



## Extension Agronomy

# eUpdate

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*12/12/2014*

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](mailto:swatson@ksu.edu), Jim Shroyer, Crop Production Specialist 785-532-0397 [jshroyer@ksu.edu](mailto:jshroyer@ksu.edu), or Curtis Thompson, Extension Agronomy State Leader and Weed Management Specialist 785-532-3444 [cthompso@ksu.edu](mailto:cthompso@ksu.edu).

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## 1. Availability of phosphorus in manure applications to soil

The total phosphorus content in manure varies depending on the animal species, age, diet, and how the manure has been stored. Concentration of phosphorus in some manures may be up to 80 to 90 lbs  $P_2O_5$  per ton (some poultry manures, for example), whereas other manure may contain as little as 4 lbs  $P_2O_5$  per ton. It will require a laboratory analysis to know for sure.

When manure is applied to the soil, what percentage of this phosphorus is available to the crop during the first year?

A large fraction of the phosphorus in manure is considered to be plant available immediately after application. The fraction that is not plant available shortly after application will become potentially available over time.

Estimated values of phosphorus availability are from 50 to 100%. This range accounts for variation in sampling and analysis, and for phosphorus requirements with different soil test levels. Use the lower end of the range of phosphorus availability values (50%) for soils testing "Very Low" and "Low" (below 20 ppm) in phosphorus. In these situations, large yield loss could occur if insufficient phosphorus is applied and soil phosphorus buildup is desirable.

On the other hand use 100% availability when manure is applied to maintain soil test phosphorus in the Optimum soil test category, and when the probability of a yield response is small.

Several studies have shown that manure P is a valuable resource, comparable to inorganic fertilizer P for crop production. These two P sources are similarly effective when the manure P concentration is known and the manure is applied properly. However, one factor that can affect the efficiency of manure as a P source in the field is the variability associated with application, and the typical variability associated with manure in general.

Nevertheless, excessive application of manure phosphorus (for example, applying manure at rates sufficient to meet the crop's nitrogen needs) often results in excessive soil phosphorus buildup over time, resulting in higher risk of surface water contamination. This problem of excessive phosphorus buildup in the long-term can be minimized by:

- Applying manure to cover the phosphorus needs of the crop and using inorganic sources of fertilizer to complement nitrogen needs,
- Constantly monitoring soil test phosphorus levels, and
- Using the P-index to assess potential impact of phosphorus buildup on water quality.

For maximum efficiency of manure use, it is essential to know the nutrient content of the manure. Using a manure lab analysis will help in determining the actual nutrient rates applied. Producers should think in terms of actual phosphorus application rates and not just gallons or tons per acre of manure being applied.

Uniform application of manure at precise rates can also be difficult. Careful calibration of manure applicators is needed. If these aspects are not considered, the efficiency of manure P compared with inorganic fertilizer P may be reduced. Careful management pays off.

For more information, see K State Extension publication MF-2562, *Estimating Manure Nutrient*

Availability at: <http://www.ksre.ksu.edu/bookstore/pubs/MF2562.pdf>

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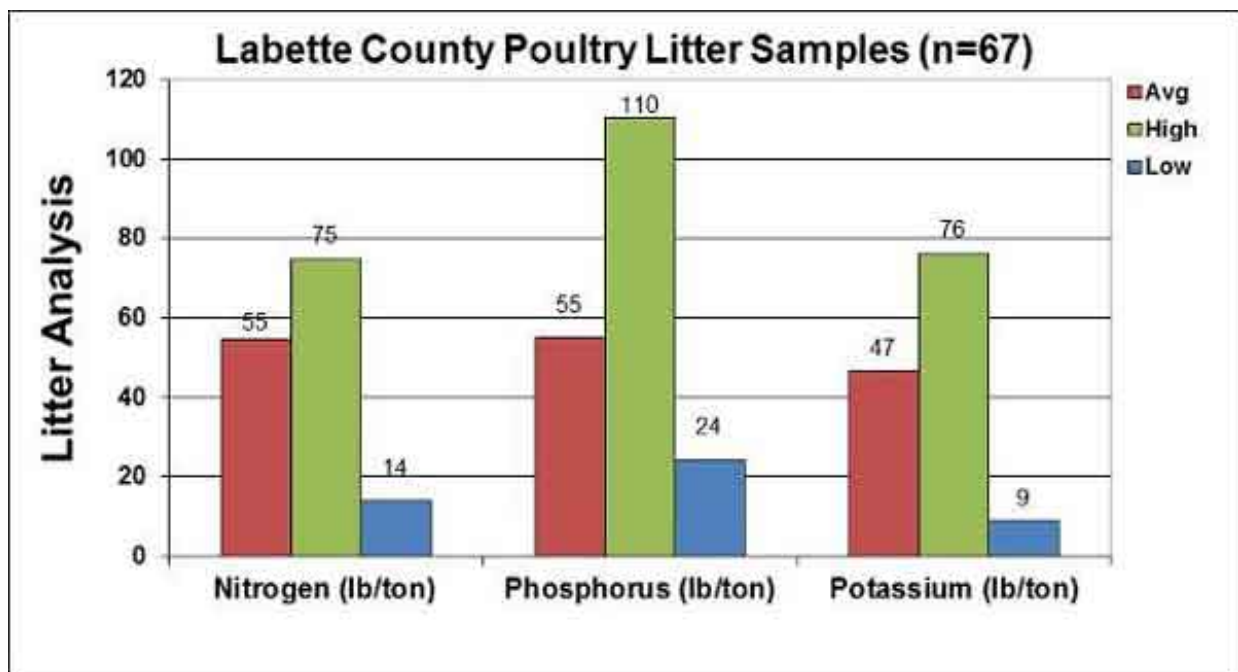
## 2. Poultry litter: Nutrient availability, value, and storage practices

Poultry litter can provide a significant and important supply of nutrients for crop production in areas of Kansas where a supply of litter is available. Although Kansas is not a major producer of poultry, there is an abundant supply of litter from the nearby states of Arkansas, Missouri, and Oklahoma, which rank among the largest producers of poultry in the U.S. The acreage available to receive poultry litter has been declining in Arkansas, Missouri, and Oklahoma in recent years because of environmental concerns. That trend, coupled with high fertilizer prices, has meant the availability of litter to areas such as southeast Kansas has been on the rise.

Poultry litter should serve as an excellent complement to commercial nitrogen (N) fertilizers. Phosphorus content in poultry litter is usually high, and applications rates should be based on P levels to avoid potential surface water contamination.

<b>Types of Poultry Litter</b>				
<b>Source</b>	<b>Typical moisture content</b>	<b>Typical nutrient content (lbs/ton)</b>		
		<b>N</b>	<b>P</b>	<b>K</b>
Layer	High	35	40	20
Pullet	Low	40	45	40
Breeder	High	40	60	40
Turkey	Low	60	60	55
Broiler	Low	60	60	55

Moisture content and nutrient concentration in poultry litter can be highly variable and depends mainly upon production conditions, storage, and handling methods. Therefore, laboratory analysis is the best way to determine the level of N and P in the material to be applied. The table above presents average values for the different types of poultry manure collected over a period of time. The table below presents the actual laboratory analysis of 67 poultry manure samples from southeast Kansas. There is a large range in nutrient values, likely due to the source of the litter. However, a good sample average to expect would be a 55-55-47.



