



Number 353
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1. Possible causes of yellow soybeans

There are always some fields of soybeans about this time of year that are turning yellow. There are several possible explanations.

* **Nitrogen deficiency.** In fields that have been extremely dry (or extremely wet, although that's not a problem this year), rhizobial nodule development can be delayed resulting in nitrogen deficiency. As the soils receive rain (or dry out in wet 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 nitrogen 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 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 little N 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 inactive for a while. 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 as soybeans expand into new acres with no history of soybean production. Over the past three years "virgin" fields which had been inoculated before or at planting have failed to produce nodules, resulting in nitrogen deficiency. A quick examination of the roots system showed very few or no

nodules. A rescue application of 90 to 120 pounds of N per acre gave good returns in these situations.

* **Iron chlorosis.** Soils that are too wet can also induce temporary symptoms of iron chlorosis. With iron 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 iron chlorosis so certain varieties may show more of the symptom than others.



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



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

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

An interesting phenomenon that occasionally has been observed is that the 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 than the rest of the field. Recent studies have shown that soil nitrate concentrations in these wheel tracks are typically lower. 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 in the volume of soil.

Why do higher levels of soil N tend to exacerbate problems with iron chlorosis? The reason for this is the subject of debate among plant physiologists, and the answer isn't yet clear. But the effect seems to be real.

* **Potassium deficiency.** Another cause of yellowing that is being seen in some fields is potassium deficiency. At this time of year, 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 nitrogen, you can see symptoms in both too wet and too dry fields. Most of the time, the symptoms will fade with improved soil moisture conditions, unless the field is truly deficient in potassium. Potassium deficiency can also be caused by soil compaction, which limits root growth and development.



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



**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, etc.) can lead to reduced growth and potential leaf yellowing. With a restricted root system, the growing plant can't access the nutrients (iron, potassium, nitrogen before nodulation) 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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2. Nitrogen additions, nutrient cycling, and water management with cover crops

Cover crops are becoming an important part of many Kansas cropping systems. They play many potential roles, including:

- * Trapping residual nitrogen (N) that may remain after a crop
- * Fixing nitrogen for use by subsequent cereal or forage crops
- * Fixing carbon as a source of additional crop residue and soil organic matter
- * Providing competition to limit weed growth

* Serving as “water pumps” to remove excess moisture on poorly drained soils

The first two of those roles are perhaps the least understood and most variable. To understand what to expect in the way of N cycling or additions from cover crops, it is important to briefly review the principles of N reactions in the soil.

Nitrogen can undergo a series of important transformations in soils. Before the N present in a cover crop can become available to a subsequent crop, the vegetation must be decomposed, and the N mineralized -- or converted to ammonium and released into the soil inorganic pool.

How quickly residue decomposes is a function of the carbon (C) and N contents of the residue and soil. As a cover crop dies or is killed and returns to the soil surface, it begins to decay. In residue with a C:N ratio of less than 20:1, adequate N is present to support a build-up in population of residue-decomposing soil organisms, and decomposition proceeds quickly. In that process, excess N (amounts above the needs for the decomposing organisms) is mineralized or released fairly quickly to the soil inorganic pool. Most residues with C:N ratios of less than 20:1 are young, lush vegetation such as wheat prior to jointing or legumes. The table below gives the C:N ratio of many common crops.

Typical Carbon and Nitrogen Content of SOM, Crop Residues or Cover Crop Materials.

Source	% Carbon	% Nitrogen	C:N Ratio
Microorganisms	50	6.2	8:1
Soil OM	52	5.0	10:1
Young clover	-	-	12:1
Alfalfa, bloom	40	3.0	13:1
Soybean residue	40	2.6	15:1
Brome hay, 15% protein	40	2.4	17:1
Well composted manure	-	-	<20:1
Green Rye	-	-	36:1
Grass cover mix	40	1.0	40:1
Corn stalks	40	0.7	60:1
Wheat straw	40	0.5	80:1
Sorghum stalks	40	0.5	80:1
Sawdust	40	0.1	400:1

With a C:N ratio above 20:1, free N from the inorganic pool will be used by microorganisms to grow and multiply, resulting in temporary immobilization of that nitrogen and a decrease in N availability to crop plants. Only when the excess C has been used, or decomposed, will the microbial population die back and the N within the microbial community be released, or mineralized, for use by the crop.

Nutrient trap crops

For nutrient trap crops, the use of fast growing, N-demanding crops are ideal. Summer crops such as millet or forage sorghum planted in the summer after wheat make ideal trap crops. So do cereal rye,

wheat, triticale, or canola, turnips, or radishes planted in the fall after summer crops. Trap crops will use soil N to support growth. In most cases, cereal trap crops will have a wide C:N ratio, so the release of the N to subsequent crops may be slow. Canola, turnips, radishes, or legumes will produce less dry matter, but have a narrower C:N ratio, and have a quicker decomposition and N release.

When using cereals, corn, sorghum, or millet it may be the second crop grown that actually benefits from the trapped N. But during that interval from the time the trap crop dies until a subsequent crop can utilize the N, the trapped N will not move through the soil to contaminate groundwater. In addition to N, nutrient traps will also help slow the loss of S, K, and Cl on sandy soils prone to leaching of mobile nutrients.

Most trap crops also are also well suited as residue cover sources. Remember, the rate of residue decomposition can be slowed to some extent by selecting a cover crop with high C, low N residue, such as forage sorghum, millet or cereal rye, and letting it become fairly mature, in an N-deficient environment.

N-fixing cover crops

If wanting to grow cover crops to provide supplemental N to future cereal or forages, legumes are preferred. But cereals can also be useful, especially due to lower seed costs, if killed at an early growth stage when the residue has a low C:N ratio so that it will decompose fairly quickly.

Legumes fix N, if nodulated, but the amount produced will vary widely. Also, remember the C:N ratio still applies when determining how quickly the fixed N within a legume will be available to subsequent crops. Fine-textured, low C:N plants such as alfalfa, clover, soybeans, or peas will decompose much more quickly, releasing N much more rapidly, than coarse-textured, wide C:N plants such as mature sunn hemp.

Nitrogen fixation is a very energy intensive process, whether done by legumes or in a Bosch-Haber fertilizer plant. That means you must have conditions favorable to photosynthesis and high yield. In many cases, some combination of dry soils, short daylength, and cool temperatures limit N fixation by many legumes planted after wheat, or planted in the fall after summer crops. Also, high soil nitrates will feed back and “poison” N fixation. So the potential N fixation from many legumes is not guaranteed, and can be limited. In the best-case scenario, the total N present in legume cover crops can be impressive. But the net difference between the amount of N trapped by a cereal and the amount of N present in a legume, considering both the residual in the plant plus the amount produced through N fixation, can be small.

