



Extension Agronomy

eUpdate

05/01/2015

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. Sampling for pH and liming in continuous no-till fields

One question that commonly comes up with continuous no-till operations is: "How deep should I sample soils for pH?" The next common question is: "How should the lime be applied if the soil is acidic and the field needs lime?"

Sampling depth in continuous no-till

First, sampling depth. Should two sets of samples be taken, at different depths?

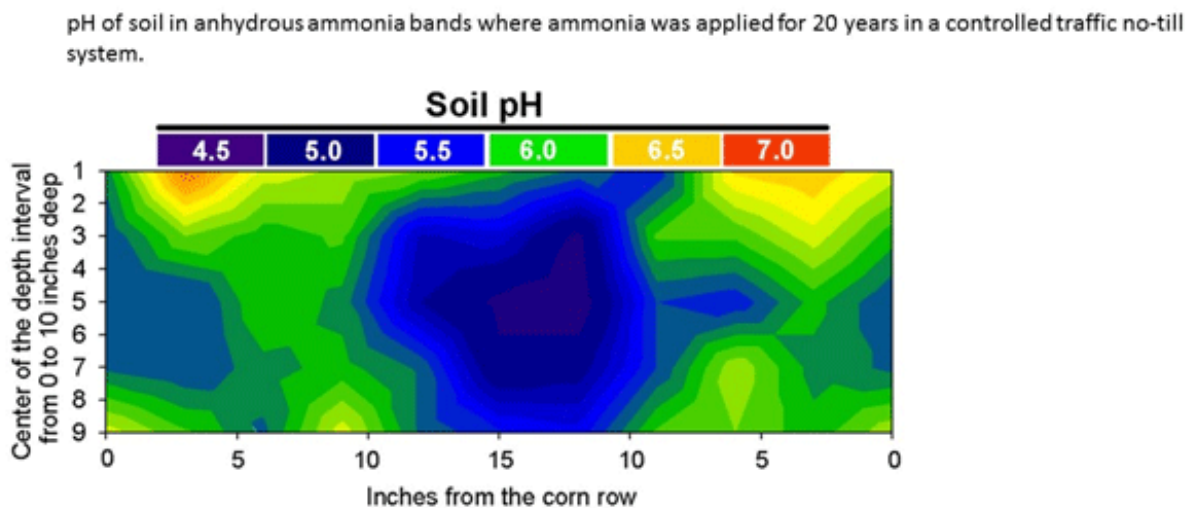
Our standard recommendation for pH is to take one set of samples to a 6 inch depth. On continuous no-till fields where most or all of the nitrogen (N) is surface applied, we recommend taking a second sample to a 3-inch depth. We make the same recommendation for long-term pasture or grass hayfields, such as a brome grass field that has been fertilized with urea annually for several years.

Nitrogen fertilizer is the primary driving force in lowering soil pH levels, so N application rates and methods must be considered when determining how deep to sample for pH. In no-till, the effects of N fertilizer on lowering pH are most pronounced in the area where the fertilizer is actually applied. In a tilled system, the applied N or acid produced through nitrification is mixed in through the action of tillage and distributed throughout the tilled area.

Where N sources such as urea or liquid UAN solutions are broadcast on the surface in no-till system, the pH effects of the acid formed by nitrification of the ammonium will be confined to the surface few inches of soil. Initially this may be just the top 1 to 2 inches but over time, and as N rates increase, the effect of acidity become more pronounced, and the pH drops at deeper depths. How deep and how quickly the acidity develops over time is primarily a function of N rate and soil CEC, or buffering capacity.

Where anhydrous ammonia is applied, or liquid UAN is knifed or coulter banded below the surface, an acid zone will develop deeper in the soil, usually 2-3 inches above the release point where the fertilizer is placed in the soil. So if the ammonia is injected 8 inches deep, there will be acid bands 5 to 8 inches below the soil surface. As with long-term surface applications, these bands will expand over time as more and more N fertilizer is placed in the same general area. The graphic below illustrates the effect of a high rate of ammonia placed in the same general area in the row middle on a high CEC soil for more than 20 years.

The actual depth of the acid zone in fields fertilized with ammonia gets tricky as application depth can vary depending on the tool used to apply the ammonia. Traditional shank applicators generally run 6 to 8 inches deep, so a sample for pH measurement could be taken at 3-6 inches or 5-8 inches deep, depending on how deep the shanks were run. The new low-disturbance applicators apply the ammonia 4-5 inches deep. A sweep plow or V-blade applies ammonia only 3-4 inches deep. So sampling depth for pH should really depend on where the acid-forming N fertilizer is put in the soil.



Liming application methods in continuous no-till

Now, where do you place the lime in continuous no-till? If you surface apply N, then surface apply the lime. That's a simple but effective rule. But remember that surface-applied lime will likely only neutralize the acidity in the top 2-3 inches of soil. So if a producer hasn't limed for 20 years of continuous no-till and has applied 100 to 150 pounds of N per year, there will probably be a 4-5 inch thick acid zone, and the bottom half of that zone may not be neutralized from surface-applied lime. So, if a producer is only able to neutralize the top 3 inches of a 5-inch deep surface zone of acid soil, would that suggest he needs to incorporate lime? Not really. Research has shown as long as the surface is in an appropriate range and the remainder of the acid soil is above pH 5, crops will do fine.

Liming benefits crop production in large part by reducing toxic aluminum, supplying calcium and magnesium, and enhancing the activity of some herbicides. Aluminum toxicity doesn't occur until the soil pH is normally below 4.8. At that pH the Al in soil solution begins to increase dramatically as pH declines further. Aluminum is toxic to plant roots, and at worse the roots would not grow well in

the remaining acid zone.

This implies that the acid zones from ammonia are probably not a major problem. We have monitored ammonia bands in the row middles of long-term no-till for many years and while the pH got very low, below 4.5, we never saw any adverse impacts on the crop that would justify liming and using tillage to incorporate the lime. In fact, some nutrients such as zinc, manganese, and iron can become more available at low pH, which can be an advantage at times.

Yield enhancement is not the only concern with low-pH soils, however. Herbicide effectiveness must also be considered. The most commonly used soil-applied herbicide impacted by pH is atrazine. As pH goes down, activity and hence performance goes down. So in acid soils weed control may be impacted. We do see that in corn and sorghum production.

Liming products for no-till

When choosing a liming product, is there any value to using dolomitic lime (which contains a large percentage of magnesium in addition to calcium) over a purely calcium-based lime product? On most of our soils in Kansas we are blessed with high magnesium content. So as long as we maintain a reasonable soil pH, there normally is enough magnesium present to supply the needs of a crop. Calcium content is normally significantly higher than magnesium, so calcium deficiency is very, very rare in Kansas. The soil pH would need to be below 4.5 before calcium deficiency would become an issue. Before calcium deficiency would occur, aluminum toxicity or manganese toxicity would be severely impacting crop growth. So producers really don't have to worry about a deficiency of calcium or magnesium on most Kansas soils.

What about the use of pelletized lime as a pH management tool on no-till fields? The idea has been around for a while to use pel-lime in low doses to neutralize the acidity created from nitrogen and prevent acid zones from developing. There is no reason it won't work, if you apply enough product each year. Pel-lime is a very high-quality product, normally having 1800 to 2000 pounds of effective calcium carbonate (ECC) per ton, and can be blended with fertilizers such as MAP or DAP or potash easily.

But it is costly. As an example, at a cost of \$160 per ton and 1,800 lbs effective calcium carbonate (ECC) per ton, 100 pounds of ECC pel-lime costs \$8.80. If it costs \$25 per ton to buy, haul, and apply a 50% ECC limestone, that equates to \$2.50 per 100 pounds ECC.

If you were applying 100 pounds of urea-based nitrogen, it would take approximately 180 pounds of ECC to neutralize the acidity produced by the N. This would require 200 pounds of 1,800 pound ECC pel-lime or 360 pounds of 50% ECC ag lime. The cost would be around \$16 per acre with pel-lime or \$4.50 per acre with ag lime. So technically, the pel-lime option is fine. But it would cost more than 3 times as much, at least in this example. You can use your own figures regarding costs and ECC of different lime products available to you to do a similar calculation. Deciding which product to use is a simple economic choice.

Summary

Applying N fertilizer to soil will cause the soil to become acidic over time. Placement of the applied N and the level of soil mixing done through tillage determine where the acid zones will develop. Make sure your soil testing program is focused on the area in the soil becoming acidic, and apply the lime

accordingly.

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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 (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.