**Results of analysis of 67 samples of poultry manure from Labette County. Source: Keith Martin, K-State Research and Extension, Wildcat Extension District.**

For maximum efficiency of manure use, it is essential to know the nutrient content of the manure. Using a manure lab analysis will help in determining the actual nutrient rates applied. A laboratory analysis should be done on the poultry litter before applying it to land. A laboratory analyses provides information regarding nutrient levels, as well as the chemical forms of these nutrients. This information is necessary for an adequate estimation of nutrient availability and application rates. For more information, see K State Extension publication MF-2562, "Estimating Manure Nutrient Availability," at: <http://www.ksre.ksu.edu/bookstore/pubs/MF2562.pdf>

### **Nitrogen availability**

Nitrogen and P crop availability shortly after application is a common question. In the case of N, it is important to consider that this nutrient is primarily in the organic form in poultry litter (up to 75-80% organic). Organic N needs to mineralize before becoming available to crops. A fraction of this organic N may become part of the soil organic matter pool and unavailable to crops in the short term.

Field and laboratory studies suggest the fraction of total nitrogen that becomes plant available the first year of application is approximately 45-55%, which includes both the inorganic N in the manure and a percentage of the organic N. This value varies depending upon components in the litter, and the method of handling and application. For example, poultry litter that contains a large fraction of bedding material will tend to have lower N availability the year of application. Reduction in N availability may also occur when litter is aged, and has undergone some level of composting. Nitrogen lost from the volatile ammonium fraction at the time of application to the soil surface can also reduce plant available N. Ammonium volatilization is typically higher during windy and warm days. Incorporation of litter immediately after application will reduce volatilization and potential nutrient loss by water runoff in case of a rainfall event, in addition to reducing the odor of the litter.

If the manure is applied to pastures, the percentage of nitrogen utilized by the forage the first year

will depend on whether the pasture consists of cool-season or warm-season grasses. For cool-season grasses, such as fescue pasture, nitrogen utilization will likely be less than 50% the first year. Most of the growth in cool-season pasture occurs early in the year. Microbes will not mineralize as much N early in the spring as they will later in the summer. Fall applications may utilize more N for fescue than winter or spring applications. For warm-season grasses, such as bermudagrass pasture, nitrogen utilization from manure will likely be close to 50%. In both cases, producers should base application rates on the P and K needs of the grass, and supplement additional N fertilizer to meet the N needs of the grass.

### **Phosphorus and potassium availability**

When manure is applied to the soil, what percentage of this phosphorus and potassium is available to the crop during the first year?

A large fraction of the phosphorus in manure is considered to be plant available immediately after application. The fraction that is not plant available shortly after application will become available over time.

Estimated values of phosphorus availability are from 50 to 100%. This range accounts for variation in sampling and analysis, and for phosphorus requirements with different soil test levels. Use the lower end of the range of phosphorus availability values (50%) for soils testing “Very Low” and “Low” (below 20 ppm) in phosphorus. In these situations, large yield loss could occur if insufficient phosphorus is applied and soil phosphorus buildup is desirable.

On the other hand use 100% availability when manure is applied to maintain soil test phosphorus in the Optimum soil test category, and when the probability of a yield response is small.

Several studies have shown that manure P is a valuable resource, comparable to inorganic fertilizer P for crop production. These two P sources are similarly effective when the manure P concentration is known and the manure is applied properly.

Nevertheless, excessive application of manure phosphorus (for example, applying manure at rates sufficient to meet the crop’s nitrogen needs) often results in excessive soil phosphorus buildup over time, resulting in higher risk of surface water contamination. This problem of excessive phosphorus buildup in the long-term can be minimized by:

- Applying manure to meet the phosphorus needs of the crop and using inorganic sources of fertilizer to complement nitrogen needs,
- Constantly monitoring soil test phosphorus levels, and
- Using the P-index to assess potential impact of phosphorus buildup on water quality.

Producers should think in terms of actual phosphorus application rates and not just tons per acre of manure being applied. Uniform application of manure at precise rates can also be difficult. Careful calibration of manure applicators is needed. If these aspects are not considered, the efficiency of manure P compared with inorganic fertilizer P may be reduced. Careful management pays off.

Availability of potassium (K) is usually near 100% with proper application, poultry litter can also provide significant amounts of secondary and micronutrients.

## Value of manure

The use of poultry litter can contribute to reduce cost of fertilizer inputs for many operations, depending on the price and transportation cost of the litter. For many farmers the use of poultry litter may represent significant savings. However, for many producers there is a “hassle factor” with using poultry litter. Reliable delivery, storage site location, uniform application, access to application equipment, and odor can all be additional challenges to producers unfamiliar with its use, and should be a consideration.

How valuable is poultry manure? This may not be a straightforward answer and depends on several factors, including the nutrient(s) required for a specific field, but here’s one example using the average nutrient analysis values from Labette County of 55-55-47 (N-P-K lbs/ton):

- Year 1:
- 35% of N is inorganic (all available) = 19.3 lbs/ton
- 65% of N is organic (1/4th available in year 1) = 8.9 lbs/ton
- Total N available in year 1 = 28.2 lbs/ton
- Total value of N available in year 1 (@ \$0.50/lb) = \$14.10
- P is 50% available in year 1 = 27.5 lbs/ton
- Total value of P in year 1 (@ \$0.50/lb) = \$13.75
- K is 85% available in year 1 = 40.0 lbs/ton
- Total value of K in year 1 (@ \$0.40/lb) = \$16.00

Total in year 1 = \$43.85/ton

Residual N and P = \$29.95/ton

## Storage

Proper storage of manure is important to prevent runoff contamination of water and odor problems. The following practices should be utilized:

- Avoid stockpiling litter near homes, public road ways and drainage ditches.
- Use tarps on litter piles to keep litter dry, reduce odor, and reduce N losses from volatilization.
- Stockpile litter at least 200 feet away from “Waters of the State.”

Additional considerations when selecting a suitable storage site

- Locate stockpiles in areas with minimal slope.
- Avoid sites that slope toward water ways and receive extraneous drainage.
- Locate sites in areas surrounded by grass that can serve as a buffer.



- Avoid sensitive groundwater areas and sites in close proximity to wells.

If you are located in Coffey, Woodson, Allan, Bourbon, Wilson, Neosho, Crawford Montgomery, Labette, or Cherokee county, the Spring River and Middle Neosho WRAPS groups working in conjunction with KSRE Watershed Specialists may be able to provide assistance in identifying suitable storage locations and/or designing improved temporary storage sites that poses the least possible environmental risk from runoff for the area.

