k-state extension
Agronomy e-Updates

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1. Yellow wheat caused by cold temperatures

Many fields of wheat around the state have begun to take on a yellowish cast over the past couple weeks. There are several factors that can cause yellowing at this time of year:

* Cold temperature leaf injury
* Nitrogen deficiency
* Poor root development
* Leaf burn from liquid fertilizer application
* Drowning
* Atrazine carryover
* Leaf rust or tan spot

Determining the cause of the yellowing can be important. Some causes require a solution, such as applying more nitrogen; some causes are temporary and do not require any corrective actions; and some causes are beyond the control of producers.

To determine the cause of the yellowing, check the following:

* What parts of the plant are affected? Is the yellowing on older lower leaves only, newer leaves only, on the tips, or on the entire plants? If the yellowing is on lower leaves, that indicates nitrogen deficiency. If it is only on newer leaves or leaf tips, that could indicate cold temperature leaf burn or barley yellow dwarf. If entire plants are yellowing, that might indicate atrazine carryover, liquid fertilizer burn, or drowning.
* What have the temperature and growing conditions been over the past 30 days? If there has been a sudden drop in temperatures while leaves were green, you might suspect cold injury or leaf tip burn.

* Are fields unusually wet or dry? If soils are excessively wet, roots can drown and nutrient uptake can be greatly reduced, resulting in yellowing of lower leaves first, then entire plants. If soils are very dry, root growth will often be stunted and plants will gradually become chlorotic, then turn bluish or brown.
* What is the pattern in the fields? If the yellowing is in streaks in the field, that implies a fertilizer application problem, or possibly atrazine carryover. If it is mostly on terrace tops, that might indicate a weather-related problem that would affect exposed plants first. If it is occurring in primarily in low areas, that might indicate freeze injury where cold air settled or drowning. If the yellowing is uniform throughout the field, any of the factors above could be the cause.
* Are other wheat fields in the general region of yours also yellow, or just a few scattered fields? If fields in the entire region are yellowing, that would imply a weather-related problem. If it is specific to just one or two fields, that implies a management-related or field-specific soil problem.
* Can the plants be pulled easily from the soil? If so, the root system is stunted and could be at least one cause of the yellowing.
* What herbicides had been applied to the previous crop? If atrazine had been applied to the previous crop, check on the rate used and the environmental conditions since the application. If soils have been drier than normal after the atrazine was applied, this would increase the chances for atrazine carryover into the wheat crop.
* What did the most recent soil test show? Are there nutrient deficiencies or lime requirements that haven’t yet been corrected?
* Is there a difference between early-planted and late-planted fields? Earlier planting usually results in bigger plants when going into winter, which can sometimes result in more cold temperature injury to the leaves over the winter. Later-planted wheat often has less root development going into winter, which can make the plants more susceptible to nitrogen and other nutrient deficiencies. Plants will grow out of the yellowing from either of these causes if growing conditions are good in late winter and early spring.

In the current situation, the likely cause of yellowing in most cases is cold temperature injury. I say that because: (1) the plants in most cases are showing yellowing or burning on upper leaves and leaf tips; (2) the symptoms are occurring over a wide region, especially in southern Kansas; (3) the symptoms are mostly on earlier-planted wheat with more leaf area exposed; and (4) the weather had been mild for much of December and January, and plants were green, followed by a period of cold temperatures recently.

Yellowing wheat from cold weather injury in Harper County, early February 2012. Photo by Brian Waldschmidt, Harper County Extension agent.

Yellowing due to cold weather injury at this time of year is temporary, and should not cause any yield loss. Expect the wheat to return to a healthy green color when stem elongation begins if growing conditions are good -- unless another problem crops up.

-- Jim Shroyer, Extension Agronomy State Leader
jshroyer@ksu.edu

2. Early spring management practices for alfalfa

As alfalfa stands come out of winter dormancy and begin their new growth, producers should evaluate their stands for winterkill damage and general health. They should also prepare for management decisions that will improve the early-season productivity of their stands. As alfalfa breaks dormancy, producers should plan to keep a close watch for insect activity. This is also a time of year when producers can apply lime or fertilizer, if needed.

Winterkill

There is a wide range of winterhardiness among alfalfa varieties. As in wheat, winterkill in alfalfa occurs when the crown is frozen. When this occurs, the taproot will turn soft and mushy. In the early spring, check for bud and new shoot vigor. Healthy crowns are large, symmetrical and have many shoots. Examine them for delayed green-up, lopsided crowns and uneven shoot growth. If any of these characteristics are present, check the taproots for firmness. Some plants may even begin to greenup and then die. Plants that put out second leaves are likely unaffected.

If there has been some winter injury, it's usually best to resist the temptation to interseed the entire stand with new seed to thicken it. New seedlings will either be outcompeted by the surviving plants or die from allelopathy created by the existing stand. Large dead spots could be disked first and then seeded. Or the stand could be left as is, then targeted for termination and replanting if productivity has declined too much.

Heaving

Alfalfa can also be damaged by the heaving effect during the winter as the soil freezes and. This will be more likely to occur where soils are not under continuous snow or ice cover, and where temperatures have been in the single digits at night. Soils with high levels of clay are especially prone to winter heaving.

If heaving has occurred, dig up some plants to determine if the taproot is broken. Plants with broken taproots may green-up, but they perform poorly and eventually die. Slightly heaved plants can survive, but their longevity and productivity will be reduced. Crowns that heaved one inch or less are not as likely to have a broken taproot. With time, these plants can reposition themselves. Raised crowns are susceptible to weather and mechanical damage. Raise cutter bars to avoid damaging exposed crowns.

Evaluating plants and stands

Producers can start to evaluate the health of their alfalfa stands in March or April, as long as the soil is not frozen. They should look at the crowns and roots. Buds should be firm, and white or pink in color if they have survived with good vigor. The bark of roots should not peel away easily when scratched with a thumbnail. When cut, the interior of healthy roots will be white or cream in color.

When alfalfa growth reaches 4 to 6 inches, producers can use stems per square foot to assess density measure. A density of 55 stems per square foot has good yield potential. There will probably be some yield loss with stem counts between 40 and 50 per square foot. Consider replacing the stand if there are less than 40 stems per square foot and the crown and root health is poor.

If an established stand was injured by winterkill or heaving, and large patches are dead, producers may want to buy some time before replacing the stand by temporarily thickening the bare areas with red clover. Red clover is not susceptible as alfalfa to the plant toxins released by alfalfa (allelopathy), and help provide good quality forage.

Insect activity

Alfalfa weevils are probably first and foremost insect pest to start scouting for in the early spring. Alfalfa weevils are cool-weather insects, so scouting should start when plants break dormancy. A degree day or thermal unit accumulation system can be used to predict when to initiate scouting. Insect development is controlled by temperature. This can be used to help manage these pests. It is a little tricky for alfalfa weevils because eggs can be laid in the fall, winter, and spring. Weevil activity has been tracked in Kansas for the past few years and has been used to generate recommendations (see table below).

