



Extension Agronomy

eUpdate

07/18/2014

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, 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. Glyphosate-resistant Palmer amaranth spreading rapidly in Kansas

Populations of Palmer amaranth resistant to glyphosate were first documented in Kansas three years ago. At that time, these populations were limited in range to isolated areas of south central Kansas. Glyphosate resistant Palmer amaranth has gradually expanded the last couple of years, and now appears to be increasing rapidly, especially through the central part of the state.

Several other weeds have also developed glyphosate resistance in Kansas, including common waterhemp, marehail, kochia, common ragweed, and giant ragweed.

Glyphosate resistance can be confirmed with greenhouse and laboratory tests, but at this point that is probably no longer necessary. If a few Palmer amaranth plants or patches of plants survived where glyphosate was applied at the recommended rate with the appropriate adjuvants and spray coverage was good, there is a good chance those plants are resistant.



Figure 1. Surviving Palmer amaranth among dead plants treated with Roundup PowerMax at 32 fl oz/acre when plants were about 6 inches tall. Photo taken at Ashland Bottoms near Manhattan six days after treatment. Plants were confirmed to be resistant by an enzyme assay in the laboratory. Photo by Dallas Peterson, K-State Research and Extension.

Where glyphosate-resistant Palmer amaranth occurs, producers should plan taking the necessary control measures. Another application of glyphosate alone probably will not help. It may be possible to use an alternative to glyphosate as a postemergence treatment in-season this year, although most postemergence alternatives are effective only on smaller plants.

In soybeans the only alternatives would be PPO-inhibiting herbicides such as Cobra, FlexStar, Marvel, or Ultra Blazer. If there are just a few scattered plants, removing them by hand or other mechanical methods before they go to seed may help prevent them from spreading rapidly in the field. If those weeds remain growing in the field and set seed, the action of a combine will spread the seed throughout the field, as well as to other fields.

In fallow, it is best to use glyphosate as a tank-mix with 0.25 to 0.5 lb ae of 2,4-D or dicamba. Treat fallow as soon as possible because the larger the glyphosate-resistant Palmer amaranth gets, the harder it is to control.

In the future, growers need to consider using a more integrated weed management approach that includes cultural practices and multiple herbicide modes of action, especially preplant and preemergence residual herbicides. Scout fields early after crop emergence and make timely postemergence applications with the appropriate herbicides for control of escaped weeds.

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2. Managing glyphosate-tolerant volunteer corn in summer fallow

Extended dry conditions followed by the recent precipitation have been very conducive to establishing stands of glyphosate-tolerant volunteer corn across many fallow fields in the High Plains. A common question is how these volunteer corn stands affect subsequent winter wheat yields and at what point they should be controlled.

Research on this has been conducted by K-State agronomists across 9 site years in western Kansas. In 8 of 9 site-years available soil water at wheat planting was reduced when uncontrolled volunteer corn was present. Overall, wheat tillers were reduced by 1/square foot for every 170 volunteer corn plants per acre and wheat grain yields were reduced 1 bu/acre for every 500 volunteer corn plants/acre. Producers can estimate volunteer density using the following table:

Plant population / acre	Plants in a 30-ft x 30-ft area
250	5
500	10
1,000	21
1,500	31
2,000	41
4,000	82
6,000	124

At current wheat prices, the economic threshold of control is likely between 1,000 and 1,500 plants/acre depending upon the producer's cost of herbicide and application. In years of extremes – either very high wheat yields (i.e. greater than 70 bu/acre when water was largely non-limiting), or years of very low yield potential (<35 bu/acre) -- the effect of volunteer corn will be much less. But for the majority of years yield reductions in wheat should be expected when volunteer corn density is greater than 500 plants/acre and not controlled.

Quantifying the density of volunteer corn stands within a field and determining priority among fallow fields is a potential use for UAV imagery. Imagery collected in northwest Kansas clearly shows volunteer corn plants in a chem-fallow field (Figure 1). Volunteer corn densities could be evaluated manually or with software tools.

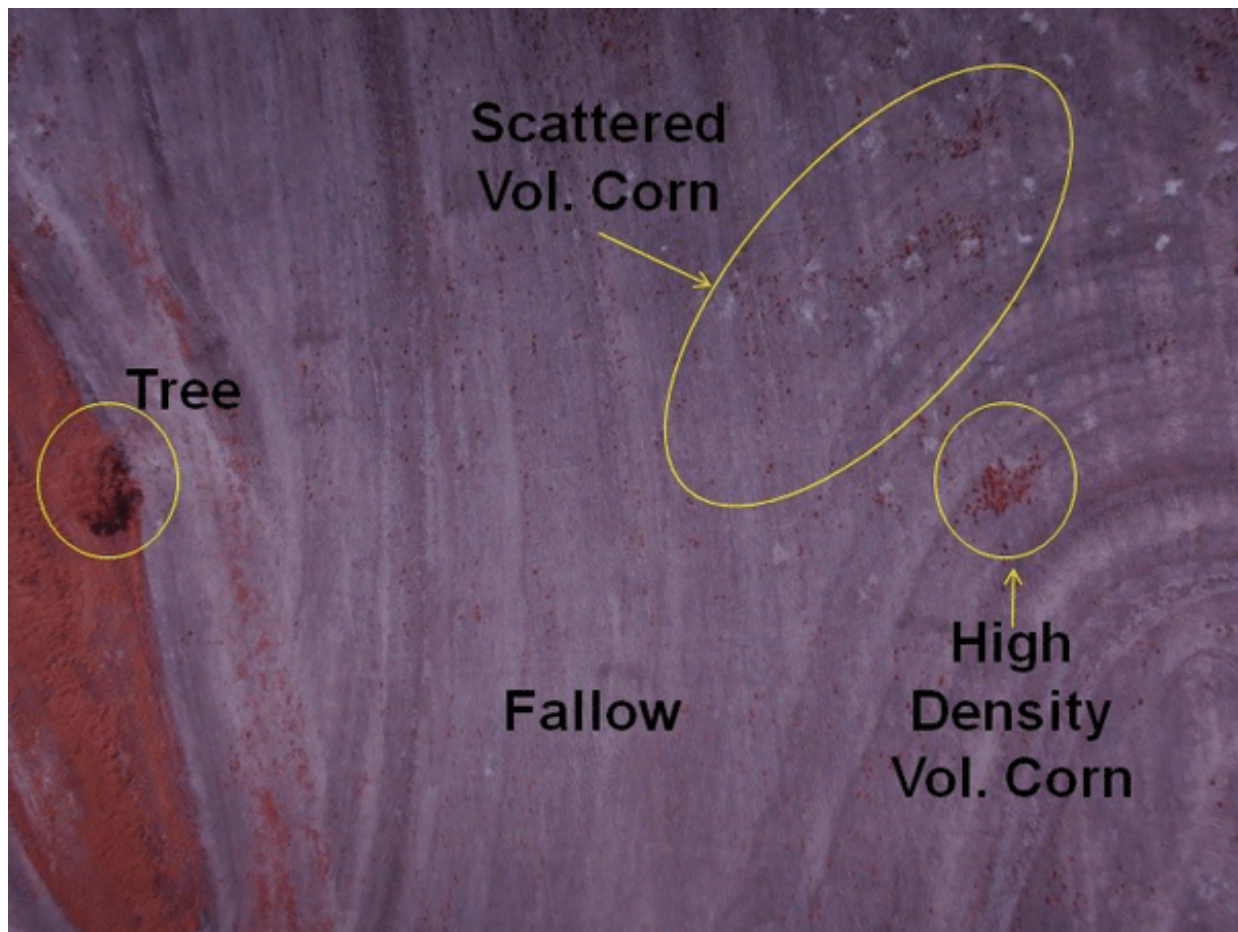


Figure 1.

