



Extension Agronomy

eUpdate

04/03/2015

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. Preliminary report on wheat varieties with good winter survival

The wheat crop in northwest Kansas is off to a rough start this spring. Harsh winter temperatures and dry soil conditions are among the dominant issues on producer's minds. There are a few bright spots to consider.

This past week, we had the opportunity to evaluate winter injury at demonstration plots in Phillips, Rooks, Thomas, Sherman, and Cheyenne counties. We also gathered information from the variety performance tests at Colby. There was a marked difference among the varieties with symptoms ranging from only minor leaf damage to what appeared to be more than 80% stand loss.



Figure 1. Wheat variety with apparent winter injury in plots in northwest Kansas, March 31, 2015. Photos by Erick DeWolf, K-State Research and Extension.



Figure 2. Wheat variety with good winter survival to this point, from same plots as the wheat in the photo above.

Wheat varieties were rated by the percentage of visual symptoms of winter injury a combination of leaf injury and apparent loss of stand. Varieties that appear to have less winter injury this spring include (alphabetical order): 1863, Byrd, Denali, Everest, KanMark, LCS-Pistol, SY Monument, T158, TAM 114, WB-Cedar, and Winterhawk. It may be helpful to note which varieties look good this this

time so that we can better explain how these varieties perform after harvest.

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2. Weed control strategies in grain sorghum

Severe grass and broadleaf weed pressure will reduce grain sorghum yields and can make harvest very difficult. Good crop rotation and herbicide selection are essential components of managing weeds in grain sorghum.

In a wheat-sorghum-fallow rotation, it is essential that broadleaf and grassy weeds do not produce seed during the fallow period ahead of grain sorghum planting. It is equally important that winter annual grasses are not allowed to head in spring, before the sorghum is planted. Thus, an effective burndown should be applied prior to winter annuals going into the flowering/heading stages.

An effective burndown prior to planting is essential. Sorghum should always be planted into a weed-free seedbed. The addition of a dicamba product or 2,4-D with glyphosate generally will control broadleaf and grass weeds effectively provided an earlier burndown treatment has been applied in March or April. There is a waiting period of 15 days between application and sorghum planting when using 8 fl oz of Clarity. Current 2,4-D labels do not address a waiting period ahead of planting sorghum; however, for corn or soybeans a 7-day waiting period is required for 1 pint or less of 2,4-D ester when used in the burndown.

In sorghum, the best choice of herbicides will depend on the weed species present. Broadleaf weeds generally can be controlled with a combination of preemergence and postemergence applied herbicides. With the development of herbicide-resistant weeds, however, this is becoming increasingly difficult.

Control of pigweeds in sorghum is an increasing concern across the state. Using a soil-applied chloracetamide herbicide with atrazine (such as Bicep II Magnum, Bicep Lite II Magnum, Outlook, Degree Xtra, Fultime NXT, or generic equivalents of these products) will greatly enhance controlling pigweeds. Some of the broadleaf escapes producers can expect when using the chloracetamide/atrazine mixtures are devilsclaw, puncturevine, velvetleaf, morningglory, atrazine-resistant kochia, and atrazine-resistant pigweeds.

Using a product such as Lumax EZ or Lexar EZ preemergence, which contains mesotrione (Callisto), will help control the triazine-resistant pigweeds and kochia. The addition of 10 oz of Verdict, which is a mix of 2 oz of Sharpen and 8.3 oz of Outlook, can help control triazine-resistant pigweeds as well as the large-seeded broadleaf weeds. The chloracetamide/atrazine herbicides will do a very good job of controlling most annual grassy weeds.

A weakness of all soil-applied programs is that rainfall is required for activation. Without activation, poor broadleaf and grass control can be expected. Once rain is received, the herbicides are activated and weed control measures are in place. Weed escapes prior to this activation will need to be controlled with postemergence applied herbicides.

Grass control in sorghum can be a difficult task in some cases. If a field has severe shattercane or longspine sandbur pressure, planting grain sorghum is not recommended. For other annual grassy weeds, it will be important to apply one of the chloracetamide herbicides. Grasses that emerge before the soil-applied herbicides are activated will not be controlled. There are no herbicides currently labeled for postemergence grass control in grain sorghum. Although atrazine and Facet L have grass activity and can control tiny grass seedlings, it's generally not a good practice to depend on these herbicides for grass control. Facet L is the new liquid formulation of quinclorac (previously

Paramount 75 DF) and has excellent activity on field bindweed.

Postemergence broadleaf weed control herbicides are available for grain sorghum. These products will be most effective when applied in a timely manner. Weeds that are 2-4 inches tall will be much easier to control than weeds that are 6-8 inches tall, or larger. Controlling weeds in a timely manner will result in less weed competition with the crop compared to waiting too long to control the weeds. Atrazine combinations with Huskie, Banvel, 2,4-D, Buctril, or Aim (or generic versions of these herbicides) can provide excellent broad-spectrum weed control.

Huskie, the newest herbicide registered in sorghum should be applied at 12.8 to 16 fl oz/acre with 0.25 to 1.0 lbs of atrazine, NIS 0.25% v/v or 0.5% v/v HSOC (high surfactant oil concentrate), and spray grade ammonium sulfate at the rate of 1 lb/acre to sorghum from 3-leaf to 12 inches tall. Huskie alone, without atrazine, can now be applied to sorghum up to 30 inches tall prior to flag leaf emergence, however it will be less effective. Huskie is effective on kochia, pigweeds, and many other broadleaf weed species. Huskie is most effective on small weeds. The larger pigweed and kochia get, the more difficult they are to control. Temporary injury to sorghum is often observed with Huskie.

The presence of certain weed species will affect which postemergence herbicide programs will be most effective. See the grain sorghum section in the K-State *2015 Chemical Weed Control Guide* (SRP 1117) to help make the selection:

<http://www.ksre.ksu.edu/bookstore/pubs/SRP1117.pdf>

The crop stage at the time of postemergence herbicide applications can be critical to minimize crop injury. Delayed applications to large sorghum increase the risk of injury to the reproductive phase of grain sorghum, thus increasing crop injury and yield loss from the herbicide application. Timely applications not only benefit weed control, but can increase crop safety. Always read and follow label guidelines.

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3. Update on insect activity on alfalfa and wheat

Alfalfa: Weevils, aphids, and army cutworms

Alfalfa weevils have been hatching from eggs in north central Kansas since at least March 13, when we first detected larvae. Since then, again in north central Kansas, the larvae are slowly growing and eggs continue to hatch. However, both alfalfa and larvae are growing slowly so far. Alfalfa weevil development occurs at, or above, temperatures exceeding about 48 degrees F. It is a different situation in south central Kansas, however. Producers there have been spraying pea aphids for a couple of weeks now and some fields have had to be treated for army cutworms (see photo). Keep in mind any fields treated with an insecticide will have the beneficials eliminated. As the alfalfa puts out new foliage it will not have any insecticide residue. As more aphids, or other pests, migrate into these fields there won't be any beneficials (e.g., lady beetles, lacewings, and parasitic wasps) to help control them and there may be new untreated foliage for pests to feed on. So, it will probably be good practice to resume sampling 2-3 weeks after an insecticide application.

Army Cutworm



Wheat: Aphids and mites

We started finding a variety of aphids in wheat this week in south central Kansas, as well as a few aphids in north central Kansas. Aphids identified from samples brought in from south central Kansas included greenbugs, bird cherry oat, English grain, and corn leaf aphids. The colonies appear to just be getting started as there would be one winged adult with 3-4 small nymphs and only about 10% of the tillers were infested. No lady beetles were detected yet. A few winter grain mites (see photos below) were also observed but not in numbers to be concerned with.

Winter Grain Mite

actual size –0.5 to 0.75mm



Dorsal view



Ventral view

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4. Drought-tolerant corn hybrids: Yield benefits

In recent years, drought conditions have raised questions about the utilization of corn as the main crop for maximizing yield production per unit of available water in dryland environments.

Non-transgenic (conventionally bred, Pioneer and Syngenta) corn hybrids, or so-called “drought-tolerant” (DT) hybrids, came to the market with the expectation of increasing corn production in water-limited regions. In recent growing seasons, Monsanto also released its new biotech transgenic-DT hybrid.

Overall, the information from seed companies indicates that DT hybrids could provide from 2 to more than 15 percent yield increase over “competitor hybrids” in non-limiting and water-limiting environments, respectively.

K-State research conducted over the 2012-2014 growing seasons across the state has recently been summarized. The objective of this research summary is to present an overview of the DT vs. non-DT responses to management practices such as plant population and irrigation.

The information below is intended to provide some guidance to farmers, consultants, and agronomists in making the right decision for selecting corn hybrids. In addition, we hope to develop a better understanding of the kinds of environments in which DT hybrids could be most likely to result in a yield benefit. These hybrids are generally targeted for water-limited environments in the Western Great Plains.

Results

Our research compared DT hybrids from diverse companies with a standard non-DT counterpart of similar maturity. The tests also evaluated the yield response to varying plant population and irrigation levels.

At the plant scale, our analysis did not reveal any change in the plant response to plant population between DT and non-DT hybrids. This indicates no need to change plant population when using DT hybrids. This conclusion was briefly introduced in a last year's eUpdate article on corn seeding rates (Agronomy eUpdate 445, March 14, 2014).

We also analyzed yields at the plot level for DT vs. comparable DT hybrids with similar maturity. The information presented in the figure below (Fig. 1) depicts the association of the yields for the DT vs. non-DT corn hybrids: Red points = research plots (2012-2013); blue points = on-farm plots; green points = 2014 growing season plots.

