



Extension Agronomy

eUpdate

06/12/2015

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. Pre-harvest weed control in wheat

Once again it appears that weeds are going to cause harvest problems in wheat. Thin stands from winterkill in some areas and the abundant rains in May and June have resulted in weeds showing up in many wheat fields, especially if not treated earlier. No one wants to spend extra money on a below-average crop, but these weeds can make harvest very difficult.

Unfortunately, there aren't many good options at this point in time. There are also a lot of questions about which herbicides are approved and the "use guidelines and restrictions" for pre-harvest treatments in wheat. Listed below are the various herbicide options producers can use as pre-harvest aids in wheat. There are differences in how quickly they act to control the weeds, the interval requirement between application and grain harvest, and the level or length of control achieved. All of them will require good thorough spray coverage to be most effective.

Sharpen is now labeled for use as a pre-harvest treatment in wheat and is approved in North America, but is not included in the table because it does not have Maximum Residue Limit (MRL) approvals for use as a pre-harvest wheat treatment in some key export markets. Some grain marketers have indicated they will not accept wheat that was treated with a pre-harvest application of Sharpen, so it is not being promoted for that use at this point in time.

Please note that the 2,4-D rate approved for pre-harvest weed control in wheat has been reduced to a maximum of 0.5 lb/acre, which is equal to 1 pt of a 4-lb formulation or 2/3 pt of a 6-lb material. 2,4-D also has a 14-day pre-harvest requirement.

Another herbicide that is sometimes mentioned as a possible pre-harvest treatment is paraquat. **Paraquat is not labeled for pre-harvest treatment in wheat.** Application of paraquat to wheat is an illegal treatment and can result in a quarantine and destruction of the harvested grain, along with severe fines.

Product and rate	Advantages	Disadvantages	Comments
Aim EC (1 to 2 oz)	Acts quickly, usually within 3 days. Short waiting interval before harvest – 3 days.	Controls only broadleaf weeds. Regrowth of weeds may occur after 2-3 weeks or more, depending on the rate used.	Apply after wheat is mature. Always apply with 1% v/v crop oil concentrate in a minimum spray volume of 5 gal/acre for aerial application and 10 gal/acre for ground applications. Do not apply more than 2 oz of Aim during the

			growing season.
Dicamba (0.5 pt)	Controls many broadleaf weeds.	<p>A waiting period of 7 days is required before harvest.</p> <p>Acts slowly to kill the weeds.</p> <p>Controls only broadleaf weeds.</p> <p>High potential for spray drift to susceptible crops.</p>	<p>Apply when the wheat is in the hard dough stage and green color is gone from the nodes of the stem.</p> <p>Do not use treated wheat for seed unless a germination test results in 95% or greater seed germination.</p>
Glyphosate (1 qt of 3 lb ae/gal product, or 22 fl oz of Roundup PowerMax or WeatherMax)	Provides control of both grasses and susceptible broadleaf weeds.	<p>Acts slowly. May take up to 2 weeks to completely kill weeds and grasses.</p> <p>Cannot harvest grain until 7 days after application. Kochia, pigweeds, and marestail may be resistant.</p>	<p>Apply when wheat is in the hard dough stage (30% or less grain moisture).</p> <p>Consult label for recommended adjuvants.</p> <p>Not recommended for wheat being harvested for use as seed.</p>
Metsulfuron (0.1 oz)	Provides control of susceptible broadleaf weeds.	<p>Acts slowly.</p> <p>Cannot harvest grain until 10 days after application.</p> <p>Controls only susceptible broadleaf weeds. Kochia, pigweeds, and marestail may be resistant.</p>	<p>Apply when wheat is in the dough stage.</p> <p>Always apply with a nonionic surfactant at 0.25 to 0.5% v/v.</p> <p>Generally recommended in combination with glyphosate or 2,4-D.</p> <p>Do not use on soils with a pH greater than 7.9.</p> <p>Weeds growing under limited moisture may not be controlled.</p> <p>Do not use treated straw for livestock feed.</p>
2,4-D LVE (1 pt of 4lb/gal product or 2/3 pt 6 lb/gal product)	Provides control of susceptible broadleaf weeds.	Acts slowly. Weak on kochia and wild buckwheat.	Apply when wheat is in the hard dough stage to control large, actively growing broadleaf

		Cannot harvest grain until 14 days after application.	weeds. Weeds under drought stress may not be controlled. Do not use treated straw for livestock feed.
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2. Possible causes of yellow soybeans

When soybeans turn yellow at an early stage of growth, there are several possible explanations.

Nitrogen (N) deficiency. In fields that have been extremely wet (or extremely dry, although that's not a problem this year in most of the main soybean-growing areas of Kansas), rhizobial nodule development can be delayed, resulting in N deficiency. As the soils dry out (or receive rain in dry years), the nodule-forming bacteria will go to work and the deficiency symptoms will quickly disappear. With N deficiency, it is usually the lower leaves that are chlorotic or pale green. Within the plant, any available N from the soil or from N fixation within nodules on the roots goes to the new growth first.

Soybeans doublecropped after wheat can be N deficient for a short period of time shortly after emergence until the beans become well nodulated. As the wheat straw decomposes, some of the soil available N will be immobilized, making it unavailable to the young soybean plants. Applying a small amount of N (no more than 30 lbs acre) at planting time to soybeans planted into wheat residue is the best way to avoid early-season N deficiency.