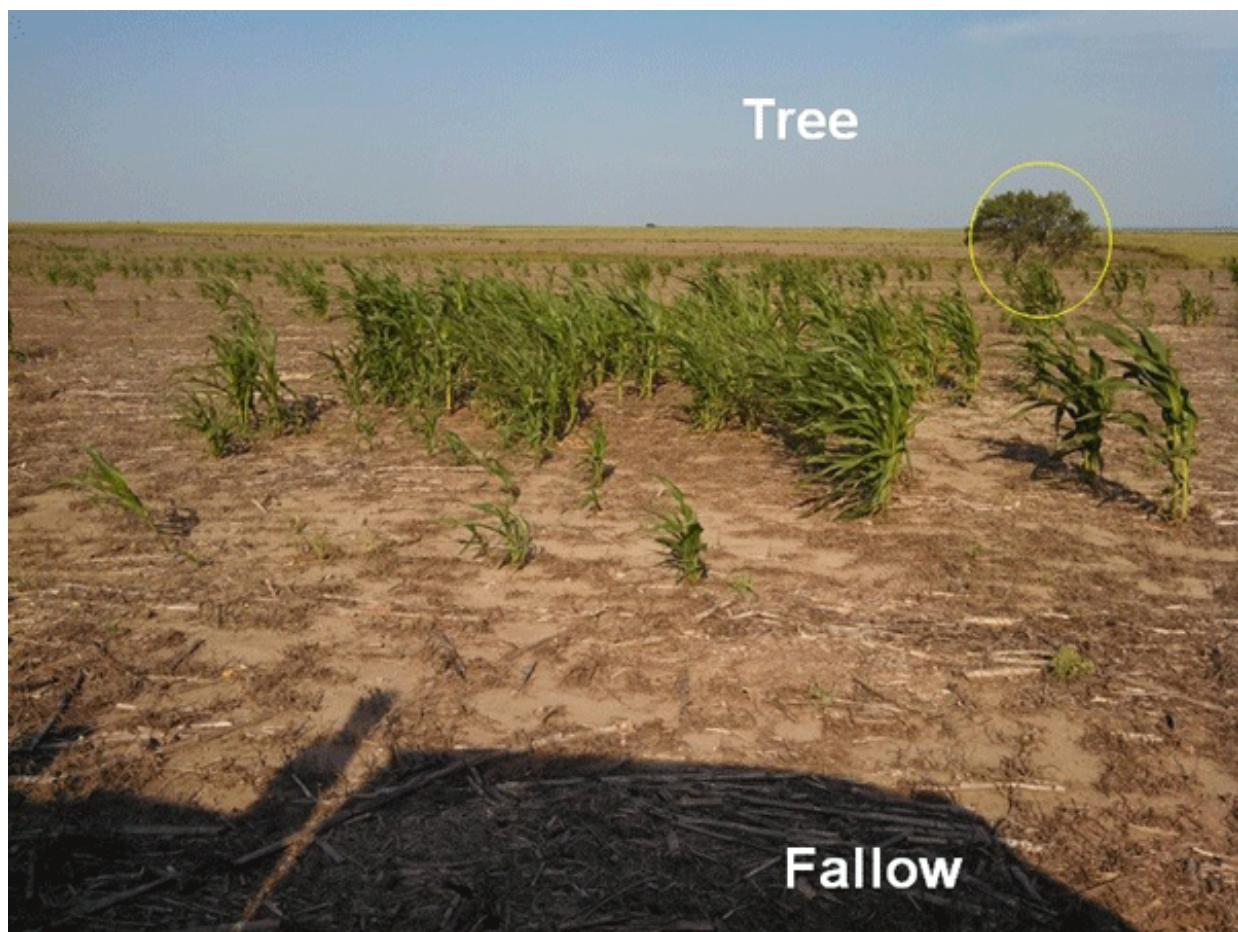


Figure 2.

A variety of herbicide options are available for attaining control. Clethodim products (e.g. Select Max) provide control to volunteer up to 36 inches in height. Volunteer corn should be controlled as soon as possible however to minimize water use and increase the probability of achieving full control.

Achieving good coverage, the use of adequate spray solution volume, and proper use of crop oil and AMS are key to attaining good control. For example, the SelectMax label specifies a minimum of 10 gallons/acre spray solution, NIS at 0.25% v/v or COC/MSO at 1 qt/acre or 1% v/v, and the use of ammonium sulfate (AMS) at 2.5 to 4 lb/acre. In drought-stressed conditions or when treating large plants, using the full rate of AMS will improve efficacy. Producers should be aware that some products have a restriction period before planting wheat. Always read and follow label directions.

In addition to chemical control, crop management that minimizes lodging in corn, proper adjustment of combine settings at corn harvest to minimize grain losses, and the use of no-till can reduce volunteer corn populations. Previous research found 80% germination of volunteer corn kernels within a tillage system, and only 10% germination within a no-till system.

For more information see K-State Research and Extension publication SRL141, *Keeping Up With Research: Volunteer Corn in Fallow* at:

<http://www.ksre.ksu.edu/bookstore/pubs/SRL141.pdf>

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3. Phosphorus fertility for wheat

It's important that producers not overreact to lower crop prices for wheat by cutting back this fall on phosphate fertilizer, if it's needed, for the wheat crop. Wheat is the most highly responsive crop we grow to P fertilizers. At low soil test levels, good profits can be made by using the right rate of P applied at the right time and in the right manner.

Soil testing is the key tool to determine if any crop, but especially wheat, will respond to added P fertilizers. In Kansas the Critical P Soil Test level (the soil test level below which a response to P fertilizer is likely) is 20 ppm using the Mehlich 3 P test. When soil test P levels (Bray P1 or Mehlich 3) are below 20 ppm, the likelihood of a wheat yield response to P is high. The lower the test level, the greater the probability of a response.

Considering the 4-R's of fertilizer management -- Right Time, Right Place, Right Rate and Right Source -- P fertilizer timing and placement are especially critical in wheat production. Since wheat is a fall-planted crop and makes critical growth during colder weather, the best and most profitable timing for P fertilizers is at or before seeding. The first few weeks after emergence in the fall, are critical since P has major impacts on tillering and rooting of wheat. An early-season P deficiency can slow root and shoot growth and reduce tillering and plant development. A poorly developed plant is more susceptible to stresses in winter and spring. So applying P fertilizers at or before seeding is best.

Phosphorous fertilizer placement is also very important in wheat production. Cool soil temperatures during fall growth reduce the rate of P movement to developing wheat roots. By concentrating the P in a band near the seed, this problem can be overcome.