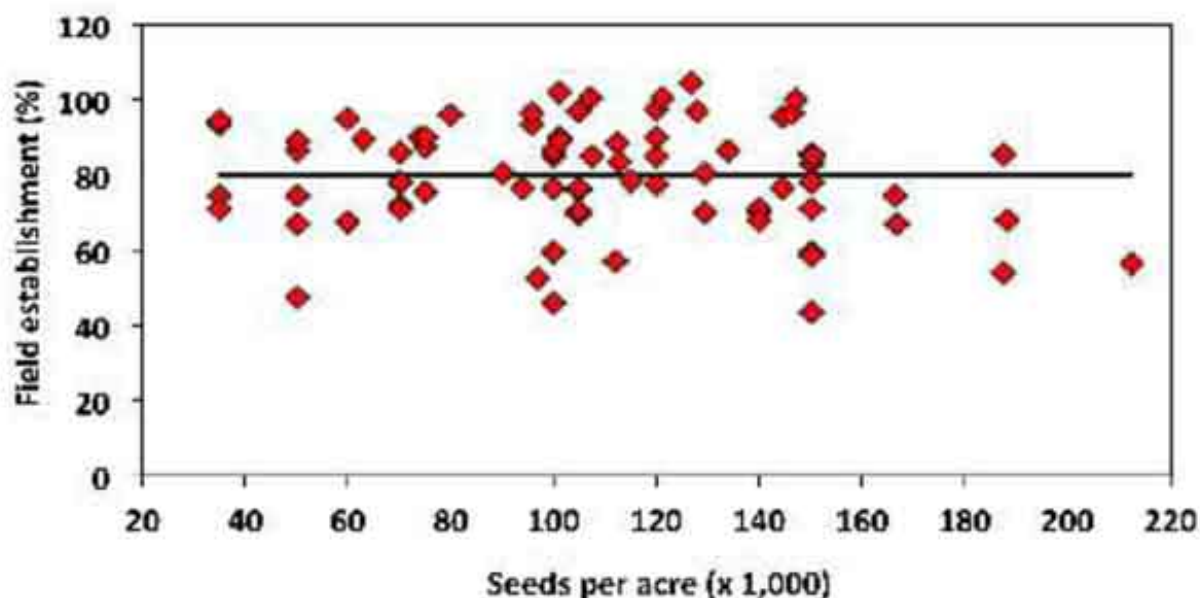


Figure 1. Percentage of field establishment and final seeding rate.

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.

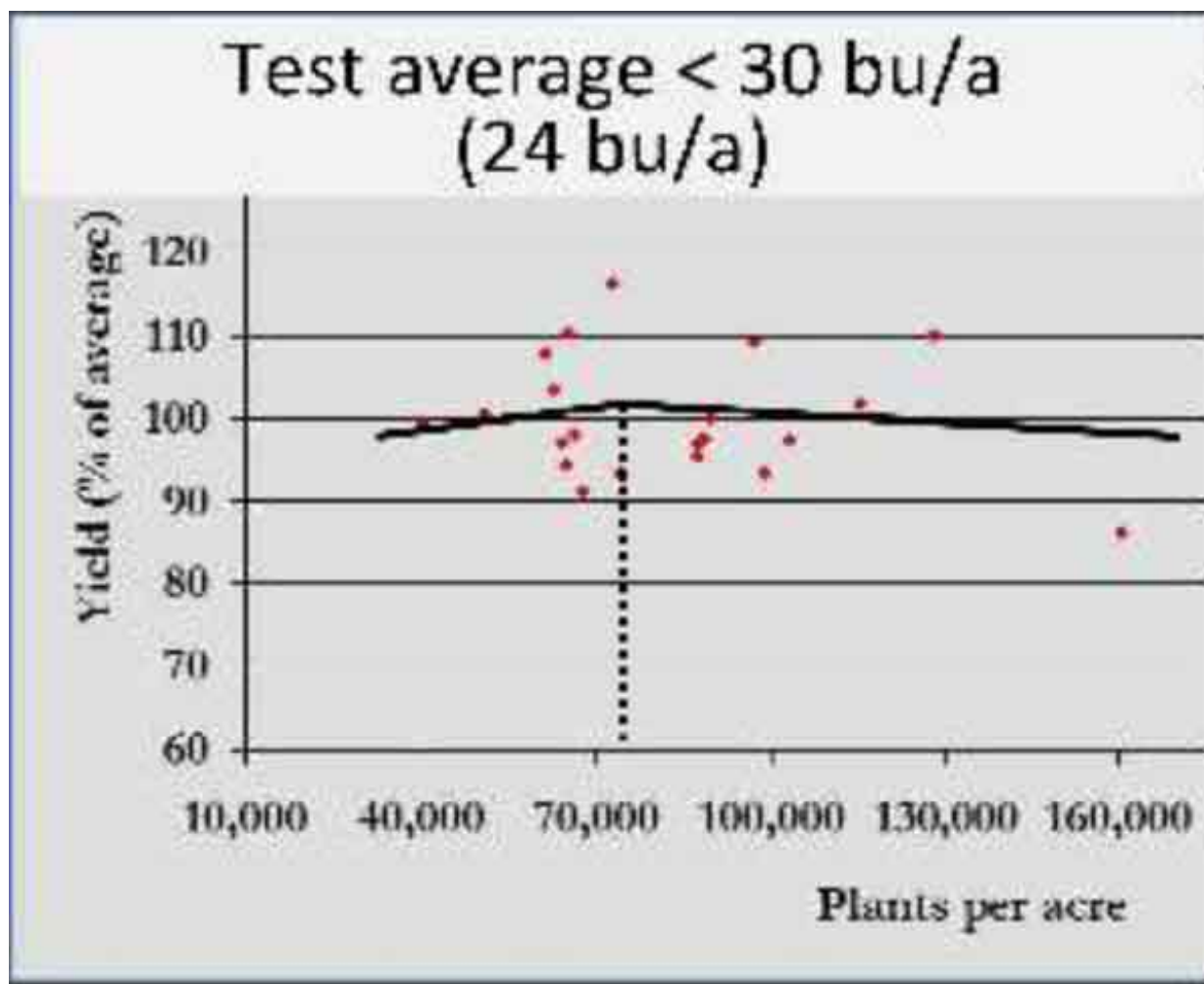


Figure 2. Optimum plant population, final plants per acre, for “low” yielding environments across Kansas, less than 30 bushels per acre.

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).

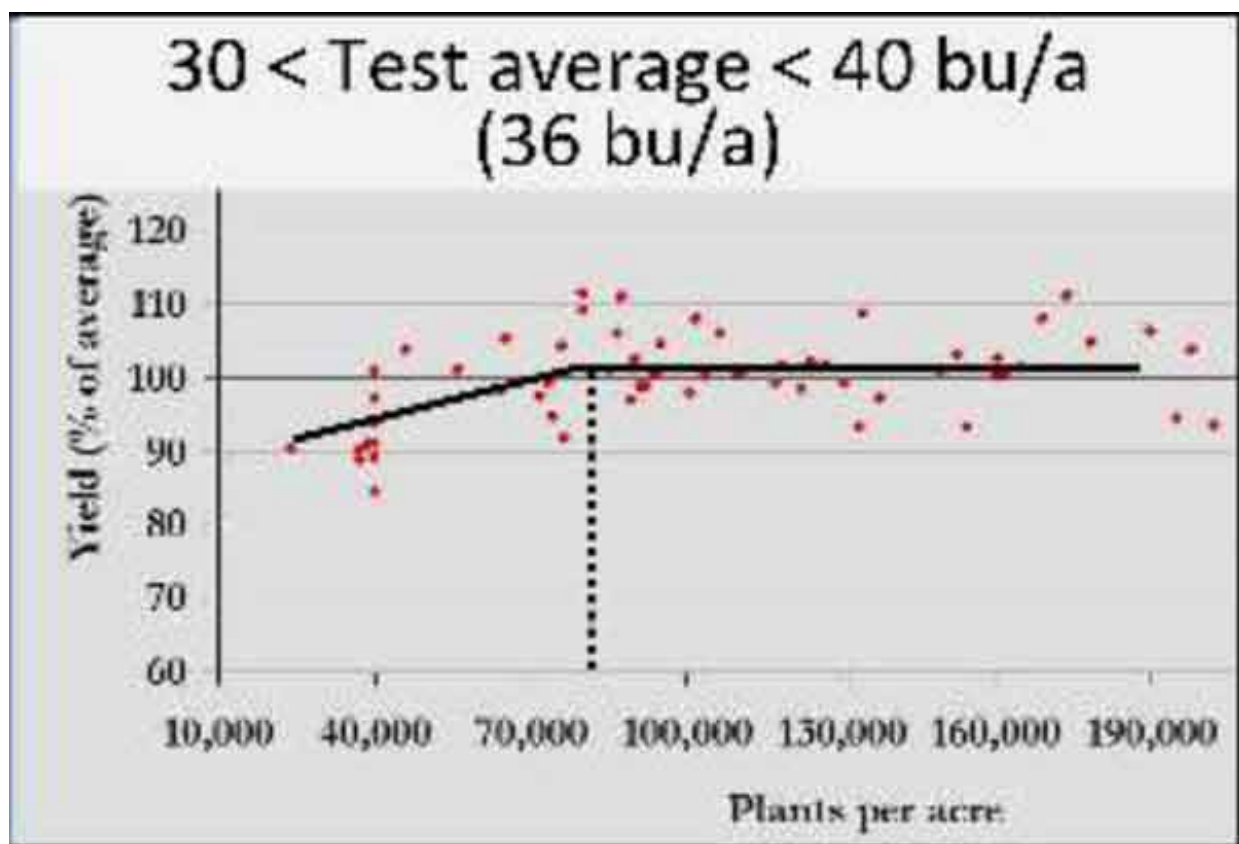


Figure 3. Optimum plant population, final plants per acre, for “medium-low” yielding environments across Kansas, ranging from 30 to 40 bushels per acre.