Hail damage can also cause N deficiency in soybeans at times. If the foliage is damaged enough so that the plant can't provide enough food for the rhizobia on the roots, the rhizobia will slough off the roots or become temporarily inactive. If this happens, the plants may temporarily become N deficient. Plants normally recover from this as regrowth progresses and photosynthates are translocated to the nodules.

Nitrogen deficiency due to a failure of soybeans to nodulate properly has also been a problem at times where soybeans are planted into new acres with no history of soybean production. In recent years, there have been reports of inoculated soybeans planted on "virgin" fields that have failed to produce nodules, resulting in N deficiency. An examination of the root systems showed very few or no nodules. Previous studies show that a rescue application of 90 to 120 pounds of N per acre gave good returns in these situations. A rescue application should be considered only if N deficiency symptoms are visible, and applications should be made as soon as possible to increase N uptake.

Iron (Fe) chlorosis. Soils that are too wet can also induce temporary symptoms of Fe chlorosis. With Fe chlorosis, the top most leaves will turn yellow, but the veins remain green. This problem is usually more serious in soils with highly alkaline pH. Additionally, soybean varieties have varying tolerance to Fe chlorosis so certain varieties may show more of the symptom than others.



Figure 1. Iron chlorosis on soybeans. The upper leaves become chlorotic. Photo by Doug Jardine, K-State Research and Extension.

Excess nitrate in the soil can exacerbate problems of Fe chlorosis in fields with high soil pH and prone to causing Fe chlorosis problems. This can be particularly noticeable during early soybean growth.

An interesting phenomenon that occasionally has been observed is that soybean plants in slightly more compacted soil (for example in the wheel tracks associated with the last tillage pass) will be greener and display less yellowing from Fe chlorosis than the rest of the field. Recent studies have shown that soil nitrate concentrations in these wheel tracks are typically lower, so Fe chlorosis symptoms are alleviated compared to the rest of the field. The areas of compacted soil have less oxygen, likely resulting in more denitrification. Areas of higher soybean population in the field can also show greener conditions. Higher plant populations and greater root density can reduce the negative effect of higher soil nitrate concentrations on Fe chlorosis in the volume of soil.



Figure 2. Field of soybeans with iron chlorosis, showing greener areas in the wheel tracks. Photo by Dorivar Ruiz Diaz, K-State Research and Extension.

Potassium (K) deficiency. Another cause of yellowing could be K deficiency. Contrary to Fe deficiency, K deficiency is typically more common later in the season. Deficiency symptoms include an irregular yellow mottling around leaflet margins. The yellow areas coalesce to form a more or less continuous, irregular yellow border. Again, as with N, you can see symptoms both in fields that are too wet or too dry. Most of the time, the symptoms will fade with improved soil conditions that allow good root growth, unless the field is truly deficient in K. Potassium deficiency can also be caused by soil compaction, which limits root growth and development.



Figure 3. Yellowing around leaflet margins from potassium deficiency. Photo by Dorivar Ruiz Diaz, K-State Research and Extension.



Figure 4. Chlorosis of the lower leaves from potassium deficiency shows up first on lower leaves.

Photo by Dave Mengel, K-State Research and Extension.

Rooting restrictions. Anything that restricts expansion of the root system (e.g. extremely wet or dry soil, compaction layers, sidewall compaction, root insects and disease etc.) can lead to reduced growth and potential leaf yellowing. With a restricted root system, the growing plant can't access the nutrients it needs to make more leaves. As a result, many of the nutrient deficiencies described above can show up in fields where you might not expect them based on a typical soil test.

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Producers may be seeing corn that is falling over or flopping in the wind this year. Occasionally plants are standing, but exhibit wilting or stunting symptoms. To diagnose the problem, start by digging up some plants and examining the root system. Corn in the V4 to V6 stages and beyond should have a well-established secondary root system. These are larger and thicker than the primary roots. If the corn plants have not established a viable secondary, or nodal, root system, the problem is often termed “rootless” or “floppy” corn.



Figure 1. Plant with poorly developed secondary root system. Crown was exposed above soil surface. Photo by K-State Research and Extension.



Figure 2. Plants with adequate (left) and poor root development (right) systems. Photo by Ignacio Ciampitti, K-State Research and Extension.

When corn germinates, the first roots to emerge from the seed are the primary, seminal, or seed roots. These roots support the plant through emergence and the appearance of the first few leaves. At emergence, exposure of the coleoptile to light will cause it and the mesocotyl to stop growth and will position the crown at $\frac{3}{4}$ " to 1" or more below the soil surface. As the plant grows, the first four or five nodes do not elongate, keeping the growing point below the soil surface until V6 when the stem begins to elongate rapidly.

The roots that develop from these compressed nodes at the crown form the secondary root system. This is a bit confusing because this "secondary" root system is of primary importance for the rest of the life of the corn plant. It is called secondary because it is the second to appear chronologically. These secondary roots rapidly take over water and nutrient uptake and are important for anchoring the plant as it moves through the V4 to V6 growth stages and beyond. If something prevents establishment of these secondary roots, the plants can fall over or flop in the wind or the plants may be stunted or wilted.