How much N can be expected to be trapped or produced by cover crops?

Research in Kansas has shown that the amount of N that can be trapped or produced through fixation can vary widely.

It is common for 20 to 60 pounds of N to be trapped by crops such as millet, forage sorghum, or sudan grass planted after wheat. In fields with a history of manure applications, or when planted after a failed or drought-damaged wheat or corn crop, values could be higher. When planting after a failed crop, however, the stage of growth of the crop when it failed will determine how much N is left in the soil. The vast majority of the N used by the crop will have already been taken up when wheat heads or corn tassels. Winter cereals planted after corn will generally trap less N due to

limited fall growth. In many cases this can be as low as 20 to 40 pounds N per acre. Cereals after sorghum will typically trap even less than that, because N fertilizer rates on sorghum are lower, and sorghum residue has a wider C:N ratio.

As for the amount of N produced through N fixation, remember that legumes are basically lazy, and will utilize available N present in the soil before spending energy to fix N. So the additional N produced, above the amount a trap crop would take up, may be limited, particularly if the legume is terminated early to minimize the amount of growth (such as is often the case with sunn hemp). Generally, sunn hemp and long-season soybeans that stay vegetative will produce/trap the largest amounts of N, perhaps as much as 100 pounds N per acre. But the portion that will become available for future crop use can be a question, especially with very aggressive species such as sunn hemp, which produces lots of biomass with a wide C:N ratio. Cowpeas would be expected to produce significantly less N.

The amount of N produced by winter legumes such as vetch and winter peas planted after corn and other summer crops is primarily determined by the timing of termination in the spring. Generally the equivalent of 30 to 50 pounds of fertilizer N can be produced if these species are allowed to grow until mid to late May. Killed earlier, N production is considerably less. Unfortunately, the cost of seed and seeding, and the yield reduction possible from delayed planting of a crop such as corn, can exceed the value of N produced from many legume cover crops.

Other considerations: What about water management?

Good, actively growing cover crops utilize water much like any other growing crop. This may be important to legumes in their production of N. But overall, water use by cover crops can be a blessing or a curse, depending on the soil and rainfall situation, and can determine when a cover crop should be terminated.

In sandy soils, or areas where rainfall may be limited, an aggressive cover crop can utilize the available soil moisture and make germination and stand establishment of the following cash crop difficult. In these situations, terminating the cover crop several weeks prior to planting the cash crop may be important to ensure adequate moisture at planting beneath the cover crop residue.

However, on poorly drained soils, especially in areas with potentially high spring rainfall, actively growing cover crops can serve as water pumps to help dry the soil to facilitate trafficability and early planting. Waiting to kill the cover crop until just prior to or immediately after planting can be an advantage in these situations. Killing a cover crop early on a heavy soil, then getting subsequent heavy rain, can make it very difficult to get the soil under the cover crop residue to dry adequately to avoid soil compaction at planting.

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3. Nitrogen in the soil: Additions, losses, and the impact on crops

Whether trying to determine the amount of nitrogen (N) trapping or additions from cover crops, the N credit from a legume crop, or how to make an N recommendation based on soil test results for a given crop and yield goal, there are certain principles of soil N that must always be considered. The first thing to understand is that there are three primary pools of nitrogen (N) present in soils:

1. An inorganic N pool comprised primarily of ammonium and nitrate. The inorganic N pool of ammonium and nitrate is readily available to crops. This pool is primarily the result of mineralization of organic residues and soil organic matter, along with residual or “left-over” N from fertilization. It also will contain N added through atmospheric deposition, and fixed N falling to earth with rain as the result of lightning passing through the atmosphere.

2. A dynamic pool of organic materials, including living organisms, plant roots and crop residues which are actively undergoing decomposition and transformation. The end products of these transformations include CO₂, NH₄, (and other nutrients such as phosphate and sulfur) and true SOM. The dynamic N pool breaks down fairly slowly, taking from as little as a few weeks to 4 or 5 years to fully decompose, depending on the relative carbon and nitrogen content of the materials added to that pool each year. As this material decomposes, N can be mineralized quickly, if the residues have a low C:N ratio. This is the source of the N accounted for in the “previous crop credit” which is included in the N recommendation from soil test laboratories.

When plant residue is high in N, such as with alfalfa roots and crowns, the residue breaks down quickly and N begins to be released almost immediately. This release may be sizeable and can continue for two or three years, giving a second or even third year credit for the alfalfa. Soybeans are intermediate, with most of the N released in the first year and little additional release in subsequent years.

However when the residue is very low in N, with a high C:N ratio -- such as corn, sorghum or sunflower stalks, or wheat straw -- the limiting factor to decomposition is N, or protein, to expand the microbial population so they can take advantage of all the carbon. Any N released will be used to produce more microbial biomass as long as large amounts of carbon “fuel” is present. Over time the C will be used as energy for the microbes and will eventually be depleted. At that point N will be released as the microbial population dies back.

3. A stable, recalcitrant pool of organic materials produced from the decomposition of plant and animal residue is referred to as soil organic matter (SOM). The stable or recalcitrant pool, true soil organic matter, is only slowly available, with perhaps 1 to 2% of the N present becoming available each year. This amounts to about 20 pounds of available N added to the inorganic pool per 1% SOM per year. This 20 pound credit for each one percent of SOM is used by K-State when determining N recommendations for summer crops. But only half that much, or 10 pounds N for each one percent of SOM, is given as a credit for fall or winter crops such as wheat or canola. This is due to the slower rate of SOM decomposition in fall, winter, and early spring, when wheat is actively taking up N.

Additions of N to the soil system

There are several ways N is added naturally to soil systems. These include N fixation by lightning, and biological N fixation by both free living organisms and legumes. In our native prairie

ecosystems this can account for 20 to 40 pounds of N per acre per year. In modern managed systems we also gain N through acid deposition from burning fossil fuels, adding N fertilizers, growing leguminous crops such as alfalfa and soybeans, and applying waste materials, especially animal manure on farm lands. The total additions of N to intensively managed farmland can exceed 250 pounds N per acre per year when manure is involved.

