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1. New drone aircraft will help agronomists track crop and prairie conditions

The Agronomy Department is the proud owner of a new MAJA Unmanned Aircraft System (UAS), sometimes called UAV or drone. Dr. Kevin Price in Agronomy is working with Dr. Deon van der Merwe in Veterinary Science to develop a very high resolution airborne imaging system that will carry a near infrared (NIR), and a natural color camera at the same time. It will also be equipped with a first-person viewing video camera that will allow the researchers to view the area over which the plane is flying, while recording high resolution images of the over flight area below.

Once a Certificate of Authorization is obtained from the Federal Aviation Administration (FAA), the aircraft will be equipped with autonomous flying capabilities so it can be flown to predetermined locations within a line of sight. Flight lines can be predetermined and uploaded to the autopilot, and the plane flown along these lines to create picture coverage of areas or fields of interest. The images can be digitally "stitched" together to form whole field mosaics.

Two views of the new MAJA drone owned by the Department of Agronomy. Photos by Deon van der Merwe, K-State Department of Veterinary Science.

Note that the fuselage can be opened for convenient work on electrical components, and installation of cameras and video recorders.

This system will generate 12 megapixel images in NIR infrared (NIR), red, green, and blue wavelengths, which have been proven to be important for studying plant productivity, monitoring plant growth stages, assessing plant health, and mapping plant composition for characterizing changes in distribution of invasive and toxic plant species.

It can be flown up to several thousand feet or more above the ground, but for safety reasons, it will be flown below 600 feet -- and mostly below 400 feet. That will permit the capture of very detailed images of features of interest on the ground. The pixel size will be from 0.25 to 2 inches (depending on whether a telephoto or wide angle lens setting is used) for images captured at 400 feet above the ground, so individual plants can be observed and studied. Using calibration panels on the ground, pixels can be converted to percent reflectance values to normalize images for date-to-date changes in incoming solar radiation.

Graduate students currently involved in the project are David Burchfield (M.A. student in Geography) who will be using these data to study prairie conditions, and Nan An (Ph.D. student in Agronomy) who is studying Flint Hills tallgrass productivity. We have also been working with Josh

Brungardt and Dr. Kurt Barnhart of the K-State-Salina Aviation Department with matters related to FAA flight approval. We are in the process of getting an FAA Certificate of Authorization so the plane can be safely used in areas approved by the FAA. This certificate requires the pilot in command to hold a Pilot Certificate, and it requires preauthorization of areas to be flown by the FAA.

A more detailed description of the system with examples of the imagery will be described and shown in an upcoming issue of the Agronomy e-Update. If you have any questions, you may contact Dr. Price at kpprice@ksu.edu or call him at (785) 393-5428.

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2. Fallow replacement crops for cover, forage, or grain in western Kansas

Cover crops have several potential benefits as a fallow replacement in chemfallow crop production systems in western Kansas. But there are also questions about the profitability of this practice if the crops are used strictly for cover -- as well as questions about the effect of cover crops on yields of subsequent cash crops.

Some of the potential benefits of cover crops (varies, depending on the specific cover crop):
* Increases soil organic matter
* Increases water infiltration rates, and reduces water runoff
* Reduces soil erosion
* Reduces soil compaction
* Adds nitrogen to the system
* Reduces nitrate leaching
* Suppresses weeds
* Reduces soil compaction

Some of the potential drawbacks of cover crops:
* May decrease available soil moisture for subsequent crops, reducing yields
* Increases costs

Adding cover crops to a cropping system introduces a complex interaction of factors, making it a challenge to realistically test the concept. One of the biggest challenges in analyzing the agronomic and economic effects of cover crops, from a scientific testing perspective, is the large number of cover crop options available – including the various combinations of mixtures of different species. Each cover crop species has its own distinct effect on the cropping system, meaning that each one has to be tested on its own for a number of years before any conclusions can be drawn.

At the Southwest Research-Extension Center, we have tested several plant species marketed as cover crops in a chemfallow wheat system to compare their effects as a fallow replacement, and comparing each of those systems to a continuous wheat cropping system. The term “cover crop” is correctly

applied to these crops only when they are terminated and grown only for cover. In our study, we also tested these crops as a source of forage for hay or grazing -- or as a source of grain in the case of spring peas. When these crops are utilized in that way, they are fallow replacement crops, but not truly cover crops. Therefore, this article will refer to these crops, when used in western Kansas, as "fallow replacement" crops. That term encompasses all the potential ways they can be used.

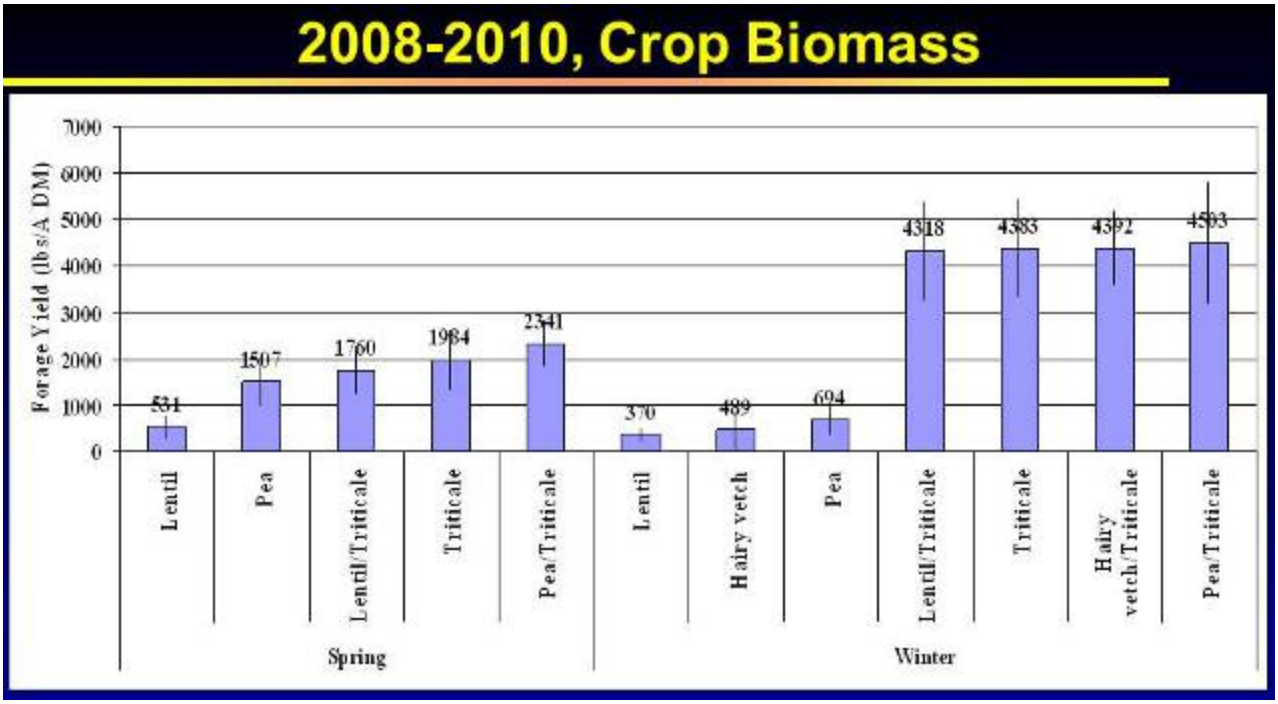
Below is a chart of the various fallow replacement systems we have tested over the past 3 years:

Fallow Treatments (Cover, Forage, Grain)