Several situations may cause poor secondary root development:

- Saturated soils may prevent adequate root development.
- If the surface soil dries rapidly just as the secondary roots begin to grow, the roots desiccate and the tips die before they reach more moist soil below.
- If the crown becomes exposed for any reason, the secondary roots can dry out and die before they grow into the soil. Crowns can be exposed if heavy rains have compacted the seedbed or washed away the soil (erosion) from around the developing crown.
- Occasionally the mesocotyl (the connection between the seed and the crown) will continue to grow after the coleoptile emerges from the soil, causing the crown to be positioned close to or at the soil surface. The reasons for continued growth of the mesocotyl and the resulting

exposed position of the crown are poorly understood. Some believe it could be due to growth-regulating herbicides (e.g., 2,4-D, dicamba) or cloudy conditions, but cause-effect relationships have not been well established. Several instances of exposed crowns have been documented with no application of growth-regulating herbicides.

- Shallow planting could be the cause of the problem in a few cases. Although shallow planting can cause exposed crowns and poor secondary root development, most fields observed this spring with “rootless” corn have been planted at an adequate depth.

Is there any hope for “rootless” or “floppy” corn? Possibly, depending on whether soils are able to dry out enough to provide good aeration for the roots. Even if plants have fallen over, new secondary roots can continue to form and establish a viable root system if soil aeration and moisture conditions are adequate. Inter-row lay-by cultivation to move soil around the exposed crowns can help if not too many plants have fallen over.

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4. Comparative Vegetation Condition Report: May 26 - June 8

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 23: 05/26/2015 - 06/08/2015

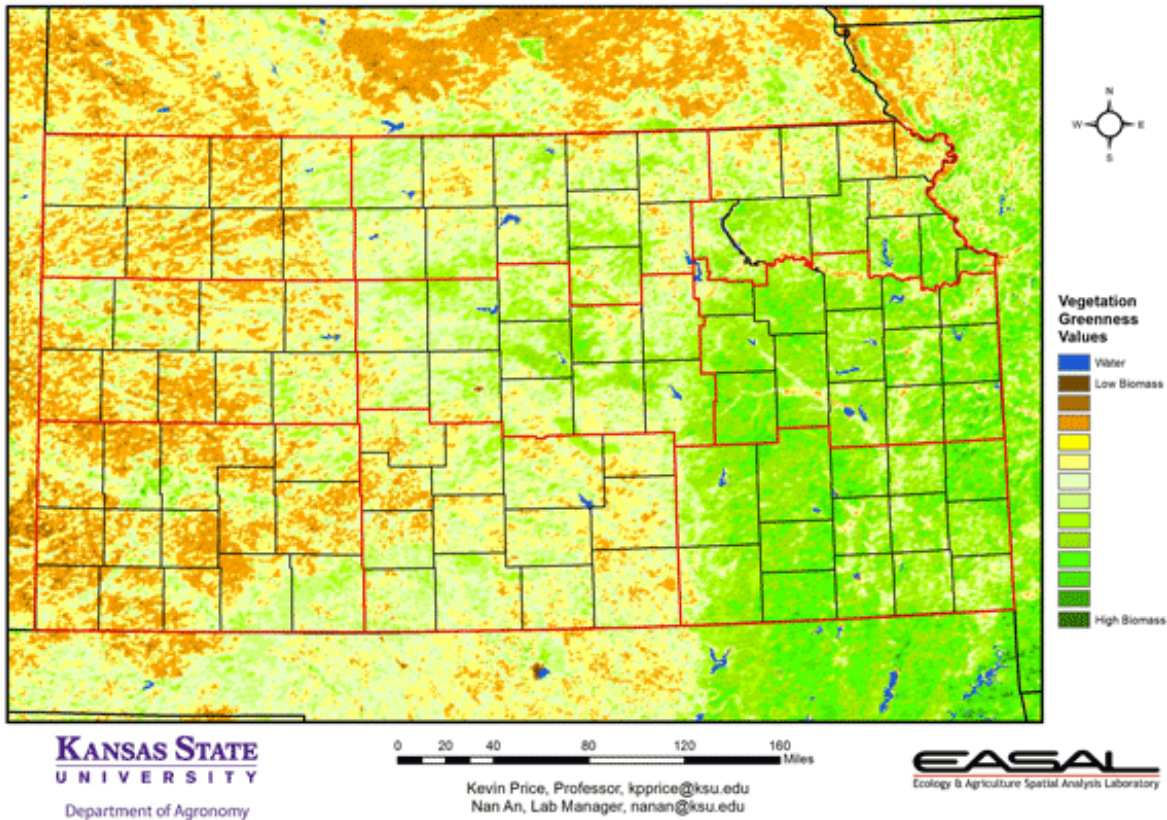


Figure 1. The Vegetation Condition Report for Kansas for May 26 – June 8 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that vegetative activity has increased across the state. There are areas of low biomass production in eastern Kansas that align with stream areas that are at high levels due to heavy rains in May.