Overall, the analysis found a yield benefit of 3 percent for DT vs. non-DT hybrids under diverse environments and stress conditions across Kansas during the 2012-2014 seasons. In absolute terms, the yield advantage of using DT hybrids was around 5 bushels per acre compared to the non-DT material. Similar yield trends were observed in research plots and on-farm demonstration plots. A great proportion of DT and non-DT yields were similar -- within a 5% confidence interval as highlighted in Figure 1 -- except in low-yielding and high-yielding environments. In low yielding-environments, DT out-yielded non-DT corn hybrids more often compared to the situation in higher-yield environments.

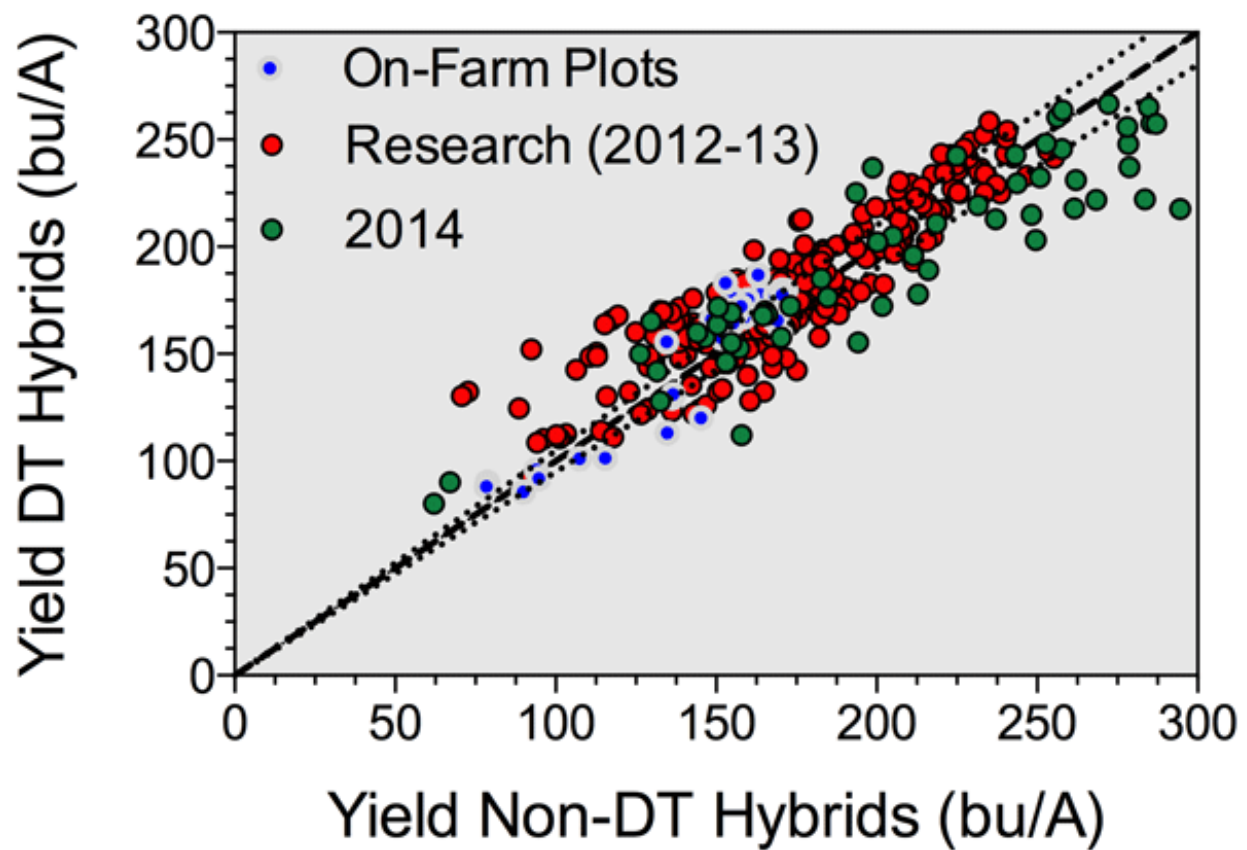


Figure 1. Yield for the DT versus non-DT corn hybrids across several site-years for the 2012-2014 growing seasons.

DT vs. non-DT corn hybrids: Yield Environment Analysis

The analysis of information across diverse yielding environments allows us to more clearly understand where there would be a yield advantage from planting DT hybrids. It is clear from Figure 2 that the yield advantage of DT corn hybrids increases as the yield potential of the crop decreases. This graph shows that there is basically no yield difference between DT and non-DT hybrids when yields are around 170 bushels per acre or greater. The yield advantage for DT hybrids gradually increases as the yield of the regular hybrids decreases from 170 bushels per acre.

It is important to note however, that these are generalized relationships, and that there are varied responses at each yield level. Some individual points show no difference between DT vs. non-DT hybrids at yields around 100 bushels per acre. Other points show a 30-bushel-per-acre yield advantage for non-DT hybrids at 160 to 170 bushels per acre, and still others show a 60-bushel-per-acre yield advantage for DT hybrids when non-DT hybrid yields were near 70 bushels per acre. On the opposite side of the yield environments, under high yield environments (>220 bushel-per-acre), individual points show a 30 to 60-bushel-per acre yield advantage for non-DT hybrids when DT hybrid yields were above 220 bushels per acre. How individual hybrids respond to a specific environment is influenced by a number of factors, including the timing and duration of the stress.

One more technical clarification is important to note. The linear response and plateau (LRP) function

model fitted in Figure 2 (adjusted to the 2012-2013 data), presented an R^2 of 0.26 units, which can be interpreted to indicate that this model is accounting for only slightly more than one-fourth of the total variation presented in the data. In other words, there are many management factors involved in the yield results, which makes it difficult to separate out the effect of hybrid alone.

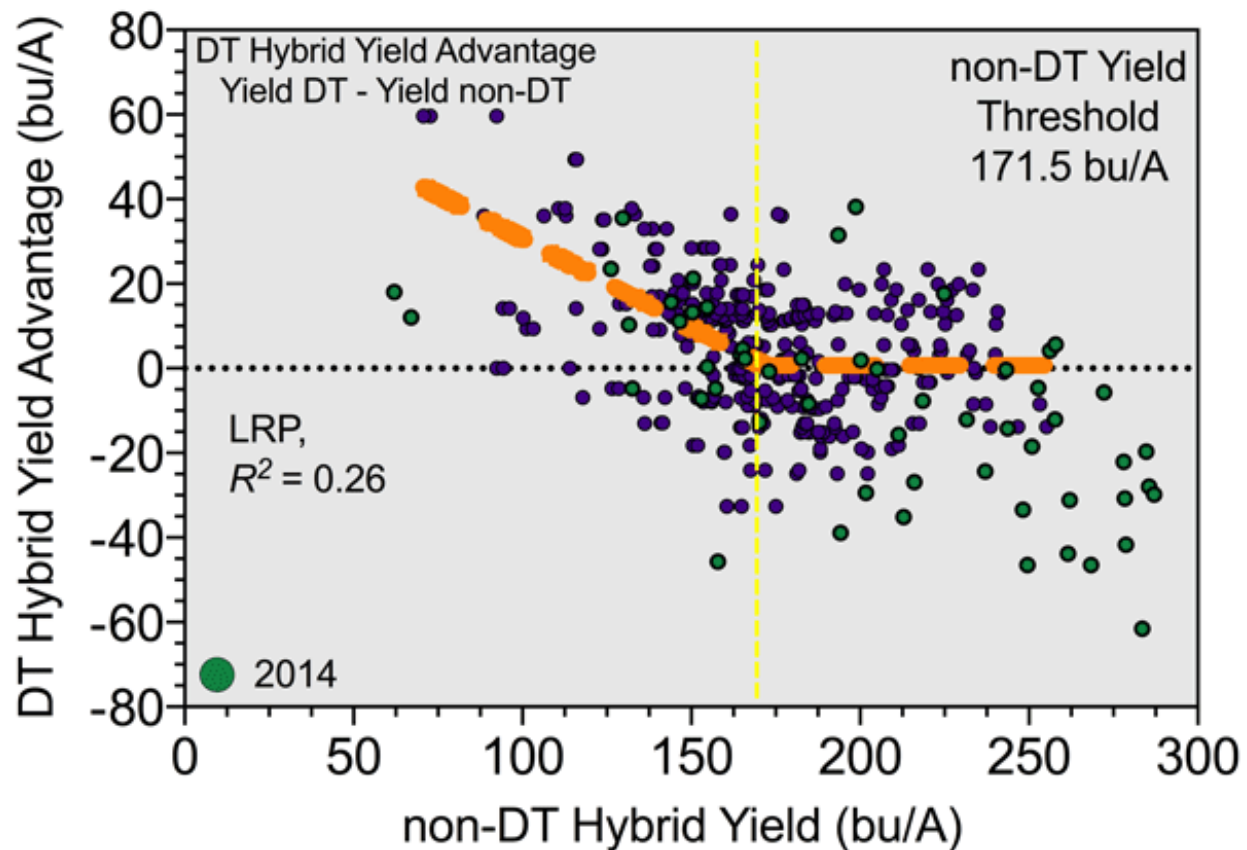


Figure 2. Yield advantage for DT compared to non-DT corn hybrids at the same environment and population, ranging from low-yielding environments to high-yielding environments across several site-years for the 2012-2014 growing seasons.

Still, we need to be cautious using and interpreting this information. More experiments and research data need to be collected, and a deeper understanding is needed to more properly comprehend the main causes of the yield differences of DT vs. non-DT corn genotypes. Potential interpretations offered for the yield advantage for the DT corn hybrids in certain environments are:

- Slower vegetative growth, saving water for reproductive stages (stress avoidance)
- Greater root biomass with superior water uptake

- Differential regulation in the stomata opening, controlling water and CO₂ exchange processes
- Other potential physiological modifications

Summary

General observations:

1) Performance of individual hybrids within DT and non-DT types may vary. Some non-DT hybrids can perform nearly as well as the DT hybrids even in stressful conditions, and DT hybrids have the potential to yield with non-DT hybrids when water isn't limiting.