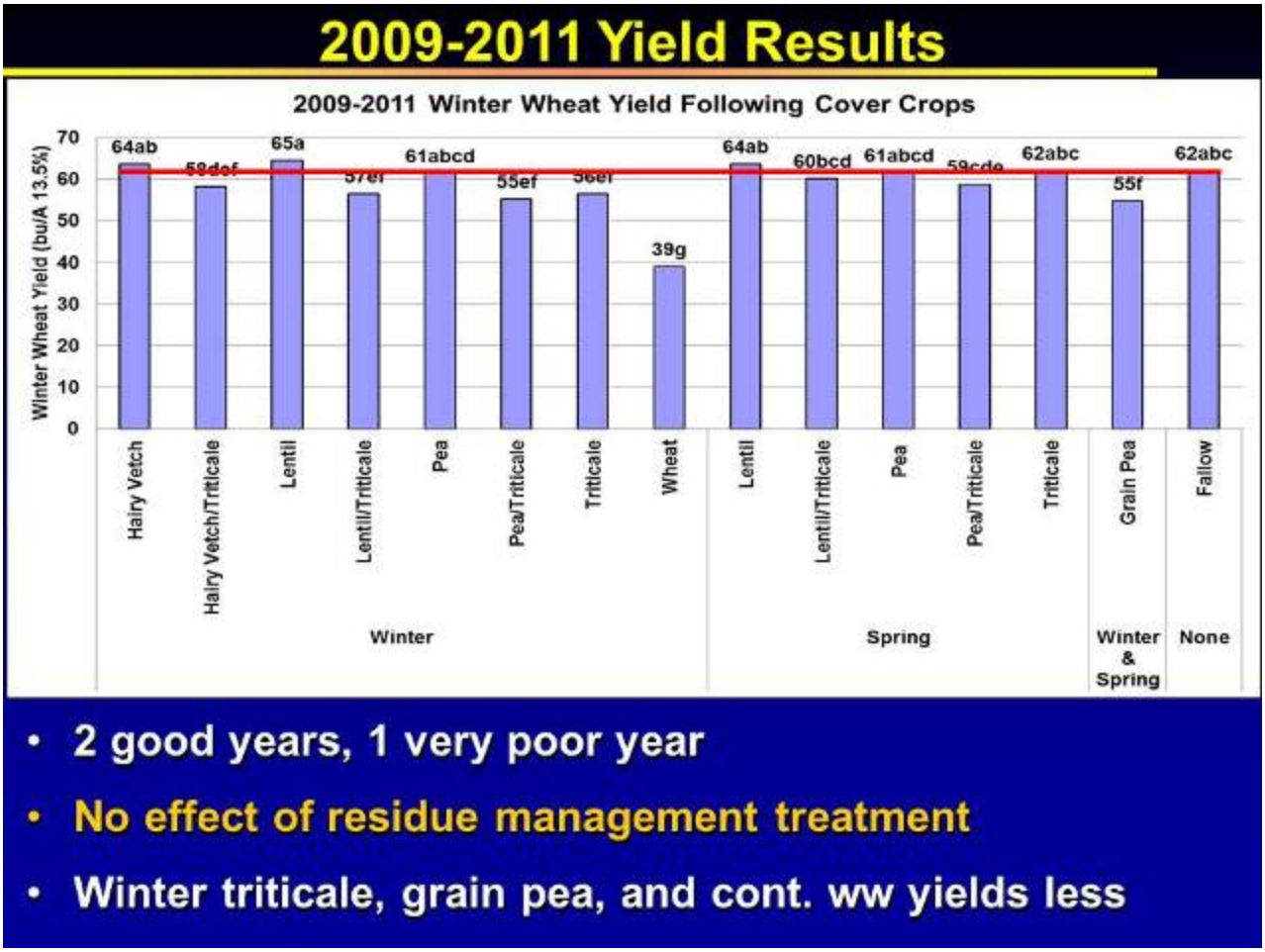
Season	Cover Crop	Year Produced				
		2007	2008	2009	2010	2011
Winter	Yellow sweet clover	x	x			
""	Yellow sweet clover/Winter triticale		x			
""	Hairy vetch	x	x	x	x	x
""	Hairy vetch/Winter triticale		x	x	x	x
""	Winter lentil			x	x	x
""	Winter lentil/Winter triticale			x	x	x
""	Winter pea (grain)		x	x		x
""	Winter pea	x	x	x	x	x
""	Winter pea/Winter triticale		x	x	x	x
""	Winter triticale	x	x	x	x	x
Spring	Spring lentil	x	x	x	x	x
""	Spring lentil/Spring triticale		x	x	x	x
""	Spring pea	x	x	x	x	x
""	Spring pea (grain)				x	x
""	Spring pea/Spring triticale		x	x	x	x
""	Spring triticale		x	x	x	x

- **Fallow and cont. wheat, 16 treatments total**

We found, in general, the fallow replacement crops that included winter triticale produced the most biomass – and thus had the most hay or grazing potential (see chart below). Winter triticale was more productive than spring triticale. On the other hand, with the legume fallow replacement crops, the winter species were less productive than spring species. That's because the winter legumes, especially peas, tended to suffer winterkill injury.



Over the period of this test, we observed that none of the fallow replacement crops we tested significantly increased the subsequent wheat yield (see chart below). Some fallow replacement crops did, however, reduce wheat yields compared to yields in a wheat/fallow system. Any fallow replacement crop treatment that included winter triticale tended to reduce wheat yields regardless of whether it was terminated as a cover crop or hayed. Grain peas also tended to reduce wheat yields. Wheat yields in a continuous wheat system were much lower than yields in a chemfallow wheat system.



If the fallow replacement crops were terminated and used strictly for cover, the short-term economics were not favorable (see chart below). However, when the fallow replacement crops were harvested for hay, the income from some of those crops more than compensated for the loss of income from reduced wheat yields and resulted in a net profit. The highest net profits were where winter triticale was grown by itself or with peas or lentils, and harvested for hay. In our tests, spring cover crops were harvested approximately 2 weeks later than winter cover crops each year.