Kansas Vegetation Condition Comparison
Late-May/Early-Jun 2015 compared to the Late-May/Early-Jun 2014

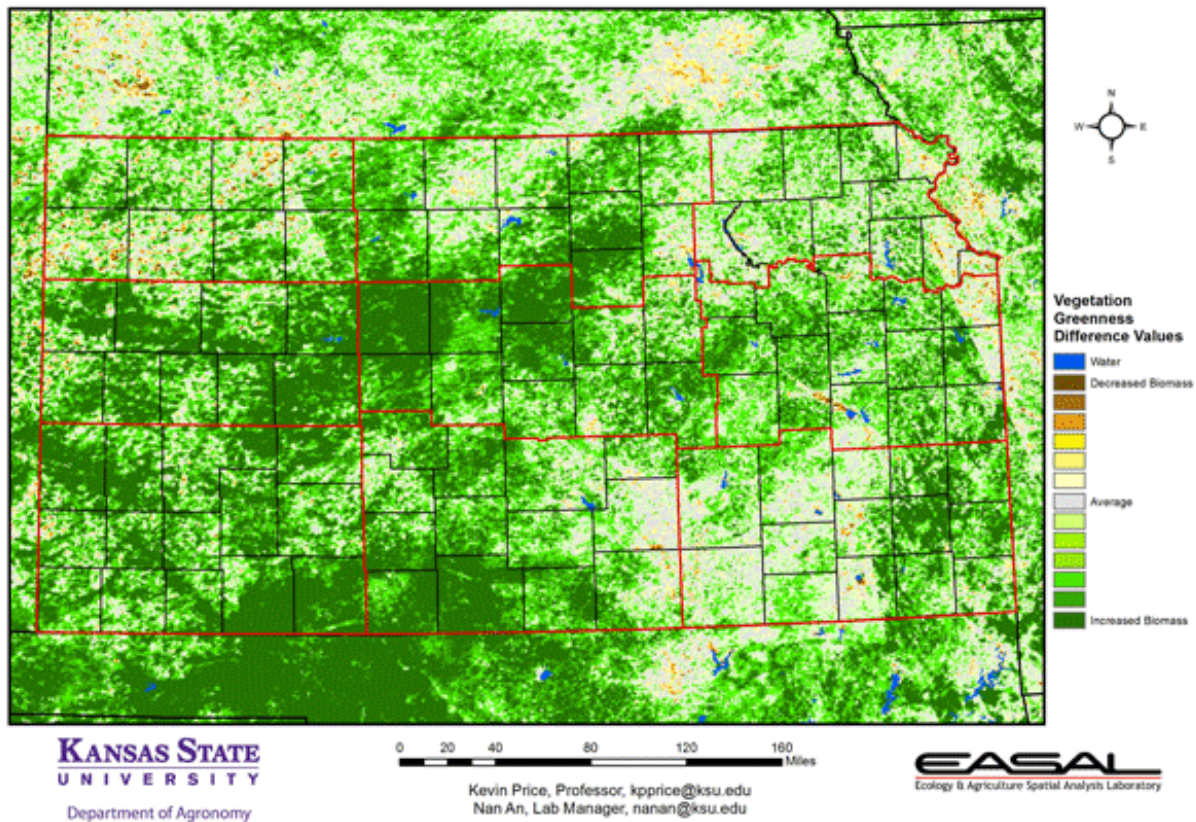


Figure 2. Compared to the previous year at this time for Kansas, the current Vegetation Condition Report for May 26 – June 8 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows biomass production is much higher than last year across much of the state. It is particularly noticeable in southwest and south central Kansas. Last year, precipitation through May in these divisions was averaging around 67 percent of normal. This year moisture in the region is averaging 120 to 150 percent of normal.