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### 3. K-State Sorghum Production Schools scheduled for February



A series of four K-State Sorghum Production Schools will be offered in mid-February 2015 to provide in-depth training for sorghum producers. The schools will be sponsored by Kansas Grain Sorghum Commission.

The one-day schools will cover issues facing sorghum producers: weed control strategies, crop production practices, soil fertility and nutrient management, insect control, irrigation, and risk management.

The dates and locations are:

- Feb. 10: Garden City, Clarion Inn, 1911 E Kansas Ave

Local Research and Extension office contacts:

Andrea Burns, Ford County, [aburns@ksu.edu](mailto:aburns@ksu.edu) 620-227-4542

Barbara Addison, Finney County, [baddison@ksu.edu](mailto:baddison@ksu.edu) 620-272-3670

- Feb. 11: Oakley, Buffalo Bill Center, 3083 U.S. 83

Local Research and Extension office contact:

Julie Niehage, Golden Prairie District, Oakley, [julienie@ksu.edu](mailto:julienie@ksu.edu) 785-671-3245

- Feb. 12: Hutchinson, Hutchinson Community College, 1300 N Plum St

Local Research and Extension office contact:

Darren Busick, Reno County, [darrenbusick@ksu.edu](mailto:darrenbusick@ksu.edu) 620-662-2371

- Feb. 13: Ottawa, Neosho County Community College, 900 E Logan St

Local Research and Extension office contact:

Darren Hibdon, Frontier District, [dhibdon@ksu.edu](mailto:dhibdon@ksu.edu) 785-229-3520

Registration for each school is at 8:30 a.m. The program begins at 9 a.m. and adjourns at 3:30 p.m.

Lunch will be provided, courtesy of the Kansas Grain Sorghum Commission. There is no cost to attend, but participants are asked to pre-register by Feb. 4. Online registration is available at [K-State Sorghum Schools](http://bit.ly/KStateSorghumSchools) (<http://bit.ly/KStateSorghum>) or by emailing or calling the nearest local K-State Research and Extension office for the location participants plan to attend.

Presentations from the 2014 K-State Sorghum Schools can be seen at:  
<http://bit.ly/KStateSorghumSchool>

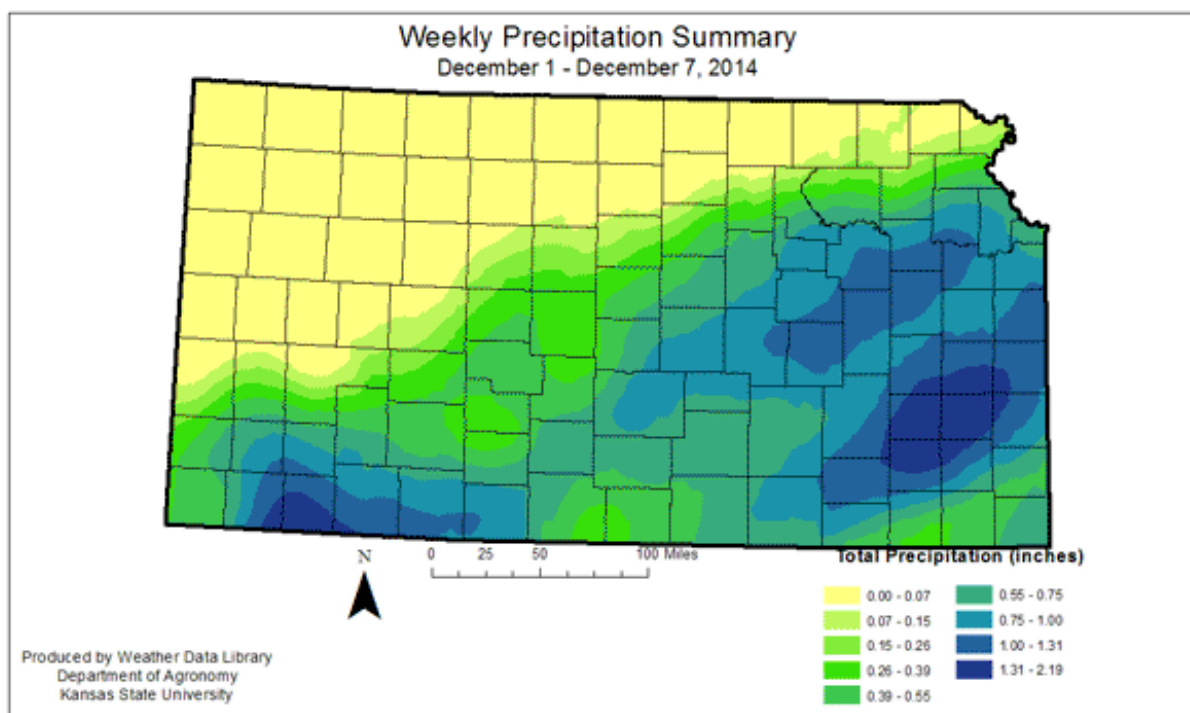
For more information, contact: Ignacio Ciampitti, K-State Crop Production and Cropping Systems Specialist, [ciampitti@ksu.edu](mailto:ciampitti@ksu.edu) 785-532-6940.

#### 4. Rain in southern Kansas: The Pineapple Express

Last week some parts of southern Kansas saw significant amounts of rainfall during what is usually a dry part of the year. A major factor was an upper air phenomenon known as the “Pineapple Express.”

This is a plume of high-level moisture from the Pacific which comes ashore along California. These systems tend to originate in the area of Hawaii, hence the name. As they move eastward, across the southern U.S., the systems tap into Gulf moisture. This combination means that parts of Kansas can enjoy a shot of moisture. Without the Arctic component, temperatures tend to be milder, increasing the chance that the precipitation will be rain rather than snow.