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.

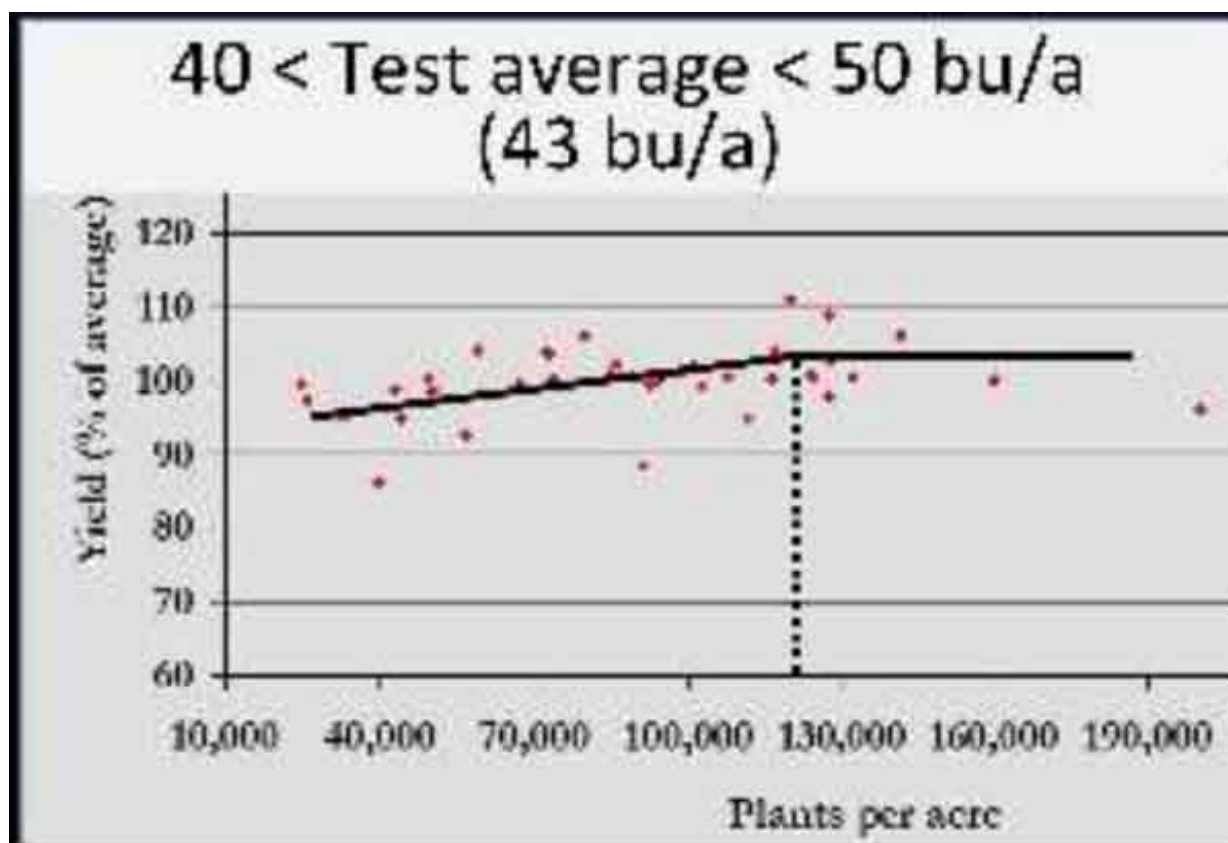


Figure 4. Optimum plant population, final plants per acre, for “medium-high” yielding environments across Kansas, ranging from 40 to 50 bushels per acre.

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>

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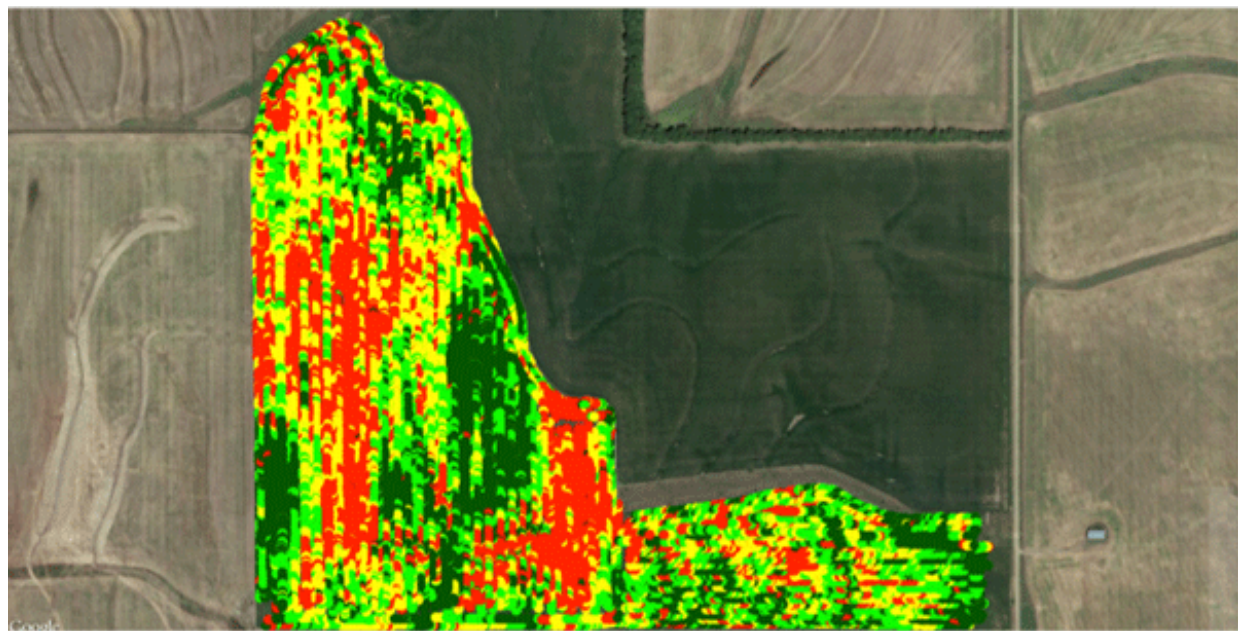
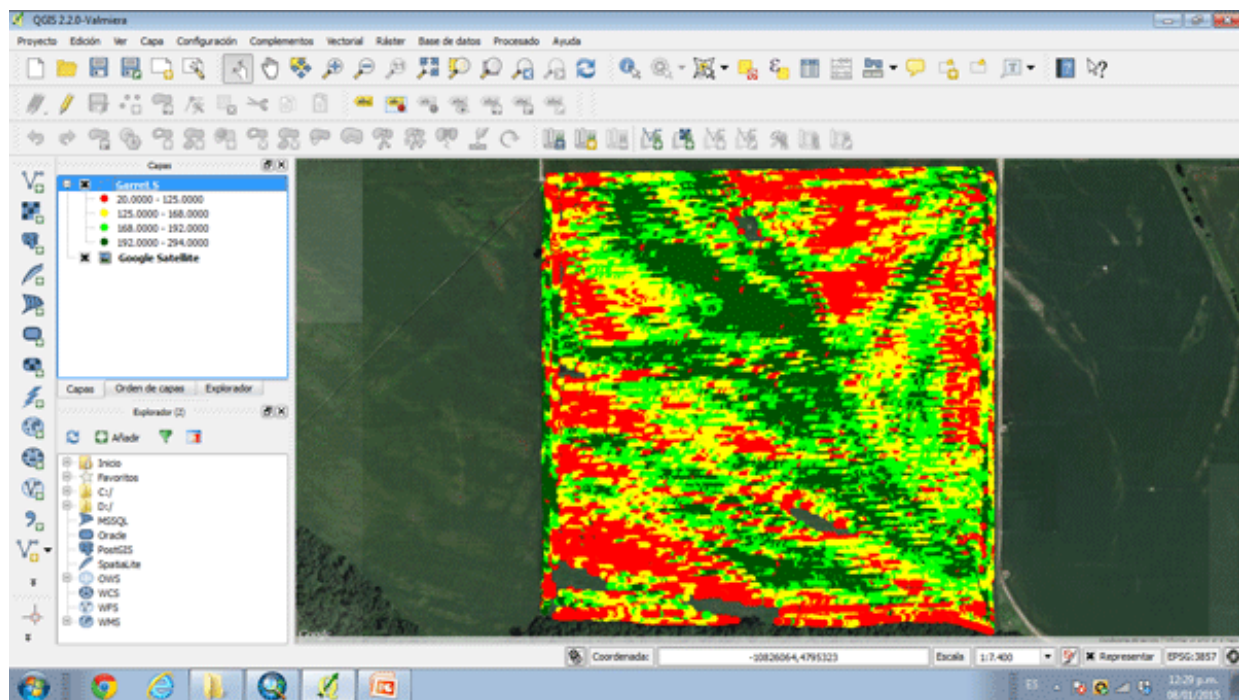
During the 2014 growing season, several on-farm research studies were established in collaboration with Kim Larson, Kansas River Valley Extension District Agent, and soybean producers in that district. The experimental layout, field variability, and strip-trial position in the field for those studies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