Kansas Vegetation Condition Comparison

Late-May/Early-Jun 2015 compared to the 26-Year Average for Late-May/Early-Jun

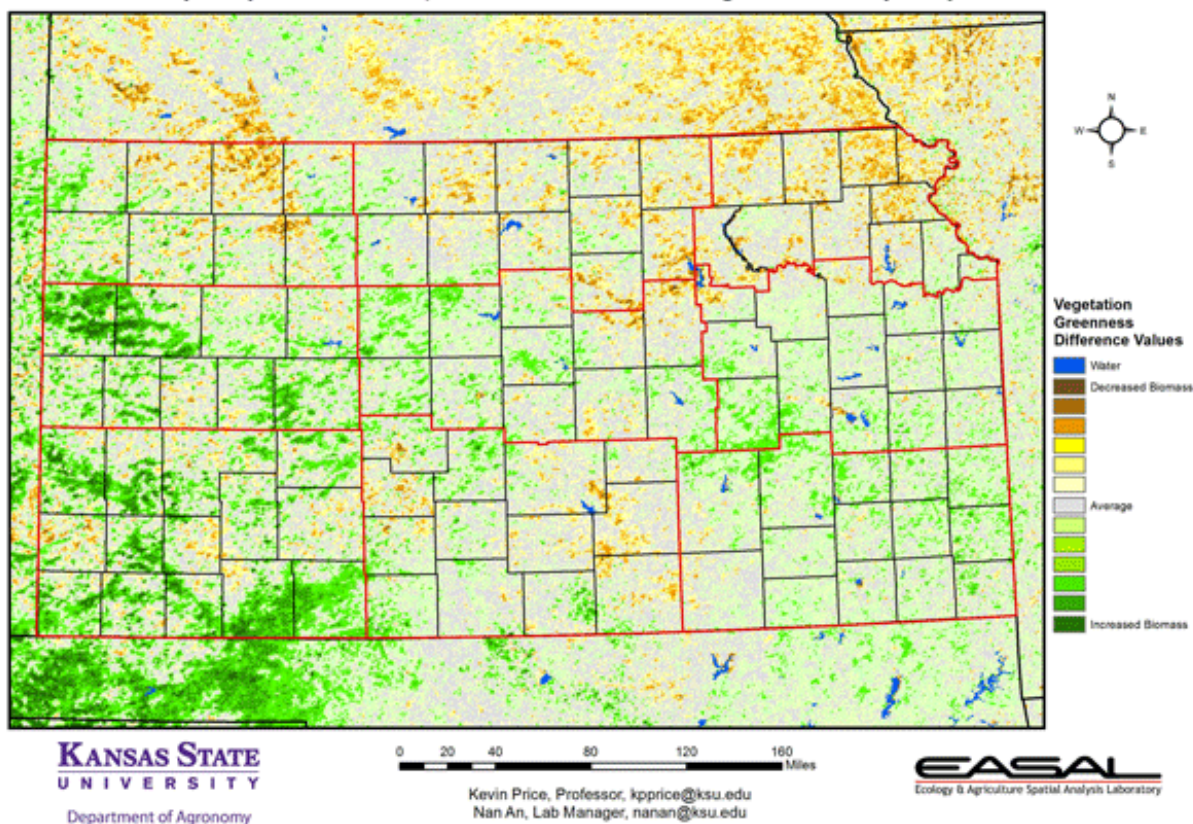


Figure 3. Compared to the 26-year average at this time for Kansas, this year's Vegetation Condition Report for May 26 – June 8 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that the western divisions have the greatest increase over normal levels of photosynthetic activity. While precipitation in this region is much above normal, it has not been quite as excessive as in the Northeastern Division.

U.S. Corn Belt Vegetation Condition

Period 23: 05/26/2015 - 06/08/2015

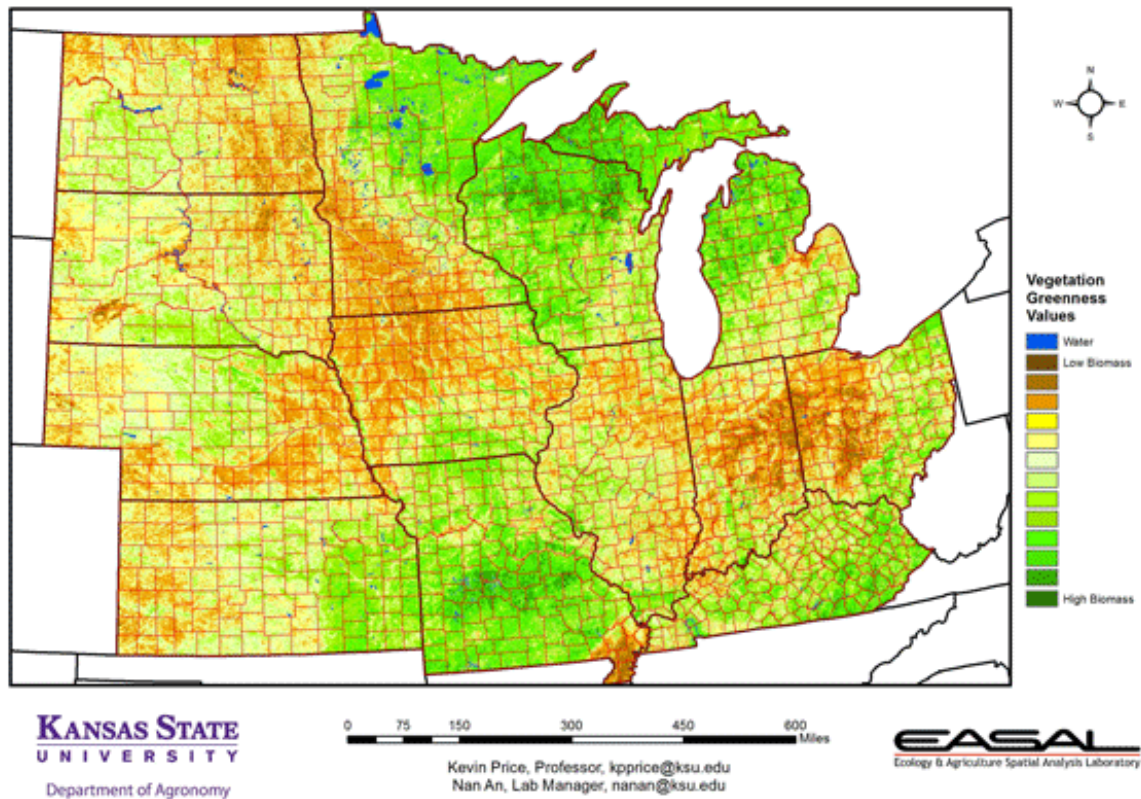


Figure 4. The Vegetation Condition Report for the Corn Belt for May 26 – June 8 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that the lowest level of photosynthetic activity is across the center of the region from North Dakota through western Ohio. Cooler-than-normal temperatures for much of the period have continued to delay crop progress.

U.S. Corn Belt Vegetation Condition Comparison
Late-May/Early-Jun 2015 Compared to Late-May/Early-Jun 2014

