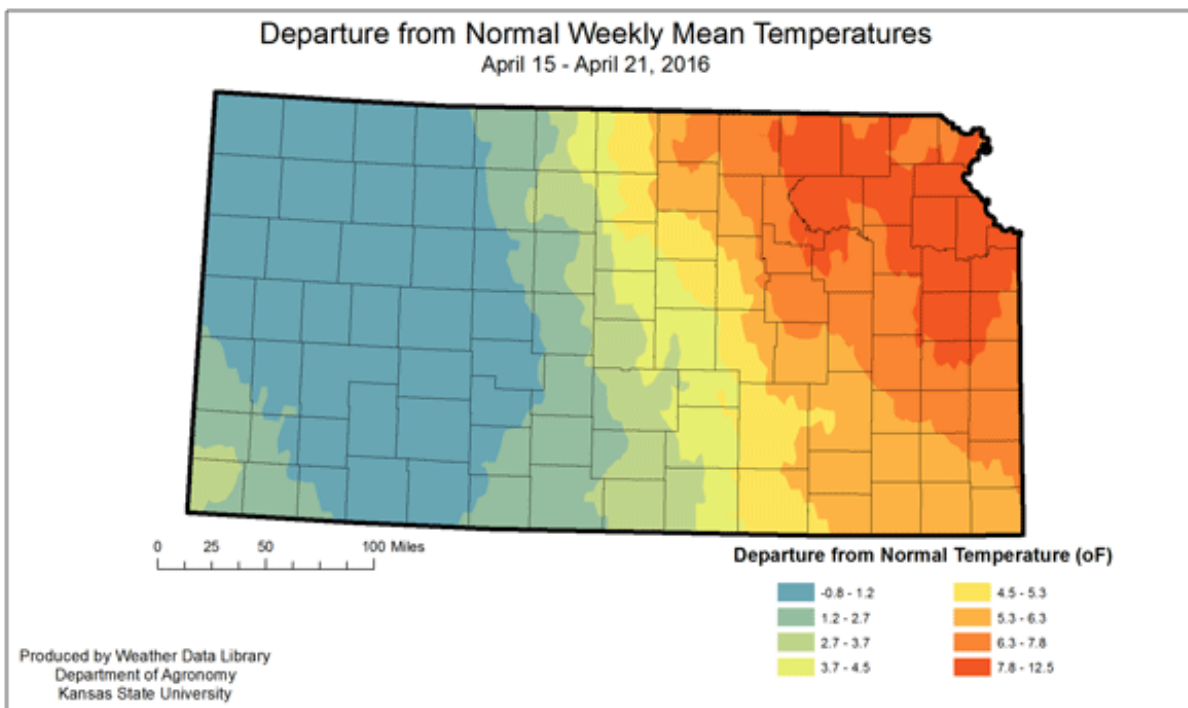
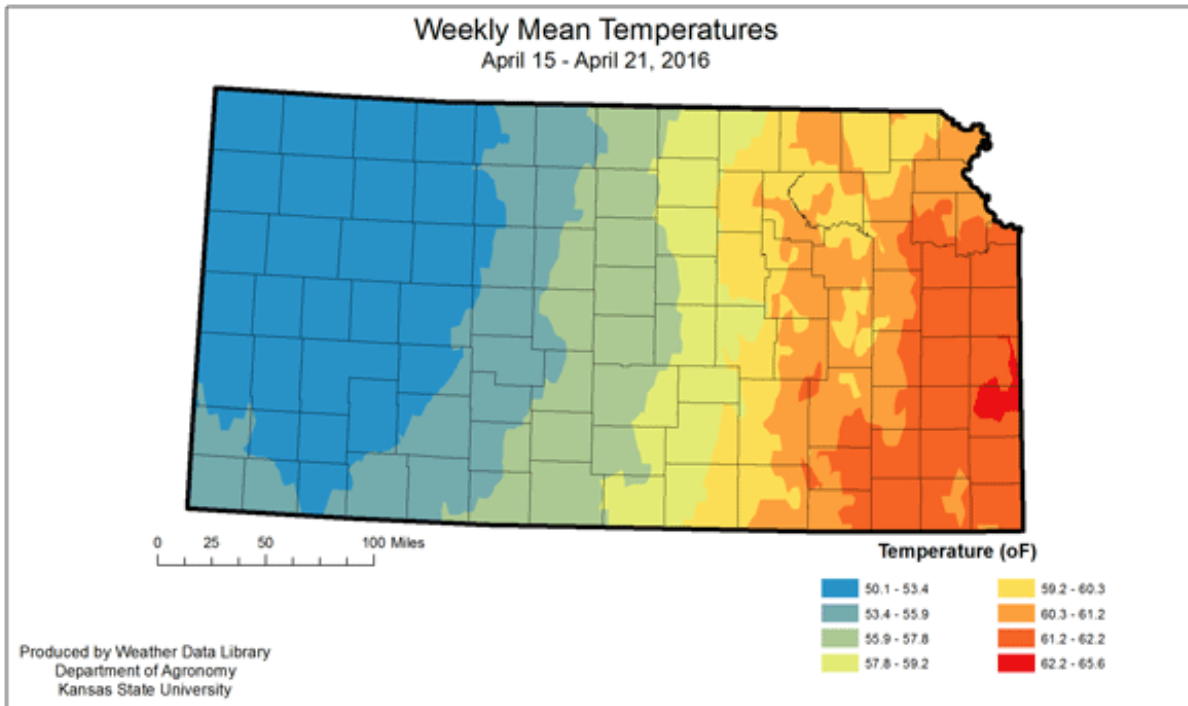
Significant rains fell across the state during the week of April 15-21, with the heaviest amounts in the west. All divisions averaged above normal precipitation for the week, with the western divisions ranging from almost 5 times normal in the northwest to more than 8 times normal in the southwest. Percentages of normal tapered off in the east as the system was slow to move eastward. Eastern divisions ranged from just less than 2 times normal in the east central to almost 3 times normal in the northeast. In the areas with the heaviest rainfall, not only did precipitation range above average for the week, the totals erased both the monthly and the year-to-date deficits.