It doesn't take much added P fertilizer, with the proper timing and placement, to have a big effect on early-season development and yields. Early work at K-State conducted in the 1930's at low soil test levels, showed nearly twice the response from applying 20 pounds of P_2O_5 in the row with the seed compared to broadcasting the same amount. Those results are still valid today. Banding fertilizer near the seed is more efficient than broadcasting P, especially for crops like wheat which make critical growth during cool weather. Broadcasting P can improve early-season wheat growth, but broadcasting is less efficient and requires a higher rate to obtain a similar response, making it more expensive.

The right P fertilizer rate should be determined by a well-calibrated soil test, such as the Mehlich 3, Bray P1, or Olson. Other tests may be good, but they are not calibrated for Kansas or Great Plains conditions, and don't have the rate recommendations at a given test level developed. The rate needed for wheat is a function of soil test level. Wheat removes about 0.50 pounds P per bushel. But at low soil test levels, the recommended/required P rate for economic optimum yield is often 2-3 times the removal rate, especially when broadcast. At higher soil test levels, approaching the critical level, the soil is capable of supplying most of the P needed, and recommended fertilizer rates are often less than crop removal.

Essentially all of the normally available dry or liquid P sources, such as 11-52-0, 18-46-0, or 10-34-0 can be successfully used for wheat production, with little difference in performance seen between them.

One word of caution concerning fertilizer sources relates to ammonia and salt injury. While wheat is

relatively tolerant to salt injury, and the narrow row spacing commonly used dilutes the amount of material in each row, as compared to corn or grain sorghum, each year a report will come in of fertilizer injury from fertilizer applied with the seed. In many cases this is the result of urea being added to the starter fertilizer mix. As a general rule, never apply urea fertilizers directly with the seed as this can result in ammonia injury. Also keep the salt load low. Ideally, the total amount of N plus K should be less than 30 pounds per acre in 7.5 inch rows.

In summary, P is a critical part of a wheat fertilizer program on soils with P soil test levels below 20 ppm. Applying the fertilizer at or before planting, and using some banded P, normally placed with the seed in today's planting equipment, is the most efficient and profitable. The right P rate should be based on current soil tests.

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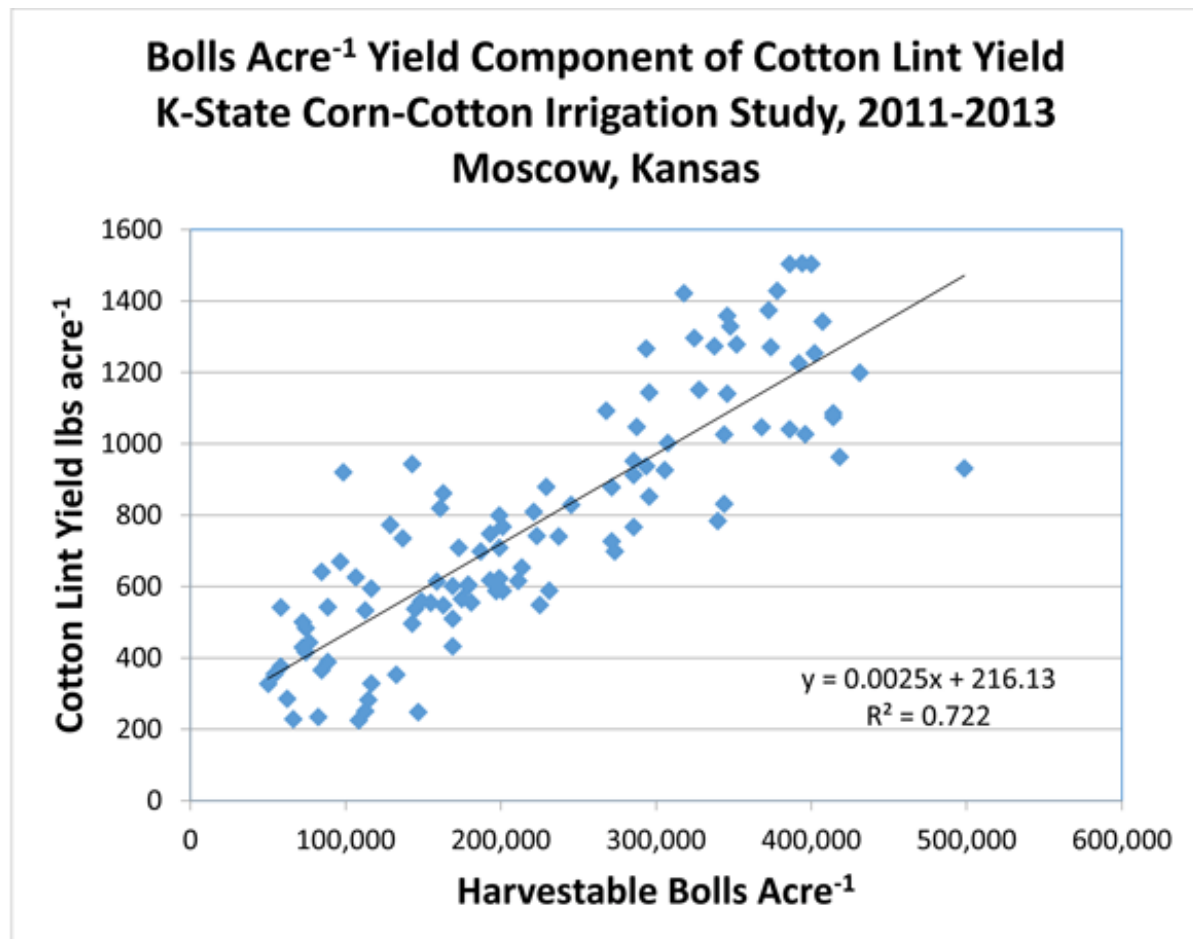
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4. Timing of irrigation for maximizing cotton yield

Producers are likely familiar with timing of limited irrigation to maximize yield in grain crops, e.g. immediately prior to tassel/silk in corn and boot stage in grain sorghum. These strategies work toward maximizing the most variable yield component and the one typically most sensitive to stress -- kernels per ear row in corn and kernels per head in grain sorghum. While lint quality and lint per boll can vary due to management, bolls per acre is the important yield component in cotton production (Figure 1).

Assuming good stands are established, early season conditions in Kansas typically are conducive to initiating a large number of squares. However, as the season progresses and stress becomes more prevalent the plant response is to abort squares, thus reducing the plants' maximum yield potential.