2) The advantage of the DT hybrids became more evident when the water stress increased to the point of leaves rolling most days.

3) From the information at hand, it is reasonable to expect a DT hybrid to serve as a type of insurance policy to sustain yield potential under water-limited environments. It also appears that there is no yield penalty associated with DT hybrids if water-limiting conditions do not occur.

Lastly, it is critical to understand that these corn genetic materials will not produce yield if the environment is subjected to terminal drought. We cannot expect them to thrive when moisture is severely limited, especially in dryland systems. As properly and explicitly stated by all seed companies, these DT materials have demonstrated the ability maintain yields to a certain degree in water-limited situations, and those differences will likely be in the order of 5 to 15 bushels per acre (depending on the environments and crop practices), when compared with a similar maturity non-DT corn hybrid.

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5. Planting conditions as of late March/early April

An article in the March 27, 2015 Agronomy eUpdate discussed average soil temperatures for the week of March 16-22 and average last spring freeze dates. Over the past week, changes in soil temperatures have been quite noticeable for the southern section of the state, rising by 1 to 3 degrees F overall (Fig. 1). Soil temperatures in the northern section of the state decreased 1 to 2.5 degrees compared to the prior week. The remainder of the state had only a small or no change in soil temperature.

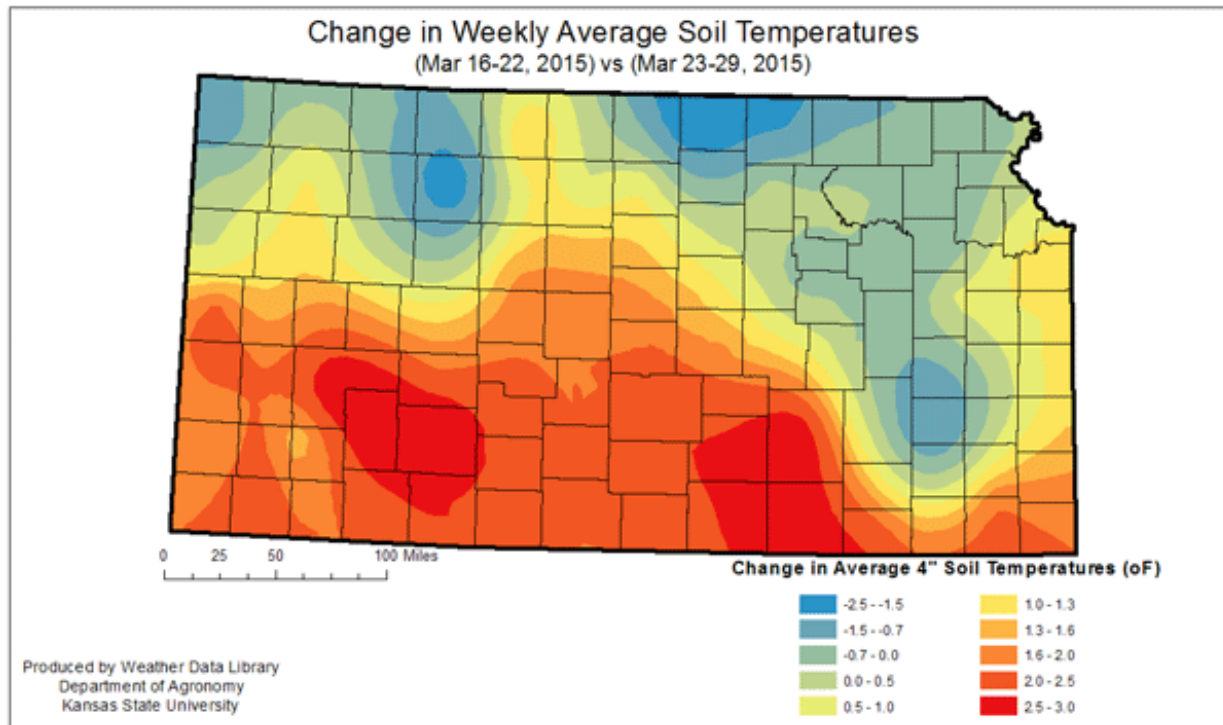


Figure 1. Change in weekly average soil temperatures at 4-inch depth from the week of March 16-22 to the week of. March 23-29, 2015.

Absolute soil temperatures at the 4-inch depth are still below 50 degrees F in the NE corner of the state (Fig. 2). In the opposite corner of Kansas, the SW area has soil temperatures close to 55 F -- near optimal for beginning corn planting. The lack of precipitation in much of Kansas was a big factor in the dramatic increase in soil temperatures in the western, central, and a section of the SC districts during the past week.

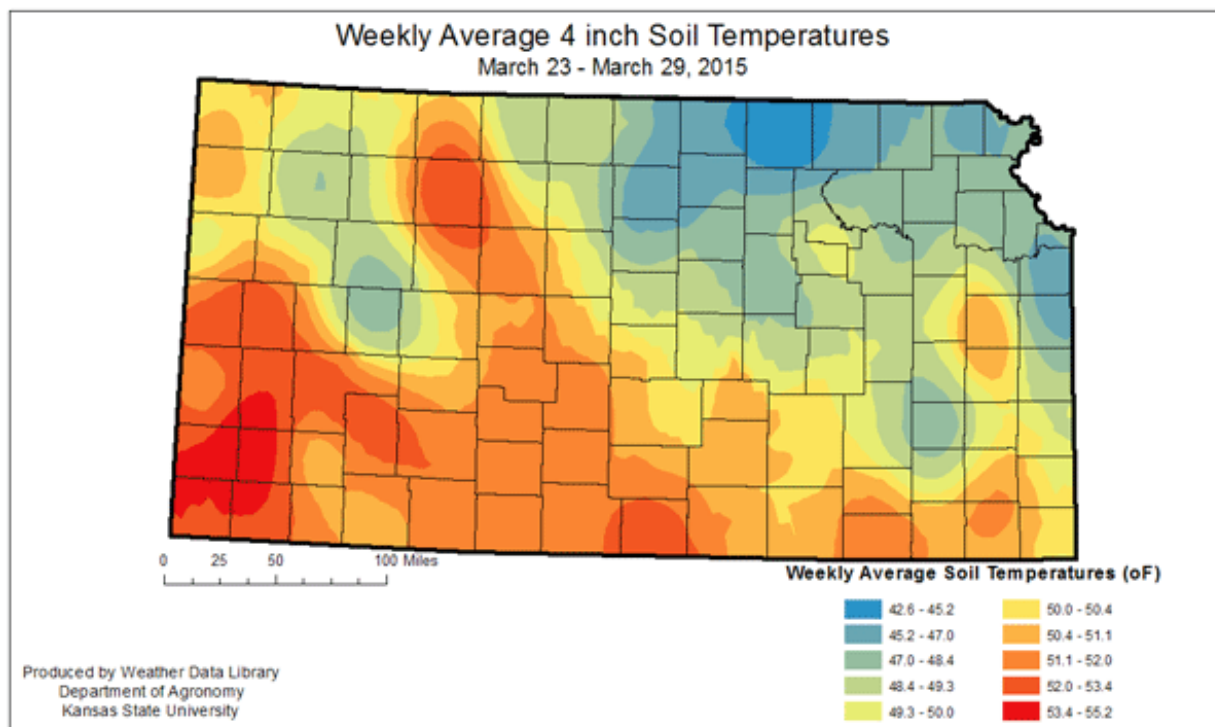


Figure 2. Average soil temperatures at 4-inches for Kansas for the week of March 23-29, 2015.

Compared to historical means, soil temperatures during the last week of March were above normal for all of Kansas. The departure from normal ranged from a few degrees in the SE corner to up to 10 degrees or more in the NW region (Fig. 3).

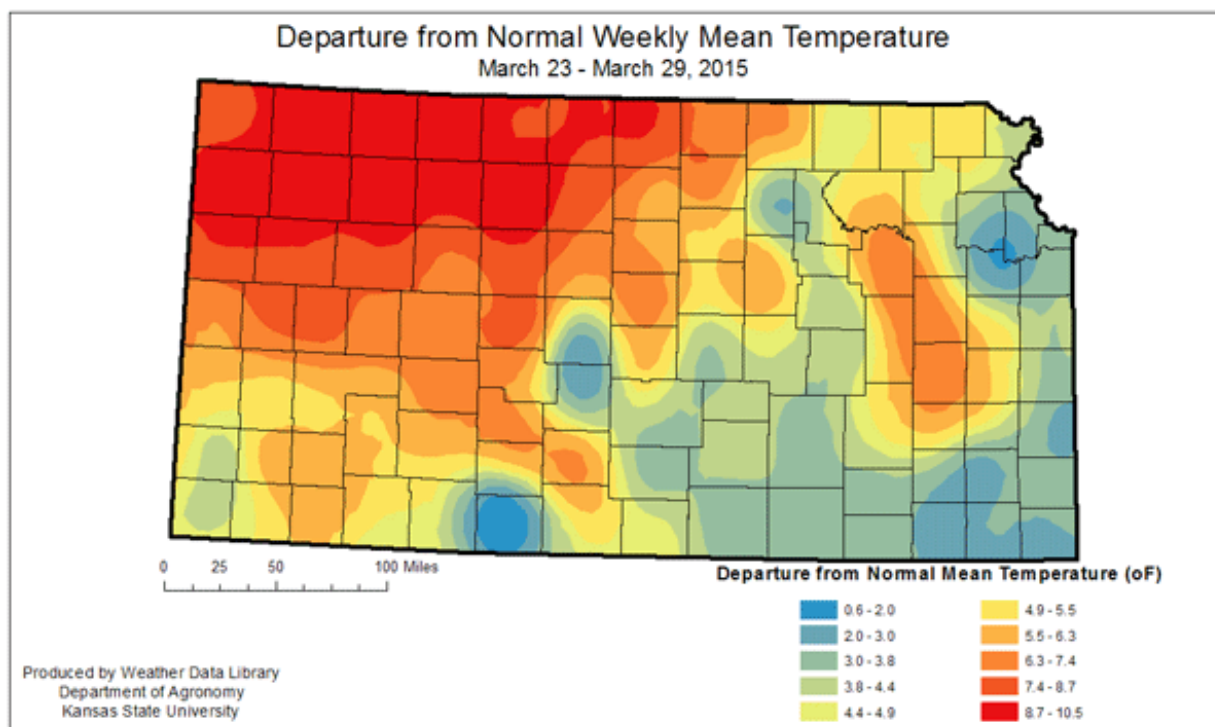


Figure 3. Departure from normal weekly mean soil temperature at 4-inch depth for the week of

March 23-29, 2015.