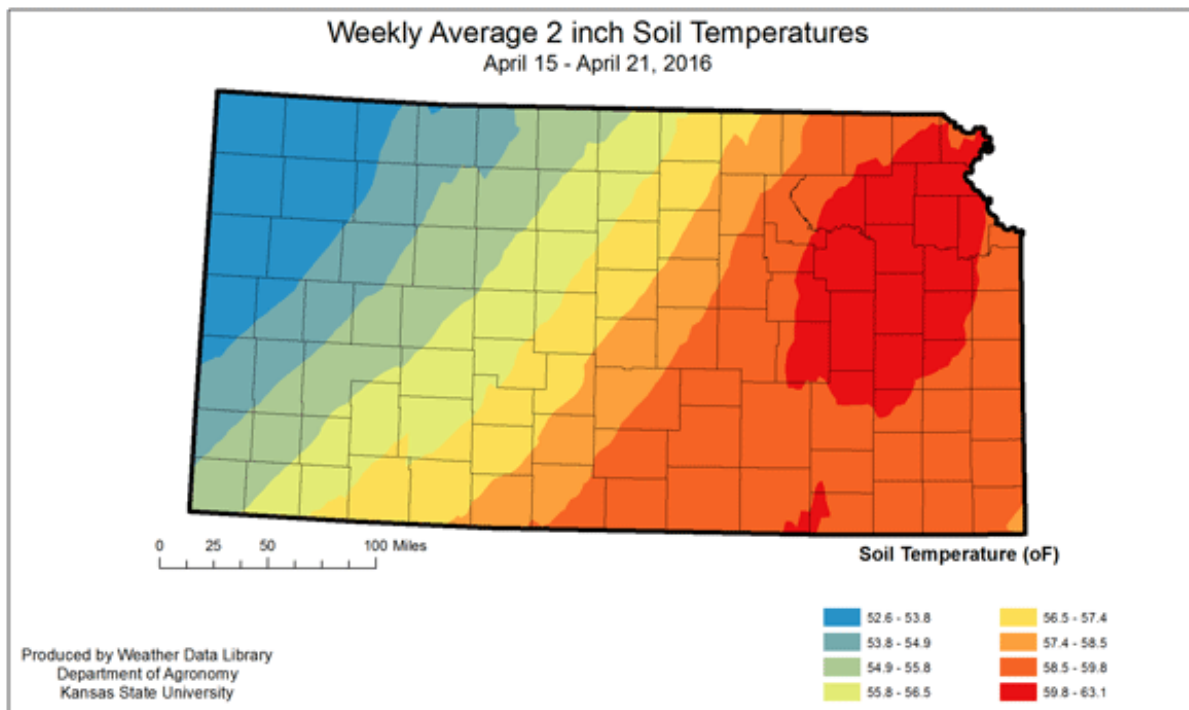




The temperatures were likewise a mixed pattern. Areas with the heaviest rains were cooler than normal, while areas where the rains were delayed and light were warmer than normal. Departures ranged from 8.9 degrees F warmer than normal in the east to -6.8 degrees F cooler than normal in the west. Statewide average departure was 1.2 degrees F warmer than normal. The warmest

temperature reported for the week was 84 degrees F at Richfield 1NE, in southwest Kansas, on the 15th. The coldest temperature reported for the week was 31 degrees F at Brewster 1W, Thomas County, on the 19th.