Experimental layout

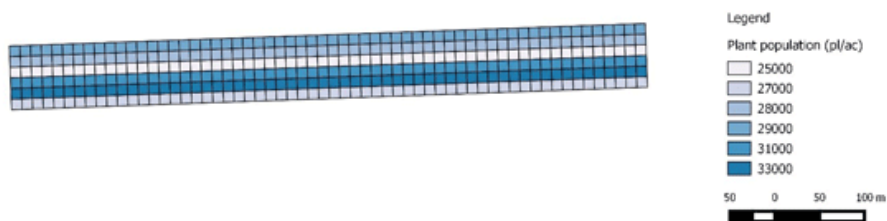
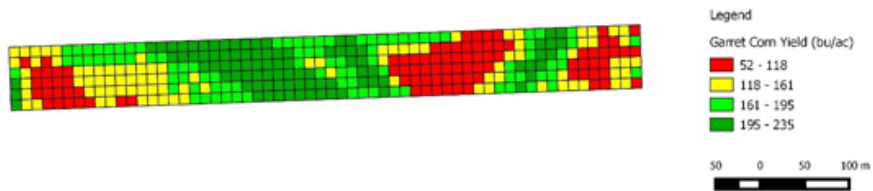
An example of the experimental design proposed for the 2014 soybean seeding rate trials is presented below. In this example, five seeding rate levels were investigated with three replications (completely randomized) in all 15 soybean strips.

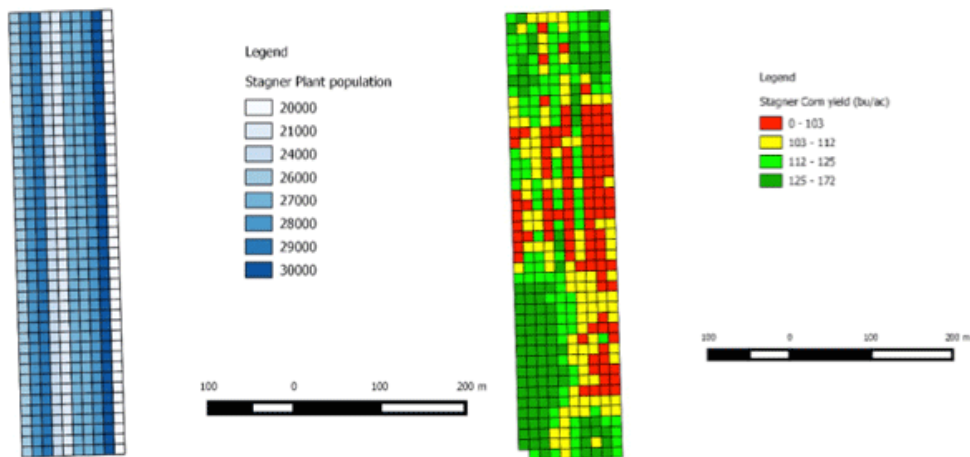


Field variability:

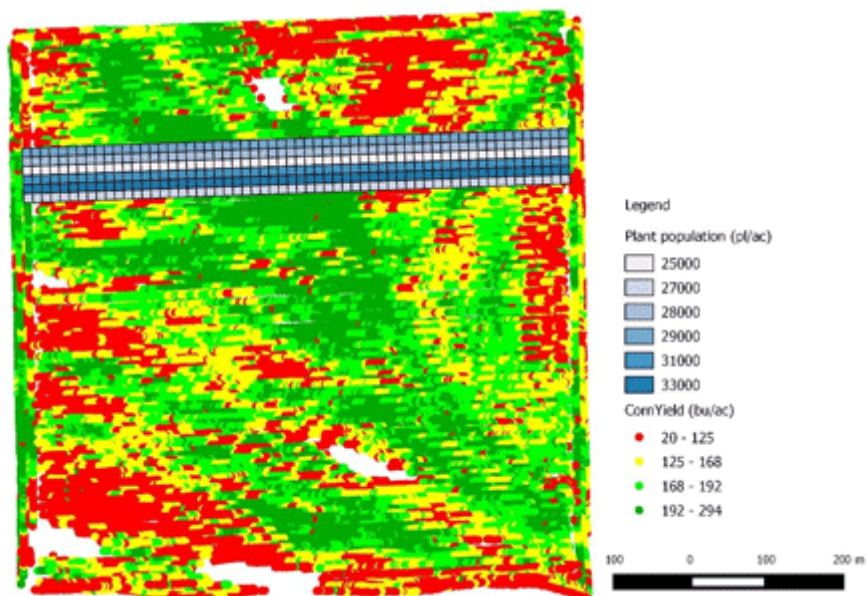


Strip-trial, soybean seeding rate:



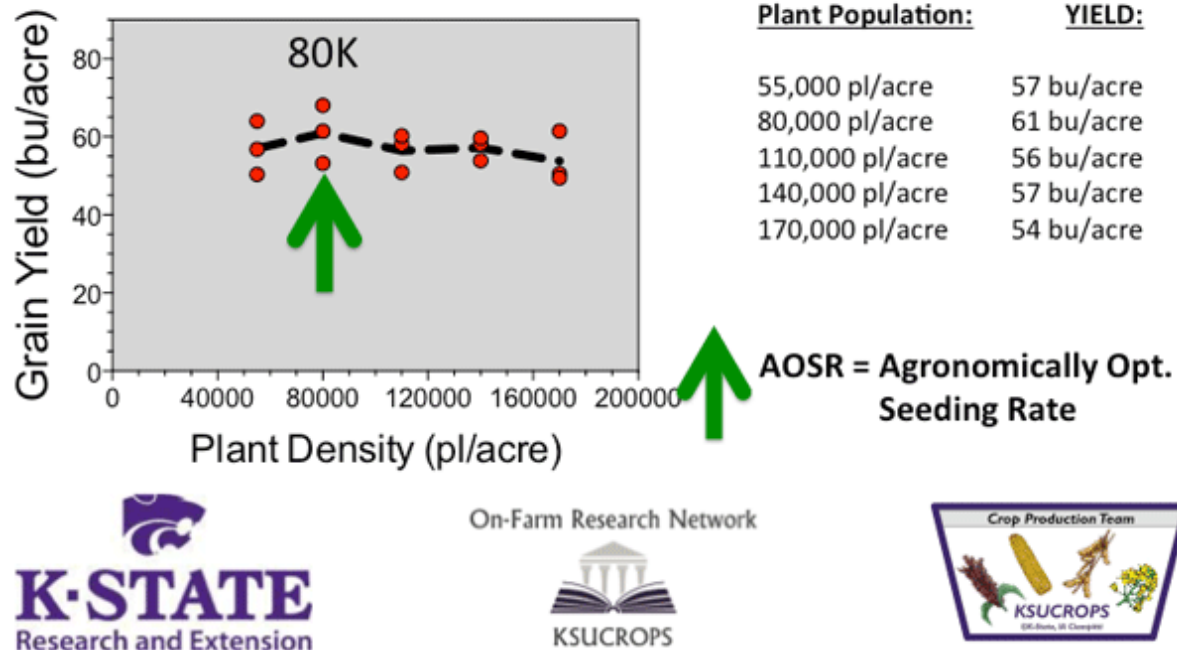


Soybean seeding rate trial and position in the field:



Yield outcomes from a seeding rate study

On-Farm Research Collaborations: North-Central Kansas Studies



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.

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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4. Is there any value to starter fertilizer on soybeans?

Soybean is a crop that can remove significant amounts of nutrients per bushel of grain harvested. Because of this, soybeans can respond to starter fertilizer applications on low-testing soils, particularly phosphorus.

In many cases, corn shows a greater response to starter fertilizer than soybean. Part of the reason for that is that soils are generally warmer when soybeans are planted than when corn is planted. The typical response in early growth observed in corn is usually not observed in soybeans. However, yield response to direct soybean fertilization with phosphorus and other nutrients can be expected in low-testing soils.