K-State research was initiated in 2011 to investigate timing of irrigation cotton yield and the associated impacts on corn yield when two crops are grown with a shared water supply. Treatments include a range of full-season irrigation scenarios where an inch of water was applied every 5, 7, or 10 days throughout the growing season. This simulates full-season irrigation with a standard quarter-section pivot under the constraint of varying well capacities of 500, 350, and 250 GPM. Additional treatments included a dryland treatment (one irrigation to ensure a good stand) and the application of water at selected time periods to maintain the key yield component of bolls per acre. Targeted

timing treatments included:

- 1" applied at MHS
- 1" applied 2 weeks prior to MHS + 1" at bloom
- 1" applied at MHS + 1" at bloom

Irrigation Strategy	Plants Acre	Bolls Acre	Ginout	Lint Yield	Mic	Length	Unifor mity	Strengt h	CG1	CG2
				lb ac ⁻¹		in.	%	g/tex		
Fully Irrigate @ 1" every 5 days	47972	299126 a	0.257 b	1104 a	3.75 c	1.10 ab	81.0 ab	29.9 ab	45	2
Fully Irrigate @ 1" every 7 days	48628	271454 a	0.267 ab	1099 a	3.84 c	1.11 a	81.5 a	30.4 a	45	2
Fully Irrigate @ 1" every 10 days	43239	259936 a	0.275 a	891 b	4.13 ab	1.10 abc	80.9 ab	29.9 ab	46	2
Stand Est. +1" MHS	45298	213870 b	0.274 a	749 c	4.08 ab	1.08 d	80.2 c	29.1 bc	46	2
Stand Est. +1" 2 wks prior MHS +1" Bloom	45947	204564 b	0.267 ab	704 c	3.94 bc	1.09 bcd	80.6 bc	29.0 bc	49	1
Stand Est. +1" MHS +1" Bloom	45228	204969 b	0.259 b	686 c	3.84 c	1.09 cd	80.2 c	29.2 bc	45	2
Water @ emergence	47288	140593 c	0.273 a	412 d	4.20 a	1.06 e	80.0 c	28.4 c	48	1
ANOVA P>F										
Source of Variation										
Irrigation Strategy	0.7351	<0.0001	0.0023	<0.0001	0.0010	<0.0001	0.0007	0.0044	-	-
LSD (0.10)										
¹ Letters within a column represent differences at LSD (0.05)										

Under full season irrigation there was no yield advantage to irrigating every 5 days as compared to every 7 days, although either of those strategies increased yields compared to irrigation every 10 days. The largest gain in yield per unit of irrigation applied occurred with the targeted timings. Lint yields increased 82% over dryland yields with the application of 1" of water at match-head square (MHS). Application of additional irrigation at bloom did not increase yields.

Producers can maximize cotton yields by ensuring irrigation occurs at or immediately prior to MHS to maintain the bolls-per-acre yield component. Data from this study indicates that a high level of water use efficiency can be attained by targeting small amounts of irrigation at critical time periods.

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5. New corn ePubs available from K-State Agronomy

Two new K-State corn ePubs have just been published:

- Diagnosing Corn Production Problems in Kansas – for tablets and smartphones
- Abnormal Corn Ears iBook – for iPads only, plus a pdf format

You can access these publications on the web at:

<http://www.agronomy.k-state.edu/extension/crop-production/corn/>



New K-State Corn ePubs (for tablets and smartphone)

- **Diagnosing Corn Production Problems in Kansas (tablet and smartphone)**

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Coordinated by Ignacio A. Ciampitti, Cropping Systems Specialist
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Sponsored by the Kansas Corn Commission



These epubS can be downloaded at:

www.agronomy.k-state.edu/extension/crop-production/corn/

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6. K-State Field Day August 6 to celebrate 25 years of subsurface drip irrigation research

For 25 years Kansas State University researchers have studied subsurface drip irrigation technology for field crop production. To mark the anniversary, K-State's Northwest Research-Extension Center at Colby will host a special anniversary SDI Technology Field Day on Wednesday, Aug. 6 at 105 Experiment Farm Road in Colby.

The field day, from 2 – 8 p.m., features presentations by K-State Research and Extension specialists in engineering and agricultural economics, plus field tour stops, refreshments, poster presentations on SDI-related topics, a trade show and an evening meal. Producers who are using SDI technology will give their perspective in a panel discussion.

The event is free and open to the public but pre-registration by July 28 is required for meal planning purposes. Contact Vicki Brown at vbrown@ksu.edu or 785-462-6281 (phone) or 785-462-2315 (fax) and indicate the number of people being registered.

Tour topics include:

- Comparison of SDI with Alternative Irrigation Methods;
- Strategies to Improve Crop Germination When Using SDI;
- Water and Nutrient Management with SDI;
- SDI and Alfalfa; and
- Research Facilities and SDI Wetting Pattern.

More information is available by contacting Brown at vbrown@ksu.edu or 785-462-6281.

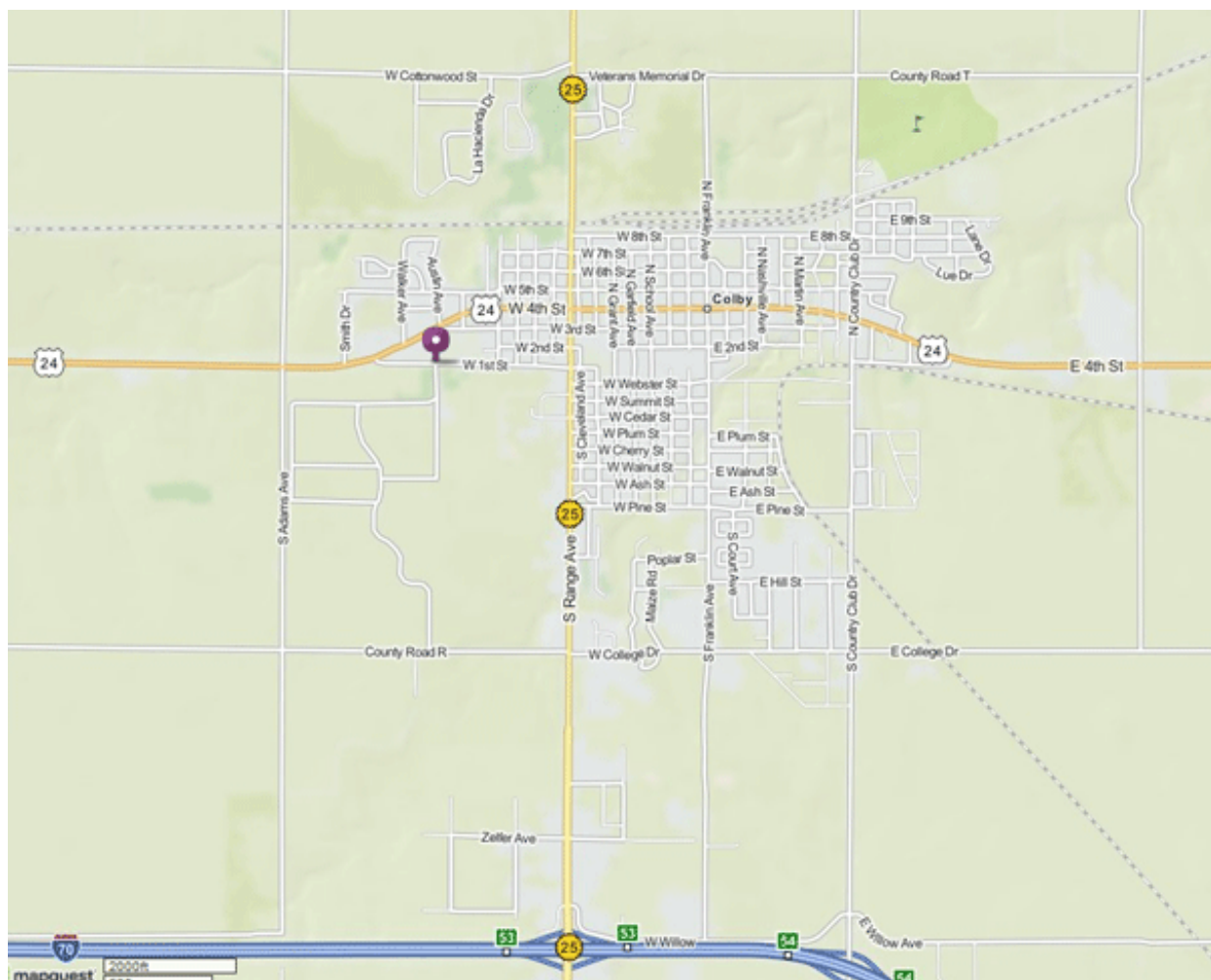


Figure 1. Map to Northwest Research-Extension Center in Colby

7. Kansas River Valley Experiment Field fall field day, August 12

The Kansas River Valley Experiment Field near Rossville will host its fall field day on Tuesday, August 12. The field day begins at 6 p.m. sharp.