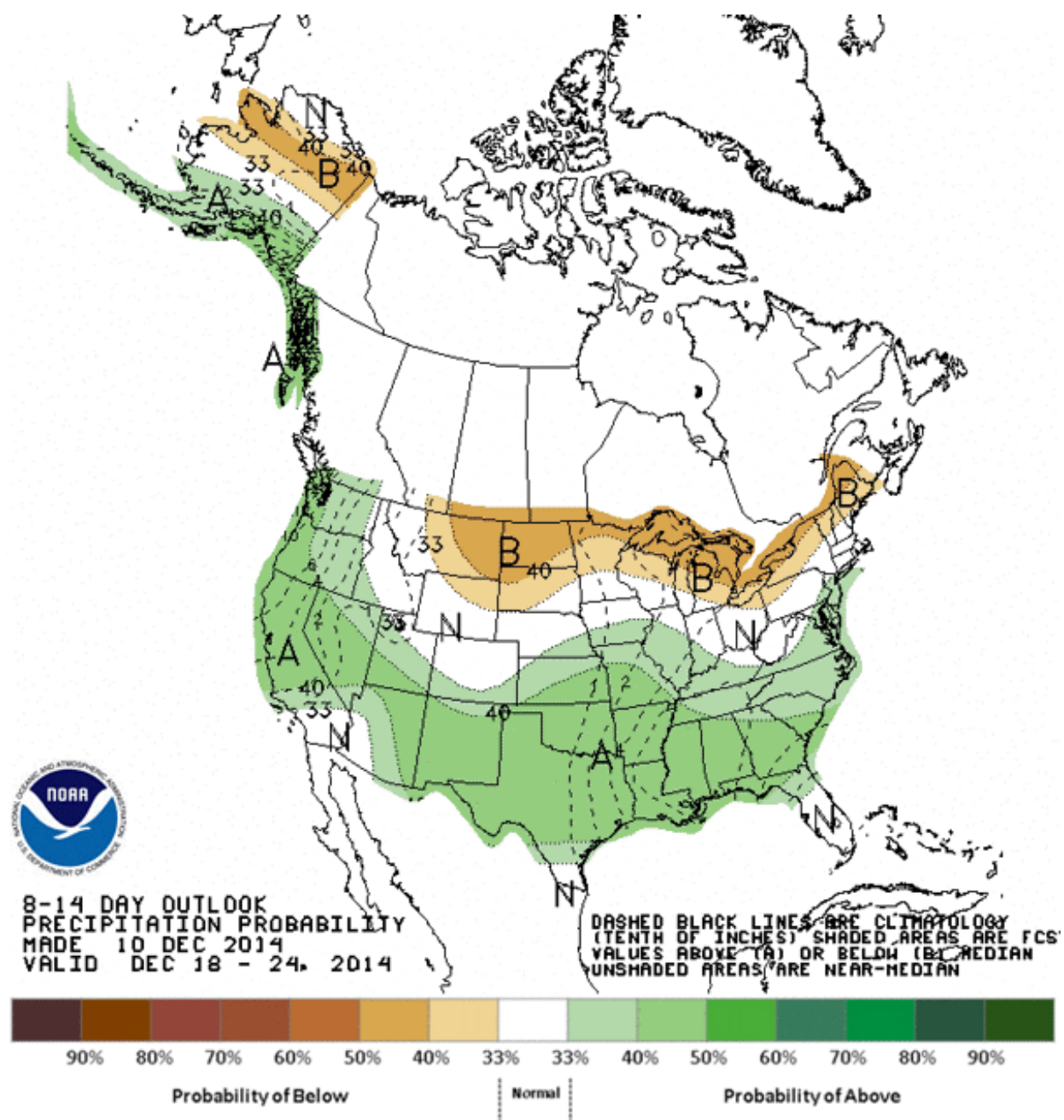
Unfortunately, there usually is a sharp gradient to the moisture. Areas of northwest and north central Kansas missed out on the moisture entirely. There are several additional systems in line to arrive on the West Coast over the next 8 to 10 days, increasing our chances for above-normal precipitation over the period.



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## 5. Comparative Vegetation Condition Report: November 25 - December 8

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

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

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

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

The objective of these reports is to provide users with a means of assessing the relative condition of crops and grassland. The maps can be used to assess current plant growth rates, as well as comparisons to the previous year and relative to the 25-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.

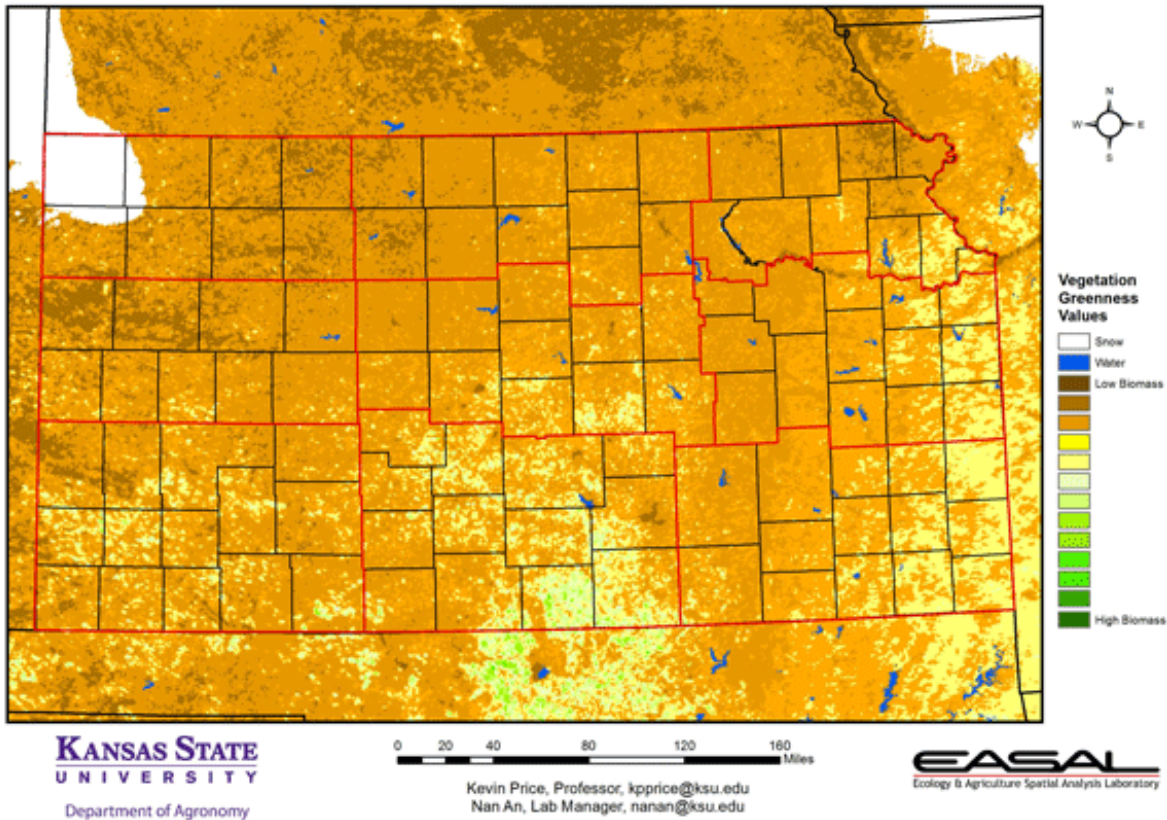
NOTE TO READERS: The maps below represent a subset of the maps available from the EASAL group. If you'd like digital copies of the entire map series please contact Nan An at [nanan@ksu.edu](mailto:nanan@ksu.edu) and we can place you on our email list to receive the entire dataset each week as they are 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, service climatologist:



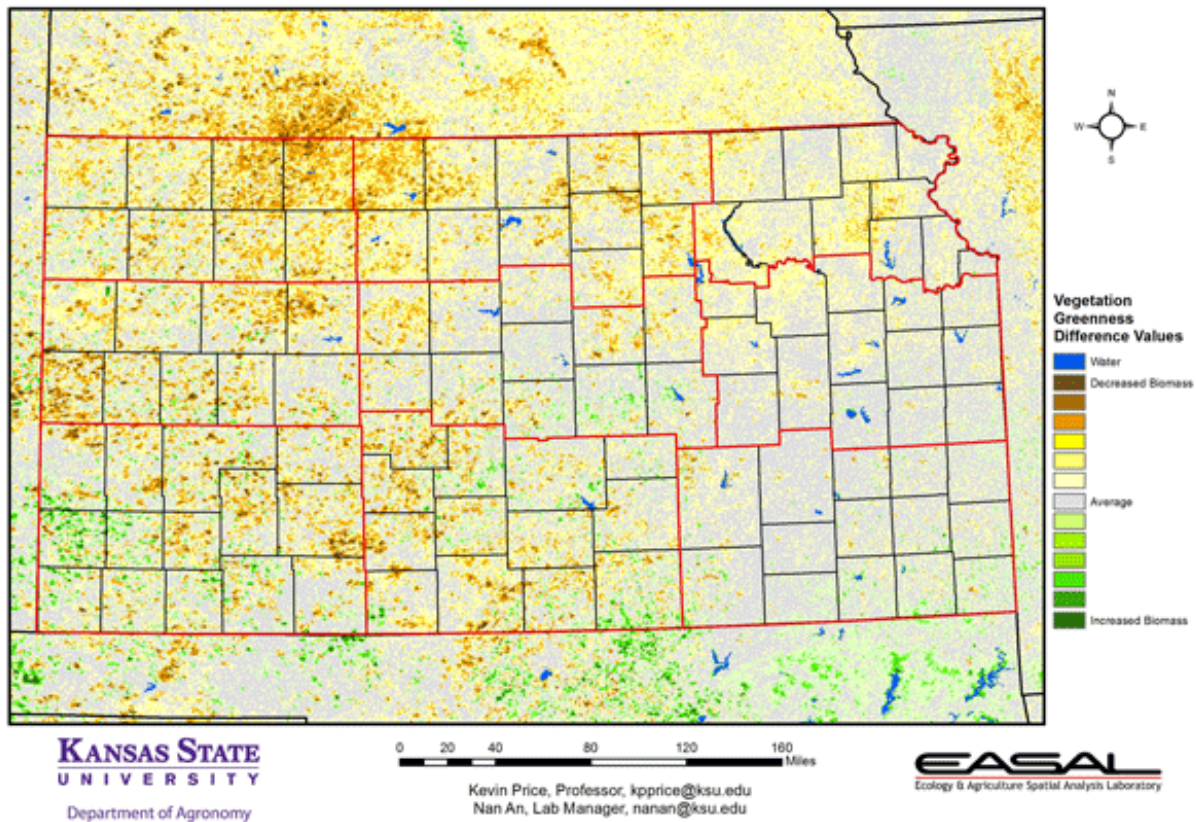
## Kansas Vegetation Condition

Period 49: 11/25/2014 - 12/08/2014



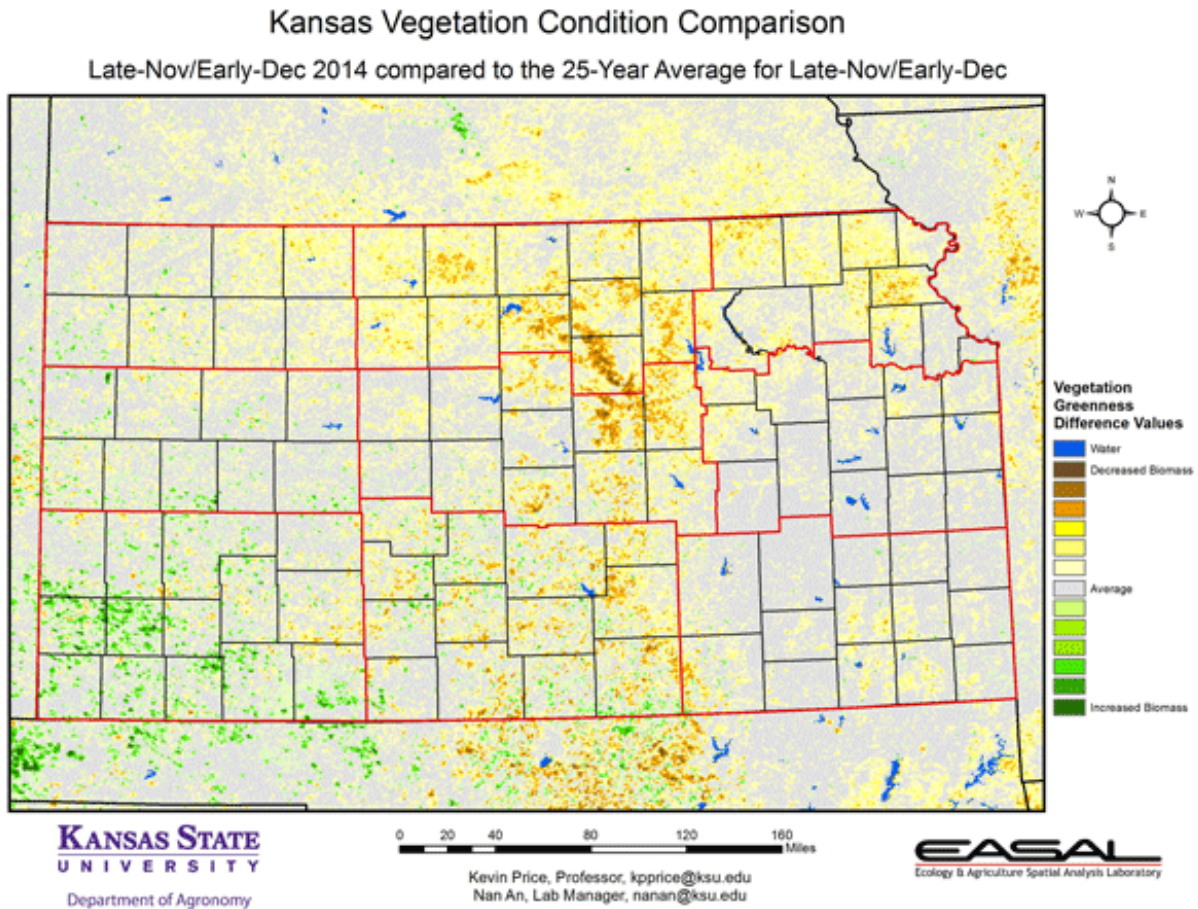
**Figure 1. The Vegetation Condition Report for Kansas for November 25 – December 8 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that only the extreme northwestern portion of the state had snow during the period. The moisture content of the snow was minimal at a trace, less than 0.01 inches.**

**Kansas Vegetation Condition Comparison**  
Late-Nov/Early-Dec 2014 compared to the Late-Nov/Early-Dec 2013



**Figure 2. Compared to the previous year at this time for Kansas, the current Vegetation Condition Report for November 25 – December 8 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that the biggest decrease in photosynthetic activity is centered near Norton and Phillips counties. The abrupt switch from wet conditions in October to dry in November had a negative impact on establishment of winter wheat.**