Approximate degree days required for alfalfa weevil development

Degree Days or Thermal Units	Stage	Importance
25–300	Eggs hatch	In stems
301–450	1st and 2nd instars	Leaf pinholing – start sampling
450–600	2nd and 3rd instars	Defoliation
600–750	3rd and 4th instars	Defoliation
750+	Pupa to adult	Adults – some feeding – oversummering

Because it is impossible to determine whether eggs were laid in the fall, winter, or spring, the degree day model may vary considerably, but it is useful for indicating when to start a scouting program. The base temperature for alfalfa weevils, or the temperature below which there is no development, is approximately 48ºF. Every day after oviposition that the temperature exceeds 48ºF, the eggs mature and get closer to hatching. Hatching occurs after about 300 degree days. In Kansas, scouting should start after the accumulation of about 180 degree days from January 1.

To calculate a degree day, record the daily high temperature anytime it exceeds 48ºF. For example, if there is only one day in January that the temperature exceeded 48ºF, take that temperature (60ºF in the example below) and add the lowest temperature for that day (or 48ºF, whichever is higher). Then divide by 2 to calculate the average temperature for that day. Next, subtract 48ºF, which gives you 6 degree days accumulated for that day.

Continue recording and summing degree days until you have accumulated 150 to 180. That is when to start scouting alfalfa fields because the first eggs will start hatching. The location where the daily temperature is recorded is probably not exactly the same as where weevils are developing, so the model may be off a little, but it can save time by alerting you to when eggs should start hatching.

Do not be too quick to treat for alfalfa weevil. Wait until the field reaches the treatment threshold. Treating too early is not only unnecessary, it can also have detrimental effects by killing beneficial insects.

For more details, see *Alfalfa Weevils*, K-State publication MF-2999, at your local county Extension office, or http://www.ksre.ksu.edu/library/entml2/mf2999.pdf

The next insect to start watching for would probably be pea aphids. They can also start relatively early in the spring, and can be a problem on first-year stands. If weevil treatments are applied, they will wipe out any beneficial insects -- which normally do a good job of keeping aphid populations under control.

Also, producers will need to keep an eye out for army cutworms as there were some reports of army cutworm activity last fall. Army cutworms will start feeding again anytime temperatures are above 50 degrees F. Armyworms are another potential problem. We had problems with armyworms after the April freeze in 2007.

Those are the early season pests which have the most potential for damaging alfalfa prior to the first cutting. For more information on control, see K-State publication MF-809, Alfalfa Insect Management 2011, at: www.ksre.ksu.edu/library/entml2/mf809.pdf

Fertility decisions

Alfalfa is a crop with high nutrient removal rates, with average values of 10-12 lbs of P_2O_5 and 60 lbs of K_2O per ton of alfalfa. Annual fertilizer application of P and K is often needed to maintain soil nutrient levels, which also helps to maintain good stand vigor and therefore the longevity of an alfalfa field.

K-State Phosphorus Recommendations for Alfalfa						
		Soil test for phosphorus (ppm)				
Condition	Area of state	Very low 0-5	Low 6-12	Medium 13-25	High 26-50	Very high >50
		Pounds per acre of P_2O_5				
New seeding						
Irrigated	Entire	90-120	70-90	50-70	0-50	None
Nonirrigated	Eastern	80-100	60-80	40-60	0-40	None
	Western	60-80	40-60	20-40	0-20	None
Established stand						
Irrigated	Entire	90-110	60-90	40-60	0-40	None
Nonirrigated	Eastern	60-80	40-60	30-40	0-30	None
	Western	40-60	30-40	0-30	None	None

K-State Potassium Recommendations for Alfalfa						
		Soil test for potassium (ppm)				
Condition	Area of state	Very low 0-40	Low 41-80	Medium 81-120	High 121-160	Very high >160
		Pounds per acre of K_2O				
New seeding						
Irrigated	Entire	100-140	80-100	50-80	0-50	None
Nonirrigated	Entire	100-120	70-100	40-70	0-40	None
Established stand						
Irrigated	Entire	100-120	70-100	50-70	0-50	None
Nonirrigated	Entire	90-120	60-90	40-60	0-40	None

Source: K-State *Alfalfa Production Handbook*

Alfalfa also shows responses to some secondary and micronutrients and in Kansas sulfur and boron can often limit yield potential and should be monitored periodically.

If phosphorus, potassium, sulfur, or boron are needed, when should they be applied?

Producers who are planning a new stand this spring have time now to build up soil test P and K to the optimum range before seeding, because this is the only opportunity (for the life of the stand) to mix the nutrients through the topsoil. At seeding, small amounts of P and K can be banded below the seed, making sure to allow adequate separation between the seed and the fertilizer band.

Lime is also important for alfalfa. Lime should be applied before seeding and during land preparation for planting. Alfalfa grows best in a soil pH range of pH of 6.5 to 7.5 and when needed, lime should be applied to reach a pH of 6.8.

On established stands, broadcasting phosphorus has proven effective on soils low in phosphorus because alfalfa has roots near the soil surface. For nonirrigated stands, top dressing is normally done in the fall, early spring, or even after the first cutting. Irrigated stands can be fertilized in the fall, early spring, or after any cutting because moisture can be supplied to make the topdressed fertilizer available to plants.

Potassium application times and methods are similar to those for phosphorus, and in most cases, the nutrients will be applied together.

When high nutrient application rates are needed to boost soil fertility, splitting the total required amount into two or more applications is recommended in order to avoid salt injury and luxury consumption beyond the alfalfa nutritional requirement.

Little difference exists between liquids or solids, or ortho- or polyphosphates, as phosphorus sources for alfalfa. Use of straight phosphate sources (0-46-0) over ammonium phosphate is preferred for topdressing to minimize weed competition, but availability of straight phosphates is limited, and the use of ammonium phosphates (18-46-0, 10-34-0) as phosphorus sources for alfalfa has been successful.

The amount of nitrogen included in 18-46-0 or 10-34-0 fertilizer will not affect alfalfa to any noticeable degree. It is not necessary or desirable, however, to apply straight nitrogen to established stands of alfalfa. Nitrogen fertilizer applied to well-nodulated alfalfa will only stimulate grassy and broadleaf weeds, and may reduce stand longevity.

For more information, see K-State publication C-683, *Alfalfa Production Handbook*, at: http://www.ksre.ksu.edu/library/crpsl2/c683.pdf

-- Jim Shroyer, Extension Agronomy State Leader
jshroyer@ksu.edu

-- Jeff Whitworth, Extension Entomologist
jwhitwor@ksu.edu

-- Dorivar Ruiz Diaz, Nutrient Management Specialist
ruizdiaz@ksu.edu

3. Soybean irrigation management: 2012 yield prediction tables

In the January 27, 2012 issue of the Agronomy e-Update (No. 334), we had an article an article on predicted irrigated corn and sorghum yields for 2012 based on available soil water at planting time, in-season precipitation, and irrigation levels. This is important this year because irrigators will need to tailor their water management to have the expectation of producing at least their irrigated proven yield to qualify for crop insurance as an irrigated practice. If they do not have enough water to produce their proven yield on the whole field, they may need to reduce irrigated acreage to fully irrigate the planted area. They need to know how much water it will take to produce their proven yield.