Field day topics and K-State presenters include:

- Strategies and Products for Weed Control in Corn – Curtis Thompson
- Dealing in Challenges in Soybean Production: SDS, Seed Treatments, Iron Chlorosis – Bill Schapaugh
- Utilization of Drought-Tolerant Corn – Eric Adee
- Abnormalities in Corn Ears: What Do They Tell Us? – Ignacio Ciampitti

The field is located 1 mile east of Rossville on U.S. Hwy 24, on the south side of the road.

A BBQ meal will be provided after the field day, sponsored by Wilbur-Ellis. To pre-register, call Joanne Domme at the Shawnee County Extension office at 785-232-0062, ext. 100 by 5 p.m. on Monday, August 11.

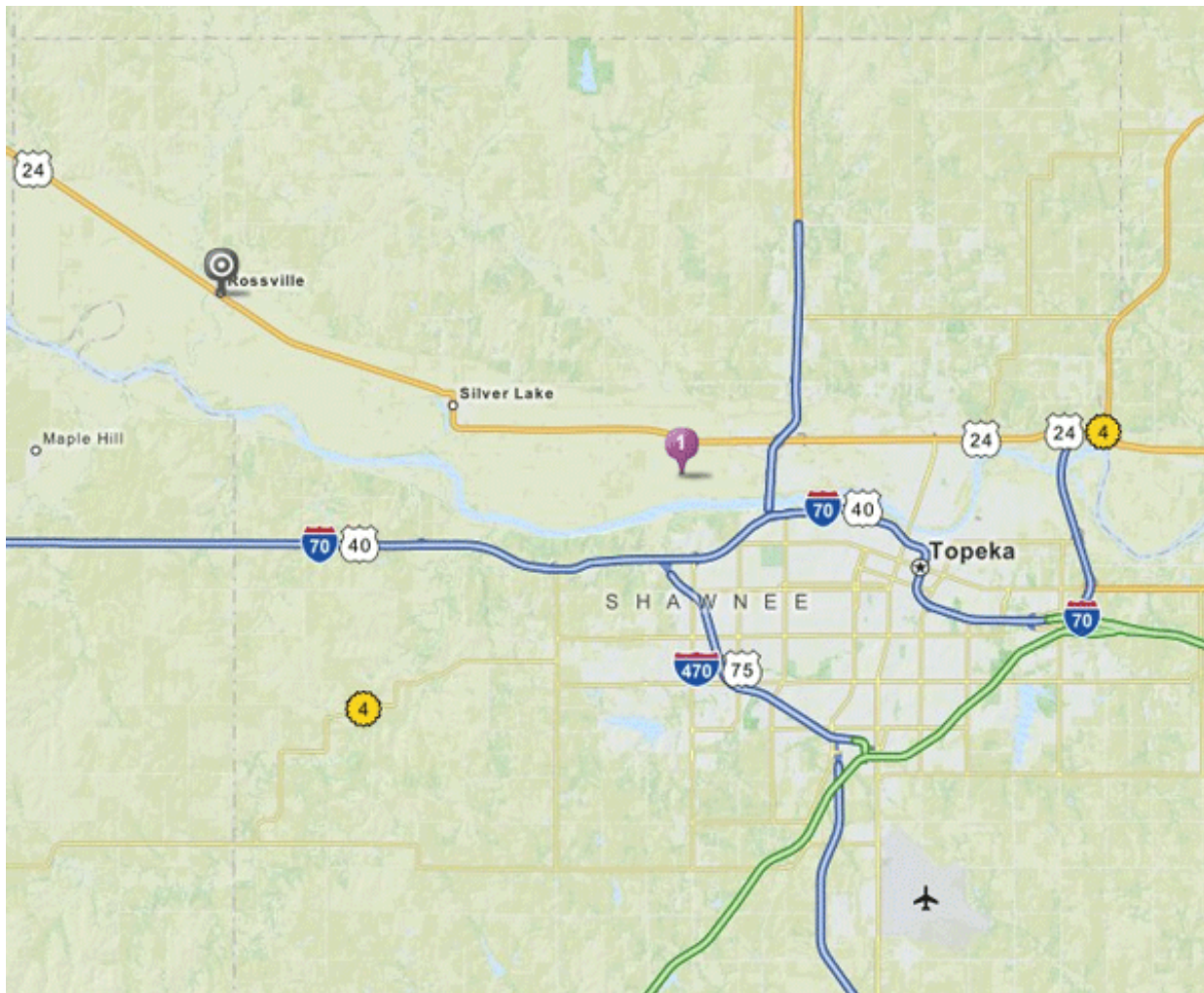


Figure 3. Map to Rossville. Experiment Field is east of Rossville.

8. North Central Kansas Experiment Fields fall field day, August 19

The North Central Kansas Experiment Fields Fall Field Day will be held Tuesday, August 19 at the Belleville field approximately 2 miles west of Belleville on U.S. Hwy 36. The Field Day will start at 6 p.m. sharp.

Field Day Topics:

- New Wheat Varieties and Variety Selection
- Chloride Fertility Needs in Sorghum
- Corn and Soybean Population On-Farm Research
- Soil Water Depletion by Cover Crop Species and Mixtures

A meal, compliments of K-State Research and Extension, will follow the presentations.

9. East Central Experiment Field fall field day, August 20

The East Central Experiment Field in Ottawa will host its fall field day on Wednesday, August 20. The field day begins at 9 a.m. with registration, coffee and doughnuts, and the program starts at 9:30 a.m. A complimentary lunch will be served.

Field day topics and K-State presenters include:

- Phosphorus and Potassium Fertilization – Dorivar Ruiz Diaz
- Corn Growth and Development – Ignacio Ciampitti
- What Is Causing Yellow Corn in the Spring? – Doug Shoup
- Drought-tolerant Corn – Eric Adee

From I-35 at the Ottawa exit, the East Central Experiment Field is south 1.7 miles on Kansas Highway 59, then east 1 mile, and south 0.75 mile.

More information, including Certified Crop Advisor Credits, is available by contacting the East Central Experiment Field at 785-242-5616.