Losses of N from the soil system

N is also lost from cropland soils each year, even in Kansas. Key loss mechanisms include:

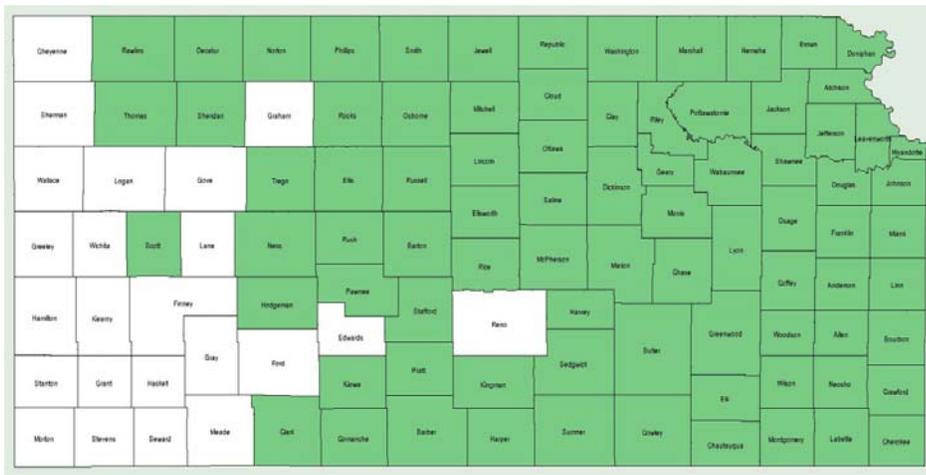
- * *Leaching* of nitrate through the soil, a key issue on sandy soils, especially with irrigation.
- * *Denitrification*, the biological conversion of nitrate under anaerobic conditions to various forms of gaseous nitrogen oxide products. This process can ultimately result in nitrous oxide and nitrogen gas. This is the primary nitrogen loss mechanism on poorly drained, heavy textured or claypan soils.
- * *Ammonia volatilization* from surface applied urea or manure, a concern at high soil pH or in high residue no-till systems.
- * *Soil erosion*.

We also can't forget *crop removal*, which is generally the largest N loss annually from an agricultural system, especially when we harvest forage crops or corn grain.

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4. Chemical control of smooth sumac

Smooth sumac (*Rhus glabra*) is a native shrub found throughout the eastern two-thirds of Kansas. It is commonly found along fencerows, open fields, roadsides, prairies, and dry rocky hillsides. The plant provides emergency winter feed for wildlife. Pheasant, quail, wild turkey, and many song birds include smooth sumac fruit in their diet. White-tail deer eat the fruit and stems.



Smooth sumac distribution in Kansas
 Source: USDA Plant Database

In rangeland, shallow rocky soils are usually the natural site for smooth sumac stands. Without management, smooth sumac can start invading on deeper soils replacing more desirable species. Smooth sumac spreads by rhizomes, vigorously resprouting after fire. Repeated mowing at the proper time can reduce smooth sumac stands. Mowing should be done in early to mid-June when the carbohydrate reserves are at their low point.



Smooth sumac on Kansas rangeland. Photo by Walt Fick, K-State Research and Extension.

Smooth sumac is a relatively easy plant to control with herbicides. The optimum time to spray smooth sumac is during the flowering and seed production stage. This timeframe corresponds to increasing food reserves in the root/crown of the species.

A number of foliar-applied herbicides, including triclopyr (Remedy Ultra), picloram + 2,4-D (Grazon P+D), triclopyr + 2,4-D (Crossbow), and triclopyr + fluroxypyr (PastureGard), will control smooth sumac. Appropriate rates can be found on those labels. The cheapest and also a very effective herbicide to use is 2,4-D amine or low volatile ester applied at 2-4 pint/acre. Ground applications of 2,4-D should be made in 10-20 gallons/acre total spray solution. There is no waiting period for beef or non-lactating animals grazing areas sprayed with 2,4-D. However, do not allow dairy animals to graze treated areas within 7 days of application.

Soil applied materials, such as Spike 20P (tebuthiuron) and Pronone Power Pellets (hexazinone), can provide control of smooth sumac. Spike 20P should be applied during the dormant season at 0.75 ounces product per 100 square feet. This is equivalent to 20 pounds of product per acre. Pronone Power Pellets should be applied when the soil is moist and rainfall is expected within 2 weeks of application. For plants 3-6 feet tall apply 2-4 pellets at the base of the plant. Expect to see grass damage following use of Pronone Power Pellets. These dry soil-applied products may be useful in areas where spray drift may cause considerable non-target damage.

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5. Only 50 free Plant Management subscriptions remaining

Last month, the United Soybean Board and the Plant Management Network (PMN) promoted 500 free one-year subscriptions to PMN's 13 crop management resources, including the Focus on Soybean webcast resource. These subscriptions are meant for soybean growers and the consultants who work for them. In Kansas, county agents already have a subscription to the Plant Management Network because Hale Library pays for it.

Only 50 of these subscriptions are left, available on a first-come, first-serve basis. You can sign up for a free one-year subscription to all the Plant Management Network's content through a signup form at the following link: <http://bit.ly/GFDCzj>

Just enter the required contact information, scroll down toward the bottom of the page, enter your preferred username and password, and click "submit."

Once you subscribe, you'll get article alerts once a month in the form of PMN's Update newsletter. Click through to whatever content you like. If it's subscriber-only content, you'll be prompted to fill in your username and password.

A listing of PMN's soybean-inclusive resources, all of which can be accessed through Focus on Soybean, can be found at:

<http://www.plantmanagementnetwork.org/subscriptions/details/soybean.asp>

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6. Comparative Vegetation Condition Report: May 22 – June 4