For the coming days, the amount of precipitation expected will play a critical role in speeding up or slowing the progression of soil temperatures around the state, more precisely in the northern section. Wet soils in a no-till situation are slower to warm. Dry soils will change in temperature more rapidly, and match air temperatures more closely.

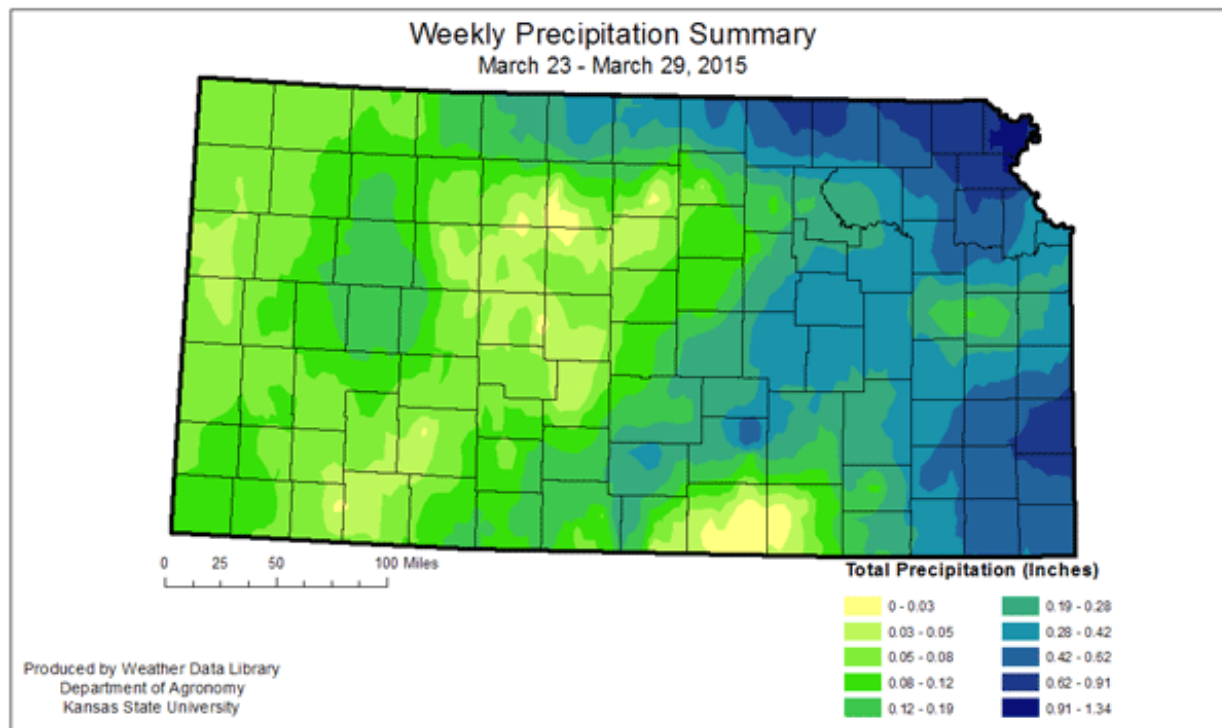


Figure 4. Weekly precipitation for the week of March 23-29, 2015.

Still, soil moisture is not the only factor affecting soil temperatures. The absolute change in soil temperatures is also governed by the residue cover (quantity and distribution), tillage system, and landscape position. For summer crops, uneven soil temperature around the seed zone can produce non-uniform crop germination and emergence. Non-uniform stands can affect maximum attainable yield, especially for corn.

Please be sure to consider these factors during the next several weeks before planting your crop. More information about effects on plant stands and uniformity will be provided in coming issues of the Agronomy eUpdate newsletter. 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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6. Expected number of days to plant summer crops in Kansas

Weather conditions and the number of suitable working days in a given time period vary over time and across Kansas. Knowing how many suitable working days might be available to conduct fieldwork for a given crop operation impacts crop choice and machinery investment decisions. Using the “most active” dates to plant and harvest Kansas crops as reported by USDA NASS (2010) (Table 1), the number of days suitable for planting corn, grain sorghum, and soybean each year from 1981 to 2013 were graphed for each Kansas crop reporting district. When two or more spring planting periods overlap, crop acreage competes for farm equipment. It should be noted that these dates are not necessarily the best timing for highest yields, but are simply when farmers are most actively conducting these field operations.

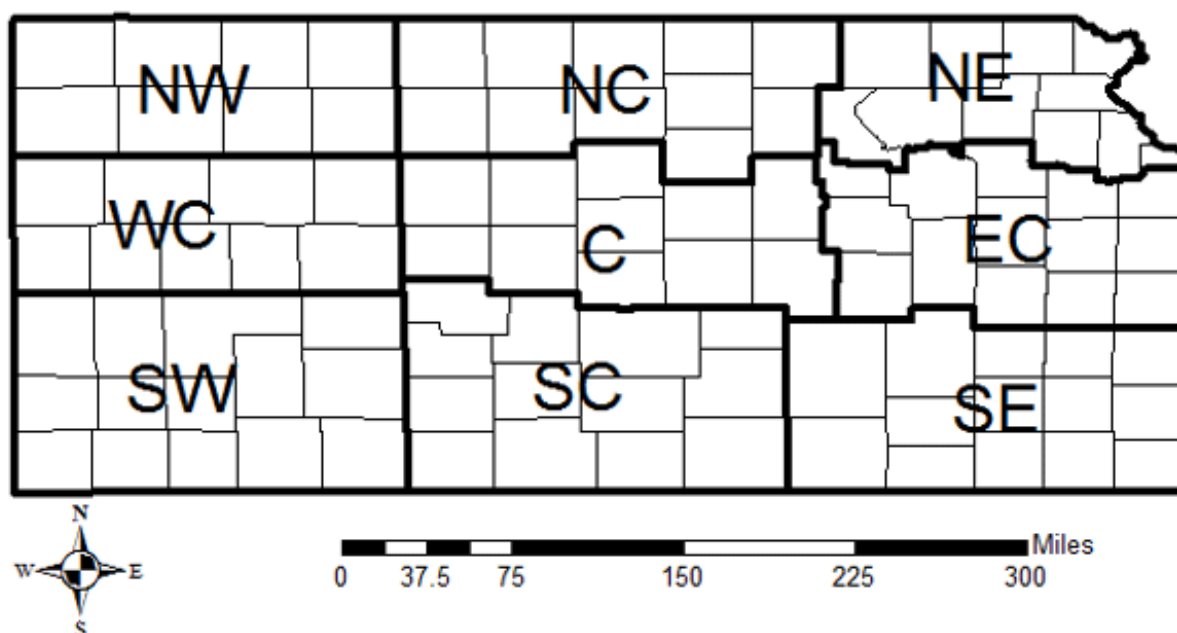


Figure 1. Map of the nine USDA crop reporting districts

Table 1. Most active planting and harvest dates in Kansas

	Planting		Harvest	
	Start	End	Start	End
Corn	15-Apr	15-May	10-Sep	25-Oct
Cotton	20-May	15-Jun	25-Oct	15-Dec
Grain Sorghum	15-May	20-Jun	25-Sep	10-Nov

Soybeans	15-May	20-Jun	1-Oct	1-Nov
Winter Wheat	15-Sep	20-Oct	20-Jun	5-Jul

Most active progress is defined as between the 20th to 80th percentile. Source: USDA NASS (2010) Agricultural Handbook Number 628.
<http://usda.mannlib.cornell.edu/usda/current/planting/planting-10-29-2010.pdf>

Corn planting

Most corn acreage in Kansas is planted between April 15 and May 15, according to the 2010 USDA NASS handbook, a period of 28 days. Except for SW district, all crop reporting districts had years with 24 or more days suitable to plant corn, although 8 districts had at least one year with 8 or fewer days suitable during this 28-day period (Fig. 2). The ninth district, the SW, has had at least 13 days to plant corn in each of the last 33 years. Producers in the SC district had between 7 and 27 days suitable for planting corn during the 1981-2013 period. Eight of the 33 years have had 23 to 24 days to plant, while 13 years have had at least 21 days suitable to plant corn in the SC district. For the SW district, 9 years had fewer than 20 days. Twenty-one years had more than 21 days in SW district.