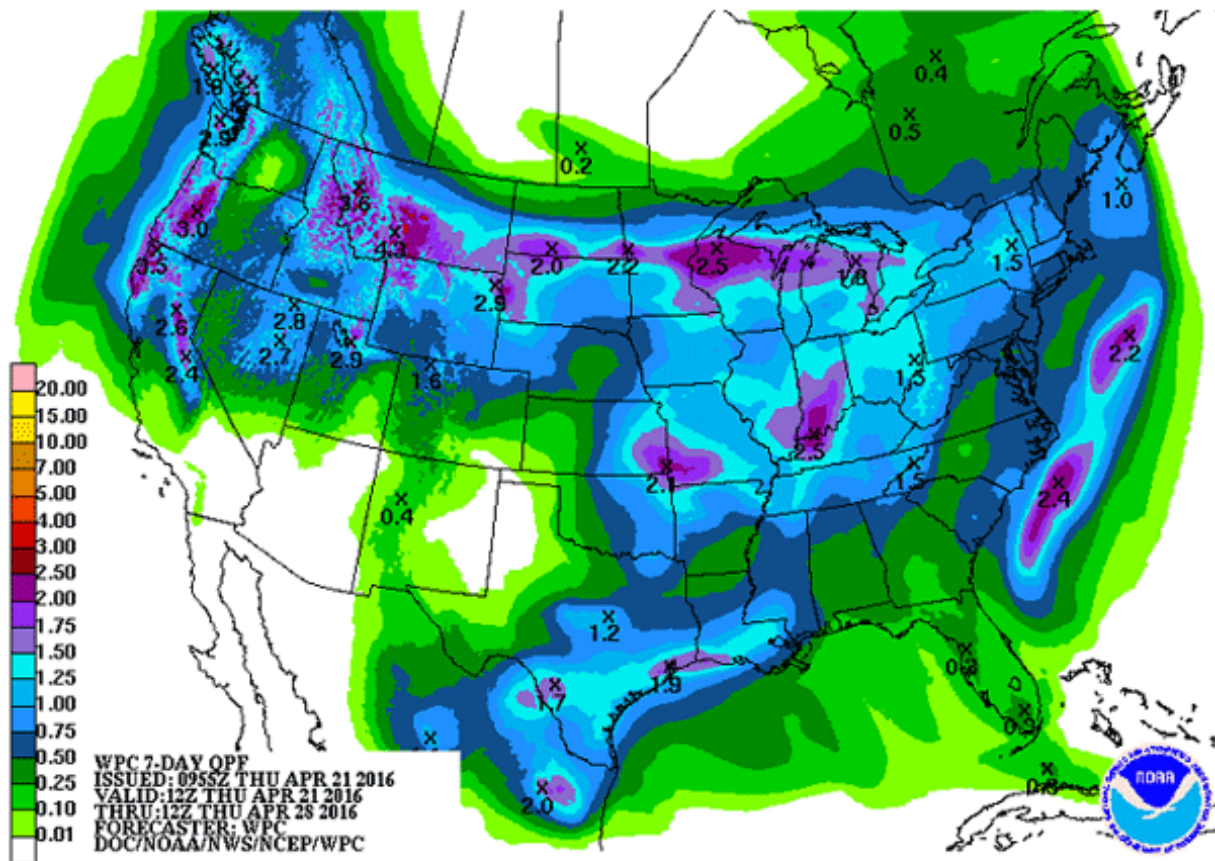




The 8- to 14-day outlook suggests a switch to increased chances of cooler-than-average temperatures for the period. This doesn't address whether the wide swings will continue or how extreme the temperatures might be. The precipitation outlook is slightly tilted toward wetter-than-normal conditions across the state for the 8- to 14-day period. The latest 7-day precipitation forecast shows moderate precipitation for much of the state, with parts of eastern Kansas getting more than 2 inches of rain for the period. The May outlook favors increased chances of wetter-than-normal conditions statewide. The temperature outlook is neutral, with equal chances of above- or below-normal temperatures.

Challenges for crop planting conditions and field operations

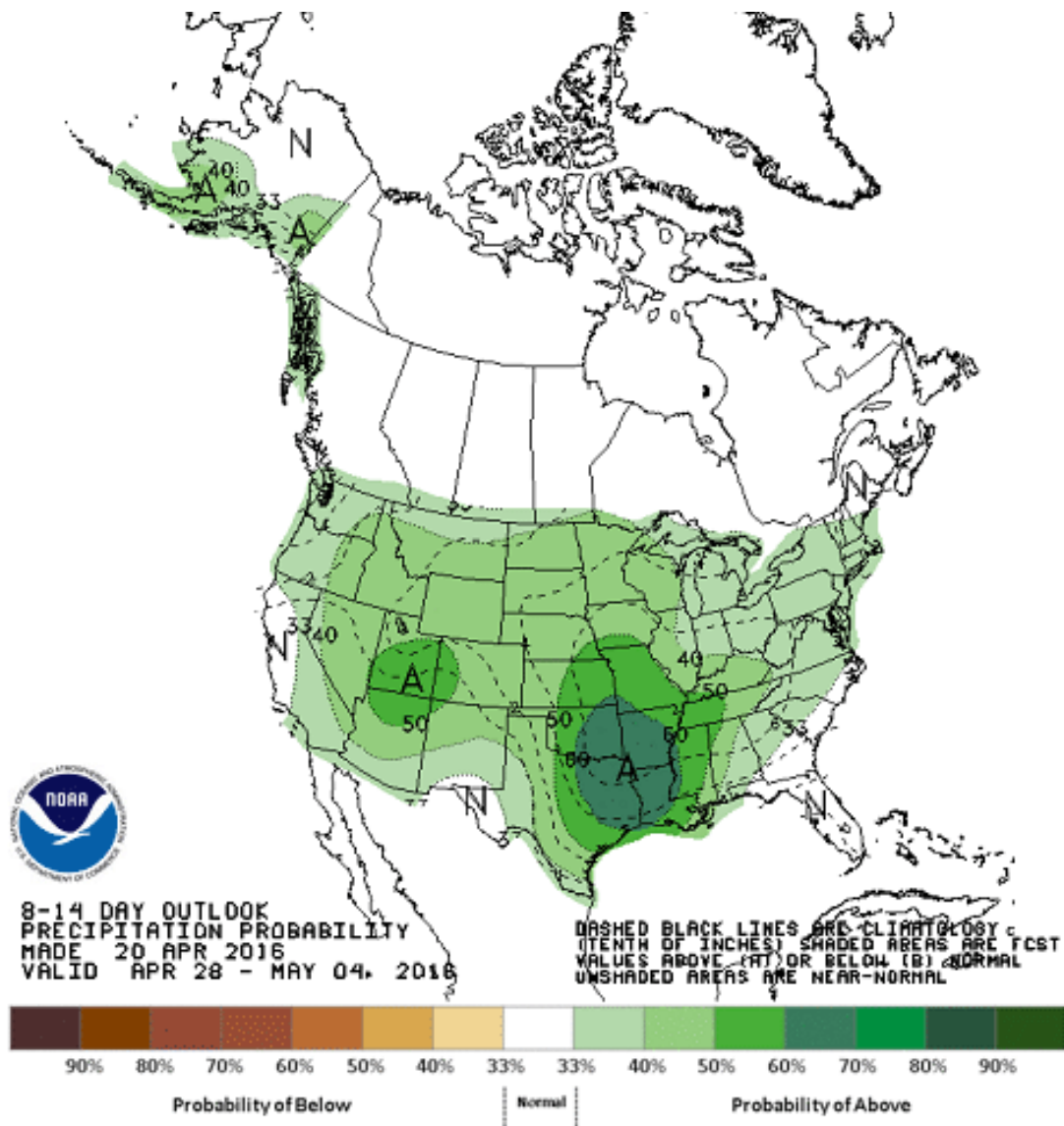
The weekly precipitation forecast for the Kansas is showing the probability of precipitation ranging from 0.1-inch in western Kansas to 2.0-inches in eastern Kansas. Additionally, the 8- to 14-day precipitation outlook is also showing a probability of better than 50% chance of above-average precipitation. The combination of the short-term forecasted precipitation and the 8- to 14-day outlook is a potential challenge for producers in planting corn and performing other field operations.