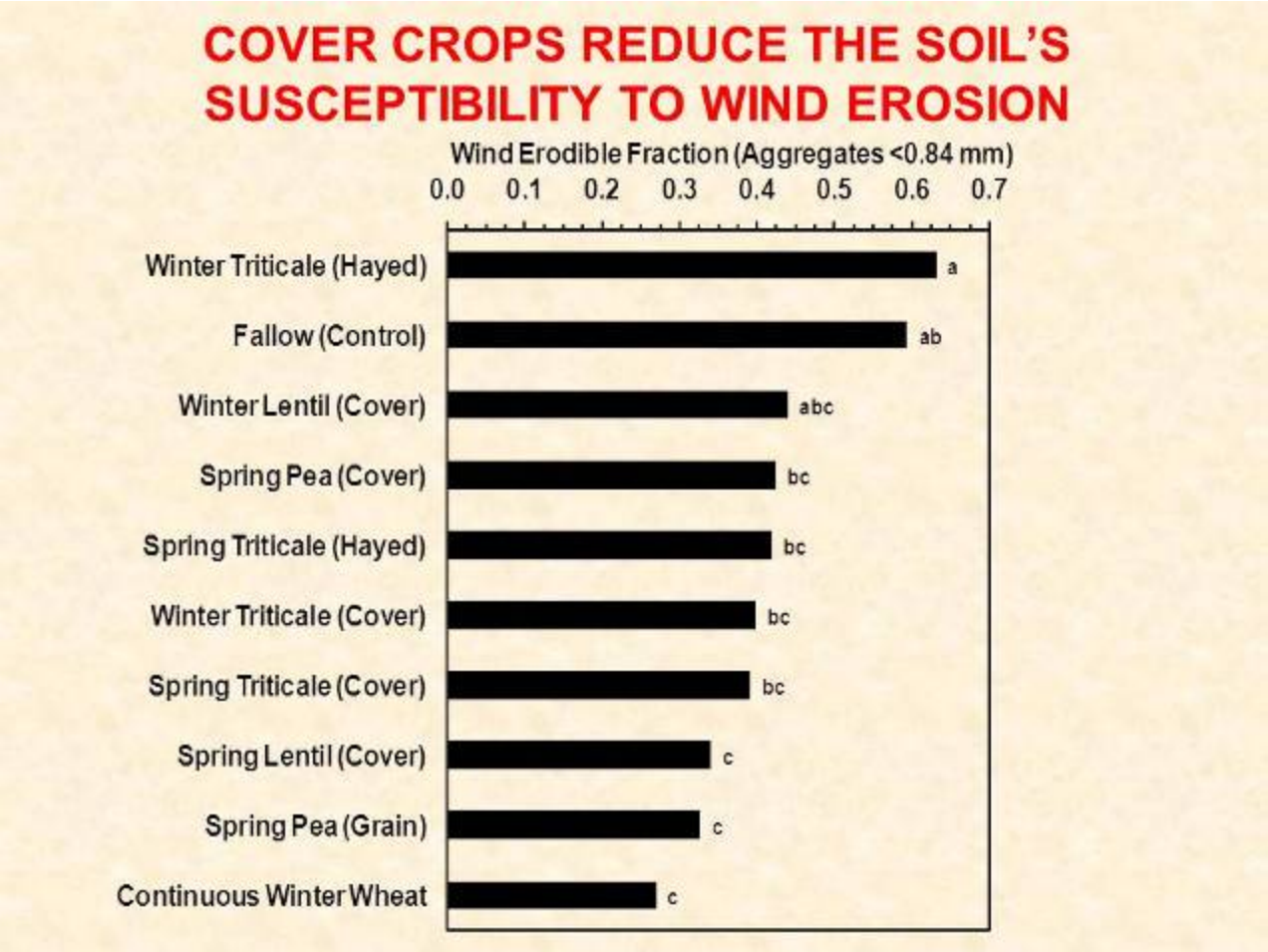
Western KS Preliminary Results

	Winter							Spring					None
	Vetch	Vetch/Trit	Lentil	Lentil/Trit	Pea	Pea/Trit	Trit	Lentil	Lentil/Trit	Pea	Pea/Trit	Trit	Fallow
Expenses													
Drill $/A	11	11	11	11	11	11	11	11	11	11	11	11	0
Seed lb/A	25		30		100		63	30		120		76	0
Seed $/lb	2.3		0.4		0.3		0.2	0.4		0.2		0.2	0
Total seed cost $/A	56	35	12	13	25	20	14	11	14	28	23	17	0
Total drilling cost $/A	67	46	23	24	36	30	25	21	25	38	33	28	0
Swath $/A	10	10	10	10	10	10	10	10	10	10	10	10	0
Bale & Stack $/ton	16	16	16	16	16	16	16	16	16	16	16	16	0
Total hay cost $/A	15	49	14	49	17	50	49	15	26	24	31	28	0
Spray application $/A	5	5	5	5	5	5	5	5	5	5	5	5	5
RT3, $/A	3	3	3	3	3	3	3	3	3	3	3	3	3
2,4-D, $/A	3	3	3	3	3	3	3	3	3	3	3	3	3
Applications/A	3	3	3	3	3	3	3	3	3	3	3	3	4
Total spray cost $/A	34	34	34	34	34	34	34	34	34	34	34	34	46
Total Expense (cover)	**101**	**80**	**57**	**58**	**70**	**65**	**59**	**55**	**59**	**73**	**67**	**62**	**46**
Total Expense (hay)	**116**	**130**	**71**	**107**	**86**	**115**	**109**	**71**	**85**	**96**	**99**	**90**	**46**
Returns													
Yield ton/A	0.3	2.4	0.2	2.4	0.4	2.5	2.4	0.3	1.0	0.8	1.3	1.1	0.0
Price $/ton	91	91	91	91	91	91	91	91	91	91	91	91	0
Yield Return $/A	25	221	19	217	35	226	220	27	88	76	118	100	0
N Return lb/A	40	40	40	40	40	40	0	40	40	40	40	0	0
N value $/lb N	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
N Return $/A	20	20	20	20	20	20	0	20	20	20	20	0	0
Soil benefits $/A													
Net Return (cover)	**-81**	**-60**	**-37**	**-38**	**-50**	**-45**	**-59**	**-35**	**-39**	**-53**	**-47**	**-62**	**-46**
Net Return (hay)	**-91**	**66**	**-52**	**85**	**-52**	**86**	**87**	**-44**	**-9**	**-21**	**7**	**-3**	**-46**

*Assumption: N contribution from legume 0 when hayed, 50 lbs of N add for winter triticale, and 25 lbs of N add for spring triticale.

Spring grain peas have a significant economic value at area feedlots if the seed is harvested. If the quality of the peas is good enough the crop can be sold as food grade rather than feed grade for about twice the price per bushel. Several producers have begun growing spring peas in place of fallow in western Kansas and are pleased with the results they are getting.

For long-term economic effects of fallow replacement crops, producers also should consider the value they provide in reducing water runoff and wind erosion. Humberto Blanco, soil scientist at the K-State Agricultural Research Center-Hays, has conducted research on this and found that fallow replacement crops have significant beneficial effects.



Many aspects of fallow replacement crops in dryland systems for western Kansas still need to be researched. In the coming years, we plan to test the effects of various fallow replacement crops in a wheat/sorghum/fallow cropping system. We also plan to test spring oats and see how they compare to triticale. We will test radishes and turnips, and their effects on soil compaction. And we will examine many more cocktail mixes of different fallow replacement crops. We have also begun screening summer-planted crops, which may be grown after winter wheat as a cover crop or forage, either as a doublecrop after wheat harvest or in place of fallow.

Mixtures should be based on need, and more is not necessarily better. Some examples:

* A spring mixture of spring pea and oats. This would improve the nitrogen content of the forage, provide some nitrogen fixation, and provide high biomass.
* A spring mixture of radish, spring pea, and spring triticale. This would provide a large taproot crop to help soil quality, a legume for nitrogen fixation, and a high biomass crop.
* A summer mixture of turnip, cowpea, and sorghum sudangrass. This would provide a large taproot for soil quality and grazing, a legume for higher nitrogen content and some nitrogen fixation, and a high biomass crop.

Summary

In wet years, the fallow replacement crops we tested had little or no impact on wheat yields. In a drought year (2011), all treatments except some of the spring crops reduced wheat yields. In a drought, spring fallow replacement crops reduced wheat yields an average of 1.5 bushels per acre

compared to yields in a chemfallow wheat system. However, if the spring fallow replacement crop produced one ton of forage per acre and the forage was harvested and sold the previous year, the net profit of the cropping system was increased by $40 per acre compared to a chemfallow wheat system in a normal year -- and by $28 per acre in a drought year, with a 1.5-bushel decrease in wheat yield.

Continuous wheat reduced wheat yields by 37%, although the net yield when combined over a two-year period was 25% higher than the wheat/fallow system. Winter triticale reduced wheat yields by 5.5 bu/acre, or 9%. Grain pea reduced wheat yields by 7 bu/acre, or 11%.

Cover crops in a chemfallow wheat system should be terminated prior to June 1 ahead of wheat planting to help ensure there is an adequate fallow period for moisture storage ahead of wheat planting in western Kansas. It is important to check with the USDA's Risk Management Agency in your individual county to determine when the cover crop needs be terminated so the following crop can be insured as having had a fallow period ahead of it and not be considered as continuous cropped, since this will reduce the level at which the crop is insurable.

If moisture is available, producers may want to consider doublecropping with a forage or grain crop after wheat instead of planting a crop strictly for cover. To make fallow replacement crops profitable in the short-term in a chemfallow wheat system, the crop should be baled and sold, grazed, or harvested for grain and sold. Harvesting the fallow replacement crop for forage or grain greatly increased the profitability of the system.

The high cost of seed more than offsets the nitrogen contribution from a legume crop. This can be overcome by growing your own seed. It is more economical to apply fertilizer nitrogen than to try to benefit from the nitrogen contribution of legume cover crops.

Fallow replacement crops should be selected based on winter survivability, among other factors. Many proposed fallow replacement crops will not perform in western Kansas.

-- John Holman, Cropping Systems Agronomist, Southwest Research-Extension Center
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Note: Tom Roberts, Assistant scientist, and Scott Maxwell, Plant Technician, at the Southwest Research-Extension Center have been an integral part of this research.

3. Kansas Flint Hills Smoke Management Plan: Objectives for 2012

The Kansas Flint Hills Smoke Management Plan is entering its second year in 2012. This comprehensive plan is designed to minimize the movement of concentrated smoke plumes into large metropolitan areas through voluntary participation. All Flint Hills landowners and managers who conduct prescribed burns should know what is in this plan.

To help educate all those affected, a series of radio interviews is being broadcast weekly each Monday on K-State's *Agriculture Today* talk show. These programs will explain the many aspects of the new plan. *Agriculture Today* is part of the K-State Radio Network. The broadcast interviews are podcast online at www.ksre.ksu.edu/news/DesktopDefault.aspx?tabid=66.

The following is a slightly edited transcript of the first in the 2012 series of *Agriculture Today* radio broadcasts on the Kansas Flint Hills Smoke Management Plan. This is an interview with Tom Gross, Air Monitoring and Planning Chief, Bureau of Air, Kansas Department of Health and Environment, conducted by Eric Atkinson of the K-State Radio Network.