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=CRP3Y5NIggw>

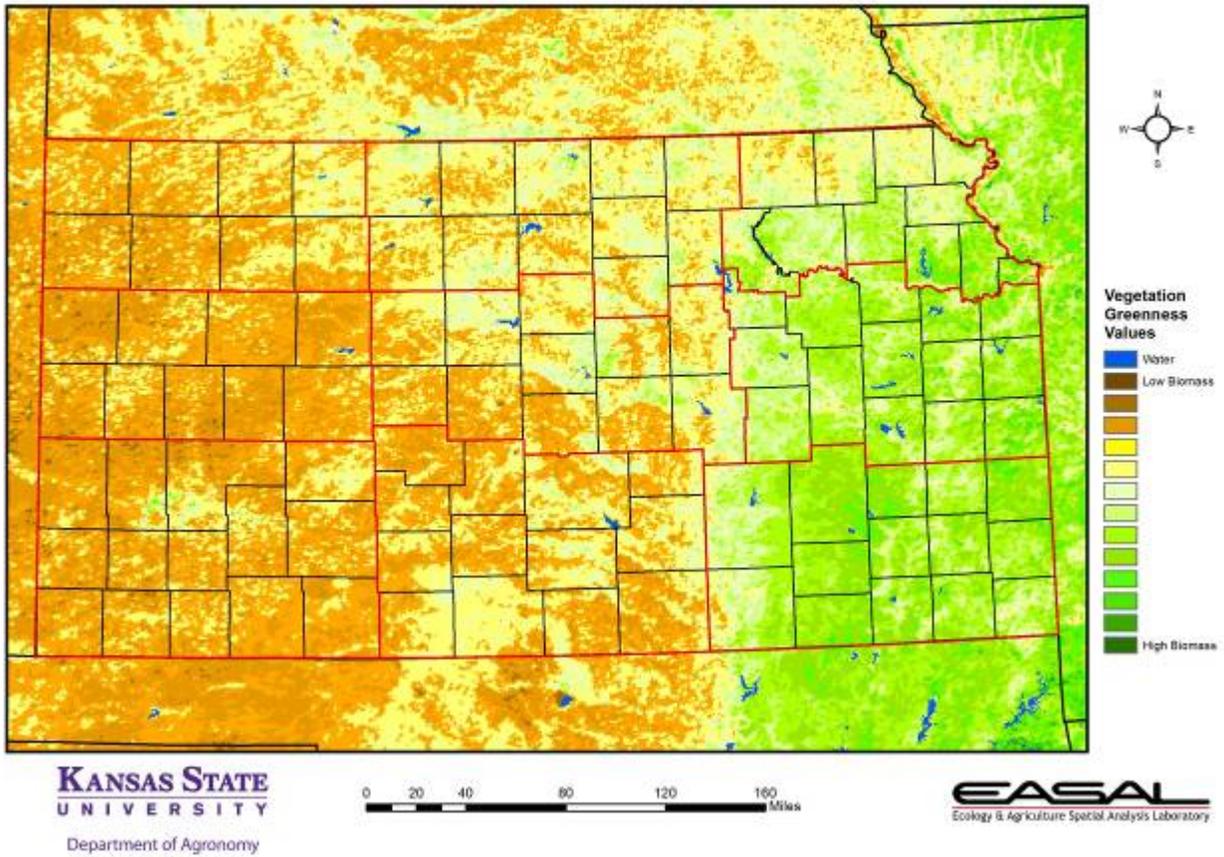
<http://www.youtube.com/watch?v=tUdOK94efxc>

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 21-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 maps below show the current vegetation conditions in Kansas, the Corn Belt, and the continental U.S, with comments from Mary Knapp, state climatologist:

Kansas Vegetation Condition

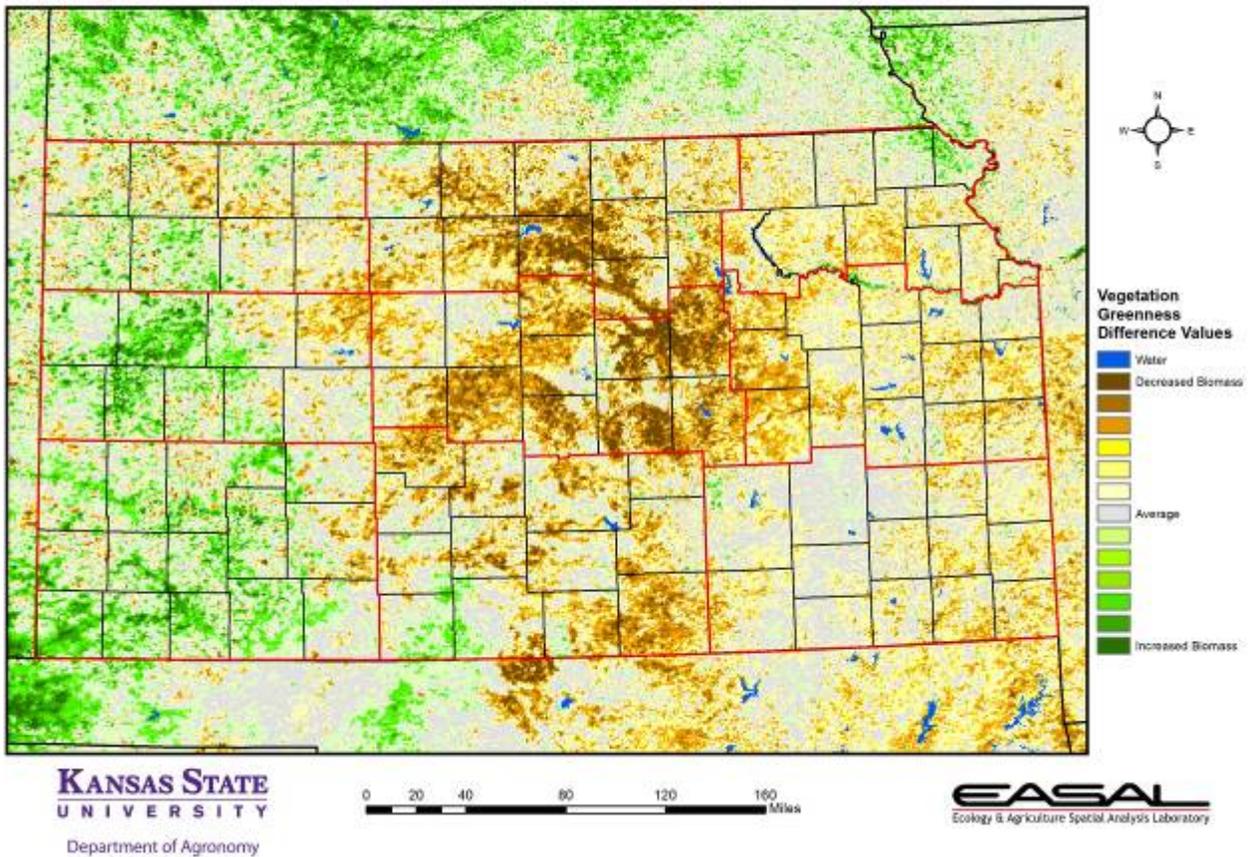
Period 22: 05/22/2012 - 06/04/2012



Map 1. The Vegetation Condition Report for Kansas for May 22 – June 4 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that biomass production is low, especially in the western portion of the state. Dry conditions and lingering impacts from last summer’s drought have reduced productivity.