K-State guidelines for soybeans include taking a soil test for phosphorus (P), potassium (K), sulfur (S), zinc (Zn), and boron (B). If fertilizer is recommended by soil test results, then fertilizer should either be applied directly to the soybeans or indirectly by increasing fertilizer rates to another crop in the rotation by the amount needed for the soybeans.

The most consistent response to starter fertilizer with soybeans would be on soils very deficient in one of the nutrients listed above, or in very high-yield-potential situations where soils have low or medium fertility levels. Furthermore, starter fertilizer in soybeans can be a good way to complement nutrients that may have been removed by high-yielding crops in the rotation, such as corn and help maintain optimum soil test levels.

Banding fertilizer to the side and below the seed at planting is an efficient application method for soybeans. This method is especially useful in reduced-till or no-till soybeans because P and K have only limited mobility into the soil from surface broadcast applications.

However, with narrow row soybeans, it may not be possible to install fertilizer units for deep banding. In that situation, producers can surface-apply the fertilizer. Fertilizer should not be placed in-furrow in direct seed contact with soybeans because the seed is very sensitive to salt injury.

Soybean seldom responds to nitrogen (N) in the starter fertilizer. However, some research under irrigated, high-yield environments suggests a potential benefit of small amounts of N in starter fertilizer.



Figure 1. Visual differences with starter P fertilizer on low testing soils. Picture by Nathan Mueller, former K-State Agronomy graduate student and current University of Nebraska Cropping Systems / Ag Technology Educator.

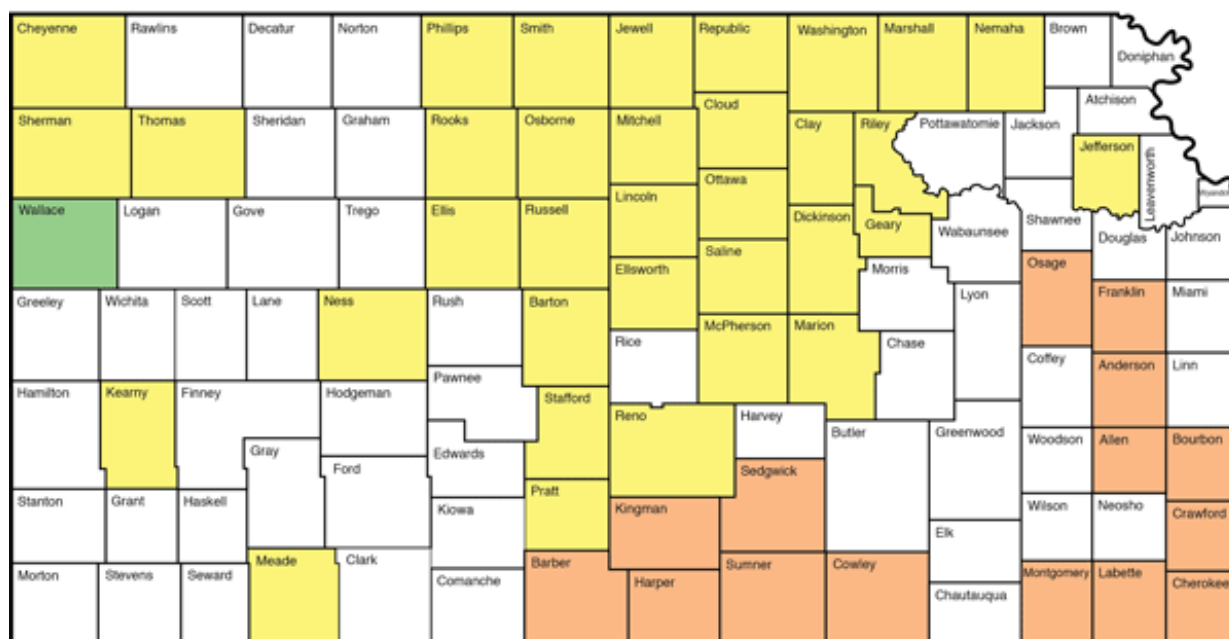
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5. Update on the distribution and intensity stripe rust

Reports from K-State Extension specialists and agents this week indicate that stripe rust is now common on the upper leaves of wheat in southeast and south central Kansas. In central Kansas, stripe rust appears to be primarily on the lower and middle canopy as of May 1, but there are a few reports of the disease on the flag leaves or leaves just below the flag.

This week also brought the first reports of stripe rust in north central and western Kansas. The disease is at low levels in many fields but there were a few locations in the north central region with moderate levels of disease on the lower leaves. Dryland fields with good yield potential and irrigated fields should be a top scouting priority.

Distribution of Wheat Stripe Rust April 27 - May 1, 2015



Disease Level

- Stripe rust not observed
- Stripe rust primarily on lower leaves
- Stripe rust common on upper leaves
- No report

Disease observation map based on reports from: E. De Wolf, D. Shoup, S. Duncan, D. Hallauer, J. James, J. Coltrain, K. Larson, C. Otte, Z. Simon, M. Ploger, D. Strouts, R. Steeves, D. Ediger, A. Harries, C. Long, C. Miller, S. Wick, T. Maxwell, A. Johnson, A. Esser, L. Haag, J. Falk-Jones, K. Sexton, M. Buchanan, J. Martin, C. Seaman

Preliminary indications are that stripe rust is more severe on varieties known to be susceptible to the disease based on disease reactions gathered since 2012. Popular varieties known to be susceptible include Everest, Armour, TAM 111, and TAM 112. Stripe rust is also being reported on varieties with intermediate or moderately resistant reactions to the disease, including WB4458, WB-Cedar, and 1863. The populations of fungi that cause rust diseases are notorious for their ability to shift to overcome genetic resistance. Therefore, all fields should be monitored for potential signs of disease.

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6. Wheat plot tour scheduled at North Central Experiment Field, June 3

The North Central Experiment Field Wheat Plot Tour is scheduled for Wednesday, June 3, starting at 7:30 a.m.

The field is located about two miles west of Belleville on Kansas Highway 36. Juice and rolls will be served ahead of the tour. Tour topics include:

- Wheat Varieties
- Wheat Disease Update
- Production Updates

More information is available by calling the North Central Experiment Field at 785-335-2836 or contacting Andrew Resser, Agronomist-in-Charge, at: aresser@ksu.edu

7. Comparative Vegetation Condition Report: April 14 - 27

K-State's Ecology and Agriculture Spatial Analysis Laboratory (EASAL) produces weekly Vegetation Condition Report maps. These maps can be a valuable tool for making crop selection and marketing decisions.

Two short videos of Dr. Kevin Price explaining the development of these maps can be viewed on YouTube at:

<http://www.youtube.com/watch?v=CRP3Y5Nlggw>

<http://www.youtube.com/watch?v=tUdOK94efxc>

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 26-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.

NOTE TO READERS: The maps below represent a subset of the maps available from the EASAL group. If you'd like digital copies of the entire map series please contact Nan An at nanan@ksu.edu and we can place you on our email list to receive the entire dataset each week as they are produced. The maps are normally first available on Wednesday of each week, unless there is a delay in the posting of the data by EROS Data Center where we obtain the raw data used to make the maps. These maps are provided for free as a service of the Department of Agronomy and K-State Research and Extension.

The maps in this issue of the newsletter show the current state of photosynthetic activity in Kansas, the Corn Belt, and the continental U.S., with comments from Mary Knapp, assistant state climatologist:

Kansas Vegetation Condition

Period 17: 04/14/2015 - 04/27/2015

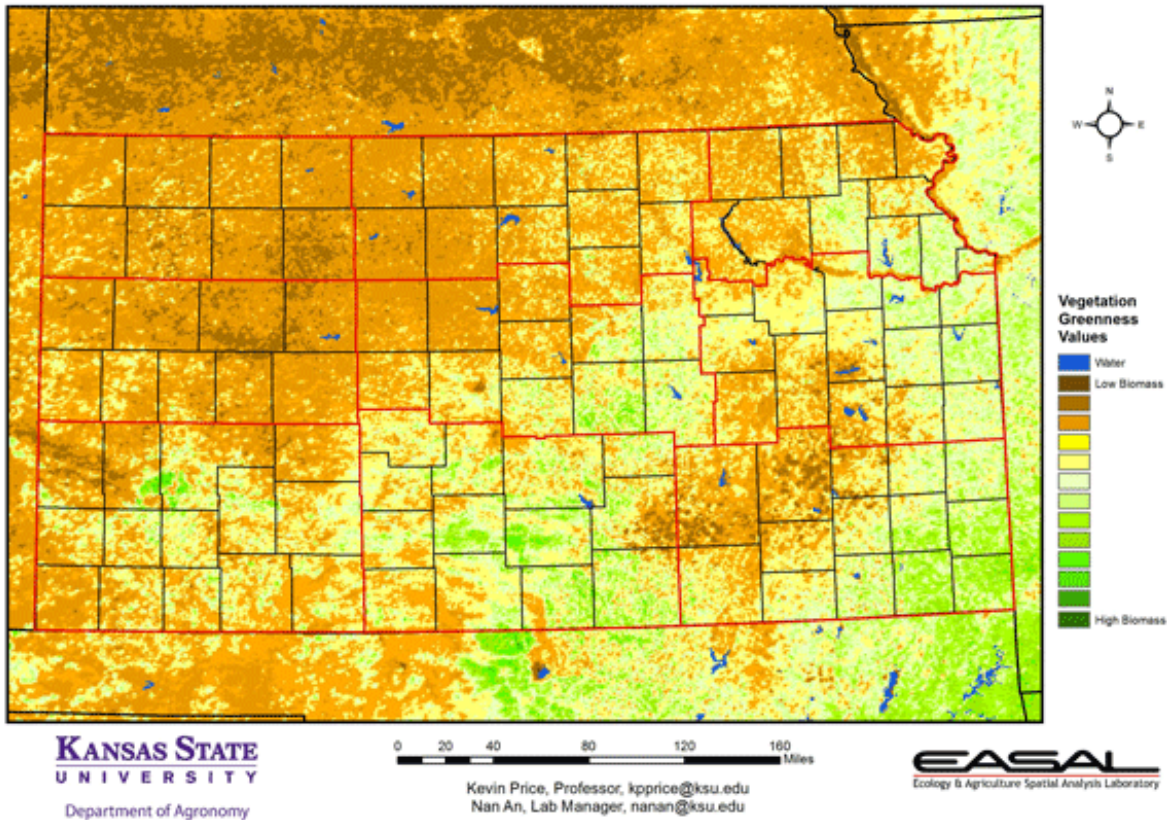


Figure 1. The Vegetation Condition Report for Kansas for April 14 – 27 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that photosynthetic activity is greatest in southeast Kansas, where temperatures and moisture have been most favorable. Pockets of increased vegetative activity are beginning to be visible in the eastern portions of north central Kansas, where significant moisture was received over this two-week period.

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Kansas Vegetation Condition Comparison

Late-April 2015 compared to the Late-April 2014

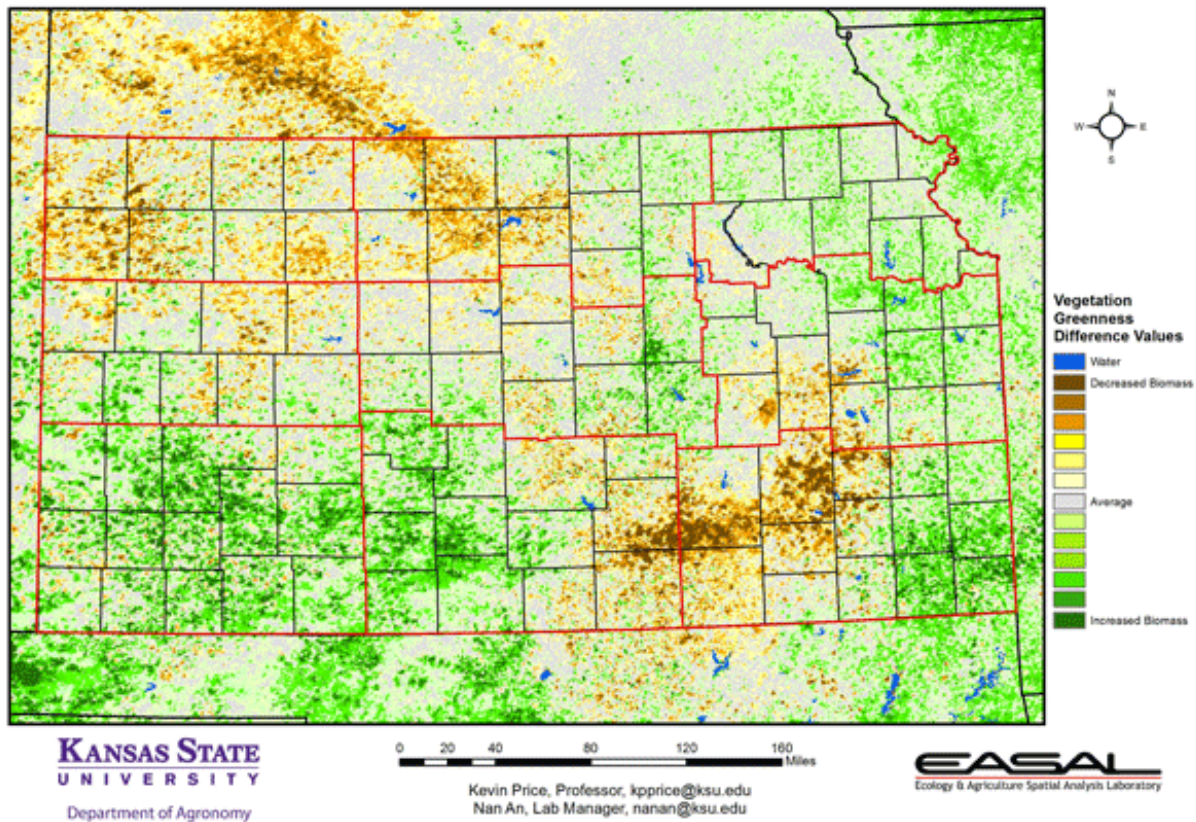


Figure 2. Compared to the previous year at this time for Kansas, the current Vegetation Condition Report for April 14 – 27 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows large areas of much lower biomass production in Sedgwick, Butler, Greenwood, and Elk counties. The April 4th freeze and cooler temperatures have slowed development compared to last year.

Kansas Vegetation Condition Comparison
Late-April 2015 compared to the 26-Year Average for Late-April

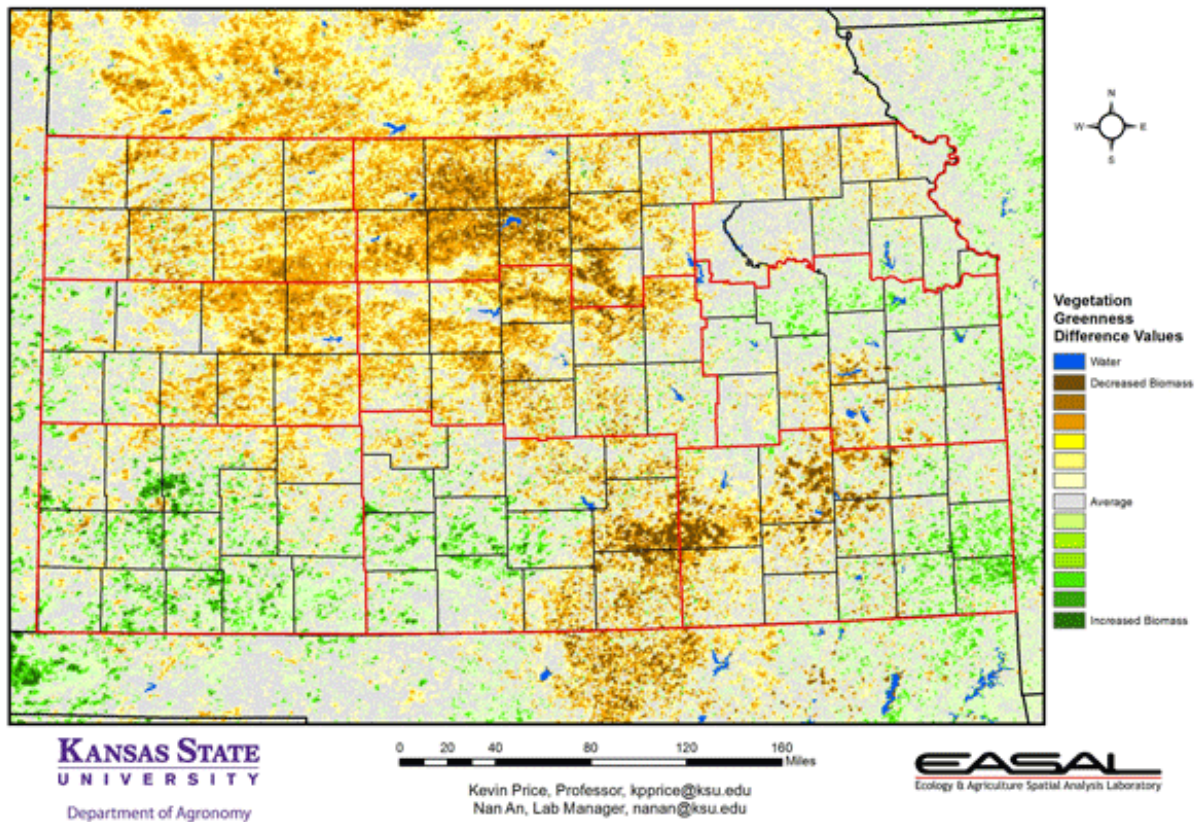


Figure 3. Compared to the 26-year average at this time for Kansas, this year's Vegetation Condition Report for April 14 – 27 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that a large portion of Kansas from the Northwest Division through the South Central Division has below-average biomass production. For much of these areas, this reduction in biomass production is a combination of winter-kill, freeze damage, and drought. Only portions of the Southwest and extreme Southeastern Divisions have higher-than-average photosynthetic activity.