Q: As a reminder, what was the original purpose of the Flint Hills Smoke Management Plan that was first implemented last year?

A: The plan was developed in response to days in which we had smoke from Flint Hills fires impacting downwind cities such as Wichita and Kansas City, primarily through higher concentrations of ozone. Last year there were some ozone exceedances in both cities because of the burning. In 2010 there was a commitment made to develop a smoke management plan, and it was adopted by the secretary of KDHE in December 2010. It was then implemented for the first time in 2011.

Q: The intent of the plan was to allow grassland managers to better time their burns so as to lessen smoke concentrations?

A: Yes. It is not our intention to eliminate or restrict burning, but rather to give range managers the tools to make more informed decisions on whether the burn they would like to make that day or the next day would have an impact on downwind metropolitan areas. To that end, we worked with K-State Research and Extension and a consultant to develop a web site that contains a lot of good information and a modeling tool that indicates whether that day or the next day would be a good day to burn from a smoke impact aspect. Burn safety conditions also have to be taken into account, but this web site focuses on smoke impact.

Q: The web site is really a key part of the plan.

A: Yes. Producers can use the web site in a couple ways. Part of the web site involves a narrative about what the next few days will be like in terms of conditions for burning. There's also a map that indicates whether conditions in each county will be good for burning in terms of smoke impact. Plus there's a tool that lets you plug in the specifics of your fire in terms of acreage, fuel load, fuel density, and location. It will then generate a map that shows over the next 24 hours where your smoke would move if you lit that fire. Then, using that information regarding air quality impacts along with information on burn safety conditions, managers can make a decision whether to burn that day or perhaps wait a day if today is not so good.

Q: All the recommendations made on the web site are strictly voluntary, right?

A: Yes. We want to get the tools in front of people, and hopefully get people to use those tools. We recognize that there are not always a lot of good days to burn. We are just asking burn managers to take one more factor into consideration – downwind air quality– and to provide a tool for taking that factor into consideration.

Q: How effective was the plan in its first year?

A: I believe it was successful even though there were some ozone exceedances last year. We had a lot of attention on the plan, and a lot of feedback on the web site and the modeling tool. So I'm not discouraged that we had some exceedances. We had a high fuel load in the Flint Hills last year, and a

limited number of good days to burn. Hopefully when we have a greater number of good days to burn, the web site and modeling tool will help prevent us from having high-ozone days. There were also a lot acres burned in 2011 – about 2.3 million acres. That was on the high end of what we've seen over the last 10 years.

Q: Safety does trump everything.

A: Yes. Safety is a concern for everyone.

Q: Are there any changes to the plan, or to the web site for 2012?

A: We won't be making any changes to the plan. Based on the feedback we had, we will be making a few changes to the modeling tool to make it easier to use and to improve it technically. The tool did a good job in recommending whether a day was good or bad for burning in terms of downwind air quality. We're just trying to make it a little better. We'll also be continuing with the strong outreach effort from K-State Research and Extension.

A: This is a long-term process, right?

Q: Yes, you can't just look at the exceedances that happened the first year and say the plan didn't work. It's a long-term project. It takes some time to get people to recognize there is another concern that needs to be taken into consideration – that is the downwind air quality impacts from burning. I view this as a multi-year activity.

A: People can go to the web site now and get a glimpse of what it's offering, right?

Q: They can look at the overall web site. We have to pay to run the modeling tool, though, so it's not active at the moment. We'll be starting that up about the start of the burn season, and run it through the burn season. We don't run it year-round. We're also still in the process of making a few last tweaks and improvements. The web site address is ksfire.org.

-- Steve Watson, Agronomy e-Update Editor
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4. Winter Canola Risk Management schools scheduled in March

Agronomists at K-State have been working hard in recent years to determine the best canola production practices for Kansas, and how to make the crop even more profitable for producers by reducing risk. Producers who would like to learn about the latest research on canola production in Kansas can attend either of two canola production schools in March, offered by K-State Research and Extension and the U.S. Department of Agriculture's Risk Management Agency (RMA).

The dates, locations and contact information for each school are:

• March 13 – McPherson, McPherson County Extension

• March 15 – Anthony, Bank of Anthony

Registration for each school begins at 8:30 a.m. with the program starting at 9 a.m. The program ends at approximately 2 p.m. Lunch will be provided at each location. To ensure adequate food and program materials are available, the organizers are requesting that participants pre-register approximately one week prior to the meeting by calling the appropriate Extension office.

The program and speakers include:

• Canola Variety Selection and Winter Survival – Mike Stamm, K-State Research and Extension canola breeder

• Winter Canola Establishment Strategies for Central Kansas – Kraig Roozeboom, K-State Research and Extension cropping systems specialist (McPherson location) and John Holman, K-State Southwest Research-Extension Center agronomist (Anthony location)

• Canola Pest and Disease Update – Bill Heer, agronomist-in-charge, K-State South Central Experiment Field

• Harvest Risk Management – Heath Sanders, Oilseed Agronomist, Producers Cooperative Oil Mill (McPherson location) and Josh Bushong, Oklahoma State University Extension canola specialist (Anthony location)

• RMA Update – Akilah Johnson, USDA Risk Management Agency, Topeka

• Great Plains Canola Association – Ron Sholar, Executive Director, and Jeff Scott, President

• Marketing Canola in Kansas – Monte Johnson, Merchandiser, ADM, Goodland

• Question-and-Answer Session and Discussion

For more information about the canola schools and to preregister, call the McPherson County Extension office at 620-241-1523 or the Harper County Extension office at 620-842-5445. Interested producers can also call Mike Stamm at 785-532-3871.

These schools are just one part of a larger program focused on winter canola risk management education and promotion, coordinated by researchers in K-State's Department of Agronomy and county extension agents across central Kansas. The program is a cooperative agreement with the USDA's RMA. It has also provided for several demonstration fields in central Kansas for educating the general public on winter canola.

-- Mike Stamm, Canola Breeder
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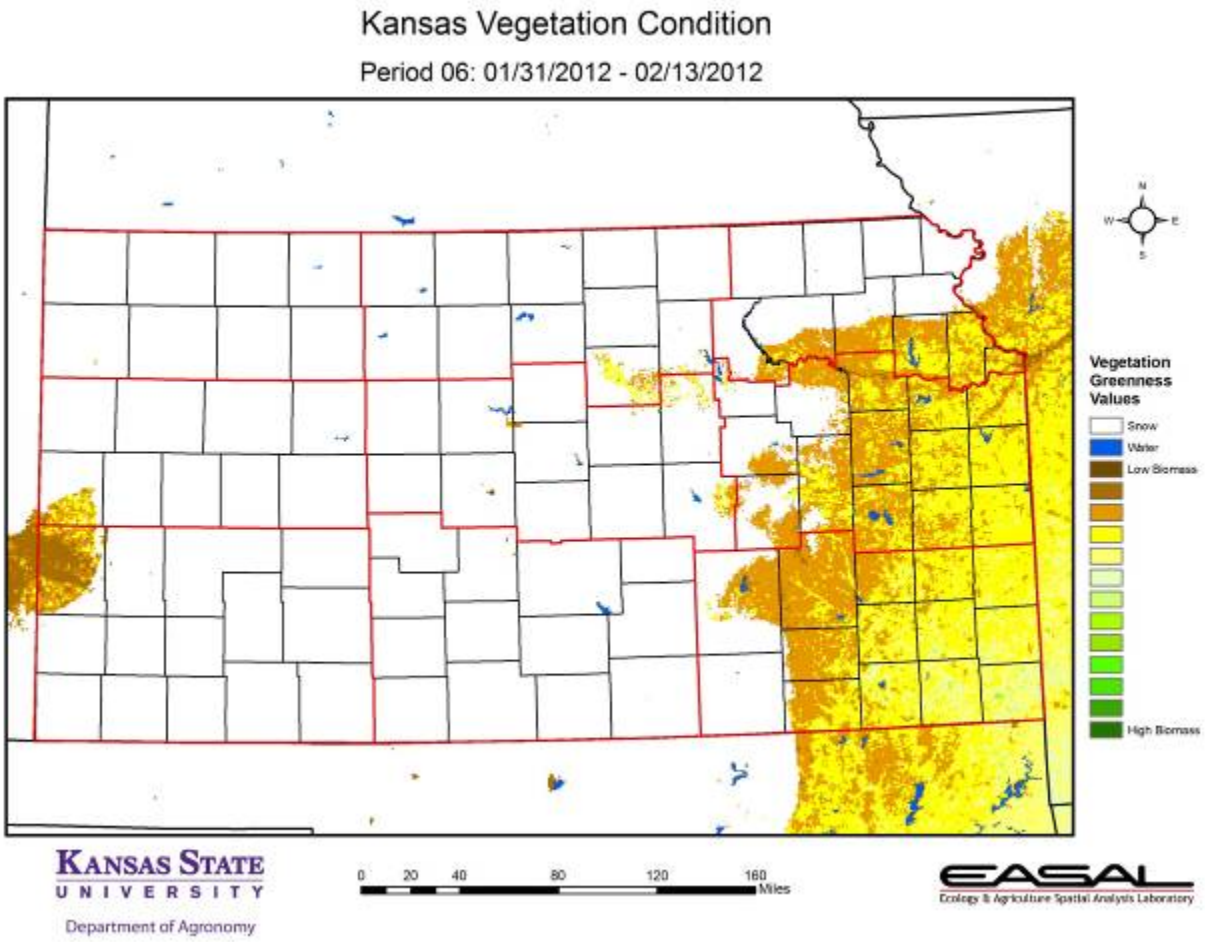
5. Comparative Vegetation Condition Report: January 31 – February 13