Predicted soybean yields for 2012 (see tables below) were based on a crop simulation model developed by K–State Research and Extension (Crop Yield Predictor available at www.mobileirrigationlab.com). The stored soil water that is available for plant use at the beginning of the growing season is one of the sources of water to produce the crop. The other sources are growing season precipitation and irrigation.

In the tables, the change in available soil water (ASW) from October 1, 2011 through April 1, 2012 is based on the average annual precipitation expected during the dormant season. Water accumulation depends on the storage capacity of the soil, how much evaporation occurs at the soil surface, and how much water drains below the expected root zone.

These tables are provided by K–State Research and Extension for producers as information for determining possible strategies for 2012. They were not derived by the USDA-Risk Management Agency. Crop insurance underwriters should be contacted for additional information.
Example: Crop = soybeans

Annual Precipitation = 17 inches
Available water on April 1= 20%
Proven Yield = 56 bu/acre
Then Irrigation needed = 14 inches
Irrigation volume available = 1200 ac-inches (example 12 inches for 100 acres)
Irrigated acres to produce proven yield = (1200 ac-inches)/14 inches) = 88 acres

Soybean Predicted Yield

Annual Precipitation = 17 inches

Available Soil Water	Available Soil Water	------------------------Applied Irrigation--------------------------							
		5"	8"	11"	14"	17"	20"	23"	26"
1-Oct	1-Apr	Yield	Yield	Yield	Yield	Yield	Yield	Yield	Yield
%	%	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
10	20	46	50	53	56	60	61	63	65
30	35	53	56	59	62	64	65	65	65
50	50	59	62	64	65	65	65	65	65
70	60	62	65	65	65	65	65	65	65

Soybean Predicted Yield
Annual Precipitation = 21 inches

Available Soil Water 1-Oct	Available Soil Water 1-Apr	-------------------------Applied Irrigation---------------------------------							
		5"	8"	11"	14"	17"	20"	23"	26"
		Yield	Yield	Yield	Yield	Yield	Yield	Yield	Yield
%	%	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
10	25	55	58	60	62	64	65	65	65
30	45	60	62	64	65	65	65	65	65
50	60	63	65	65	65	65	65	65	65
70	70	64	65	65	65	65	65	65	65

Soybean Predicted Yield
Annual Precipitation = 25 inches

Available Soil Water 1-Oct	Available Soil Water 1-Apr	-------------------------Applied Irrigation-------------------------- ------							
		5"	8"	11"	14"	17"	20"	23"	26"
		Yield	Yield	Yield	Yield	Yield	Yield	Yield	Yield
%	%	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
10	35	62	64	65	65	65	65	65	65
30	50	65	65	65	65	65	65	65	65
50	65	65	65	65	65	65	65	65	65
70	70	65	65	65	65	65	65	65	65

-- Norm Klocke, Irrigation Engineer, Southwest Research-Extension Center
nklocke@ksu.edu

-- Loyd Stone, Soil and Water Management
stoner@ksu.edu

4. Winter/spring options for winter annual broadleaf control in wheat

There are several herbicide options for controlling winter annual broadleaf weeds in wheat. Generally, fall applications will provide the best control of winter annual weeds with any herbicide, as long as the weeds have emerged. The majority of winter annual weeds usually will emerge in the fall, although you can still have some emergence in the spring, especially if precipitation after planting is limited in the fall. However, winter annual weeds that emerge in the spring often are not very competitive with the crop, assuming that you have a decent crop.

Some herbicides can work well even when applied during the dormant part of the season, while others perform best if the crop and weeds are actively growing. The key difference relates to the degree of soil activity provided by the herbicide. Herbicides that have good residual activity, such as Glean, Finesse, Amber, and Rave can generally be applied in January and February when plants aren't actively growing and still provide good weed control, assuming you have proper conditions for the application. Most other herbicides, which depend more on foliar uptake, will not work nearly as well during the mid-winter months, when the wheat and weeds aren't actively growing, as compared to a fall or early spring application.

Spring herbicide applications can be effective for winter annual broadleaf weed control as well, but timing and weather conditions are critical to achieve good control. Spring applications generally are most effective soon after green-up when weeds are still in the rosette stage of growth, and during periods of mild weather. Once weeds begin to bolt and wheat starts to develop more canopy, herbicide performance often decreases dramatically.

Huskie is a relatively new herbicide that can provide good control of a variety of broadleaf weeds with excellent crop safety from the 2-leaf to boot stage of growth. Huskie is a premix herbicide of pyrasulfatole and bromoxynil. Pyrasulfatole is an "hppd" herbicide, and can be effective to control ALS-resistant broadleaf weeds. Because Huskie has limited residual activity, it works best when applied when weeds and wheat are actively growing and with milder weather.

Another important consideration with herbicide application timing is crop tolerance at different application timings. For example, 2,4-D should not be applied in the fall or until wheat is fully tillered in the spring. On the other hand, any herbicide containing dicamba can be applied after wheat has 2 leaves, but should not be applied once the wheat gets close to jointing in the spring, Herbicides containing dicamba include Banvel, Clarity, Rave, Pulsar, and Agility SG.

There has been some discussion about wheat tolerance to herbicides, especially when applied with fertilizer carrier. The best advice regarding crop safety with herbicide-fertilizer combinations and application timing is to follow the label guidelines. We generally see very minimal crop injury and no yield loss from topdress fertilizer/residual herbicide applications during the winter months. However, these combinations can often cause considerable burn to the wheat if applied when the crop is actively growing and with warmer weather. The foliar burn is generally temporary in nature and the wheat usually will recover if good growing conditions persist.

Research at Hays several years ago found as much as 47% injury to the wheat 4 days after treatment following a late March treatment of Amber plus 2,4-D, but wheat recovered and yields were not reduced. However, research in Nebraska did show some yield loss from Ally plus 2,4-D applications with fertilizer applied in late April to more advanced wheat and with moisture stress conditions. Crop injury with herbicide-fertilizer combinations will depend on the total amount of fertilizer applied, dilution with water, and the addition of surfactant. Again the herbicide label provides the best guidelines regarding if, when, and how herbicides can be applied with fertilizer.