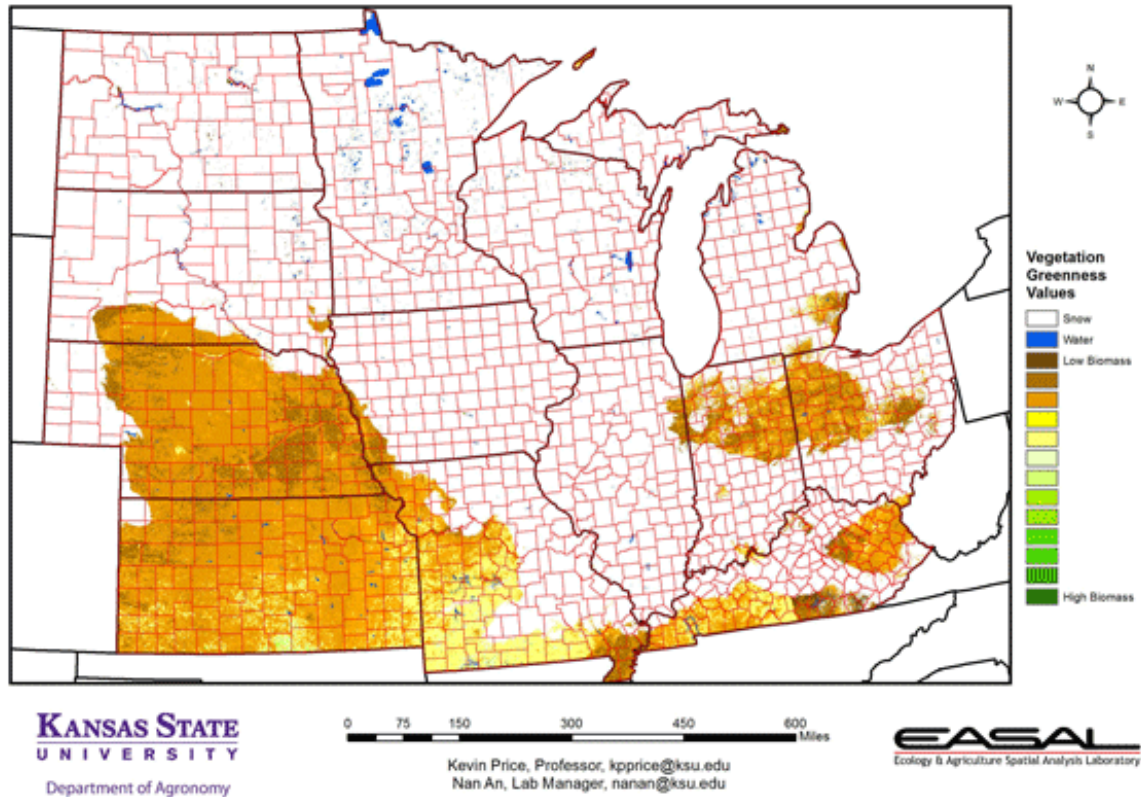




**Figure 3. Compared to the 25-year average at this time for Kansas, this year's Vegetation Condition Report for November 25 – December 8 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that parts of Ottawa and Saline counties have the greatest departure. Moisture in October, and cool November weather had a large impact on photosynthetic activity in this area.**

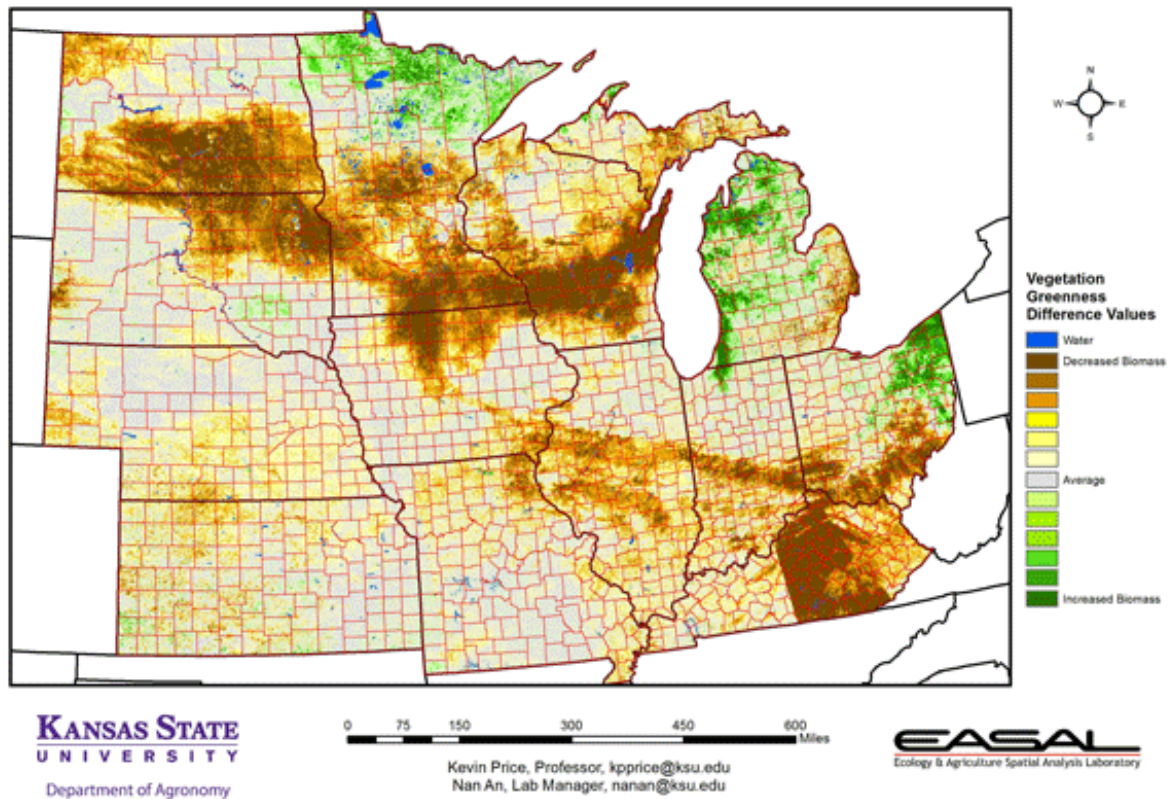
## U.S. Corn Belt Vegetation Condition

Period 49: 11/25/2014 - 12/08/2014



**Figure 4. The Vegetation Condition Report for the Corn Belt for November 25 – December 8 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that while most of the region had snow, the southwest portion missed out.**