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.

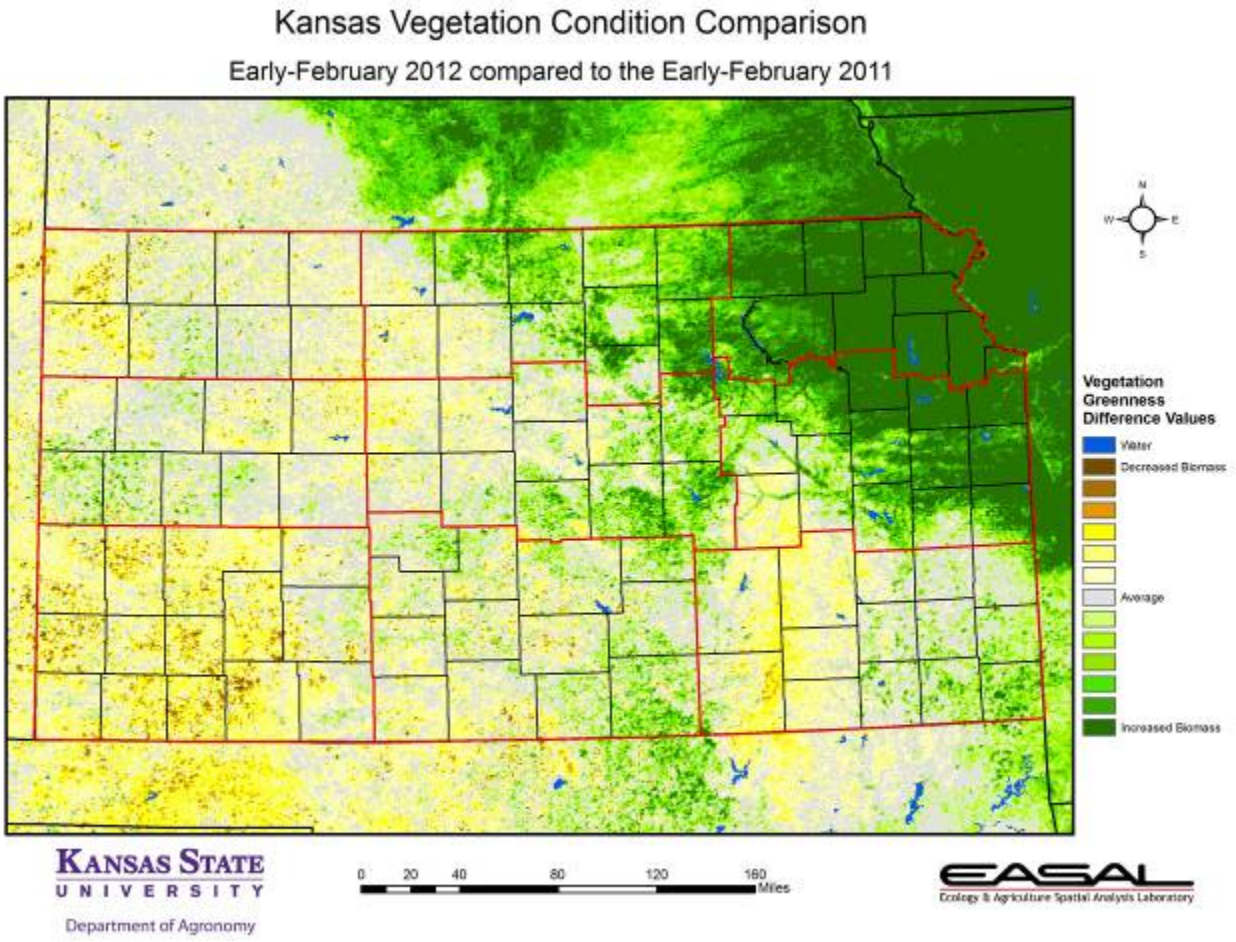
Two short videos of Dr. Kevin Price explaining the development of these maps can be viewed on YouTube at:
http://www.youtube.com/watch?v=CRP3Y5NIggw
http://www.youtube.com/watch?v=tUdOK94efxc

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.

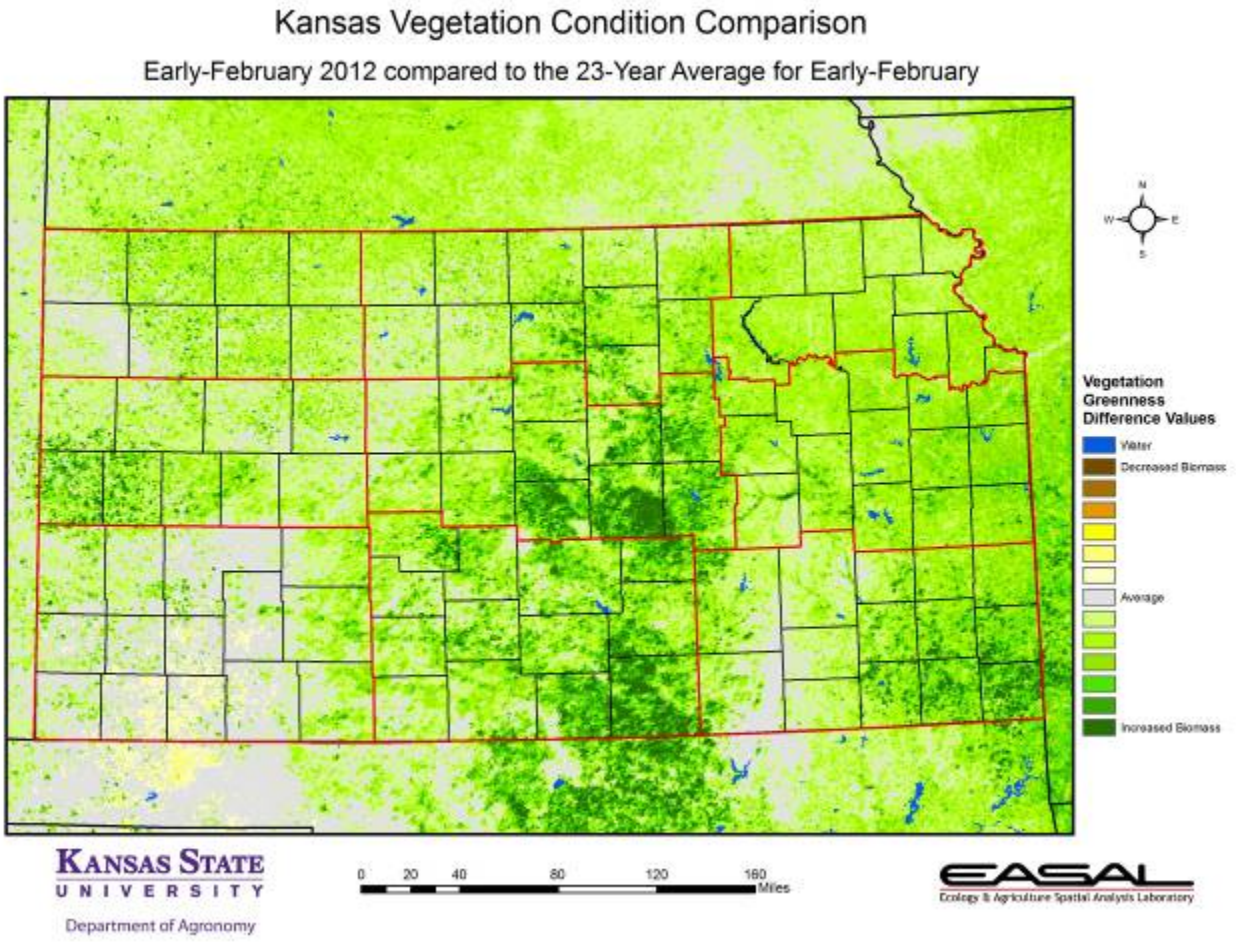
The maps below show the current vegetation conditions in Kansas, the Corn Belt, and the continental U.S, with comments from Mary Knapp, state climatologist:



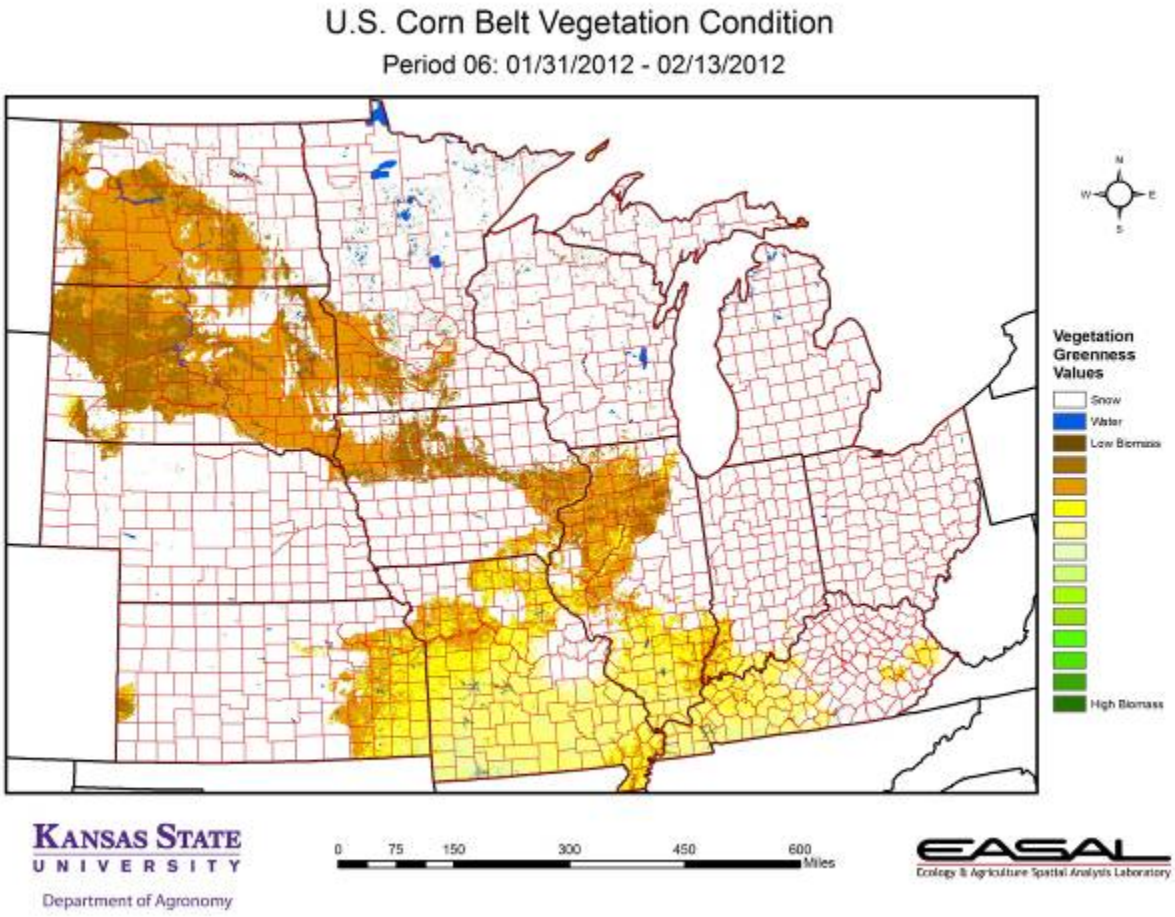
Map 1. The Vegetation Condition Report for Kansas for January 31 – February 13 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows snow was again seen in the state. Heaviest amounts were found in south central Kansas. Areas near Arkansas City reported as much as 6.5 inches of snow. East of Highway K-177 most of the precipitation fell as rain.



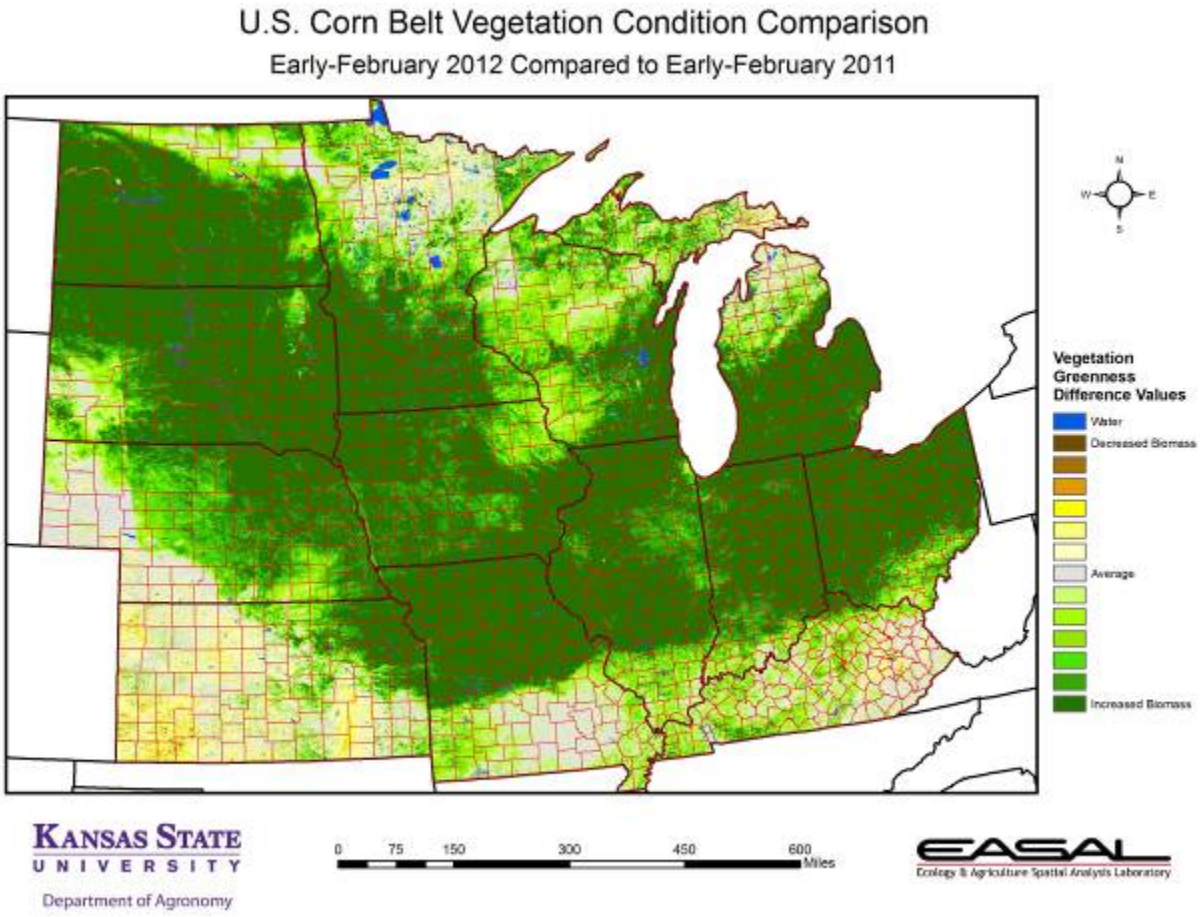
Map 2. Compared to the previous year at this time for Kansas, the current Vegetation Condition Report for January 31 – February 13 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows much greater NDVI values across northeast Kansas. Last year this region had snow cover. Current NDVI values are therefore much higher this year because there is no snow in the region. Greater NDVI values can also be seen in central, south central, and southeast Kansas. Better conditions in the winter wheat crop contribute to this increase. At the end of January, 42 percent of the wheat was reported to be in good condition. Last year at this time, only 25 percent of the crop was in good condition.