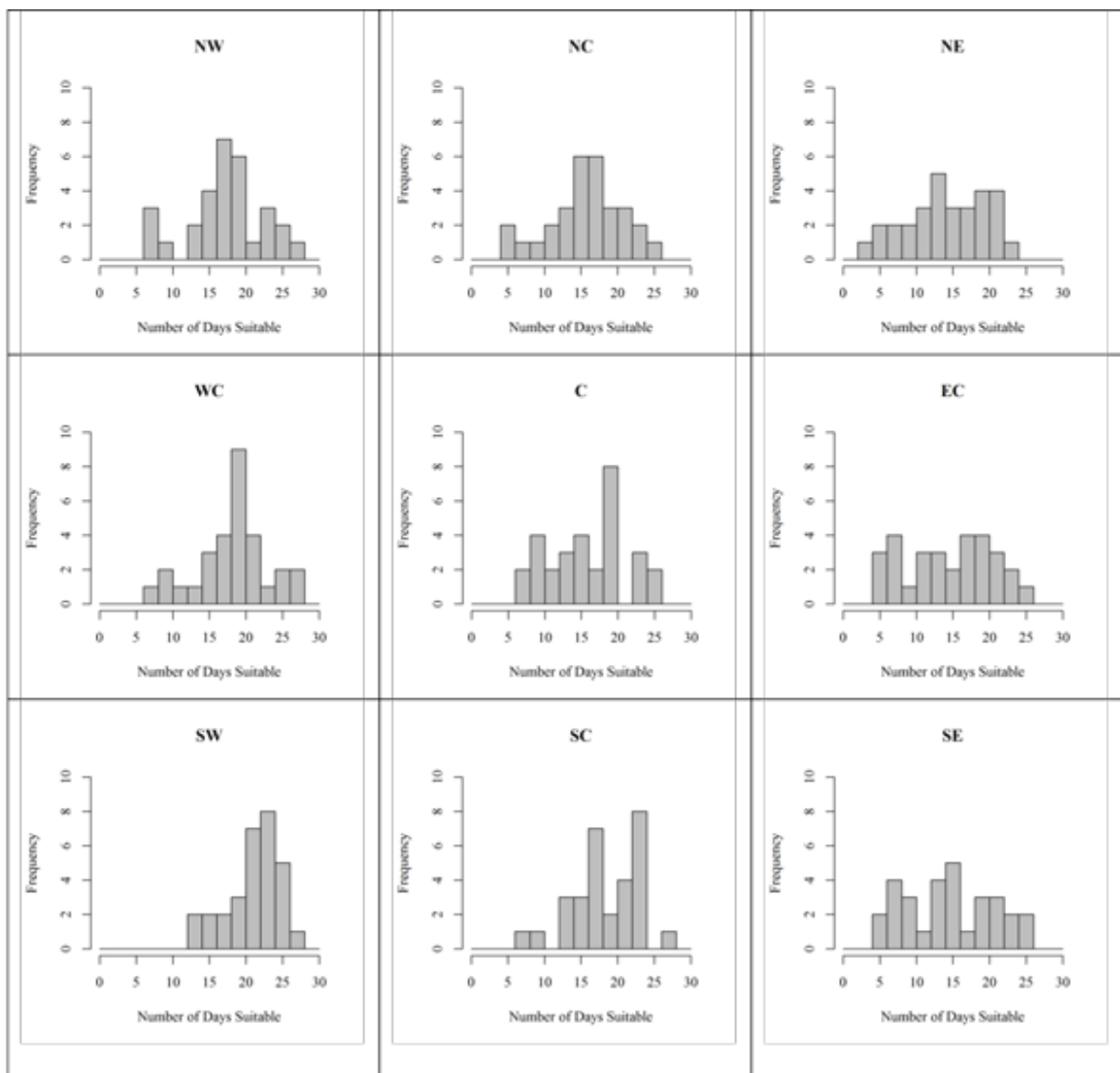


Figure 2. Distribution of number of days suitable for planting corn from April 15 to May 15.
Source: USDA NASS Kansas Field Office 1981-2013.

Grain sorghum and soybean planting

Grain sorghum and soybean are mostly planted during the same 35-day (May 15–June 20) “most active” planting period statewide. Five crop reporting districts (NC, NE, C, EC, and SE) have had at least one year with 10 or fewer days suitable for planting during this 35-day period (Fig. 3). In the SW district, producers had between 16 and 34 days to plant during this 35-day period. About half of the years (17) had at fewer than 26 days, however 16 years had more than 27 to plant in that district. For SC district, only 3 years had fewer than 15 days and 3 years had more than 30 days.

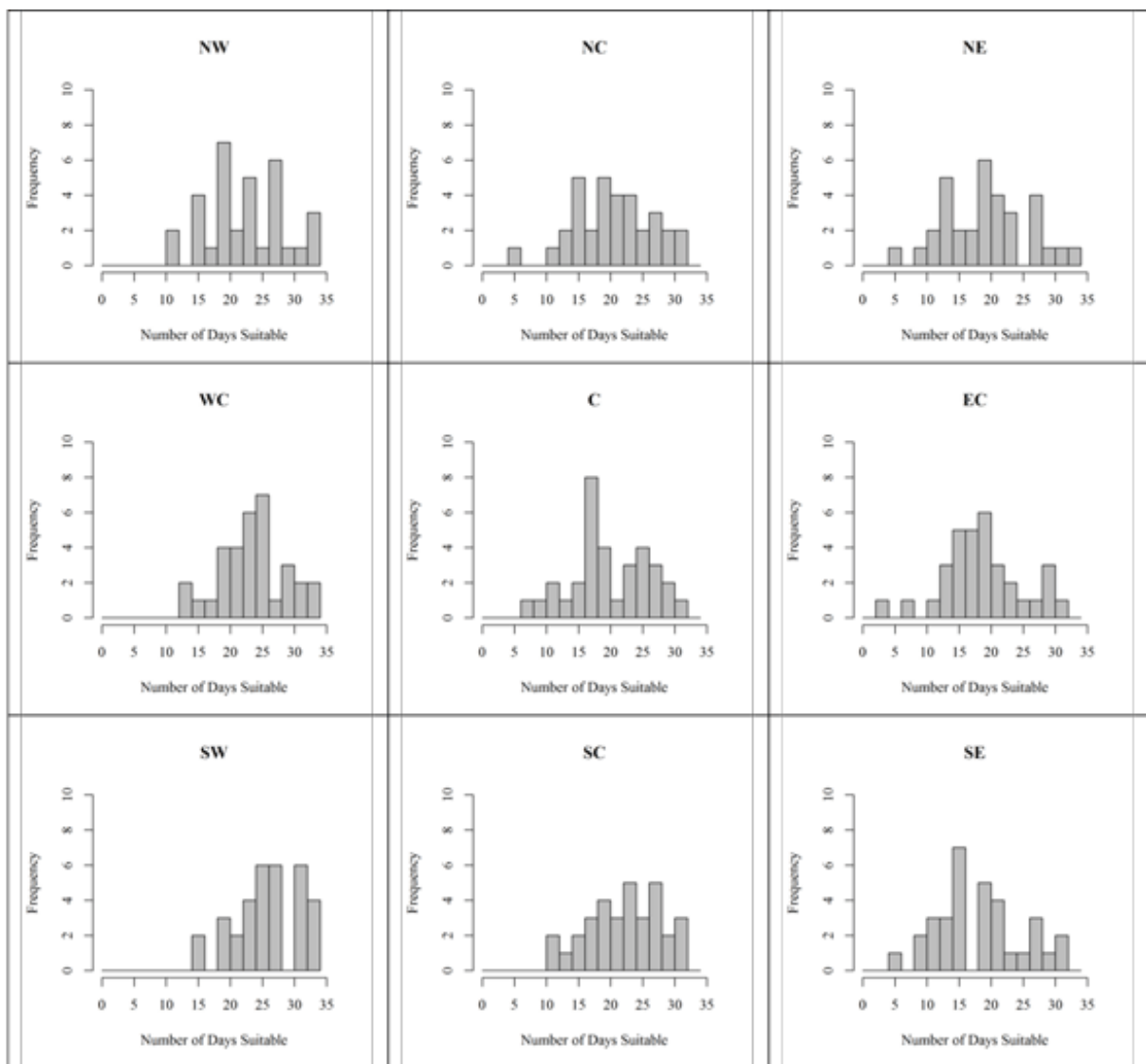


Figure 3. Distribution of number of days suitable for planting grain sorghum and soybean from May 15 to June 20. Source: USDA NASS Kansas Field Office 1981-2013.

Using historical observed planting progress data gives an indication of the expected number of days suitable for planting in the current year. Planting and harvesting data on fieldwork progress from all nine USDA Crop Reporting Districts will be available in a forthcoming K-State Research and Extension publication.

We are grateful to USDA NASS Kansas Field Office for providing days suitable for fieldwork data for all Crop Reporting Districts.