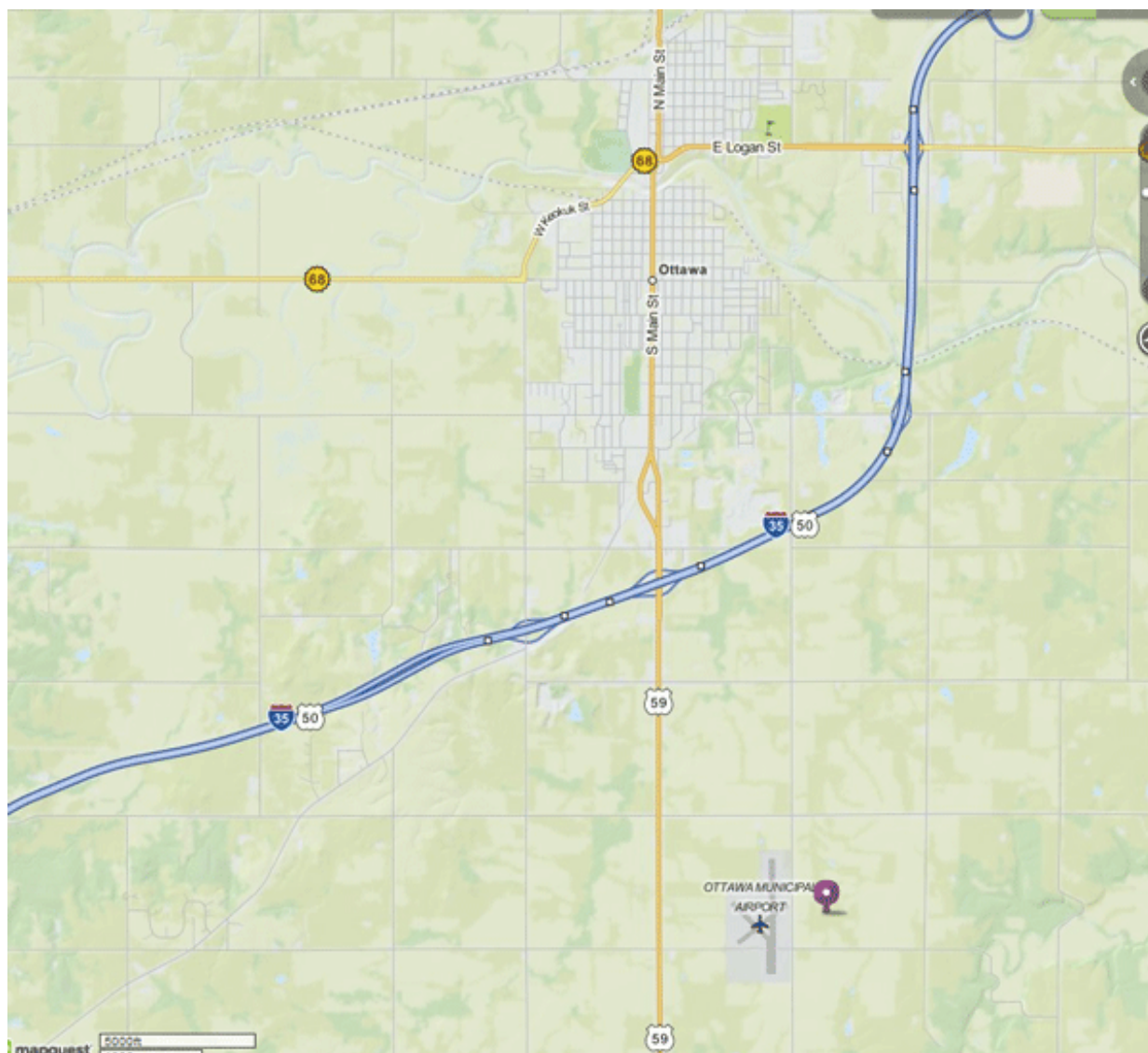


Figure 1. Map to East Central Experiment Field south of Ottawa.

10. Comparative Vegetation Condition Report: July 1 - 14

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 24-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 Kevin Price 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.

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, state climatologist:

Kansas Vegetation Condition

Period 28: 07/01/2014 - 07/14/2014

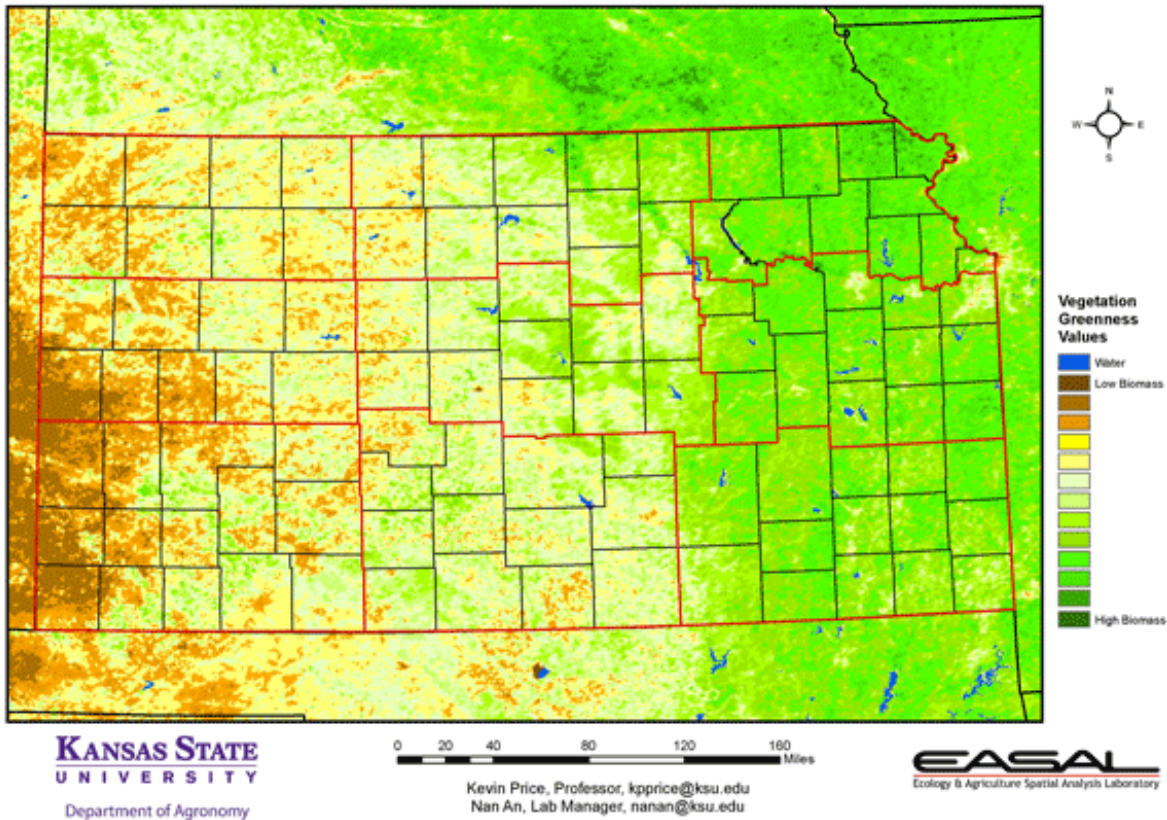


Figure 1. The Vegetation Condition Report for Kansas for July 1 – 14 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that higher NDVI values have penetrated into western Kansas. Higher photosynthetic activity is due to more favorable temperatures and moisture levels.