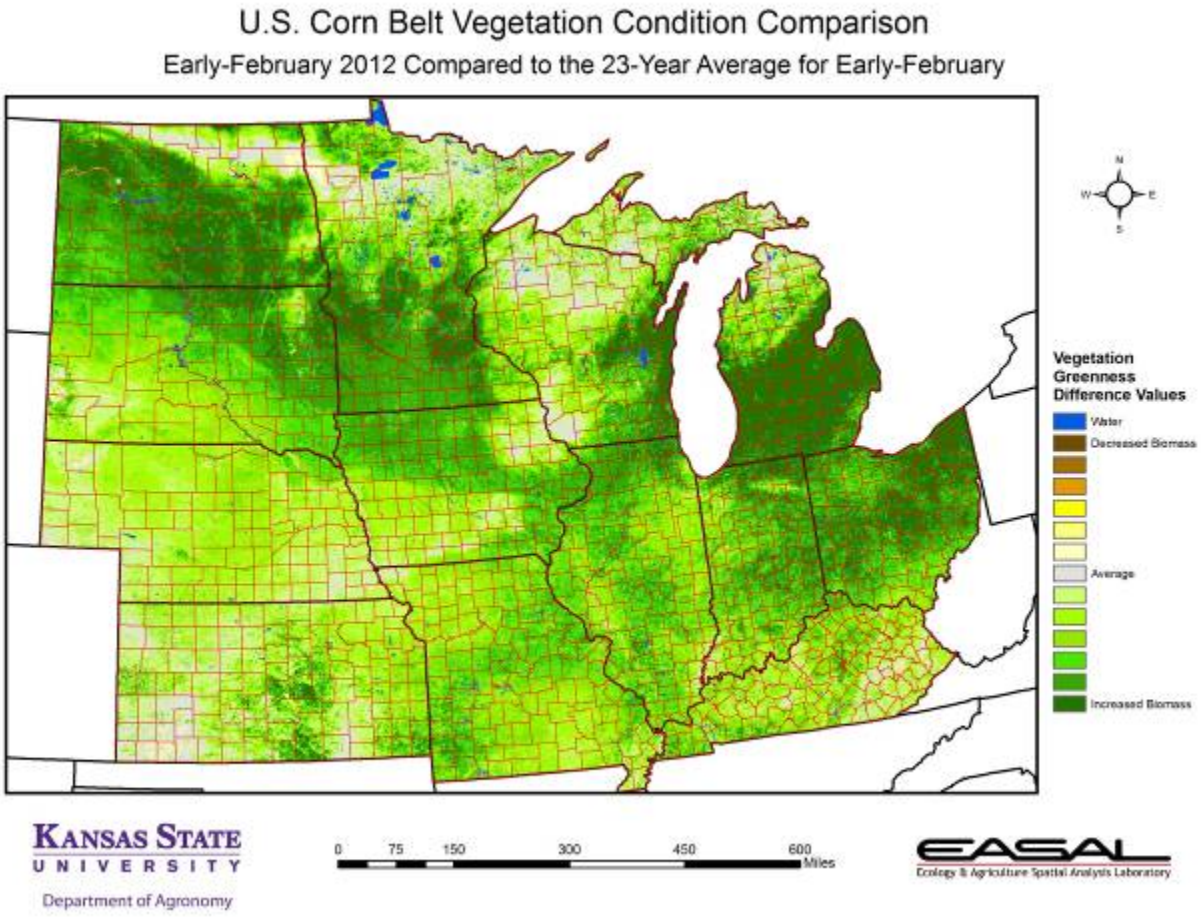
Map 3. Compared to the 23-year average at this time for Kansas, this year's Vegetation Condition Report for January 31 – February 13 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that NDVI values are much higher. Mild weather and wet conditions to start February have favored greater-than-normal photosynthetic activity. It is noteworthy that areas of southwest Kansas and along the Flint Hills in eastern Kansas do not show above-average biomass production.



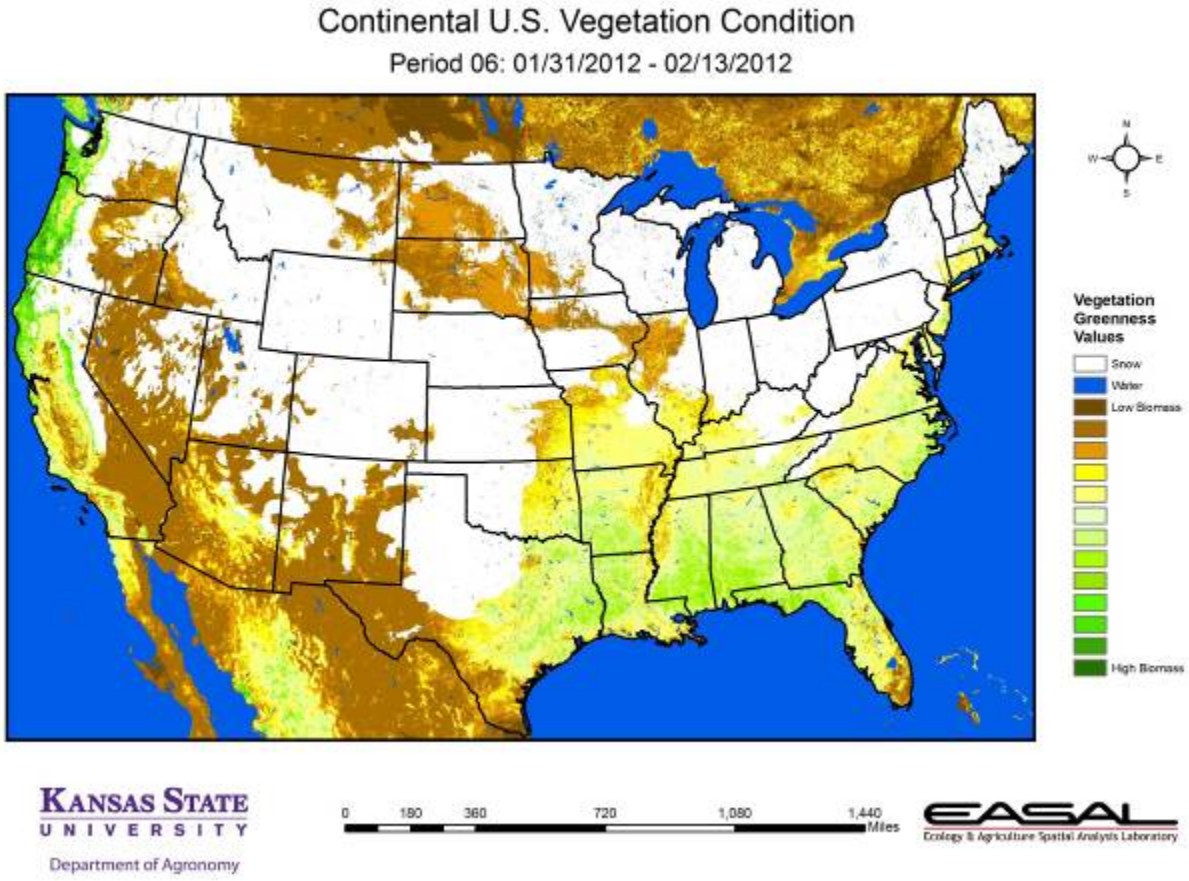
Map 4. The Vegetation Condition Report for the Corn Belt for January 31 – February 13 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that a wide band from western North Dakota across to Northern Iowa missed out on the snow. Lack of snow cover continues to be of concern in these areas.