U.S. Corn Belt Vegetation Condition

Period 17: 04/14/2015 - 04/27/2015

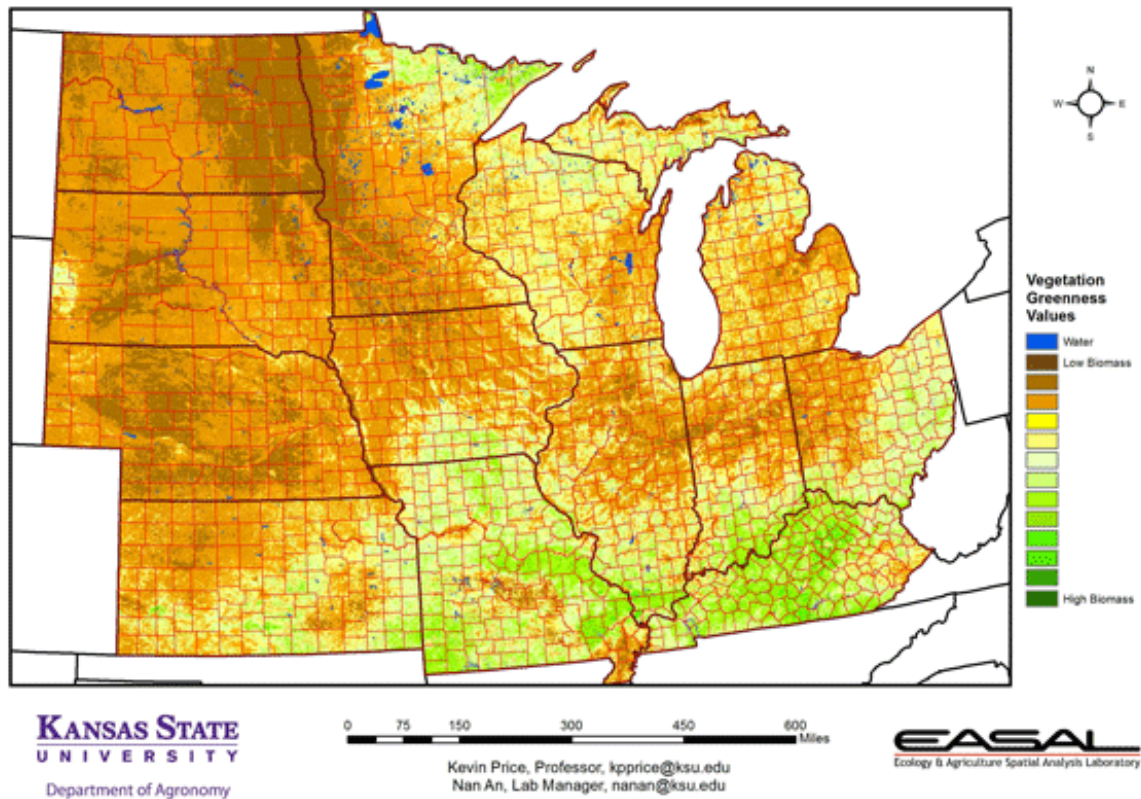


Figure 4. The Vegetation Condition Report for the Corn Belt for April 14 – 27 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that the greatest photosynthetic activity is concentrated in the south central portion of the region. Some increased photosynthetic activity is also visible in northeastern Minnesota. This is mainly due to the quick loss of snow cover in the area.

U.S. Corn Belt Vegetation Condition Comparison

Late-April 2015 Compared to Late-April 2014

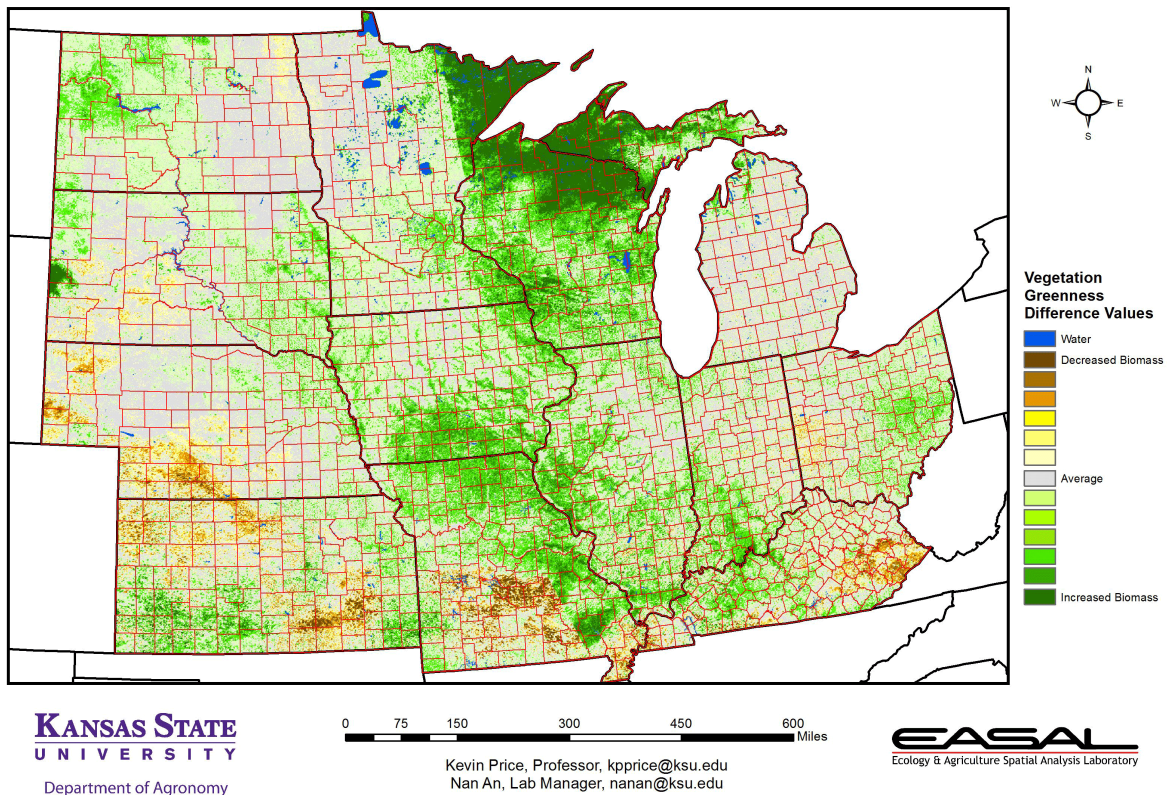


Figure 5. The comparison to last year in the Corn Belt for the period April 14 – 27 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows a pocket of much higher NDVI values in the Black Hills of South Dakota and the Upper Great Lakes region of eastern Minnesota, northern Wisconsin, and the western Upper Peninsula of Michigan. These areas had much lower snow amounts this season, and thus have higher photosynthetic values this spring. In southern Iowa, northern and eastern Missouri, and through the Ohio River Valley, mild and wet spring conditions have favored photosynthetic activity.

U.S. Corn Belt Vegetation Condition Comparison
Late-April 2015 Compared to the 26-Year Average for Late-April