Kansas Vegetation Condition Comparison

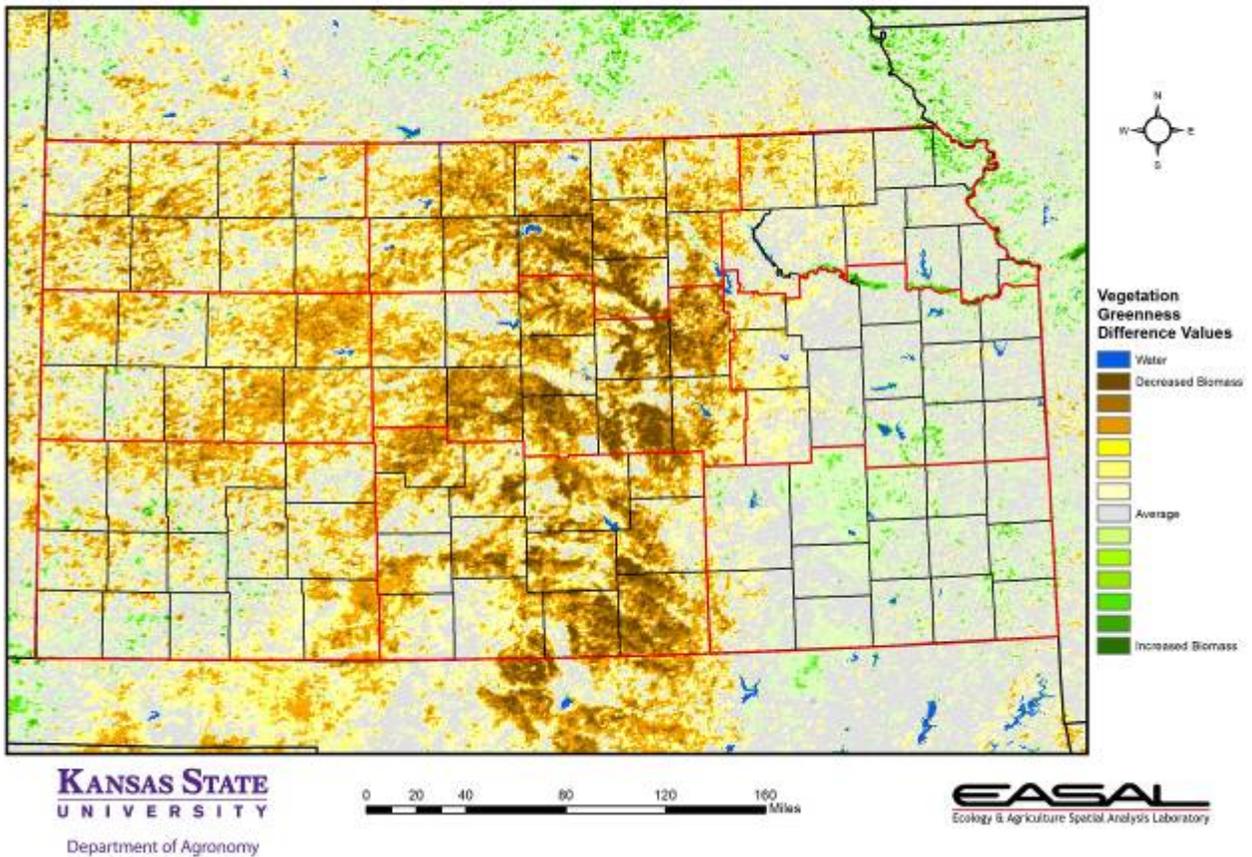
Late-May/Early-Jun 2012 compared to the Late-May/Early-Jun 2011



Map 2. Compared to the previous year at this time for Kansas, the current Vegetation Condition Report for May 22 – June 4 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that western Kansas actually has greater photosynthetic activity than last year. Much of the reduced photosynthetic activity in the central portions of the state is due to the early maturity of the wheat. Additional reduction in biomass production is due to low rainfall in May.