-- Dallas Peterson, Weed Management Specialist
dpeterso@ksu.edu

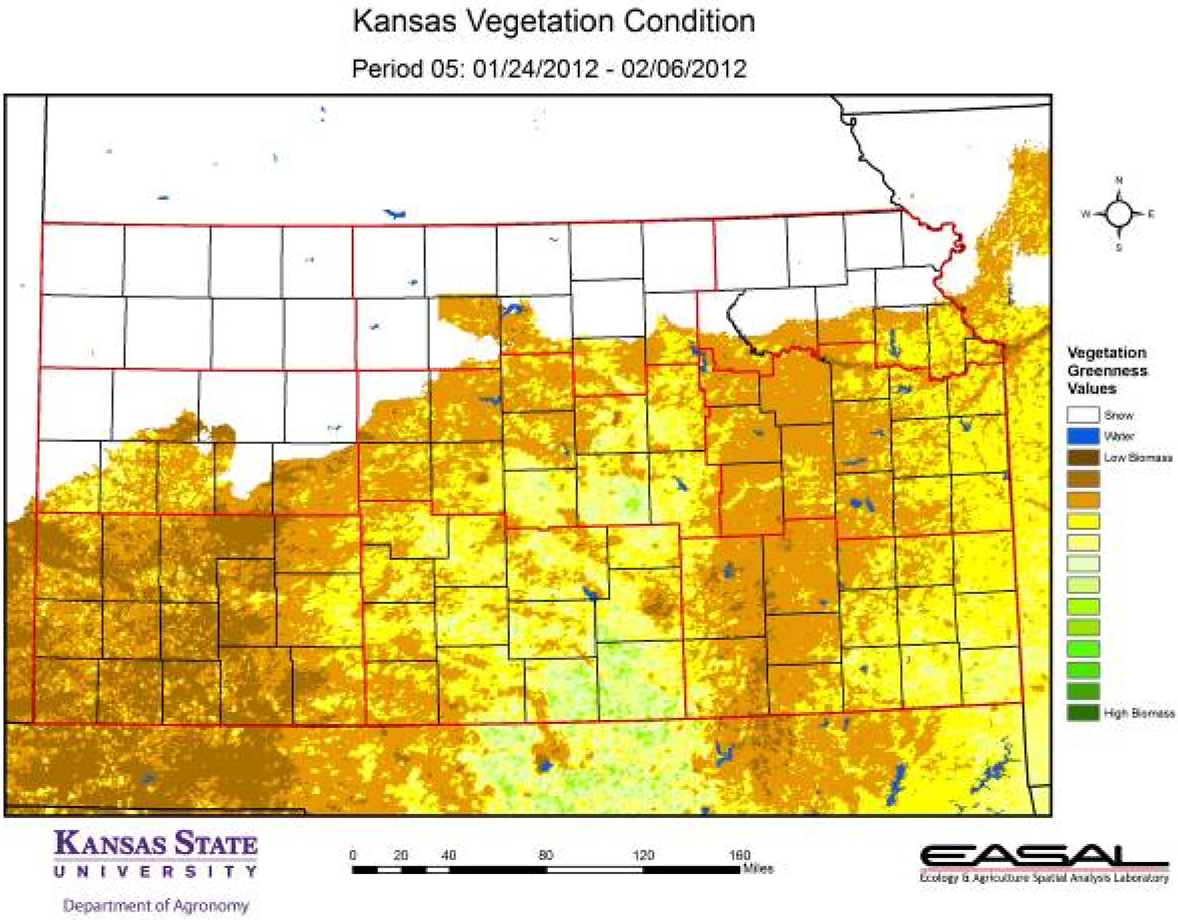
5. Comparative Vegetation Condition Report: January 24 – February 6

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.

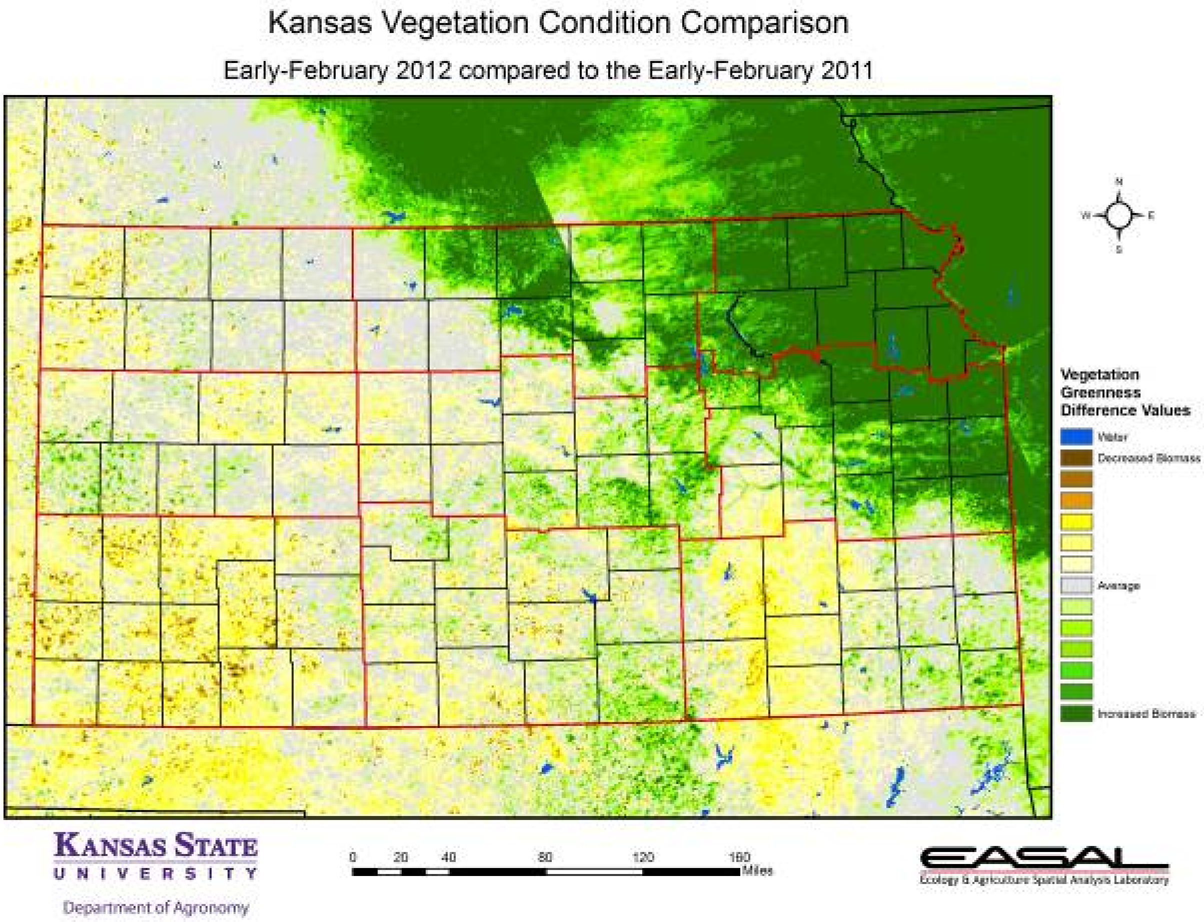
Two short videos of Dr. Kevin Price explaining the development of these maps can be viewed on YouTube at:
http://www.youtube.com/watch?v=CRP3Y5NIggw
http://www.youtube.com/watch?v=tUdOK94efxc

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.