Kansas Vegetation Condition Comparison

Early-July 2014 compared to the Early-July 2013

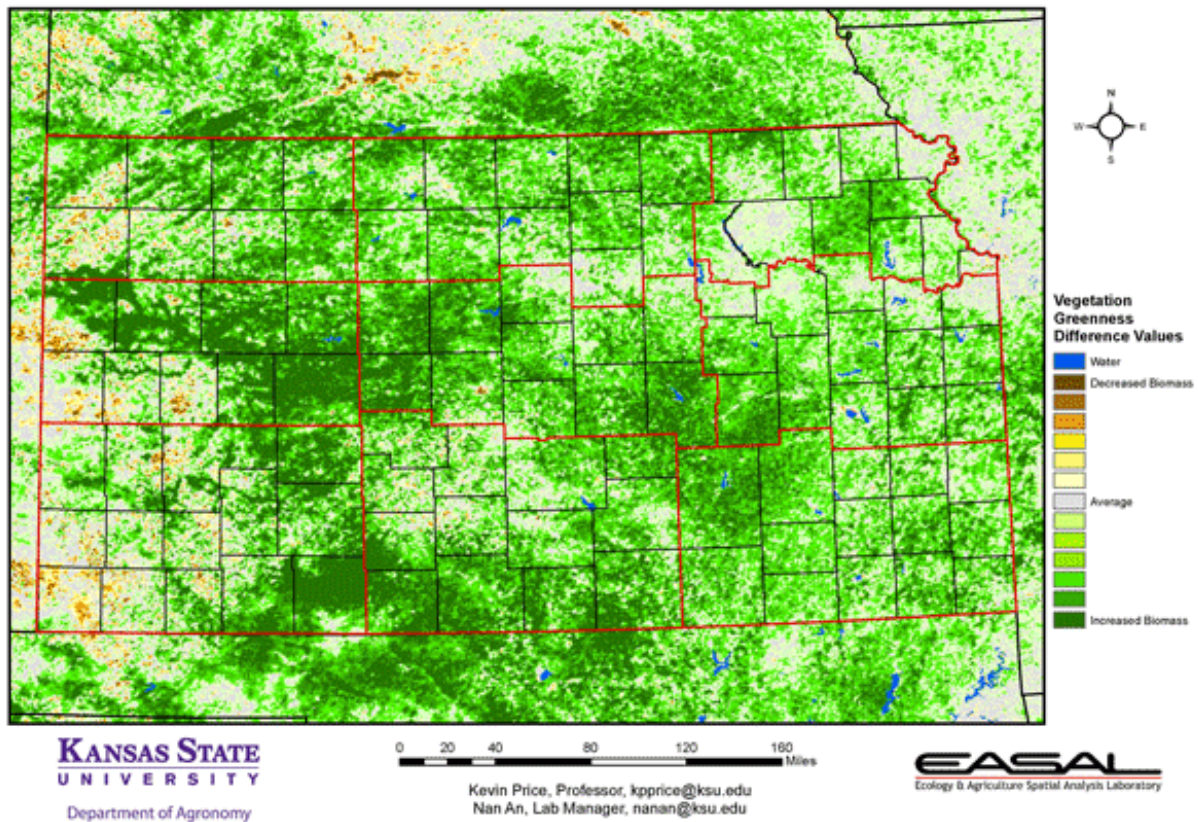


Figure 2. Compared to the previous year at this time for Kansas, the current Vegetation Condition Report for July 1 – 14 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that much of the state has much higher photosynthetic activity. Exceptions can be seen in west central and southwest Kansas, where moisture has been more recent and plants have yet to respond.

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Kansas Vegetation Condition Comparison
Early-July 2014 compared to the 25-Year Average for Early-July

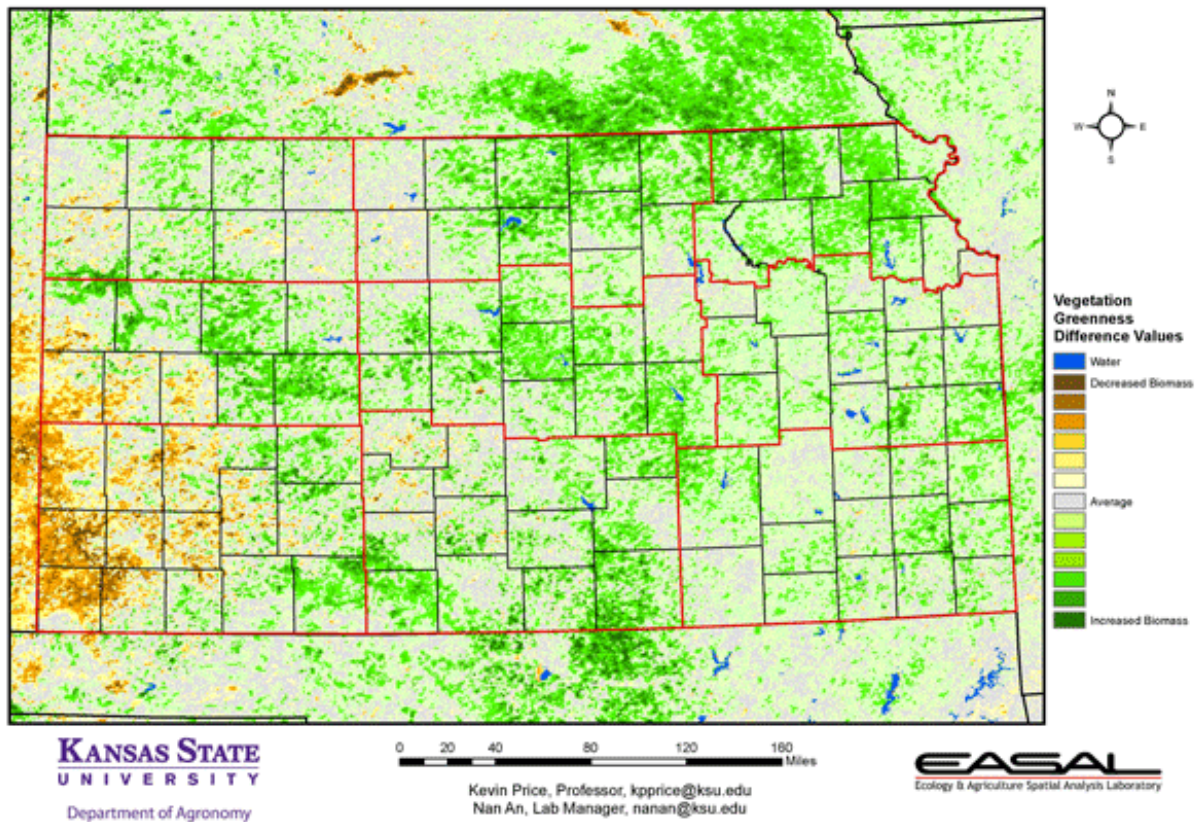


Figure 3. Compared to the 25-year average at this time for Kansas, this year's Vegetation Condition Report for July 1 – 14 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that much below-average NDVI values are concentrated in southwest Kansas, particularly in Hamilton, Stanton, Morton, Grant, and northwestern Stevens and southern Greeley counties. These areas have missed out on much of the recent rains, and are still in extreme drought conditions.