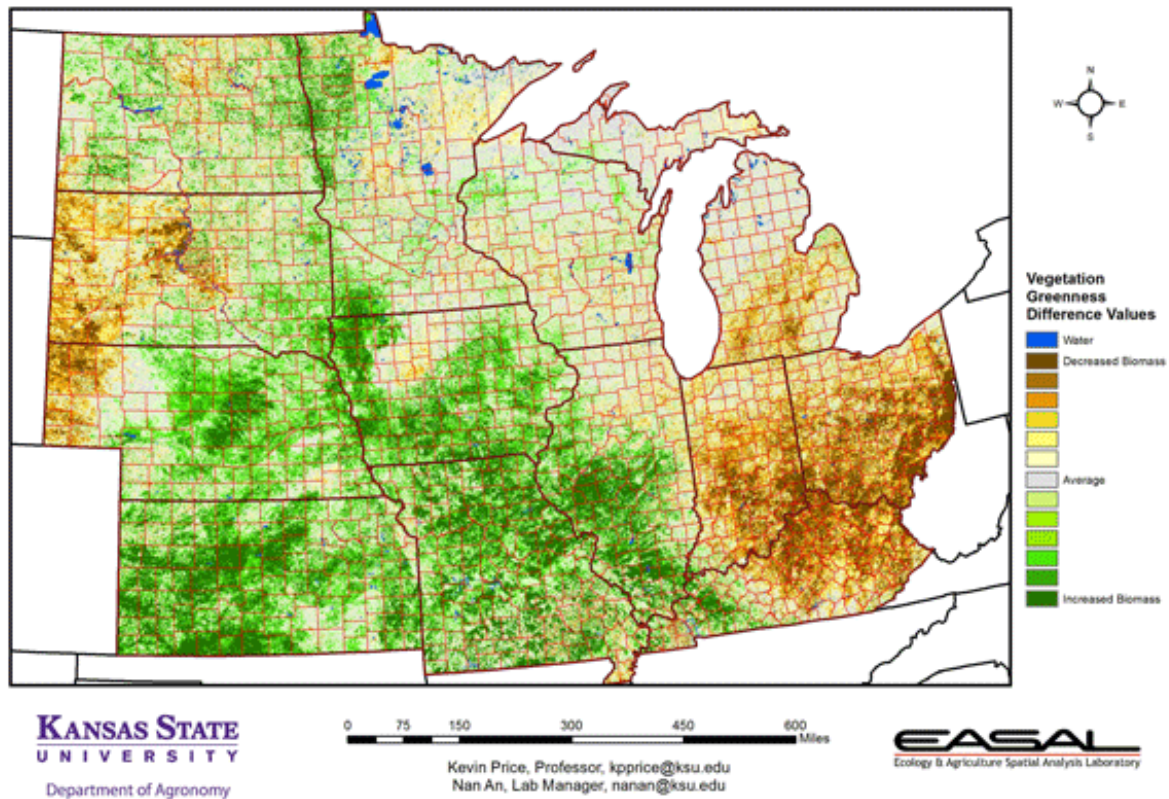


Figure 5. The comparison to last year in the Corn Belt for the period May 26 – June 8 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows much of the region has much higher biomass production. The eastern parts of the region, particularly Ohio, Indiana, and northern Kentucky, have much lower photosynthetic activity.

U.S. Corn Belt Vegetation Condition Comparison
Late-May/Early-Jun 2015 Compared to the 26-Year Average for Late-May/Early-Jun

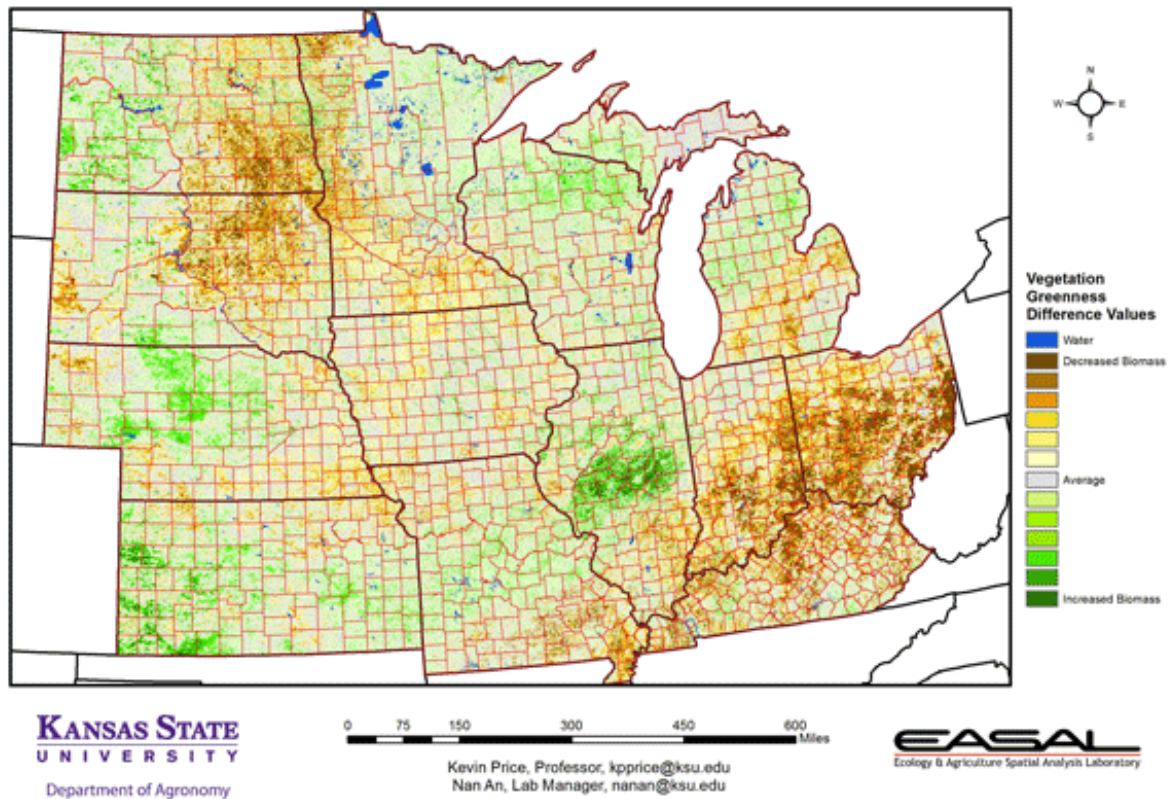


Figure 6. Compared to the 26-year average at this time for the Corn Belt, this year's Vegetation Condition Report for May 26 – June 8 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that the eastern portion of the region has below-average photosynthetic activity. Cooler-than-normal temperatures have slowed crop development, although recent dry weather has allowed for increased field work.