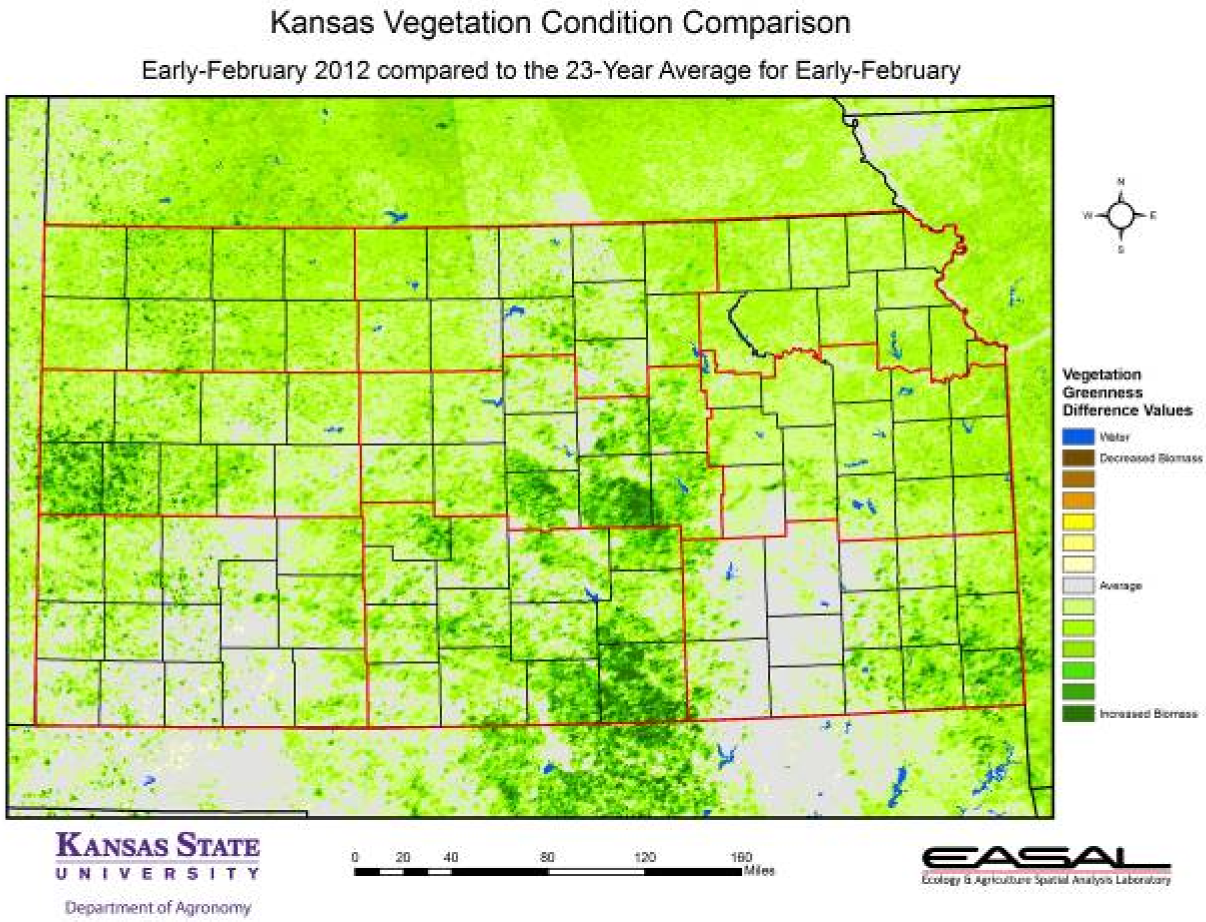
The maps below show the current vegetation conditions in Kansas, the Corn Belt, and the continental U.S, with comments from Mary Knapp, state climatologist:



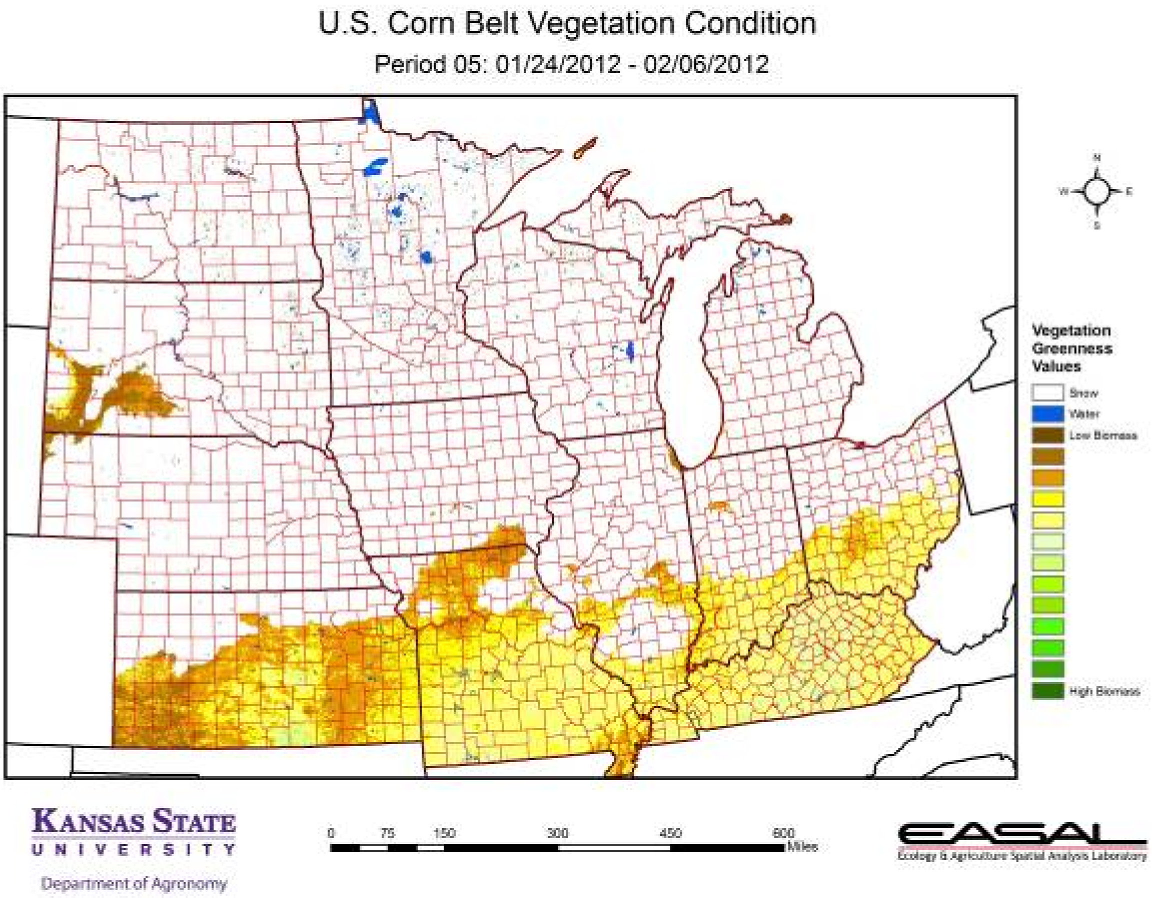
Map 1. The Vegetation Condition Report for Kansas for January 24 – February 6 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows the snow cover from the February 2-3 storm. Southern portions of the state experienced most of the moisture as rain. Parts of Sumner and Harper counties show some photosynthetic activity.