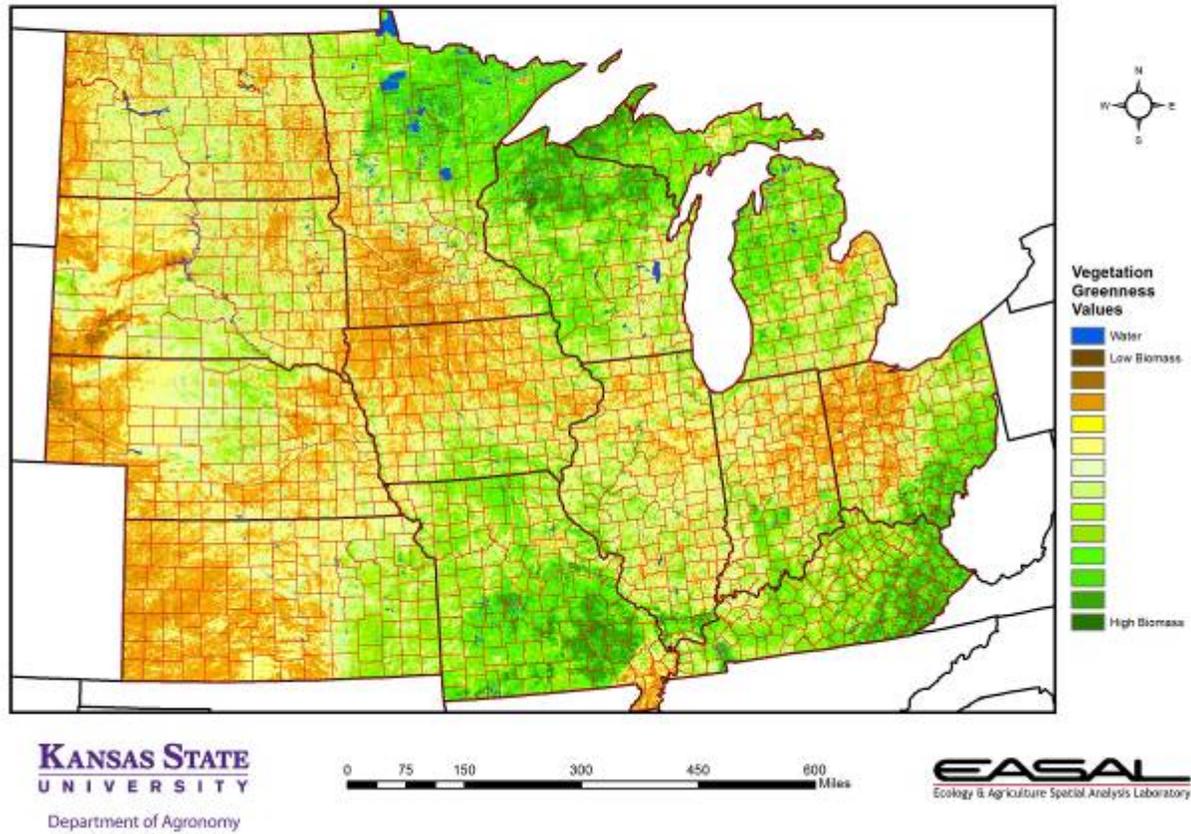
Kansas Vegetation Condition Comparison

Late-May/Early-Jun 2012 compared to the 23-Year Average for Late-May/Early-Jun



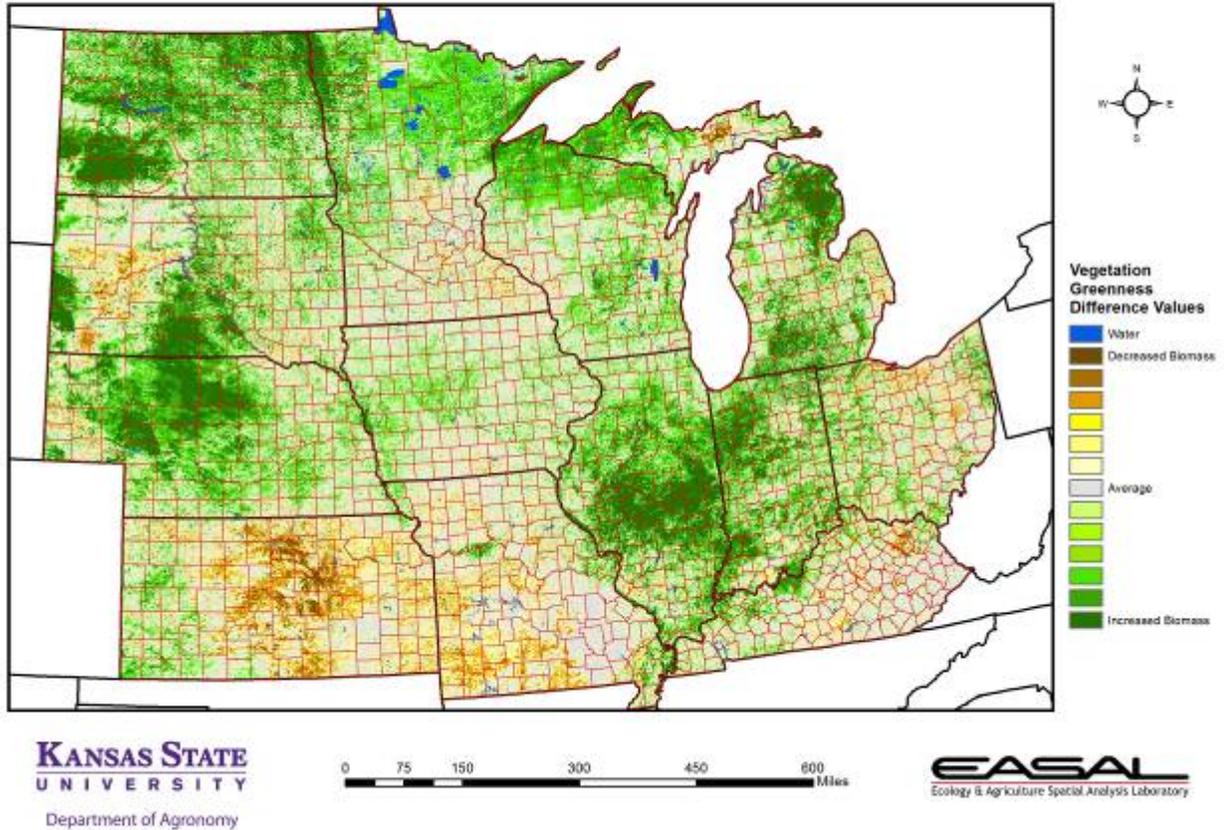
Map 3. Compared to the 23-year average at this time for Kansas, this year's Vegetation Condition Report for May 22 – June 4 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that the western two thirds of the state has lower NDVI values than average. In central Kansas wheat is well ahead of normal, with 23 percent harvested. Statewide, 96 percent of the wheat has turned color, compared to an average 33 percent.

U.S. Corn Belt Vegetation Condition
Period 22: 05/22/2012 - 06/04/2012



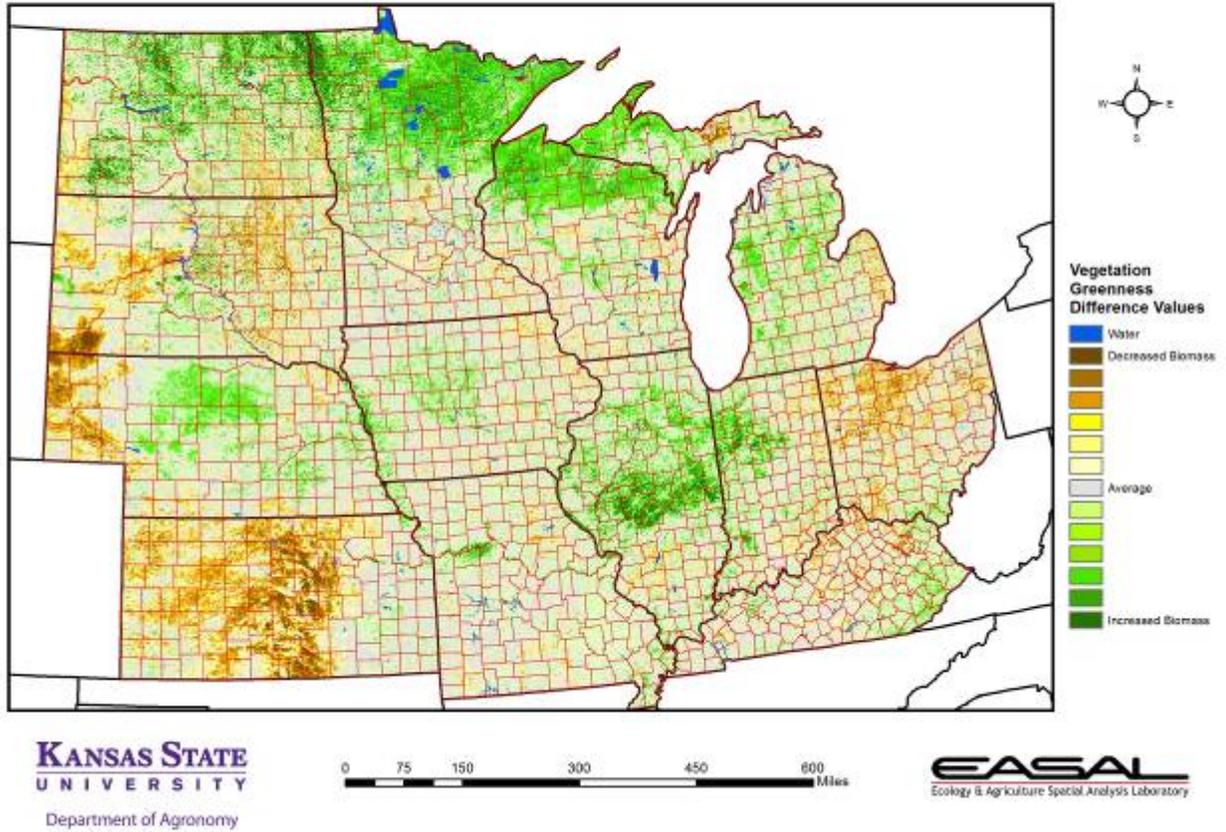
Map 4. The Vegetation Condition Report for the Corn Belt for May 22 – June 4 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that photosynthetic activity is highest on the northern and southern fringes of the region. Crop progress continues ahead of normal, particularly in the Dakotas, where crop conditions are generally good to excellent.