Continental U.S. Vegetation Condition

Period 23: 05/26/2015 - 06/08/2015

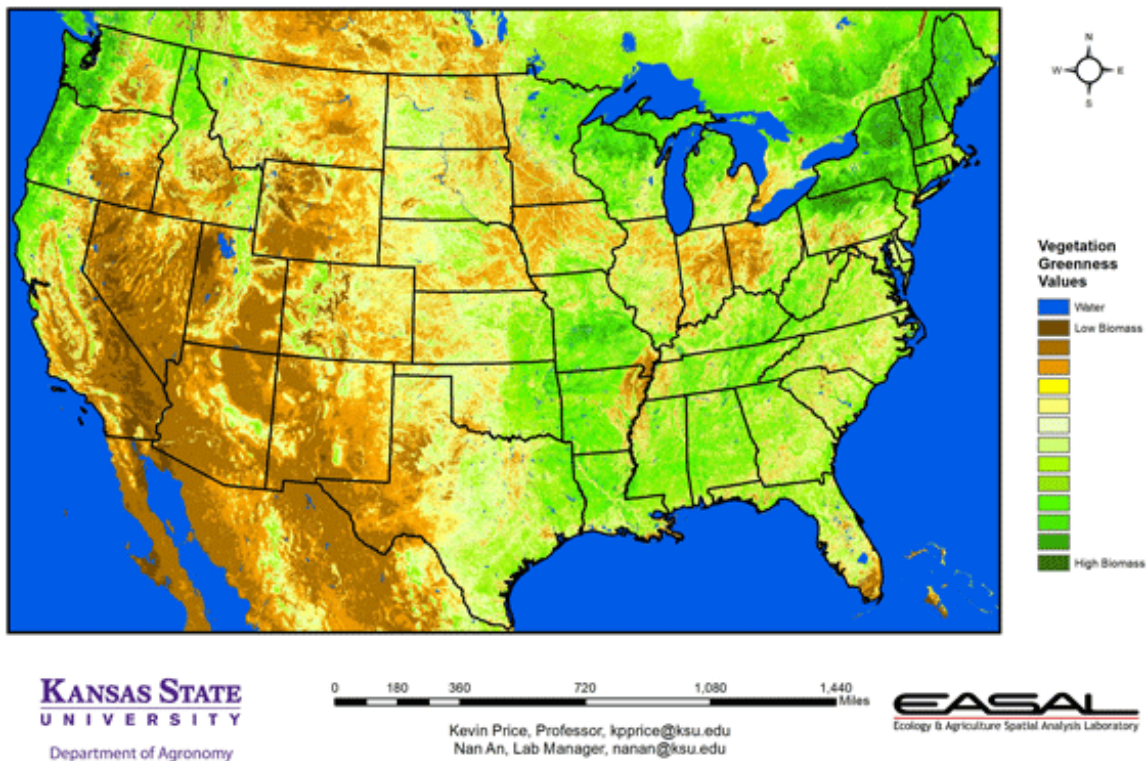


Figure 7. The Vegetation Condition Report for the U.S. for May 26 – June 8 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that a high level of photosynthetic activity is most visible in the New England area, as warmer temperatures favor plant development. There is also an area of high photosynthetic activity in Arizona and New Mexico in response to increased precipitation in the region.

Continental U.S. Vegetation Condition Comparison
Late-May/Early-Jun 2015 Compared to Late-May/Early-Jun 2014