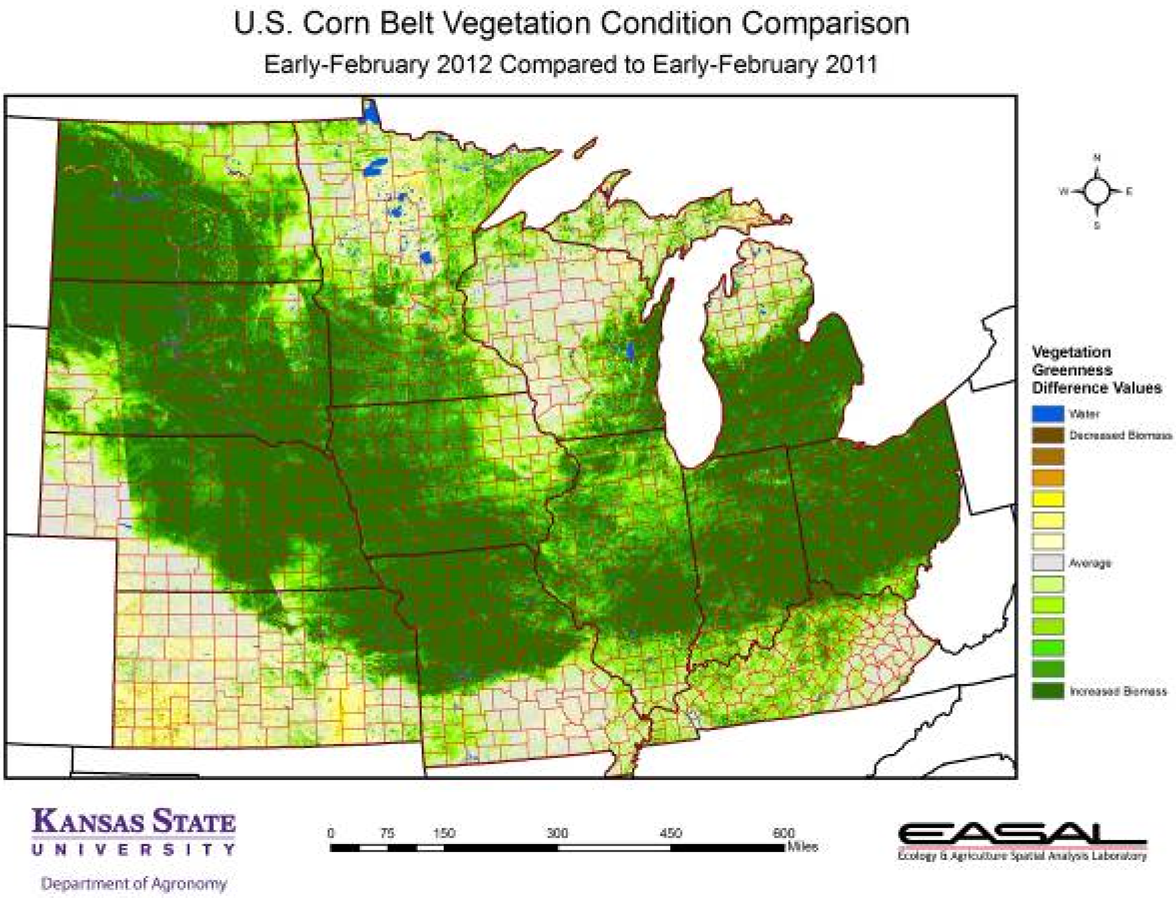
Map 2. Compared to the previous year at this time for Kansas, the current Vegetation Condition Report for January 24 – February 6 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows greater vegetation index (Normalized Difference Vegetation Index, or NDVI) values in northeast Kansas. Last year at this time, most of this area had snow cover ranging up to 8 inches. On February, Atchison reported 5.5 inches of snow on the ground. The speckled green patches in the central, southern, and western Kansas areas are associated with greater photosynthetic activity this year compared to last year at this time, which suggests greater plant productivity this year.



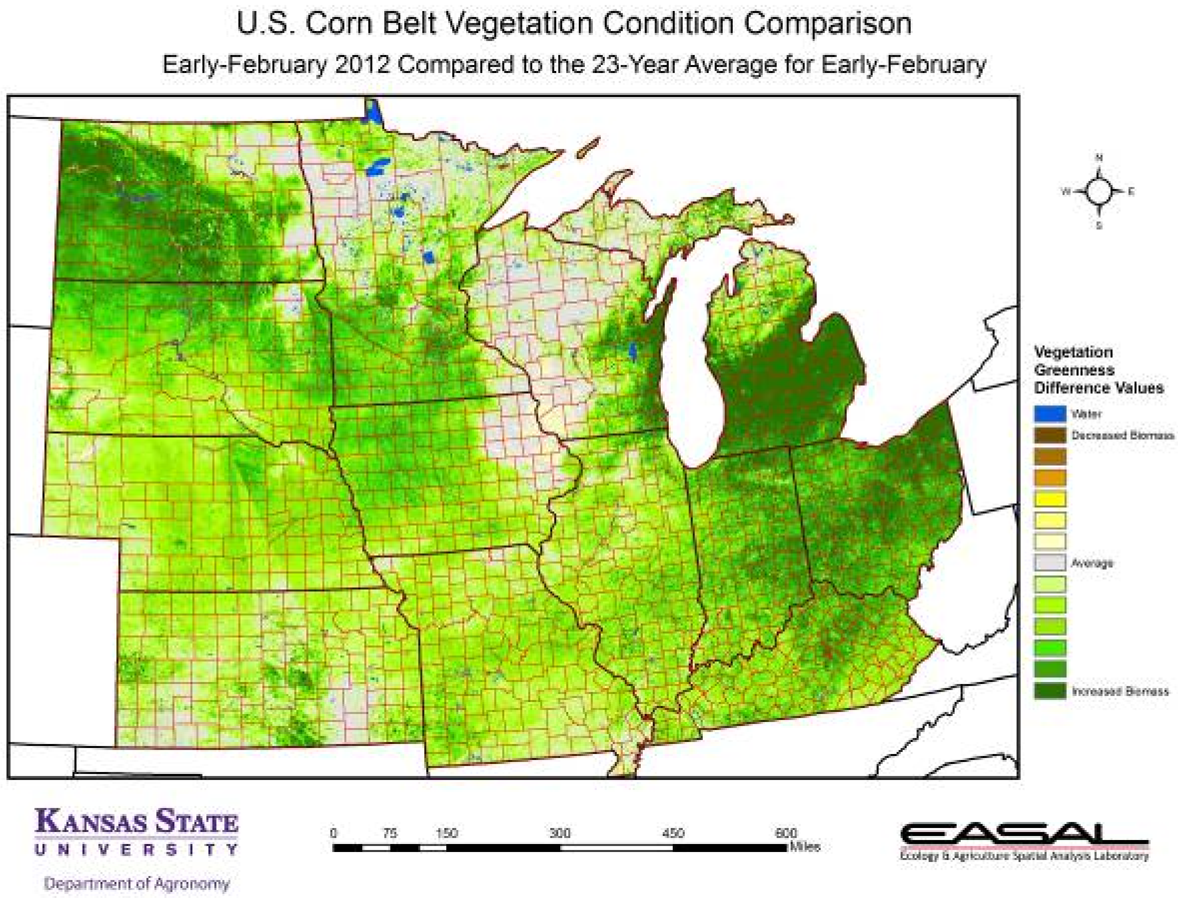
Map 3. Compared to the 23-year average at this time for Kansas, this year's Vegetation Condition Report for January 24 – February 6 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that the Central and South Central Divisions have the greatest departure from average in NDVI values. Statewide NDVI values are at or above average. This reflects the mild temperatures and favorable moisture across most of the state.