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Planting corn under wet conditions can present several challenges. At this point, more than 50% of the corn acreage is still to be planted in the coming weeks. If possible, it is best to allow time for the soil to dry adequately before planting operations. Realistically for many farmers the potential number of days to get corn planted shrinks as we approach May. One of the main problems from planting into wet soils is the potential for soil compaction. Compaction problems can restrict adequate root growth, diminishing the ability of the plant to take up nutrients and water and affecting proper anchorage.

Under wet and cold conditions, corn emergence will be delayed, presenting several challenges on insect and disease pressure. The potential for uneven corn stands likely will be greater. This situation will directly affect plant-to-plant uniformity, which could have an impact on the potential yield.



Figure 1. Uneven corn stand due to cold, wet weather in late April. Photo by Ignacio Ciampitti, K-State Research and Extension.

Further details related to considerations for corn planted under wet conditions will be presented in

future issues of the eUpdate.

Make sure to check our electronic resources:

Department of Agronomy: <http://www.agronomy.ksu.edu>

Extension Agronomy: <http://www.agronomy.k-state.edu/extension/>

Mesonet and other weather information: <http://www.mesonet.ksu.edu>

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8. Should you spray wheat for aphids?

Wheat aphids, primarily bird cherry-oat and greenbugs, continue to migrate into Kansas on southern winds. The most common question is whether to add insecticide to a fungicide application to kill the aphids.

We do not recommend pesticide applications unless justified, and the mere presence of aphids in wheat does not justify an insecticide application. Aphids need to be at densities of 20 or more aphids per tiller when wheat is in the boot to heading stages before aphids begin to impact wheat simply due to their feeding. Even then, their feeding is more impactful on plants that are already stressed by less-than-ideal growing conditions and when there are few beneficials present, i.e. lady beetles, lacewings, parasitic wasps, etc. Recent rains seem to have helped alleviate the previously dry conditions, so growing conditions are not stressing the wheat for the time being.

When an insecticide is added to a justified fungicide application, the insecticide will kill the aphids, as well as all the beneficials. The aphids will continue to migrate into the state but the beneficials will be gone and much slower to re-populate. Foliar insecticide applications made to control aphids with the aim of reducing the transmission of barley yellow dwarf viruses have not been proven and thus is not recommended.

At the present time there seem to be good populations of lady beetles and parasitic wasps in wheat fields to help mitigate aphid populations.

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Cover crops are a complex topic in many ways. There are lots of choices, each with different strengths and weaknesses, and each suited best for different goals and field conditions. That's where an interactive web site can be a big help.

There are dozens of cover crop options, and you'll need to decide which one – or which combination of species – you'd like to use on each field you have in mind.

To make that decision, you need to take into account what you'd like to accomplish with the cover crops, what cash crops the cover crops will be sandwiched between, the hardiness of the various cover crop options for your area, the soil conditions of the field, and much more.

It's not an easy decision. Your seed supplier can be a big help, but you might like to examine all the options yourself before placing your seed order.

One of the most useful online tools for evaluating cover crop options for specific situations and locations is the Midwest Cover Crops Council Decision Tool. Kansas has now been added to this online resource, she said.

At least a dozen K-State specialists, as well as representatives from the USDA-NRCS and the seed industry, have been working for more than a year now to provide the information needed to have Kansas become part of this fantastic online tool.

The address of the decision tool is: <http://www.mccc.msu.edu/selectorINTRO.html>

When you open that page, click on the link that reads "Go to the Cover Crop Decision Tool-Field Crops." That will take you to the page where you start to enter your field-specific information.

You'll find this tool will give you much more than just a list of cover crop species that we know will work in Kansas. It's an interactive tool. Producers enter some information specific to their own operation, and the web site then selects some of the best cover crop options for that localized situation.

The first step after logging onto the web site is to select your state and county. Then select the cash crop you'll have on a given field, and pick a planting and harvest date. You then choose a soil drainage type, and whether the field has tile drainage (if it is poorly drained at all) or is subject to flooding. The next step is to choose the top three goals for your cover crop.

Example: Select Butler County, Kansas. Then choose soybeans as the cash crop, with May 16 as the planting date and October 15 as the harvest date. Let's say the field is somewhat poorly drained, does not have tile drainage, and is not subject to flooding. If the goals are "soil builder," "lasting residue," and "good grazing," in that order, then you'll find a list of 14 possible cover crop options.

The web site will shade out the period of time during the year when the cash crop will be growing, and will show you when each of the cover crops it selects for you can or should be planted. In this example, winter barley is one of the possible cover crops selected, and it could be planted from October 15 to November 15. The web site rates it (on a numerical scale of 0-4, with 4 being excellent) as excellent as a soil builder, very good for lasting residue, and excellent as a grazing option. Finally, you can click on each of the cover crops selected to get more information about it, including seeding rates and depths and much, much more.

Funding for the development of the Kansas portion of this web site came from the Kansas Sustainable Agriculture and Alternative Crops and the Division of Conservation from the Kansas Department of Agriculture. DeAnn Presley is on the Midwest Cover Crops Council board of directors.

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Peter Tomlinson, Environmental Quality Specialist

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10. April 26 webinar to focus on cover crops in a livestock grazing system

Growing cover crops offer potential benefits, including improved soil health, but these crops can be expensive to establish and manage. Establishment and management costs can be recovered by integrating crop and animal production and grazing cover crops as forage.

[Great Plains Grazing](#) team member and K-State Southeast Area Extension Beef Systems Specialist Jaymelynn Farney will present “Integration of Livestock and Cropping Systems,” a free webinar at 1:30 p.m. (CDT) on Tuesday, April 26. The webinar is open to anyone interested in gaining a better understanding of how cover crops can fit into a livestock grazing system.