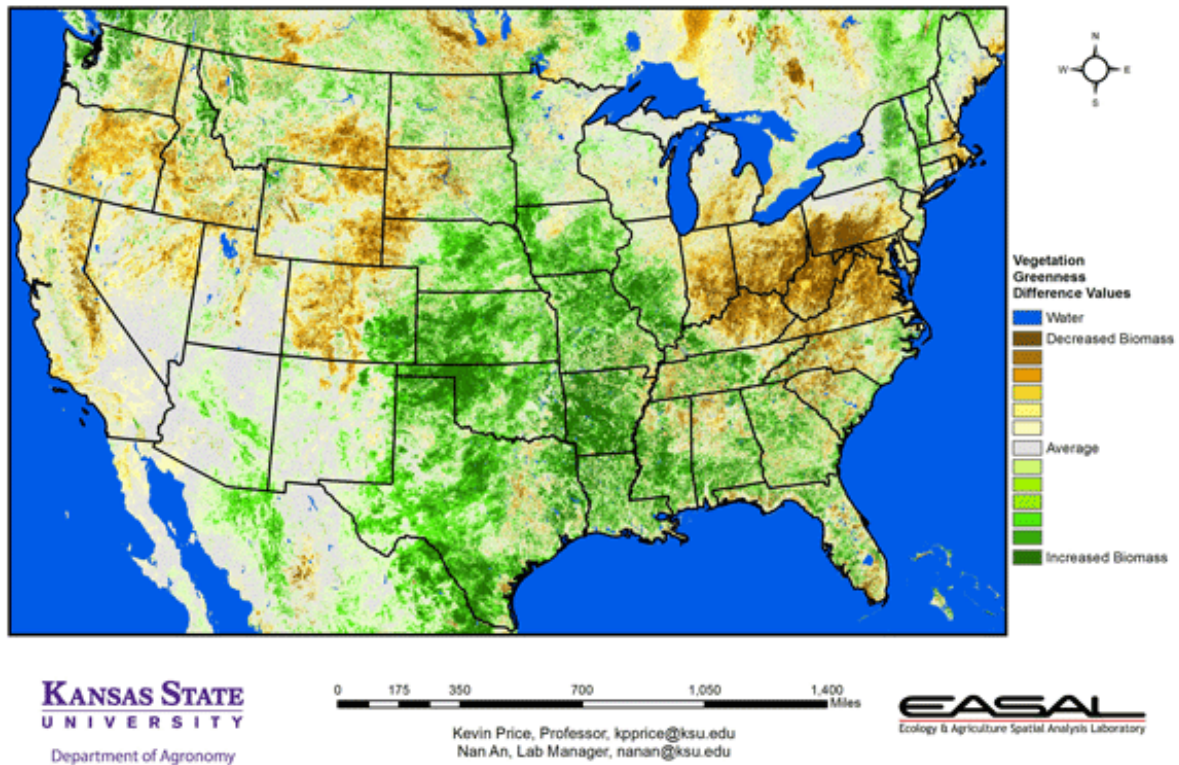


Figure 8. The U.S. comparison to last year at this time for the period May 26 – June 8 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows higher photosynthetic activity from the Plains through the Southeast. The central Ohio River Valley has much lower biomass production. Cooler temperatures have delayed crops in that area.

Continental U.S. Vegetation Condition Comparison
Late-May/Early-Jun 2015 Compared to 26-year Average for Late-May/Early-Jun

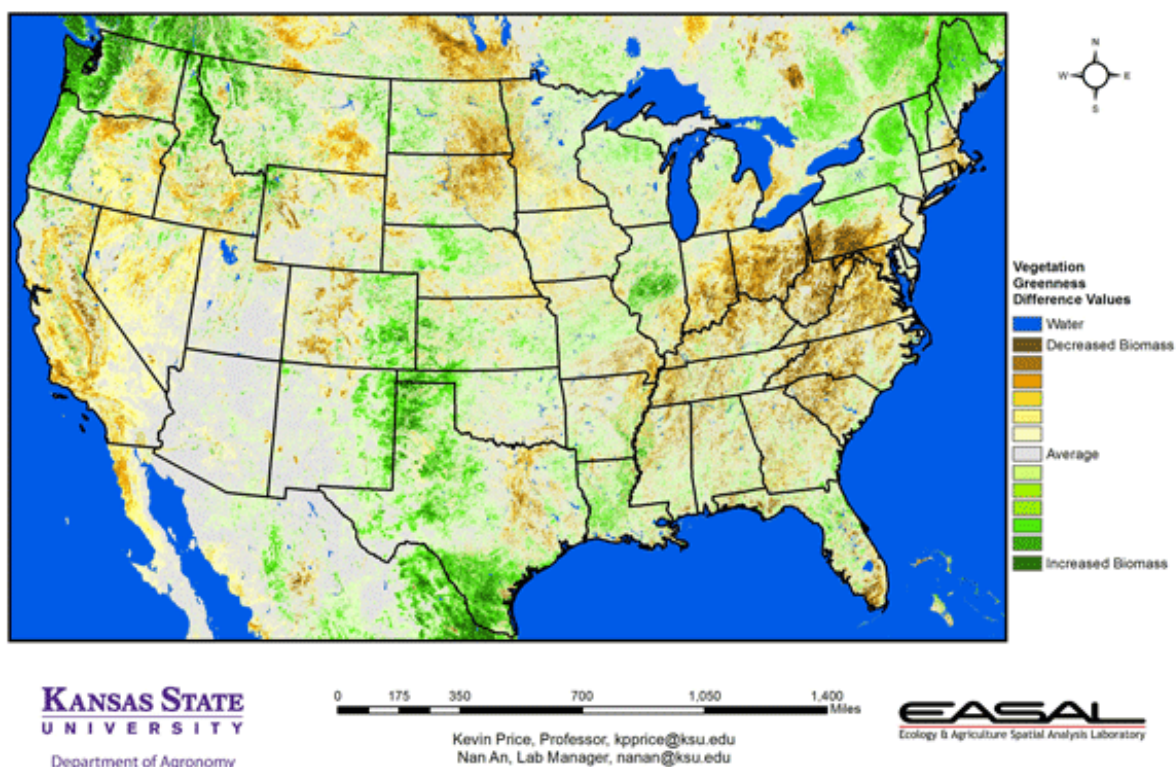


Figure 9. The U.S. comparison to the 26-year average for the period May 26 – June 8 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows much of the country has close-to-average photosynthetic activity. Higher-than-average biomass production is most noticeable across the Pacific Northwest and the western High Plains. Lower-than-average production is concentrated in the Ohio River Valley, where cooler temperatures have slowed plant development.

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