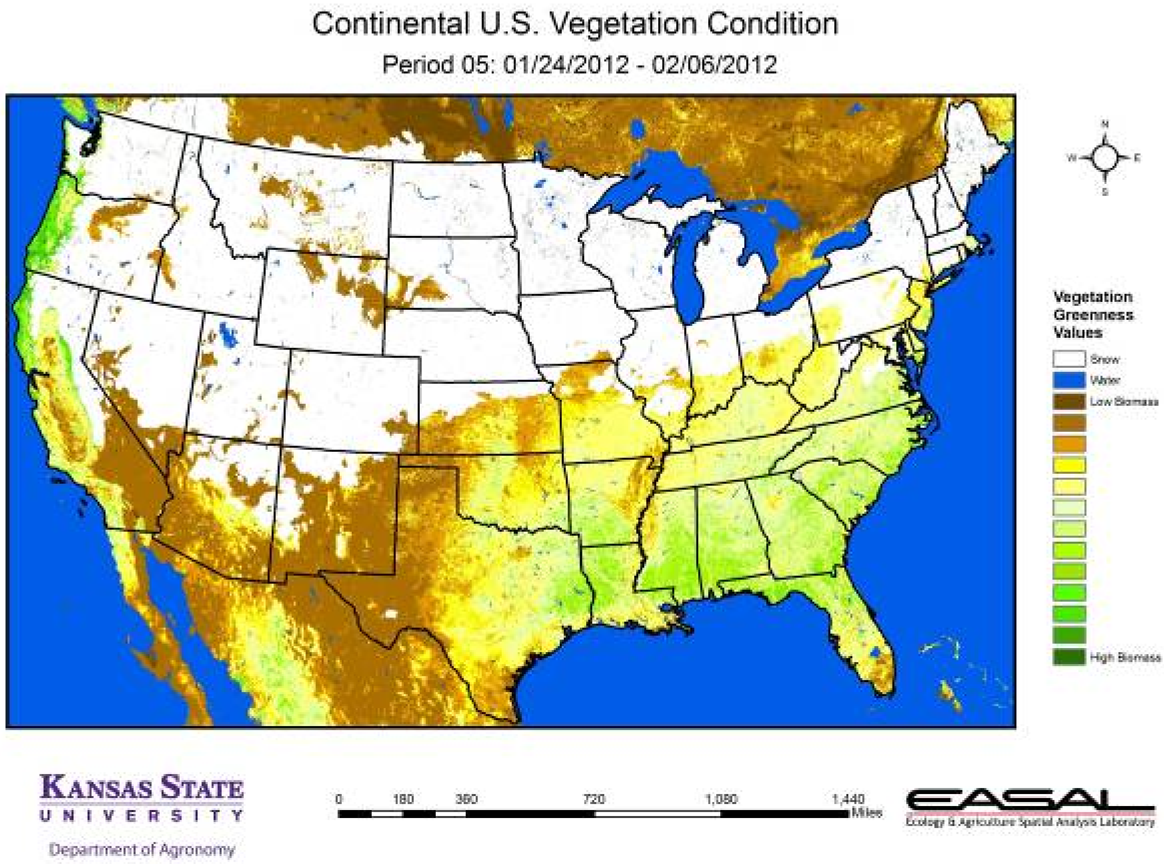
Map 4. The Vegetation Condition Report for the Corn Belt for January 24 – February 6 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that snow dominated the northern portions of the region. Parts of Nebraska through Northern Iowa had significant snow. This is an area that had relatively dry conditions going into the winter.