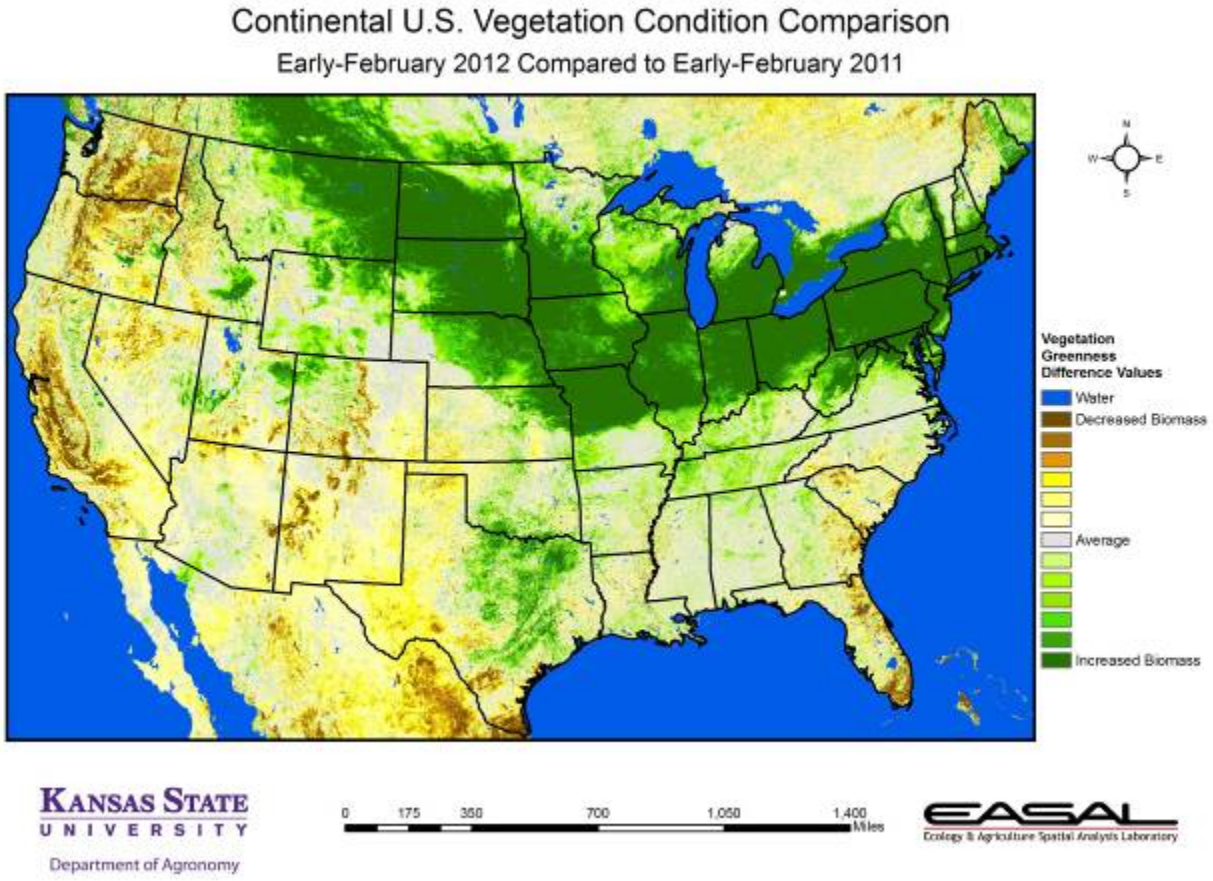
Map 5. The comparison to last year in the Corn Belt for the period January 31 – February 13 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows higher NDVI values across much of the region. Last year, snow depth ranged from 4 to 20 inches, with more than 50 percent of the area having snow cover. This year the snow cover is less than 20 percent. NDVI values in the areas without snow this year are much higher than last year.



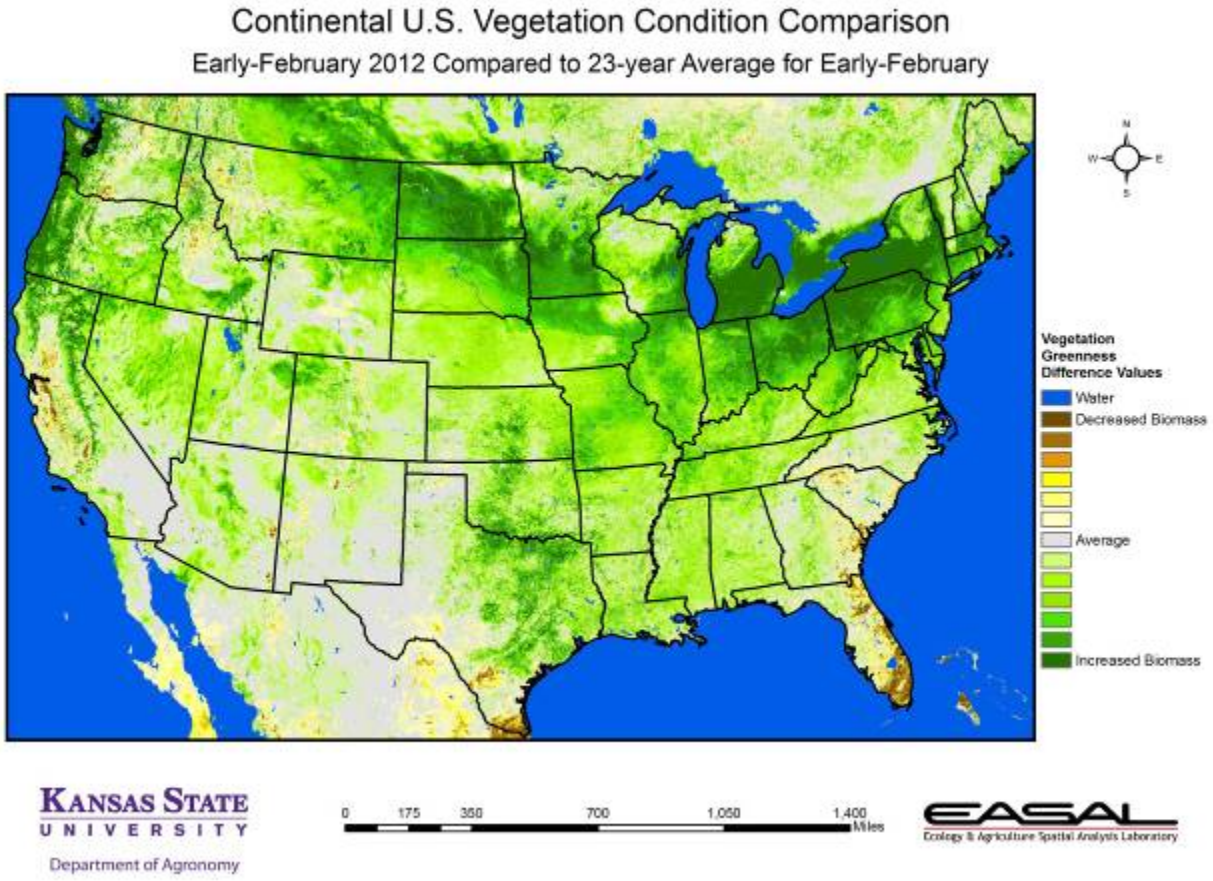
Map 6. Compared to the 23-year average at this time for the Corn Belt, this year's Vegetation Condition Report for January 31 – February 13 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows a continuation of the seasonal pattern with much higher-thn-average NDVI values across the region. The reduced level of snow this year in the region brings concerns of decreased soil moisture as we move into the growing season.



Map 7. The Vegetation Condition Report for the U.S. for January 31 – February 13 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that a significant portion of the Northern Plains missed the snow, while areas of western Oklahoma and the Texas Panhandle continued to have snow.



Map 8. The U.S. comparison to last year at this time for the period January 31 – February 13 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows the lack of snow cover, resulting in higher NDVI values across the northern areas of the country. Central Texas continues to have greater biomass production as a result of the wetter conditions this year.



Map 9. The U.S. comparison to the 23-year average for the period January 31 – February 13 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that much of the country has higher-than-average NDVI values. This is a positive in the South, where it signals improvement in the drought conditions. It is a negative in the North, where the lower snow cover brings concerns of drought as the growing season approaches. Minnesota and northern Iowa are already reported to be in moderate to severe drought 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.
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