U.S. Corn Belt Vegetation Condition Comparison
Late-May/Early-Jun 2012 Compared to Late-May/Early-Jun 2011



Map 5. The comparison to last year in the Corn Belt for the period May 22 – June 4 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that biomass productivity is at or above levels from the previous year during this two-week composite period. In central Kansas and southwestern Missouri, the combination of early maturity of the wheat and deepening drought conditions have led to significantly lower biomass productivity. This is also true for parts of western South Dakota and western Nebraska.

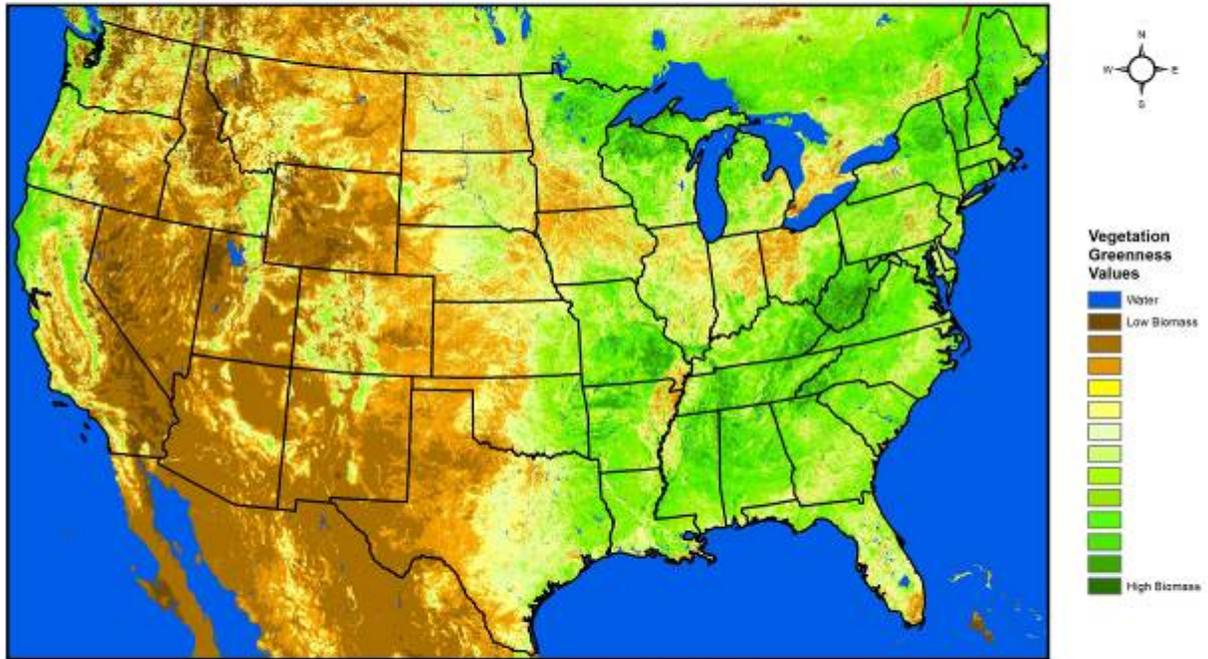
U.S. Corn Belt Vegetation Condition Comparison
Late-May/Early-Jun 2012 Compared to the 23-Year Average for Late-May/Early-Jun



Map 6. Compared to the 23-year average at this time for the Corn Belt, this year's Vegetation Condition Report for May 22 – June 4 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows below-average photosynthetic activity in the western regions, as well as in northern Ohio. This is a combination of early cool-season crop maturity and increasing drought. In Kansas and Nebraska, the area of moderate to severe drought is expanding, while in northern Ohio current conditions are abnormally dry.