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7. Comparative Vegetation Condition Report: March 17 - 30

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 climatologist:

Kansas Vegetation Condition

Period 13: 03/17/2015 - 03/30/2015

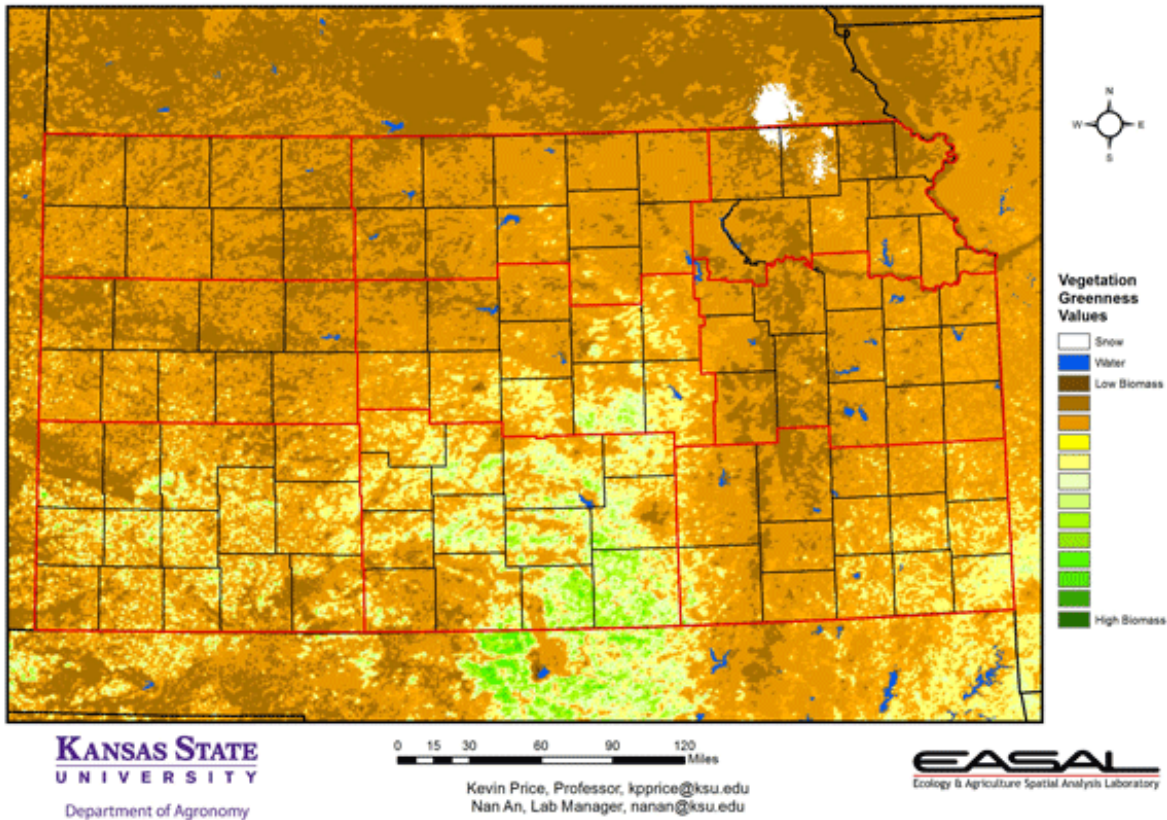


Figure 1. The Vegetation Condition Report for Kansas for March 17 – 30 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that there was a very slight snow event in extreme northeast Kansas, but that didn’t even last a day. The most active plant development is occurring in south central.

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Kansas Vegetation Condition Comparison

Late-March 2015 compared to the Late-March 2014

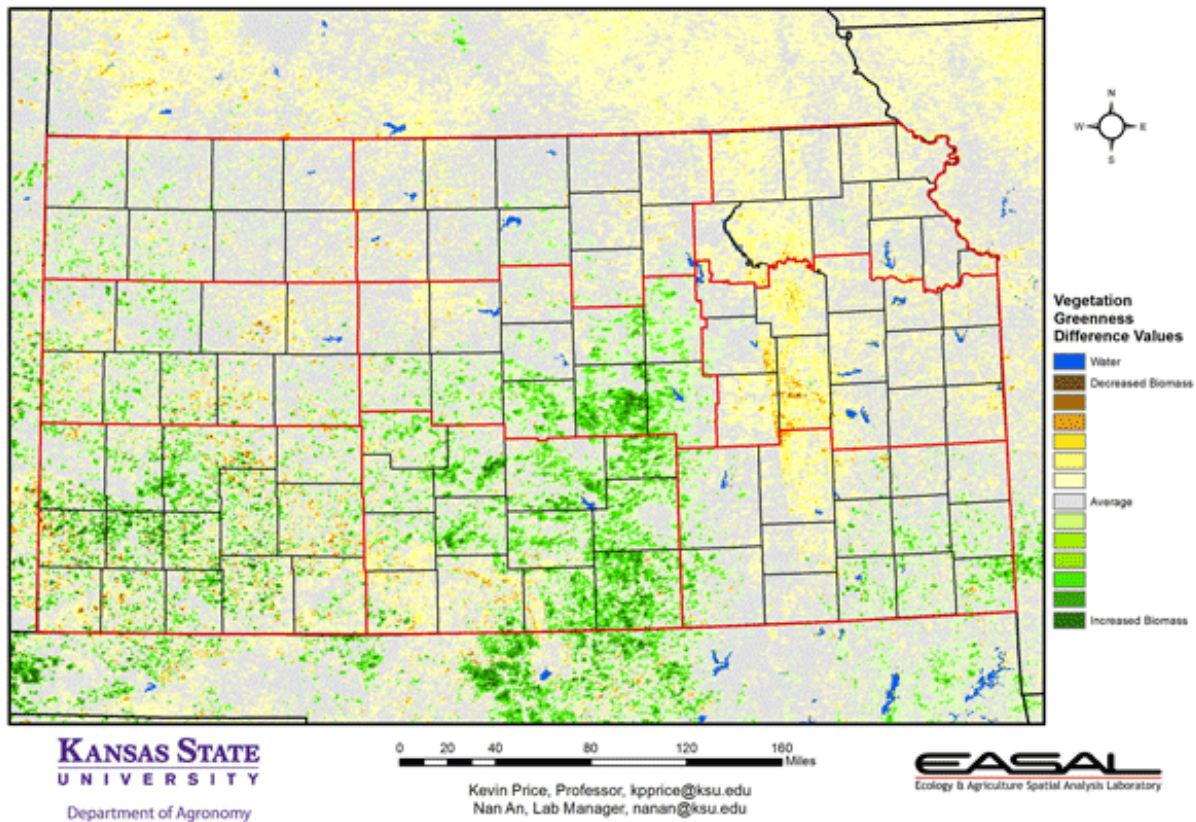


Figure 2. Compared to the previous year at this time for Kansas, the current Vegetation Condition Report for March 17 – 30 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows photosynthetic activity has been greatest in the Central and South Central Divisions, as well as parts of southwest Kansas. Temperatures are warmer this year than last, and biomass activity has increased.

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Kansas Vegetation Condition Comparison

Late-March 2015 compared to the 26-Year Average for Late-March

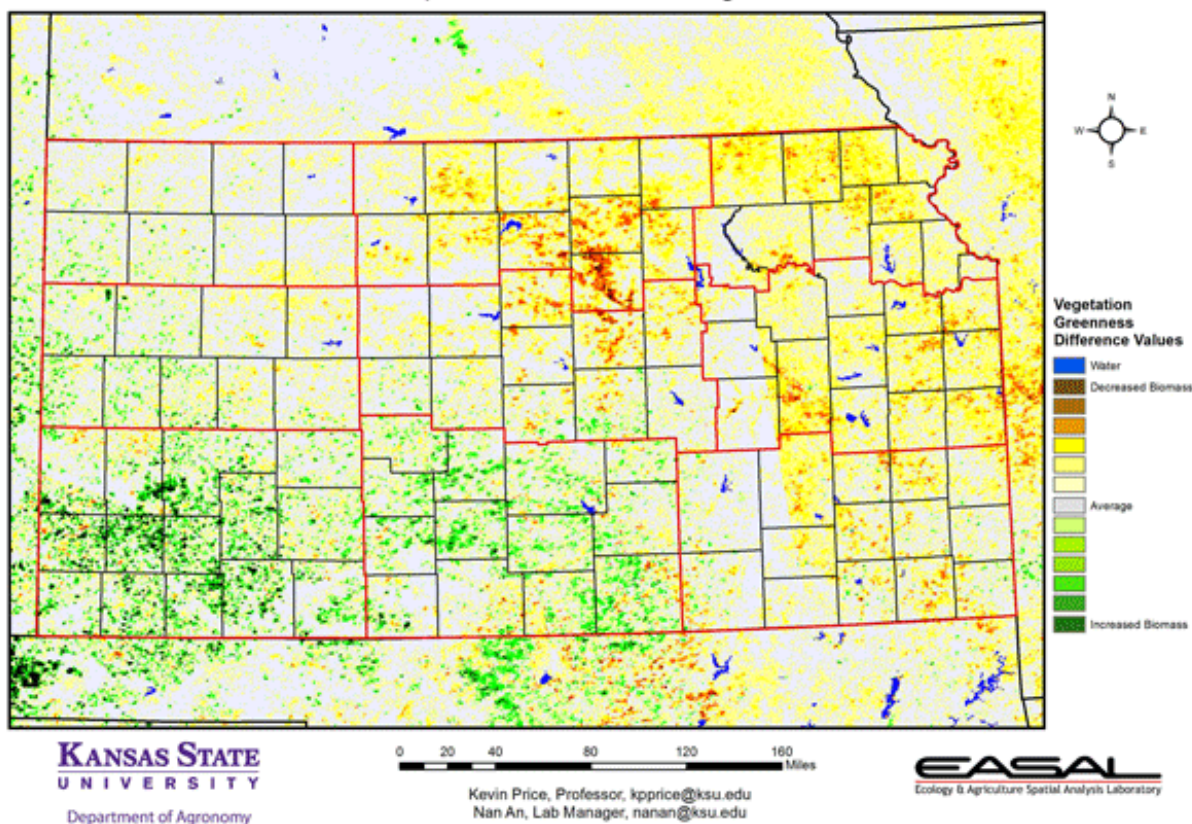


Figure 3. Compared to the 26-year average at this time for Kansas, this year's Vegetation Condition Report for March 17 – 30 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that the Northeastern Division has been the slowest to emerge from winter dormancy. This area of the state has had cooler temperatures than other parts of the state. In north central Kansas, the combination of drought conditions and extreme temperatures has resulted in very low biomass production. In southwest Kansas, the winter moisture has been close to average with slightly warmer-than-normal temperatures. This has accelerated photosynthetic activity in this region.