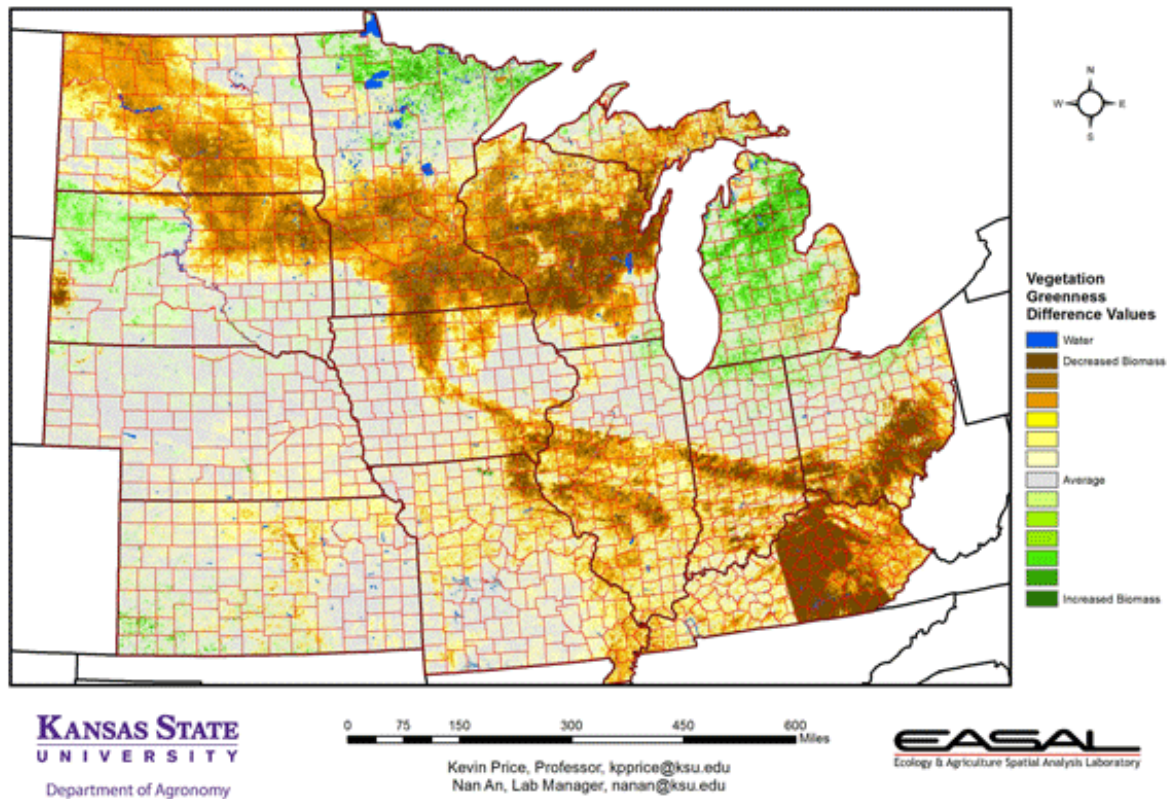
**U.S. Corn Belt Vegetation Condition Comparison**  
Late-Nov/Early-Dec 2014 Compared to Late-Nov/Early-Dec 2013



**Figure 5.** The comparison to last year in the Corn Belt for the period November 25 – December 8 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that a large band of lower NDVI readings is visible from southern North Dakota across Minnesota and Iowa into central Wisconsin. Heavier snow was present in these areas. The band of lower NDVI values across eastern Kentucky is largely an artifact of the splicing technique used to produce the images.



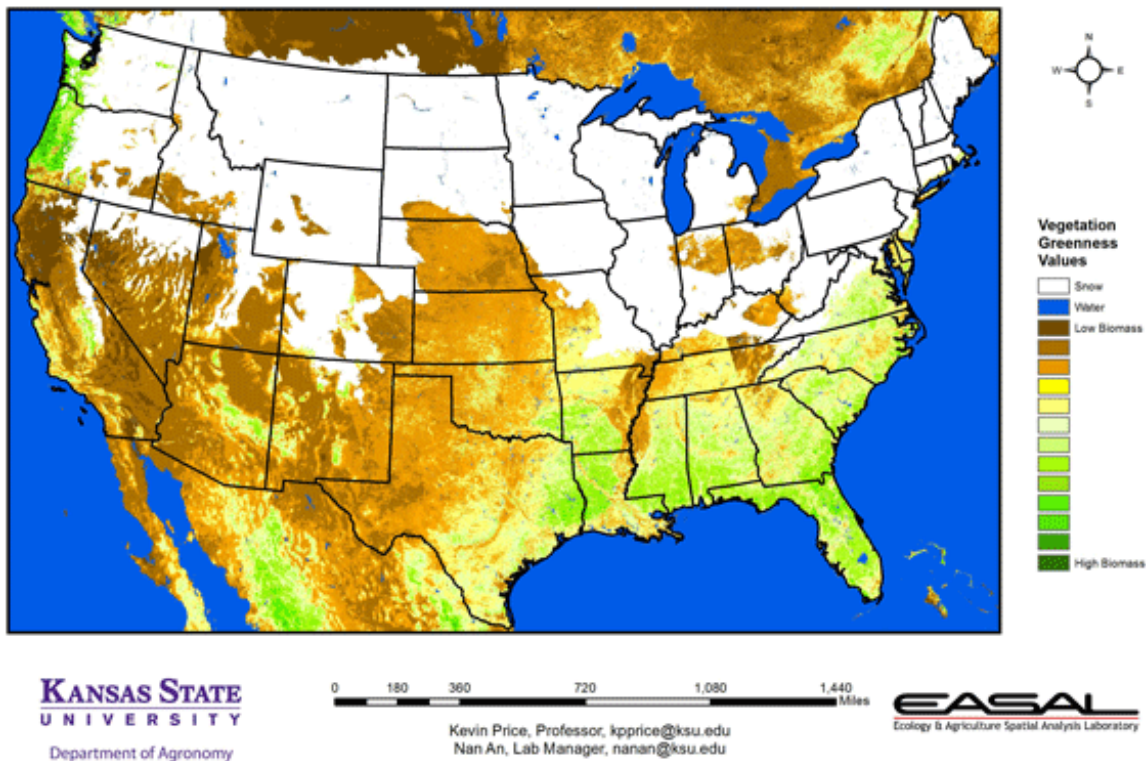
**U.S. Corn Belt Vegetation Condition Comparison**  
Late-Nov/Early-Dec 2014 Compared to the 25-Year Average for Late-Nov/Early-Dec



**Figure 6. Compared to the 25-year average at this time for the Corn Belt, this year's Vegetation Condition Report for November 25 – December 8 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that, while not as pronounced as when compared to last year, there is an area of below-average NDVI readings from North Dakota through southern Minnesota and central Wisconsin.**