Webinar participants can expect to learn:

- benefits of integrating crop and animal production;
- cover crop types and their forage production potential; and
- best utilization of these crops for cow herd or stocker grazing.

The April 26 webinar is part of a monthly series hosted by Great Plains Grazing, a U.S. Department of Agriculture-Agriculture and Food Research Initiative-Coordinated Agricultural Project (USDA-AFRI-CAP) grant. Online registration is available at [Great Plains Grazing webinars](#).

The webinar series aims to provide research-based information, and is targeted for producers and extension agents. Previous webinars are archived and more information is available at [Great Plains Grazing](#).

Lana Barkman, Great Plains Grazing Project Manager
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11. Two canola field tours scheduled April 28 for south central Kansas

Two canola field tours will be held in south central Kansas on Thursday, April 28. The tours will present a good opportunity for producers to get the latest production information and check out how different cultivars are doing so far this spring.

After a couple of hard winters, this year's canola crop has come through the winter strong and has handled the dry spring weather well. We want to give producers an opportunity to see the latest winter canola varieties available to them. We'll talk about the variety differences.

Also, K-State Research and Extension has partnered with AGCO to evaluate a novel residue management system for canola planting and common producer planting practices, and we would like to share what we've learned from this on-farm research project.

The first tour will start at 10 a.m., just east of Conway Springs. To get to the location, drive east 2 miles on Parallel Street from the Kansas Route 49/Parallel Street junction and the plots will be on the south side of the road. At this site, producers will see a 30-entry winter canola variety trial that includes materials from nine different seed companies. Growers will also observe canola planted with the AGCO residue management system and common producer planting practices.

Lunch will be sponsored by Triple Threat Ag Services. Please RSVP to the Sumner County Extension Office before April 26 by calling 620-326-7477. There is no charge to attend, but an accurate count is needed for lunch.

The second tour will be held later on April 28 at 3 p.m. near Kiowa. To get to the location, drive 3 miles south of the state line on HW-8 and turn west on E0040 Rd for one-half mile. Producers will see a second site of the AGCO residue management system and producer planting practices. From here, the group will move to the National Winter Canola Variety Trial, which includes 24 open pollinated varieties and 24 hybrids in side-by-side trials.

Mike Stamm, Canola Breeder
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12. Comparative Vegetation Condition Report: April 12 - 18

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.

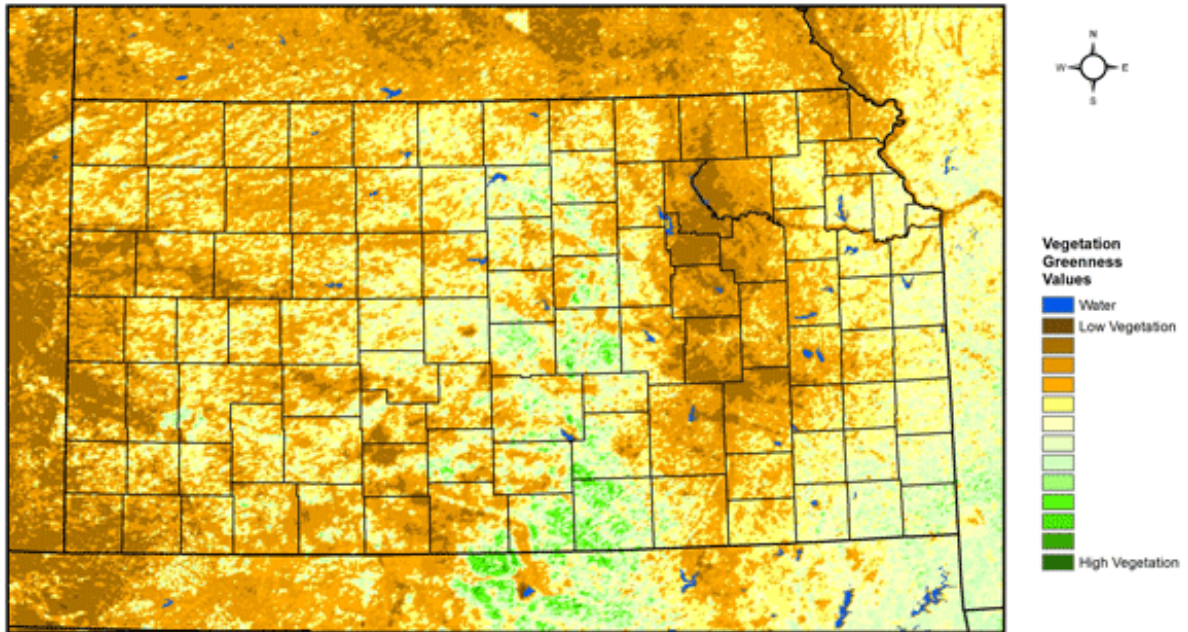
The maps have recently been revised, using newer technology and enhanced sources of data. Dr. Nan An, Imaging Scientist, collaborated with Dr. Antonio Ray Asebedo, assistant professor and lab director of the Precision Agriculture Lab in the Department of Agronomy at Kansas State University, on the new 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:

Kansas Vegetation Condition

Period 16: 04/12/2016 - 04/18/2016



0 25 50 100 150 200 Miles
Nan An, Imaging Scientist, an_198317@hotmail.com
Antonio Ray Asebedo, Assistant Professor, ara4747@ksu.edu



Figure 1. The Vegetation Condition Report for Kansas for April 12 – 18, 2016 from K-State’s Precision Agriculture Laboratory continues to show continued expansion of the area of highest plant production. The highest NDVI values are still in Sumner and Harper counties. The Flint Hills continue to show relatively low photosynthetic activity. Recent rainfall is likely to accelerate the green up in this region.