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U.S. Corn Belt Vegetation Condition

Period 12: 03/10/2015 - 03/23/2015

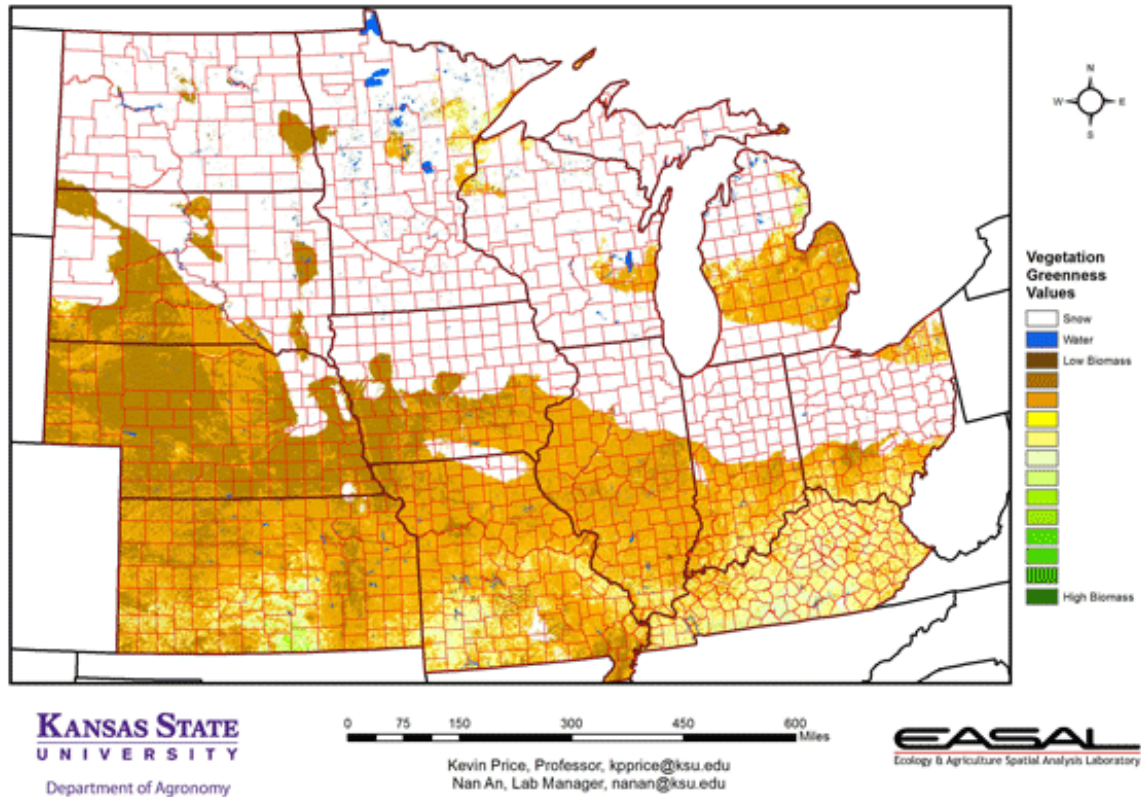


Figure 4. The Vegetation Condition Report for the Corn Belt for March 17 – 30 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that snowfall was confined to the northern areas of the region. This snowfall has not alleviated the limited snow conditions for the area this winter.

U.S. Corn Belt Vegetation Condition Comparison
Late-March 2015 Compared to Late-March 2014

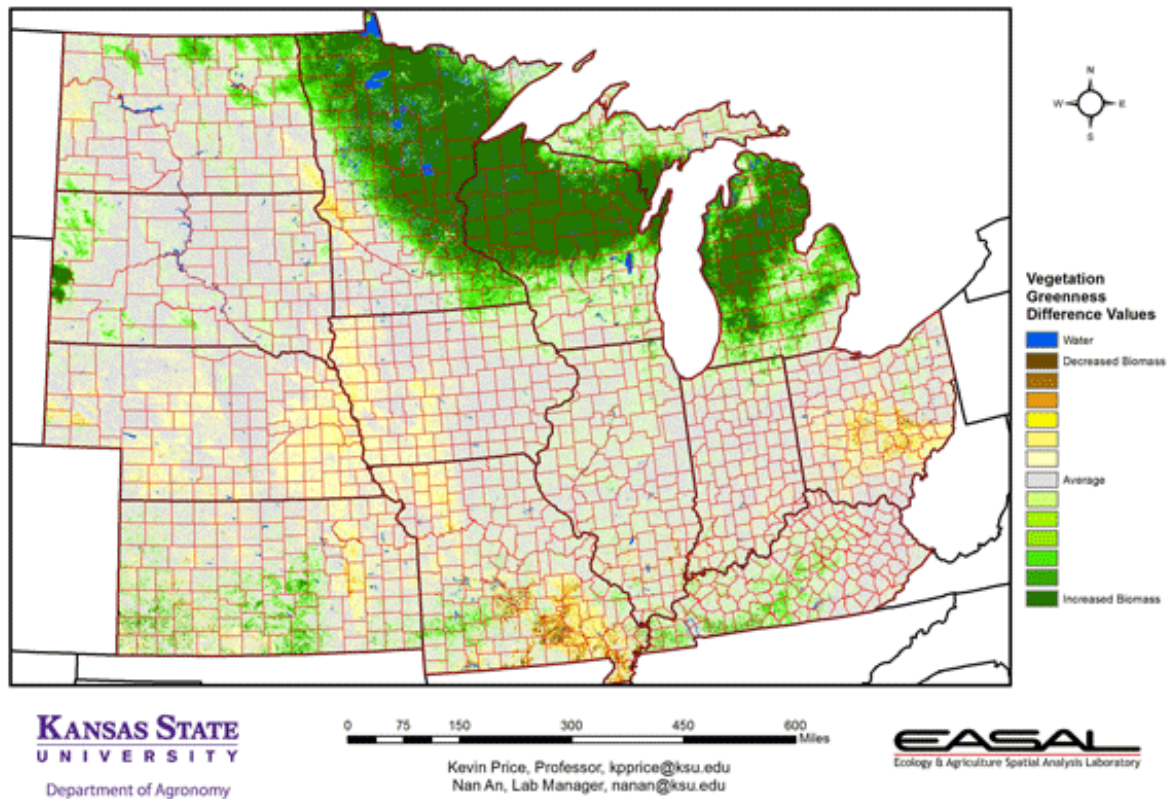


Figure 5. The comparison to last year in the Corn Belt for the period March 17 – 30 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that the areas of northern Minnesota through Michigan have the greatest increase in photosynthetic activity. Snow cover has been limited in much of these areas, so photosynthetic activity is much more visible than last year.

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

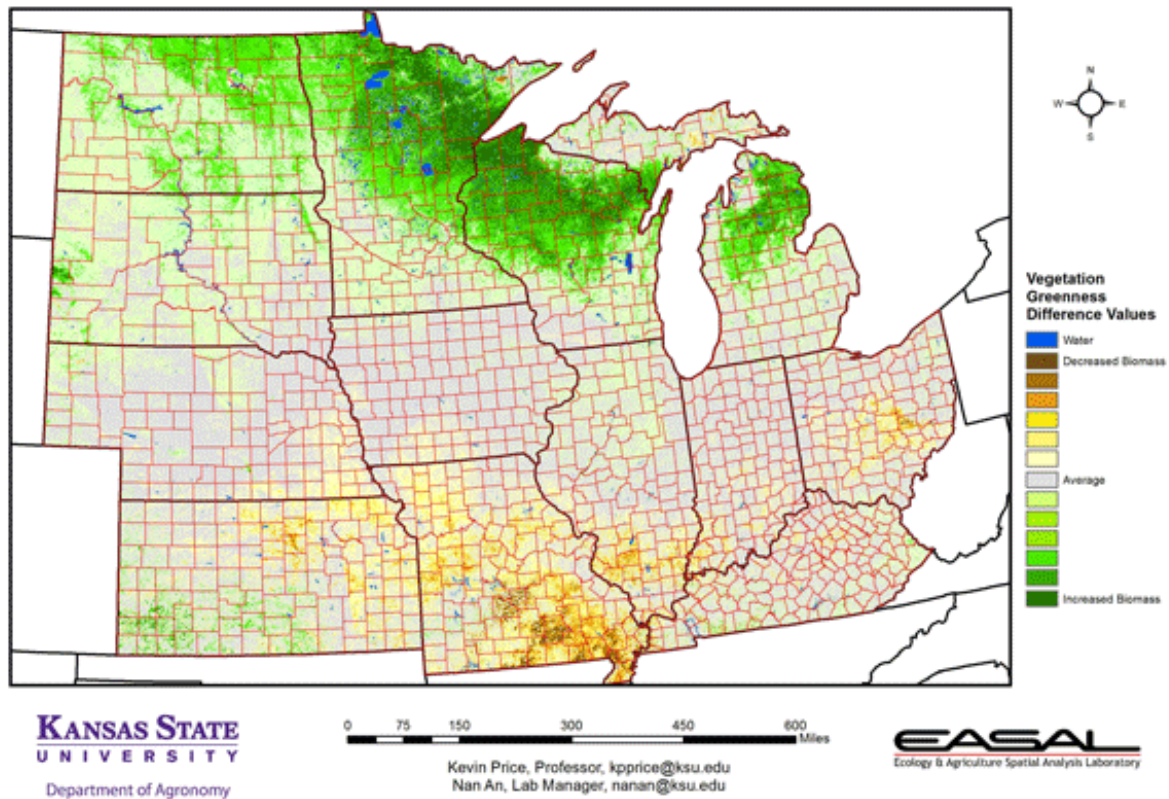


Figure 6. Compared to the 26-year average at this time for the Corn Belt, this year's Vegetation Condition Report for March 17 – 30 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows the greatest increase photosynthetic activity is in the area of northern Minnesota and northern Wisconsin. This is largely the result of the rapid elimination of the snow pack in these areas. This is an area where drought is expanding and the increased demand for water from early plant development is of concern.