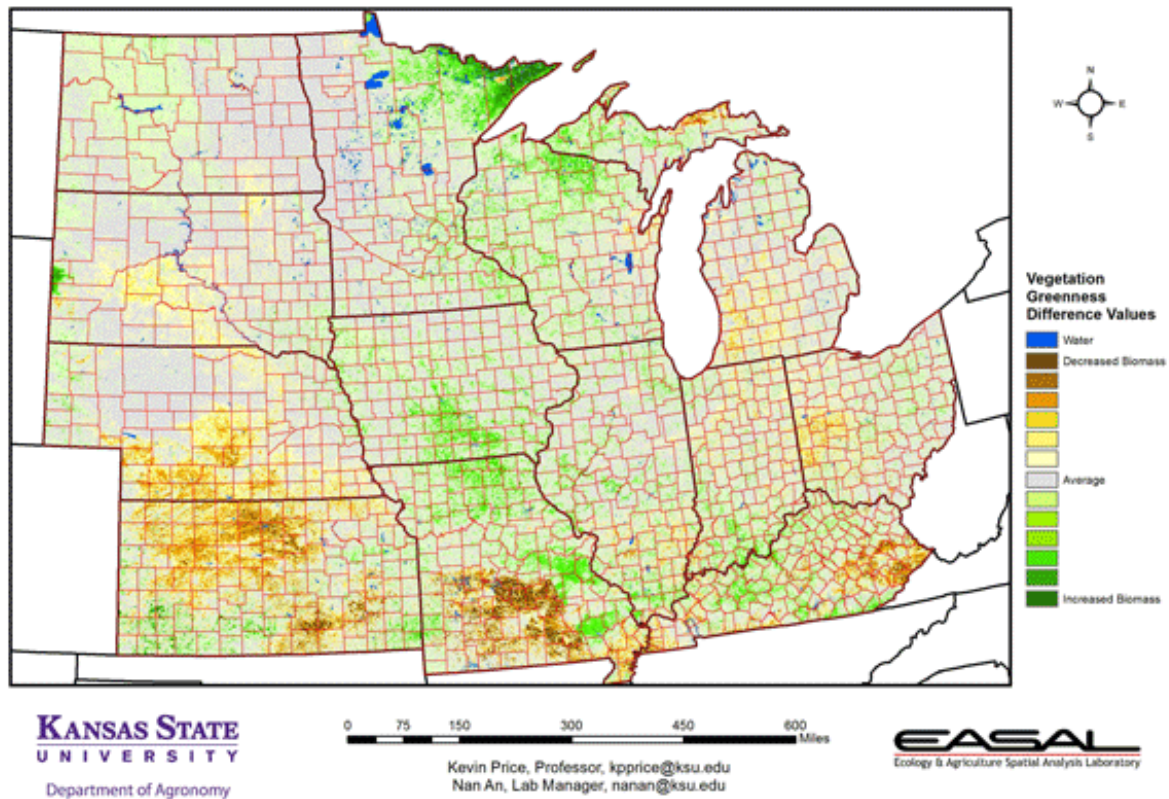


Figure 6. Compared to the 26-year average at this time for the Corn Belt, this year's Vegetation Condition Report for April 14 – 27 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows an area of below-average photosynthetic activity in south central Missouri and northern and central Kansas. Below average rainfall persists in these areas.

Continental U.S. Vegetation Condition

Period 17: 04/14/2015 - 04/27/2015

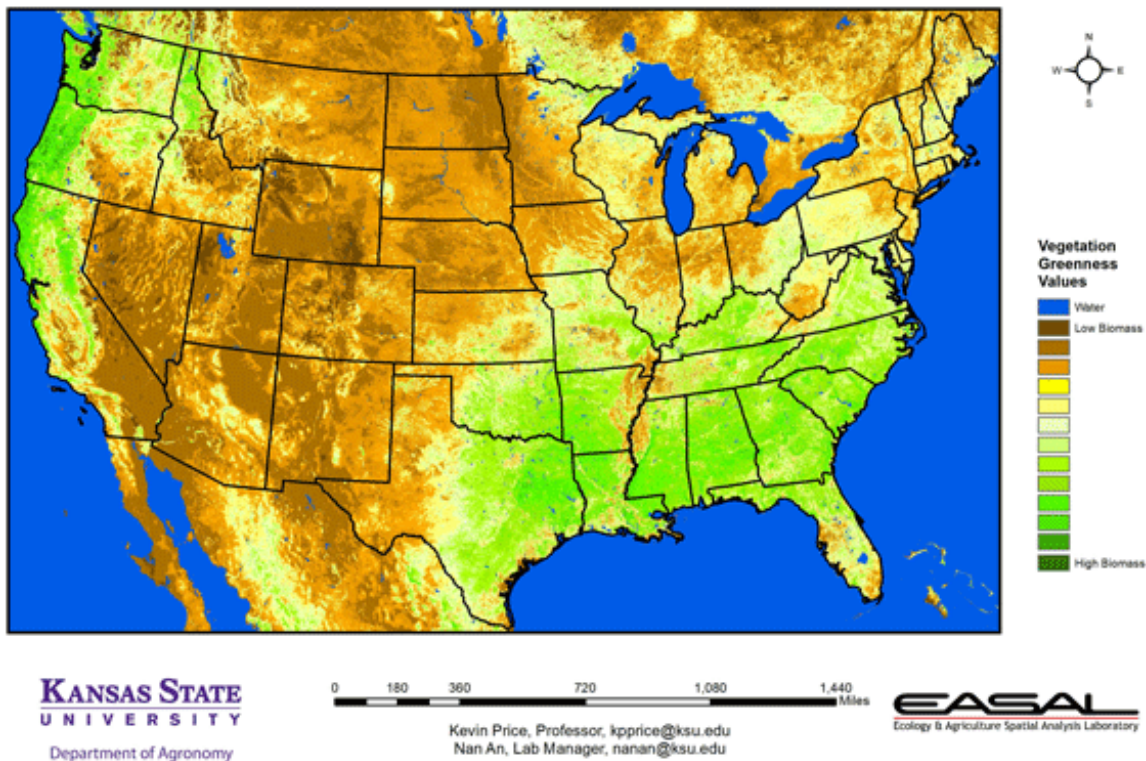


Figure 7. The Vegetation Condition Report for the U.S. for April 14 – 27 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that an area of low photosynthetic activity continues along the central Mississippi River Valley, where flood advisories continue. In the West, moderate biomass production continues along the coast from central California to Washington. Photosynthetic activity remains limited from the Northern Plains to the Panhandle of Texas and westward towards the Rockies.

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Continental U.S. Vegetation Condition Comparison
Late-April 2015 Compared to Late-April 2014

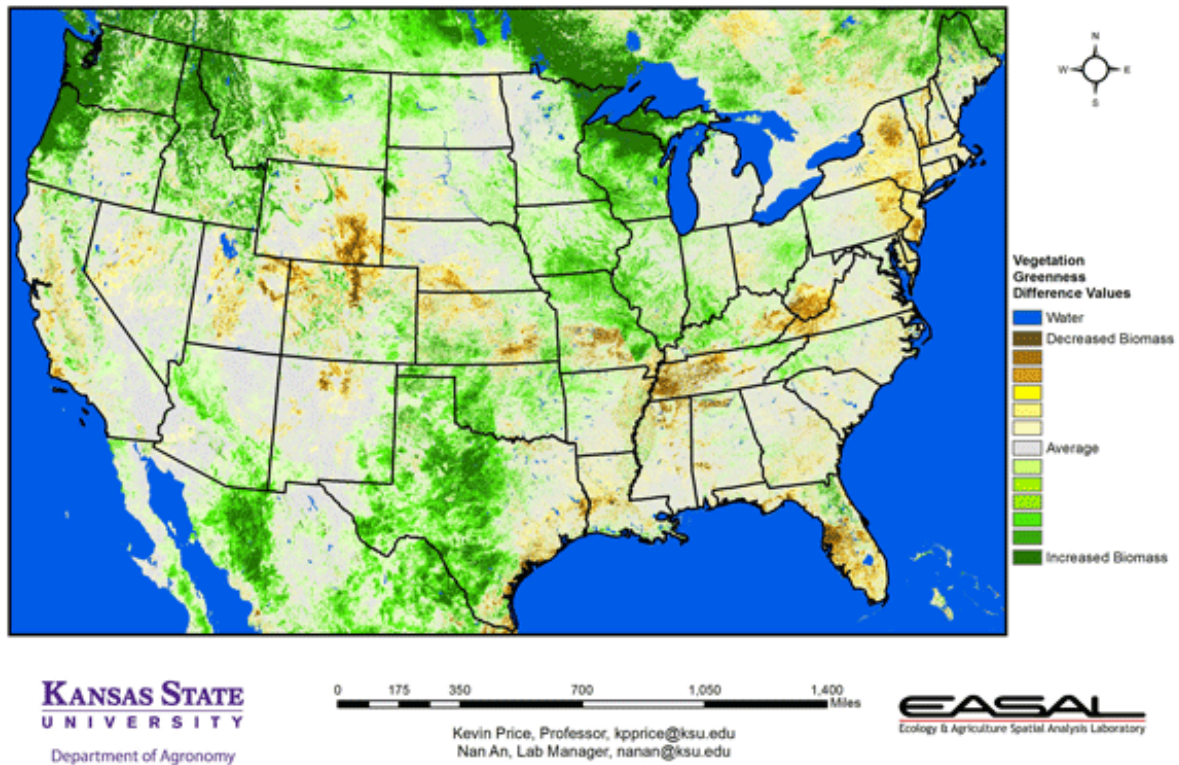


Figure 8. The U.S. comparison to last year at this time for the period April 14 – 27 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows increased photosynthetic activity in the Pacific Northwest, the Northern Great Lakes and west Texas. For the northern areas, this increase is due mainly to lower snow amounts. In Texas, this increase is due to recent moisture. That moisture has favored rapid greenup. In all cases, the question is how quickly the available moisture will be depleted. Chances for continued favorable moisture are



better in the Southern Plains than in the Northern Plains, or in the Pacific Northwest.

Figure 9. The U.S. comparison to the 26-year average for the period April 14 – 27 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows pockets of below-normal photosynthetic activity in the Central Plains and the Central Valley of California that are due mainly to drought. The small band of below-normal photosynthetic activity in northern Colorado and southern Wyoming is more the result of recent snow events.

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