Kansas Vegetation Condition Comparison Mid-April 2016 compared to the Mid-April 2015

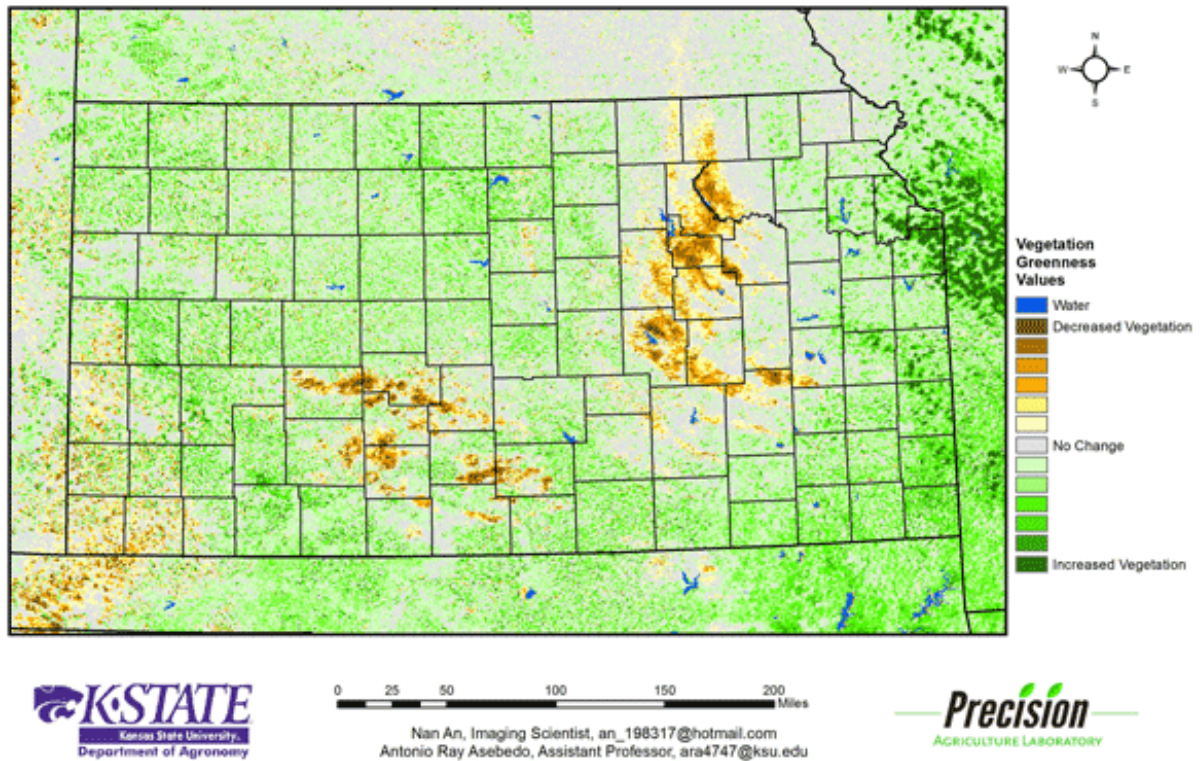


Figure 2. Compared to the previous year at this time for Kansas, the current Vegetation Condition Report for April 12 - 18, 2016 from K-State's Precision Agriculture Laboratory shows a smaller portion of the state with lower productivity. Dry conditions in March and early April have contributed to this slowed production. In contrast, above-normal moisture in February in the Northwest and North Central Divisions has buffered vegetation in these areas.

Kansas Vegetation Condition Comparison Mid-April 2016 compared to the 27-Year Average for Mid-April