Continental U.S. Vegetation Condition

Period 13: 03/17/2015 - 03/30/2015

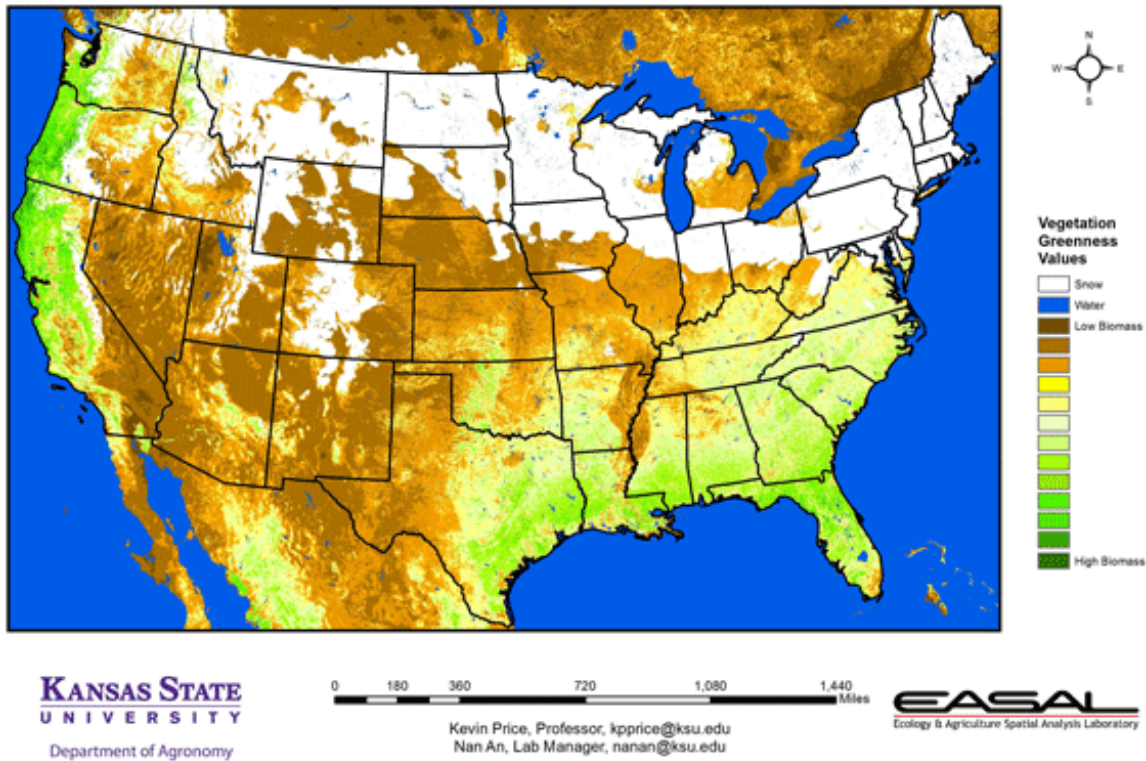


Figure 7. The Vegetation Condition Report for the U.S. for March 17 – 30 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that the snow cover continues to retreat northward. Most noticeable is the lack of snow cover in the Pacific Northwest.

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

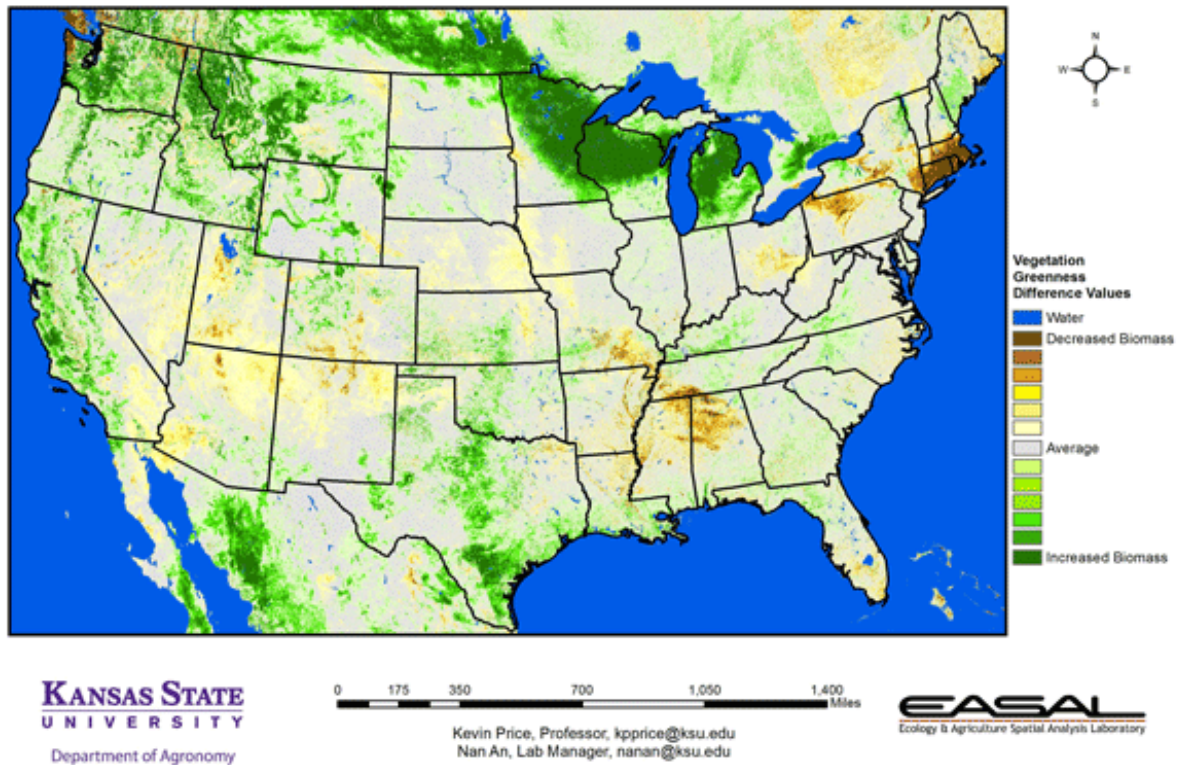


Figure 8. The U.S. comparison to last year at this time for the period March 17 – 30 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that the northern areas of the country have the greatest increase in photosynthetic activity. This is of particular concern, as the demands are likely to quickly exhaust available soil water resources.

Continental U.S. Vegetation Condition Comparison
Late-March 2015 Compared to 26-year Average for Late-March

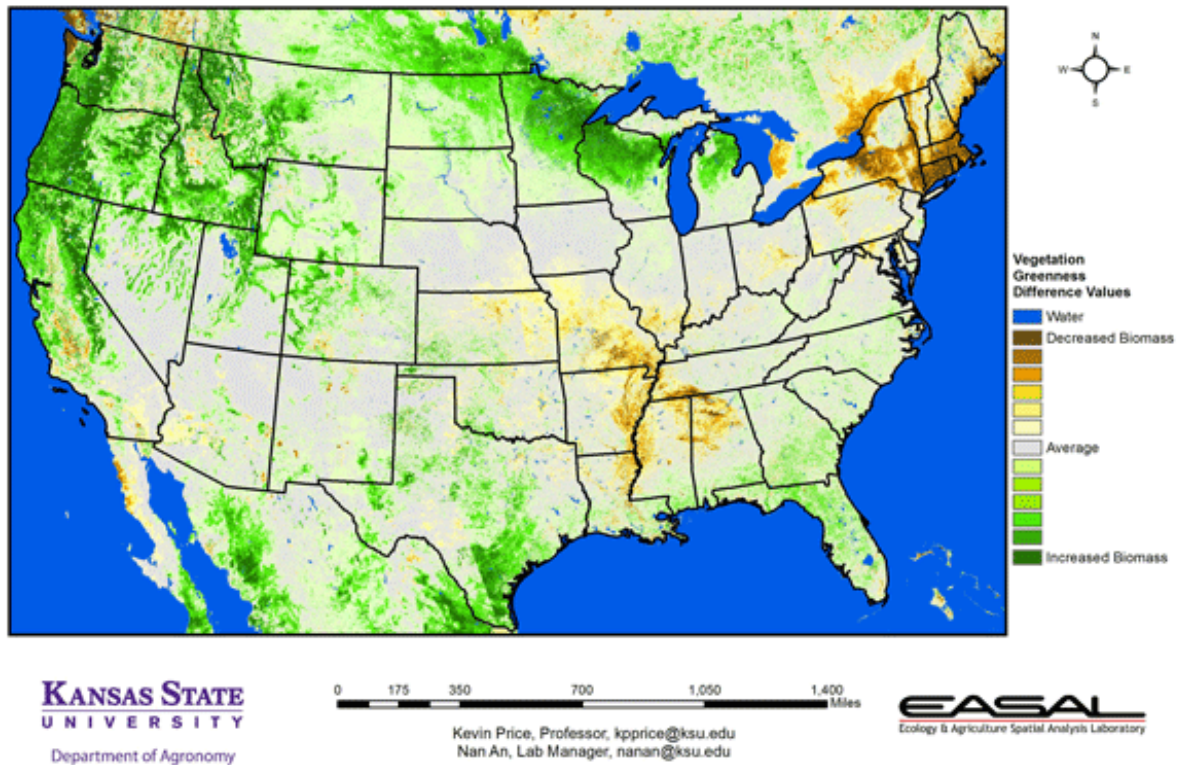


Figure 9. The U.S. comparison to the 26-year average for the period March 17 – 30 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows much higher-than-average photosynthetic activity in the Pacific Northwest. This will increase water demand with limited available water. The increase in photosynthetic activity may result in rapid intensification of drought in these areas. In Texas and Florida, the increased activity is driven by wetter conditions during the period.

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