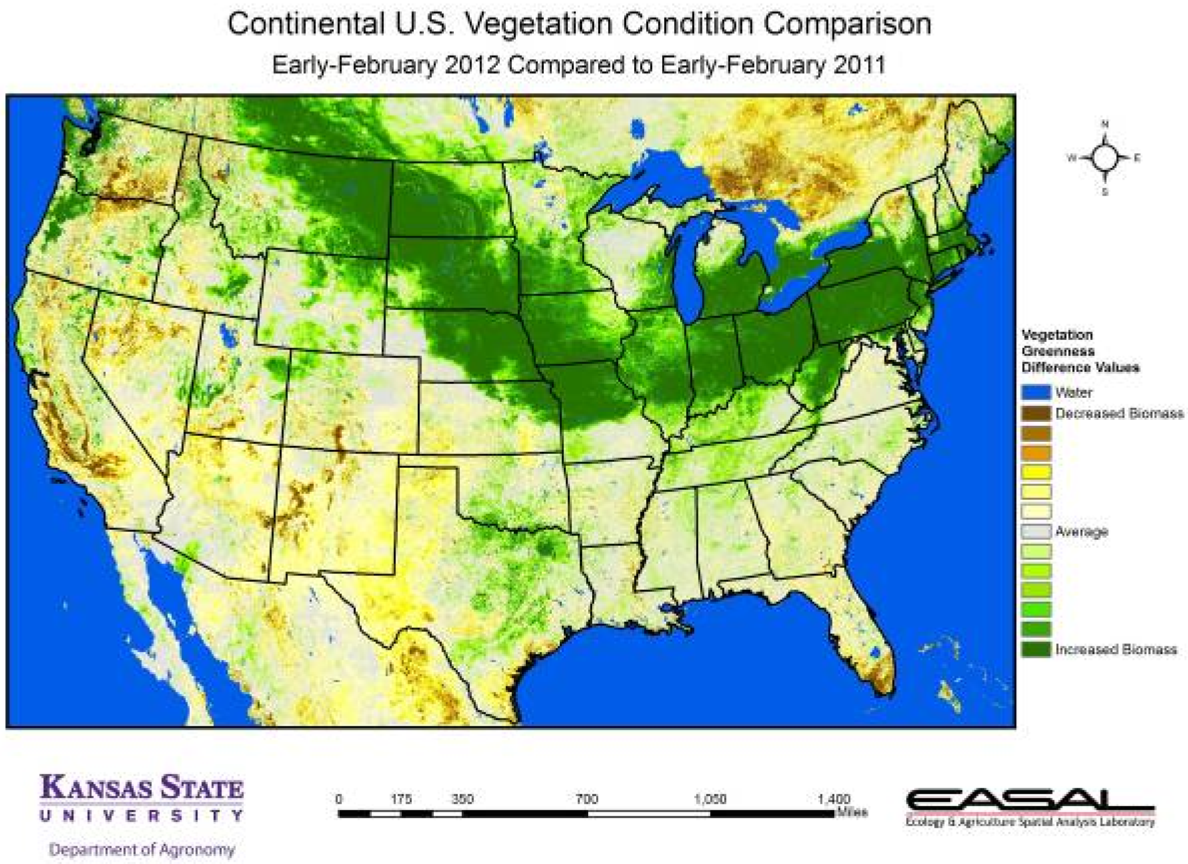
Map 5. The comparison to last year in the Corn Belt for the period January 24 – February 6 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that NDVI values along the center of the Corn Belt continue to be higher. Again, this region had much high snow depths last year at this time. The NDVI values at this time of year reflect any vegetation and exposed soil, and do not necessarily indicate that there is photosynthetically active plant growth occurring. In fact, most vegetation at this time of year in the Corn Belt is dormant. In areas where NDVI values are higher than last year (showing as green on these maps), the readings indicate that there has been less snow cover over the measurement period than during the same period last year, resulting in more exposed vegetation and soil this year.



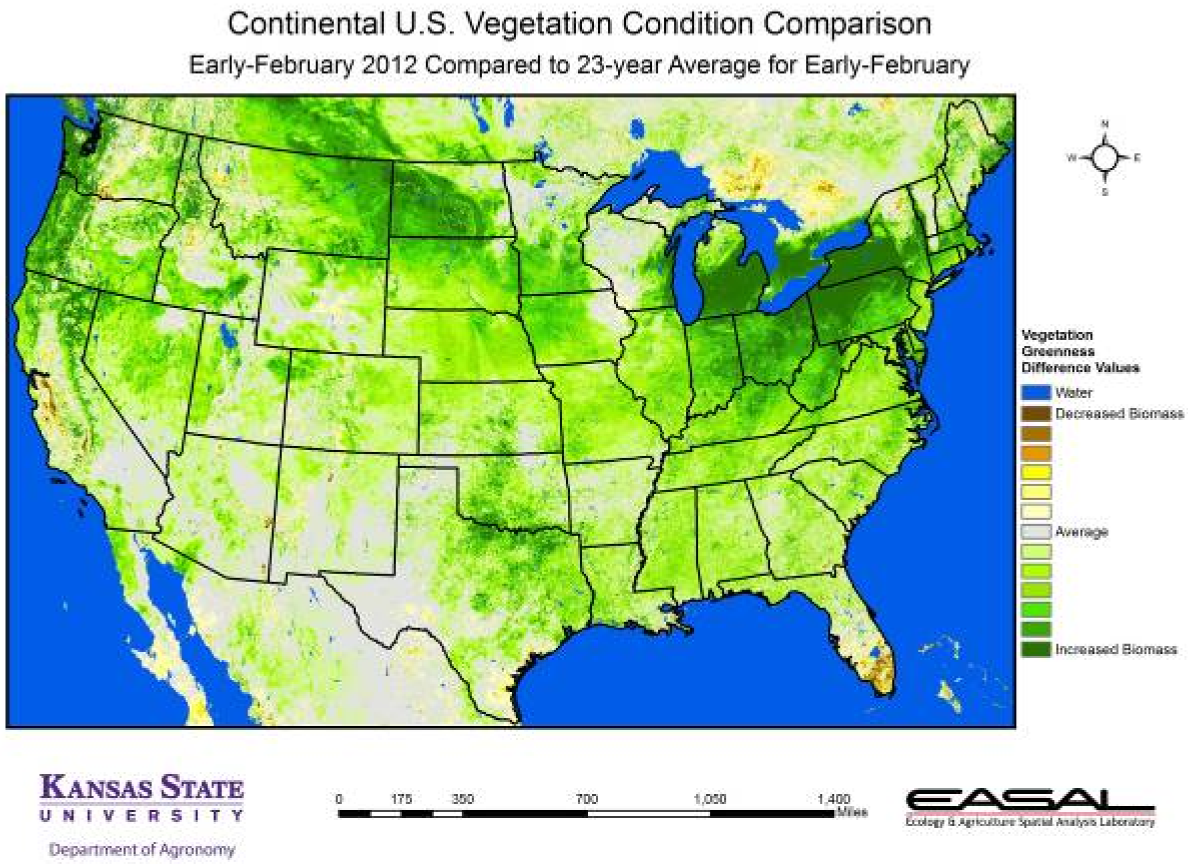
Map 6. Compared to the 23-year average at this time for the Corn Belt, this year's Vegetation Condition Report for January 24 – February 6 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that NDVI values continue to be above average for most of the Corn Belt. Milder weather conditions and less snow cover than the 23-year average are the dominant factors. In northern Minnesota, drought conditions are worsening.



Map 7. The Vegetation Condition Report for the U.S. for January 24 – February 6 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that snow was mostly confined to the northern areas of the country during this period. The Southern U.S. has near normal photosynthetic activity.



Map 8. The U.S. comparison to last year at this time for the period January 24 – February 6 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows significantly greater NDVI values along the Northern Plains, into the Upper Midwest. Differences in snow cover is the major factor. More notable is the increased photosynthetic activity from southern Oklahoma through central Texas. Favorable moisture has improved photosynthetic activity in the region.



Map 9. The U.S. comparison to the 23-year average for the period January 24 – February 6 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that most of the country continues to see higher than average NDVI values. Greatest departure is in the Upper Midwest, where lower snow depths continue to be a problem. Only the southern tip of Florida is showing decreased biomass production.

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.

-- Mary Knapp, State Climatologist
mknapp@ksu.edu

-- Kevin Price, Agronomy and Geography,
Remote Sensing, Natural Resources, GIS
kpprice@ksu.edu

-- Nan An, Graduate Research Assistant,
Ecology & Agriculture Spatial Analysis Laboratory (EASAL)
nanan@ksu.edu

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
Jim Shroyer, Research and Extension Crop Production Specialist and State Extension Agronomy Leader
785-532-0397 jshroyer@ksu.edu