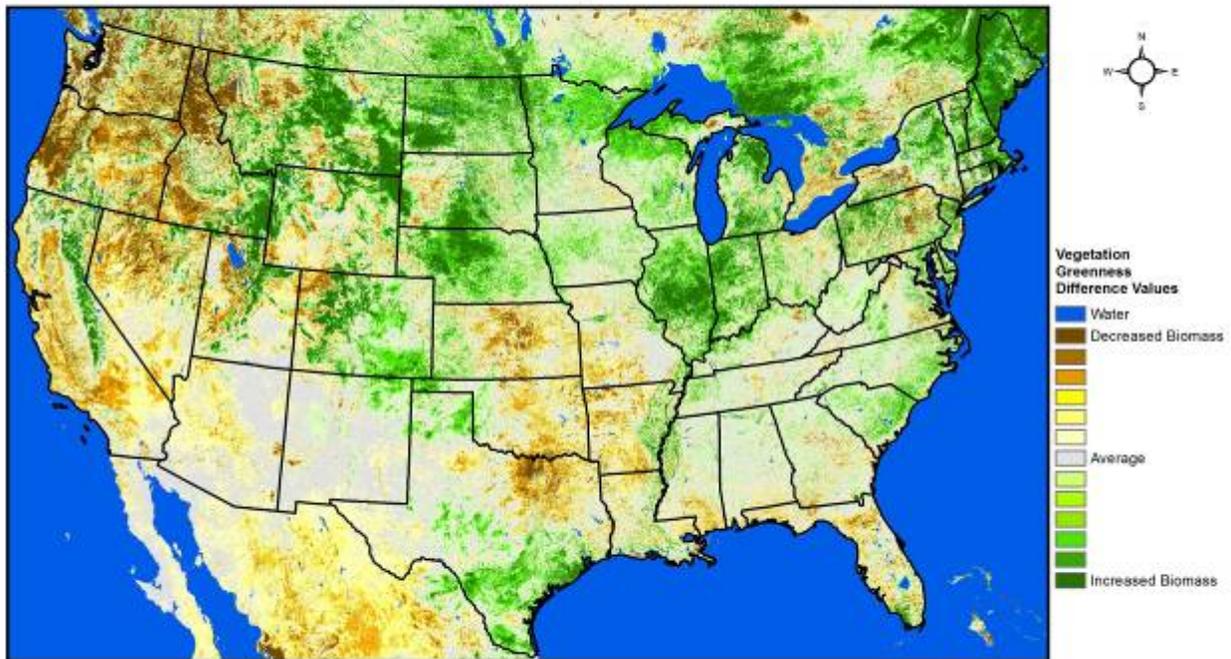
Continental U.S. Vegetation Condition

Period 22: 05/22/2012 - 06/04/2012



Map 7. The Vegetation Condition Report for the U.S. for May 22 – June 4 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that NDVI values are high in the eastern half of the country, and in the Inter-Mountain West, as well as along the Pacific Coast. Rains in New England and the Atlantic Coast states have provided relief to the spring deficit.

Continental U.S. Vegetation Condition Comparison
Late-May/Early-Jun 2012 Compared to Late-May/Early-Jun 2011



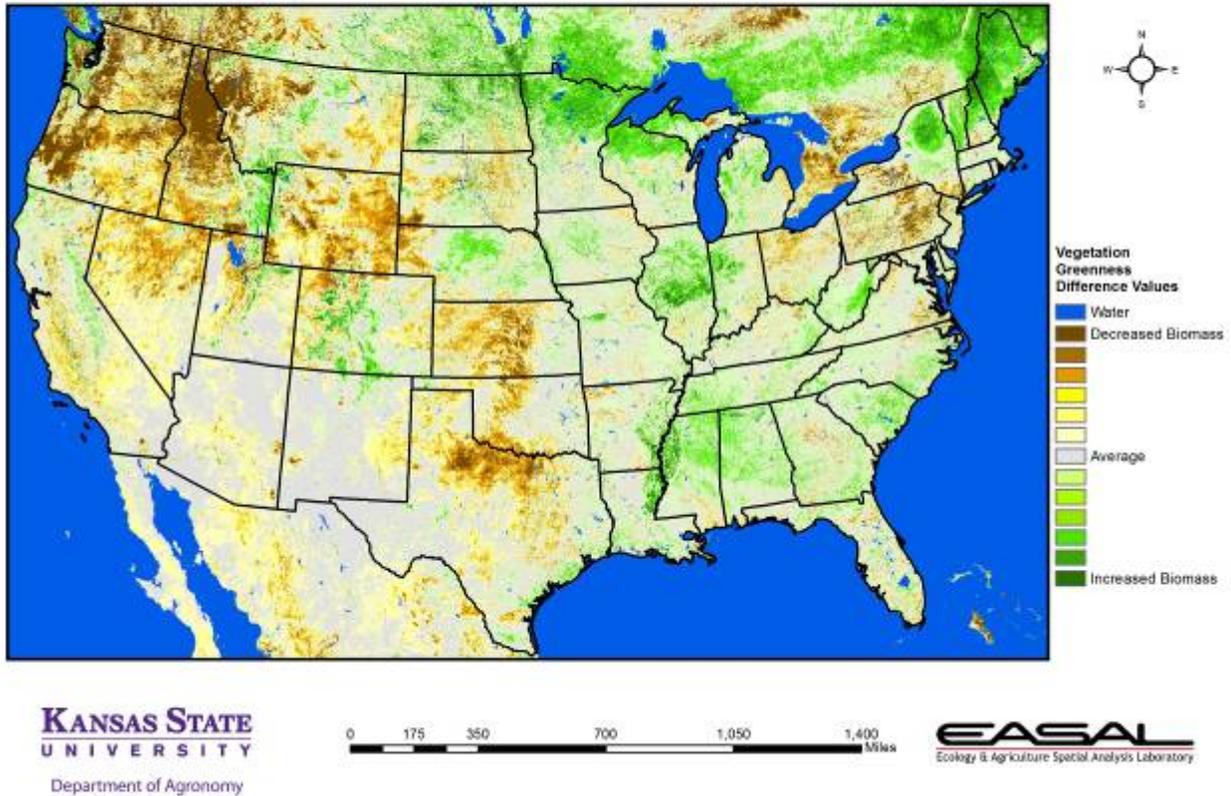
KANSAS STATE
UNIVERSITY
Department of Agronomy

0 175 350 700 1,050 1,400 Miles

EASAL
Ecology & Agriculture Special Analysis Laboratory

Map 8. The U.S. comparison to last year at this time for the period May 22 – June 4 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that lower biomass productivity values can be seen in the Central U.S. This is a combination of early plant maturity and increasing dryness in the region. Southwestern Missouri and western Arkansas, in particular, are experiencing increasing drought stress.

Continental U.S. Vegetation Condition Comparison
 Late-May/Early-Jun 2012 Compared to 23-year Average for Late-May/Early-Jun



Map 9. The U.S. comparison to the 23-year average for the period May 22 – June 4 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that the Central Plains have lower-than-average NDVI values. Much of this can be attributed to early crop maturity. However, increasing dryness has heightened the impact of last year’s drought. In particular, pastures are showing little recovery from last season’s extremely poor conditions.

Note to readers: The maps above represent a subset of the maps available from the EASAL group. If you’d like digital copies of the entire map series please contact us at kpprice@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.

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These e-Updates are a regular weekly item from K-State Extension Agronomy and Steve Watson, Agronomy e-Update Editor. All of the Research and Extension faculty in Agronomy will be involved as sources from time to time.
 If you have any questions or suggestions for topics you'd like to have us address in this weekly update, contact Steve Watson, 785-532-7105 swatson@ksu.edu, or
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