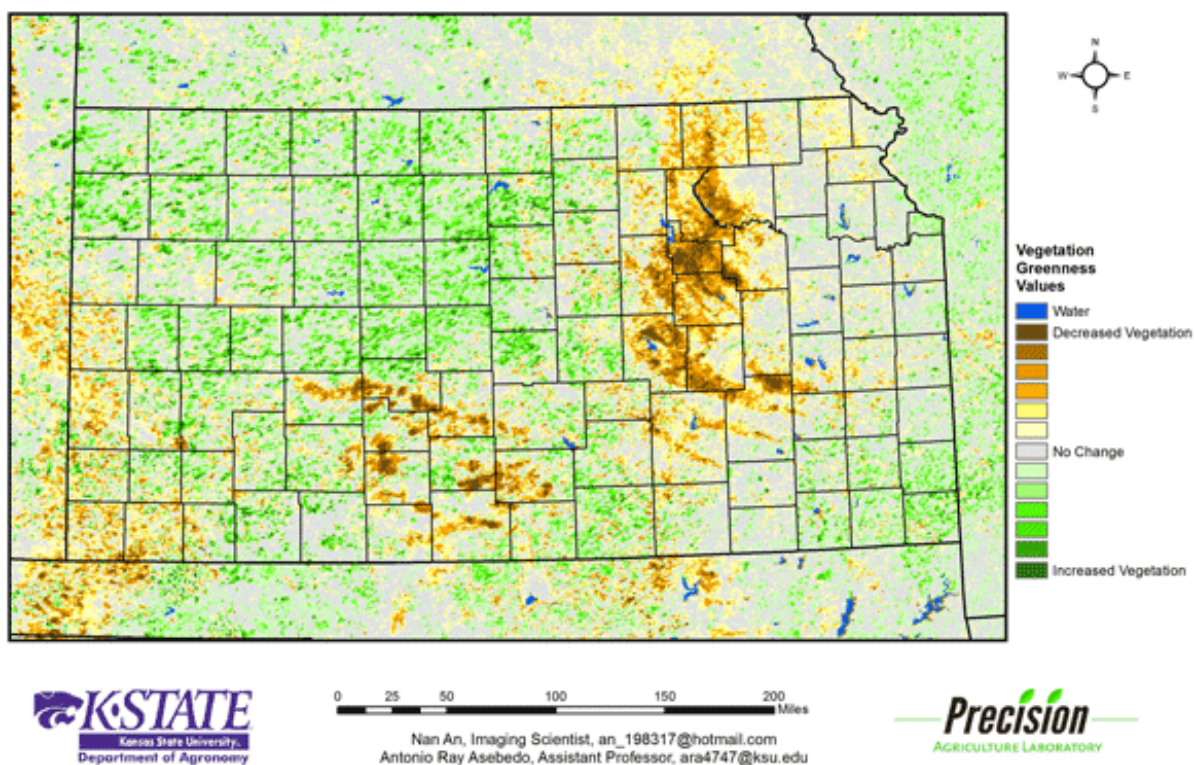


Figure 3. Compared to the 27-year average at this time for Kansas, this year's Vegetation Condition Report for April 12 – 18 from K-State's Precision Agriculture Laboratory shows that the area of above-average photosynthetic activity continues to decline. The largest areas with the greatest increase are in central Kansas. Even with the recent cool weather, temperatures continue above normal across the state. An exception to the generally above-average photosynthetic activity can be seen in western Barber County. Lack of precipitation has slowed the plant recovery from the fire in that area. The Flint Hills are also showing lower plant productivity.

Continental U.S. Vegetation Condition

Period 16: 04/12/2016 - 04/18/2016

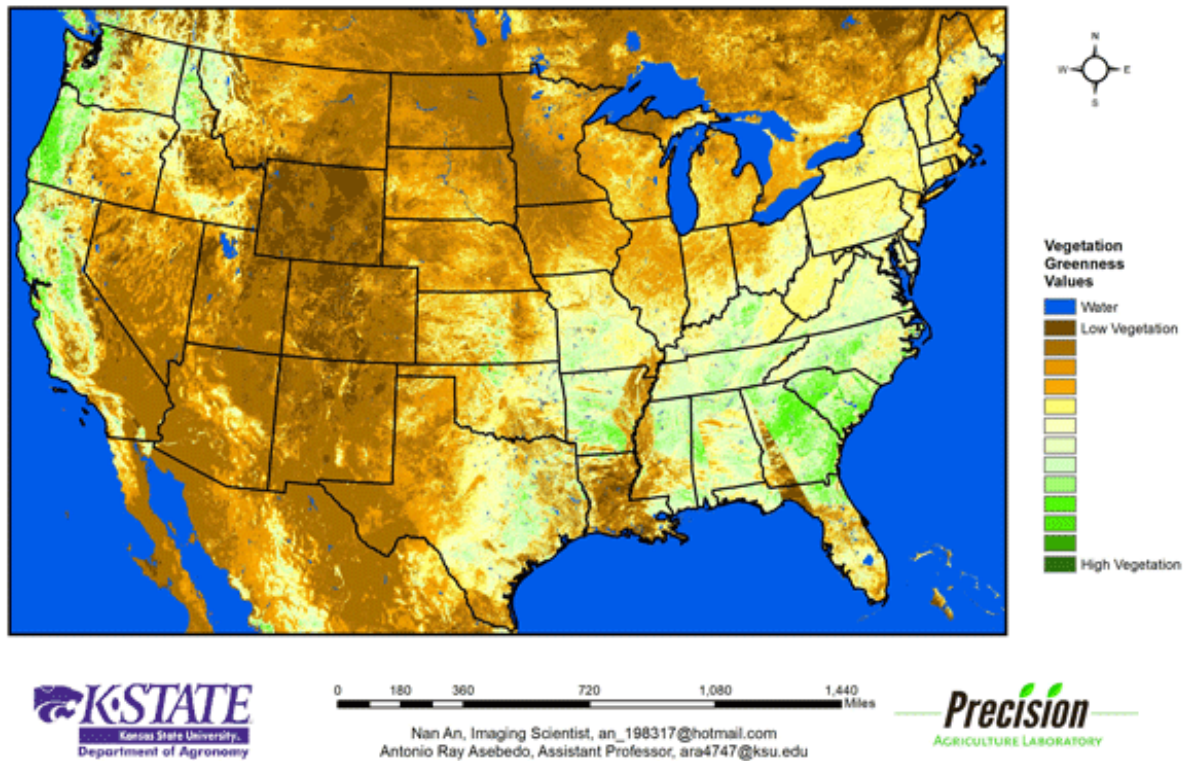


Figure 4. The Vegetation Condition Report for the U.S for April 11 – 18 from K-State’s Precision Agriculture Laboratory shows high NDVI values along much of the West Coast, and in northern Idaho. Favorable moisture continues to drive active photosynthesis in these areas. A pocket of lower photosynthetic activity can be seen in east Texas and Louisiana, where flooding is an issue.

Continental U.S. Vegetation Condition Comparison
Mid-April 2016 Compared to Mid-April 2015