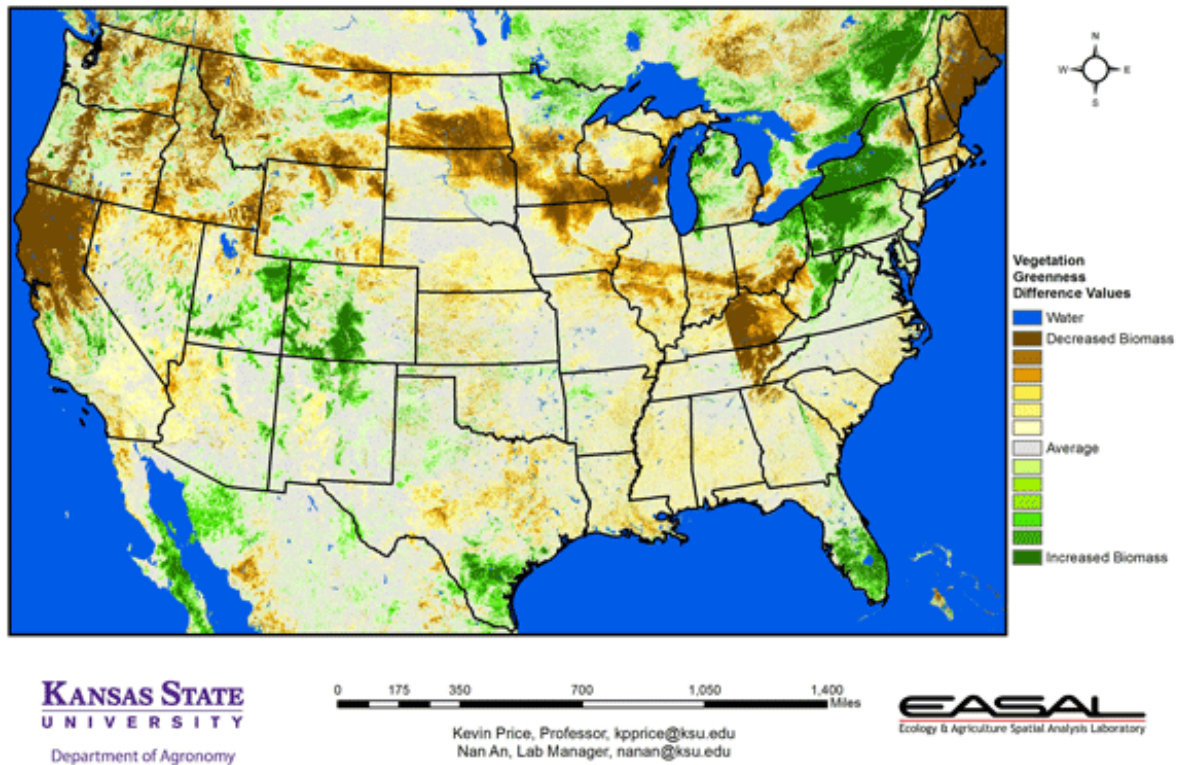
## Continental U.S. Vegetation Condition

Period 49: 11/25/2014 - 12/08/2014



**Figure 7. The Vegetation Condition Report for the U.S. for November 25 – December 8 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that snow cover was not as extensive as last week. Greatest photosynthetic activity is visible in the Pacific Northwest along the coast.**

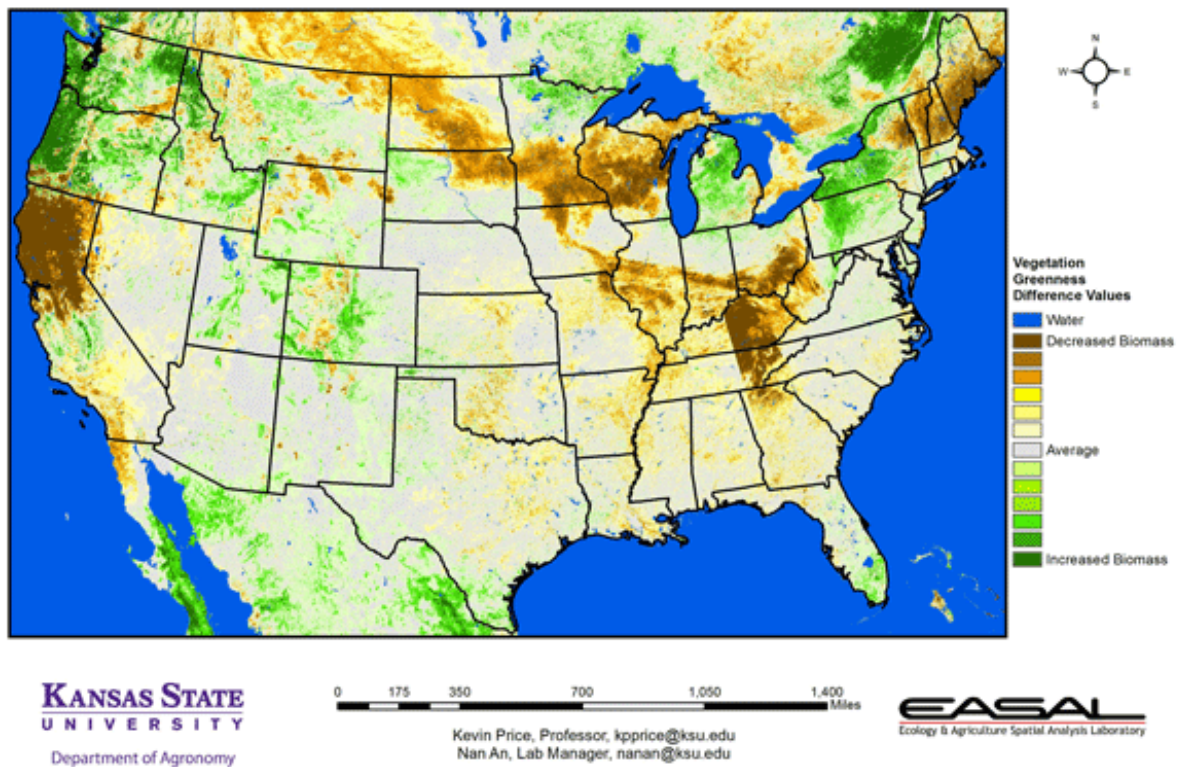
Continental U.S. Vegetation Condition Comparison  
Late-Nov/Early-Dec 2014 Compared to Late-Nov/Early-Dec 2013



**Figure 8. The U.S. comparison to last year at this time for the period November 25 – December 8 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that the greatest decrease in photosynthetic activity is in northern California and upper New England. Much of this is related to persistent cloud cover in these areas, as winter storms exit on the New England side, and develop on the West Coast.**



Continental U.S. Vegetation Condition Comparison  
Late-Nov/Early-Dec 2014 Compared to 25-year Average for Late-Nov/Early-Dec



**Figure 9. The U.S. comparison to the 25-year average for the period November 25 – December 8 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that abundant rainfall has produced much above-average NDVI values along the Pacific Northwest. Persistent clouds have reduced the NDVI values in northern California and upper New England, while a splice-line is evident in eastern Kentucky. Lower-than-average snowpack in parts of Colorado are visible as areas of above-average NDVI readings.**

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