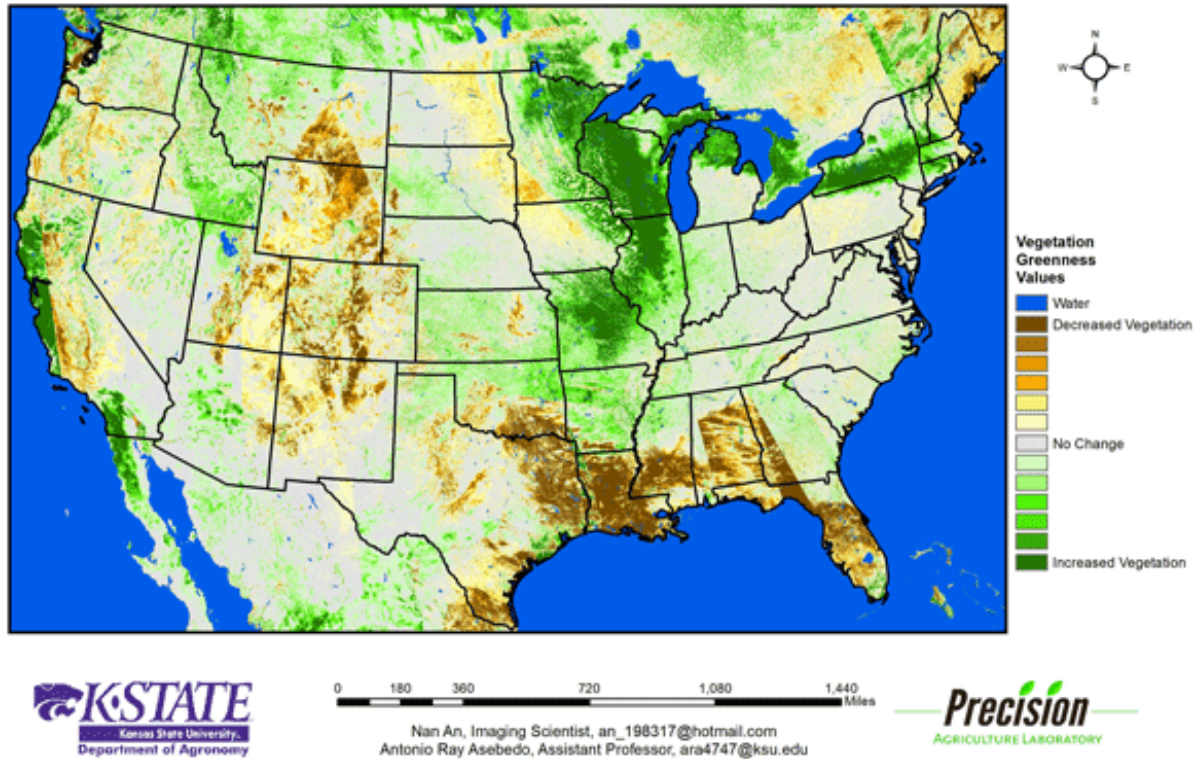


Figure 5. The U.S. comparison to last year at this time for the period April 12 – 18 from K-State’s Precision Agriculture Laboratory shows that lower NDVI values are most evident in Minnesota and Wisconsin, thanks to a late-season snow event. This is also true in Colorado and Wyoming, although to a lesser degree. In contrast, much higher NDVI values are visible in New England. Despite the recent snows in this area, the overall snow depth is less than last year, and more vegetation is active.

Continental U.S. Vegetation Condition Comparison
Mid-April 2016 Compared to 27-year Average for Mid-April

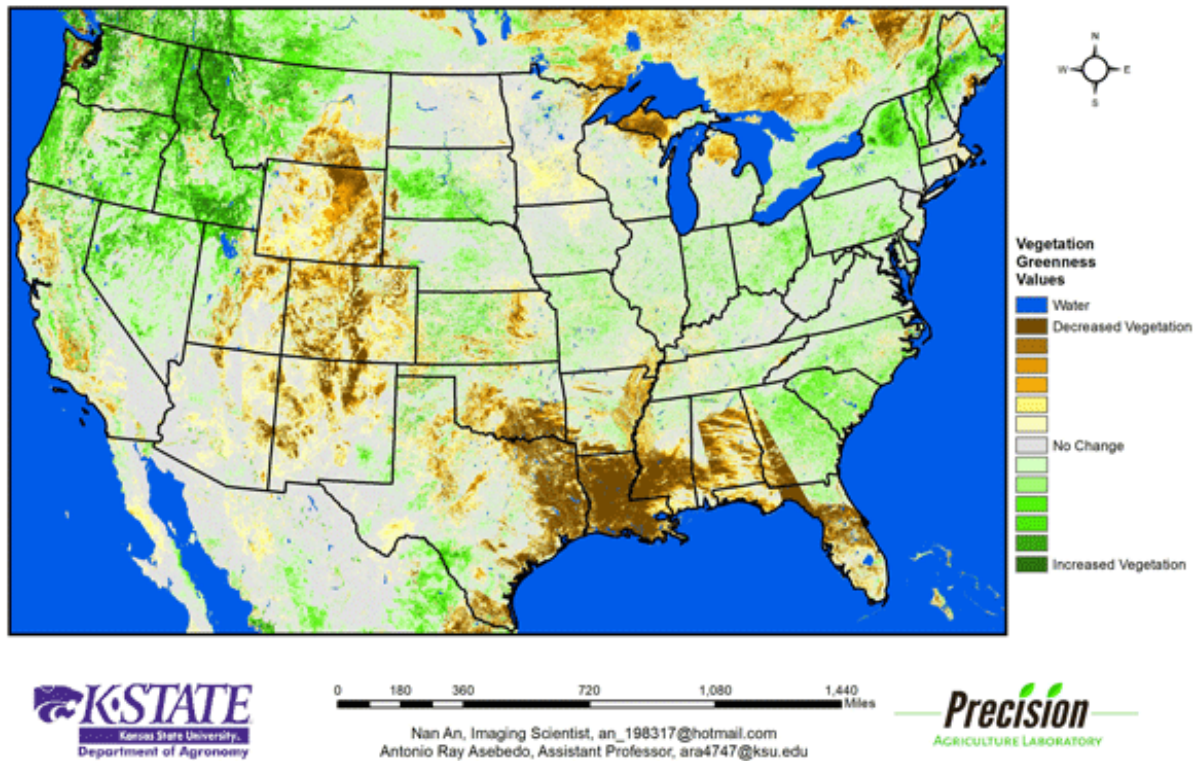


Figure 6. The U.S. comparison to the 27-year average for the period April 12 – 18 from K-State’s Precision Agriculture Laboratory shows above-average photosynthetic activity across the Pacific Northwest, where winter moisture has reduced drought impacts. Snow pack from the late-season storms in the central Rockies has reduced photosynthetic activity in that areas. Persistent cloud cover from the heavy rains in southeastern Oklahoma, east Texas, Louisiana, and eastward has masked photosynthetic activity in those regions.

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