U.S. Corn Belt Vegetation Condition

Period 28: 07/01/2014 - 07/14/2014

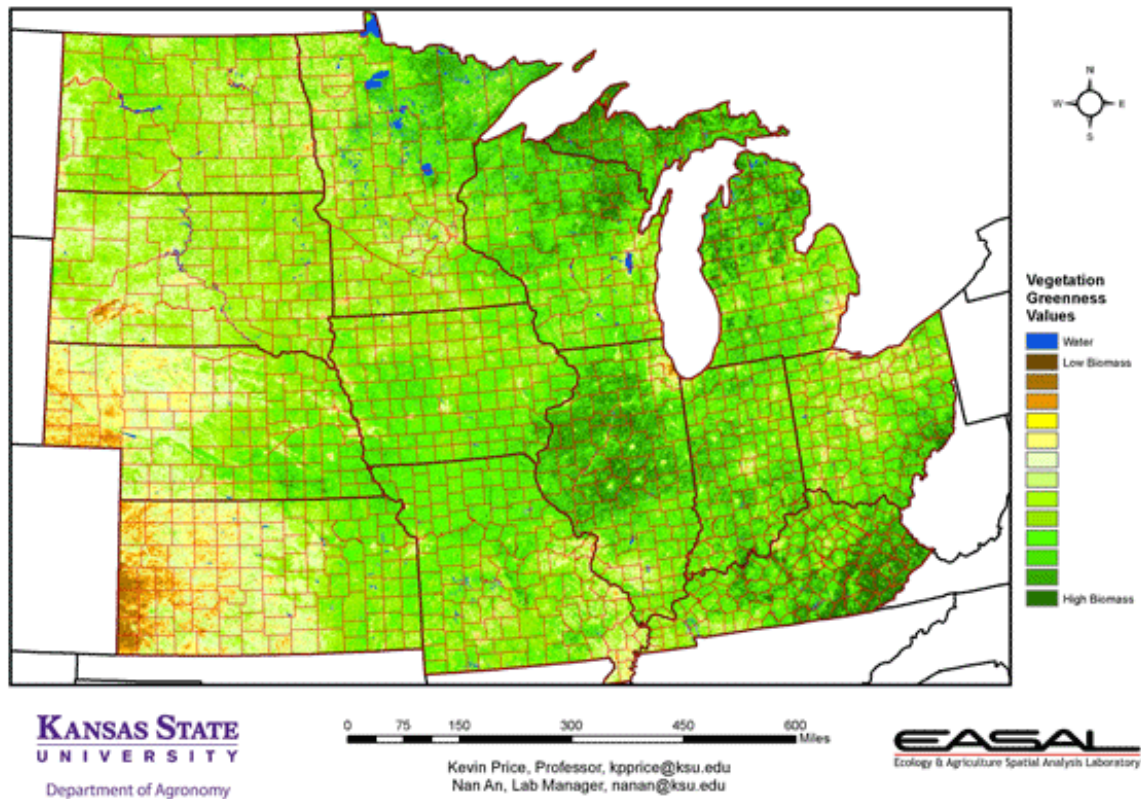


Figure 4. The Vegetation Condition Report for the Corn Belt for July 1 – 14 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that most of the low photosynthetic activity is in the western portions of the region, although there are pockets of lower productivity where excessive moisture has created problems. In Illinois, where 61 percent of the corn has tasseled, conditions are reported as 81 percent good to excellent.

U.S. Corn Belt Vegetation Condition Comparison
 Early-July 2014 Compared to Early-July 2013

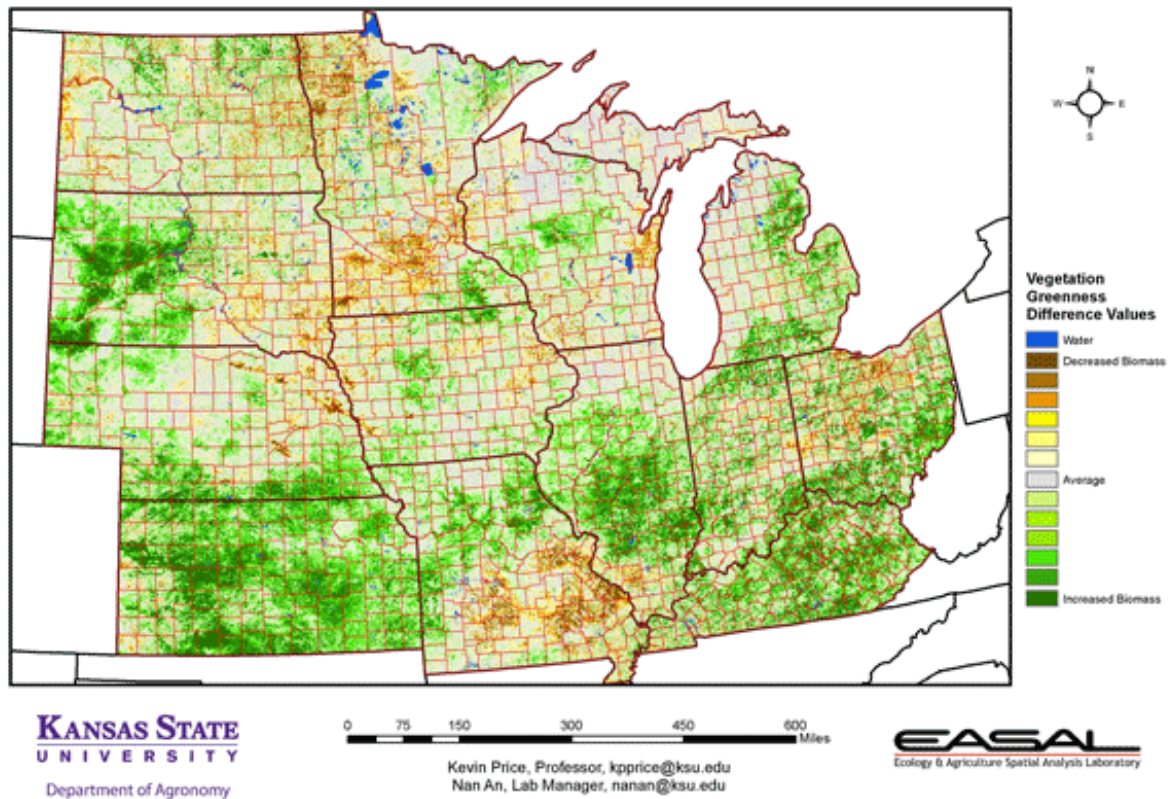


Figure 5. The comparison to last year in the Corn Belt for the period July 1 – 14 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that western Minnesota and southern Missouri have lower NDVI values. Cool, wet conditions are the major factors in this decrease.

U.S. Corn Belt Vegetation Condition Comparison
 Early-July 2014 Compared to the 25-Year Average for Early-July

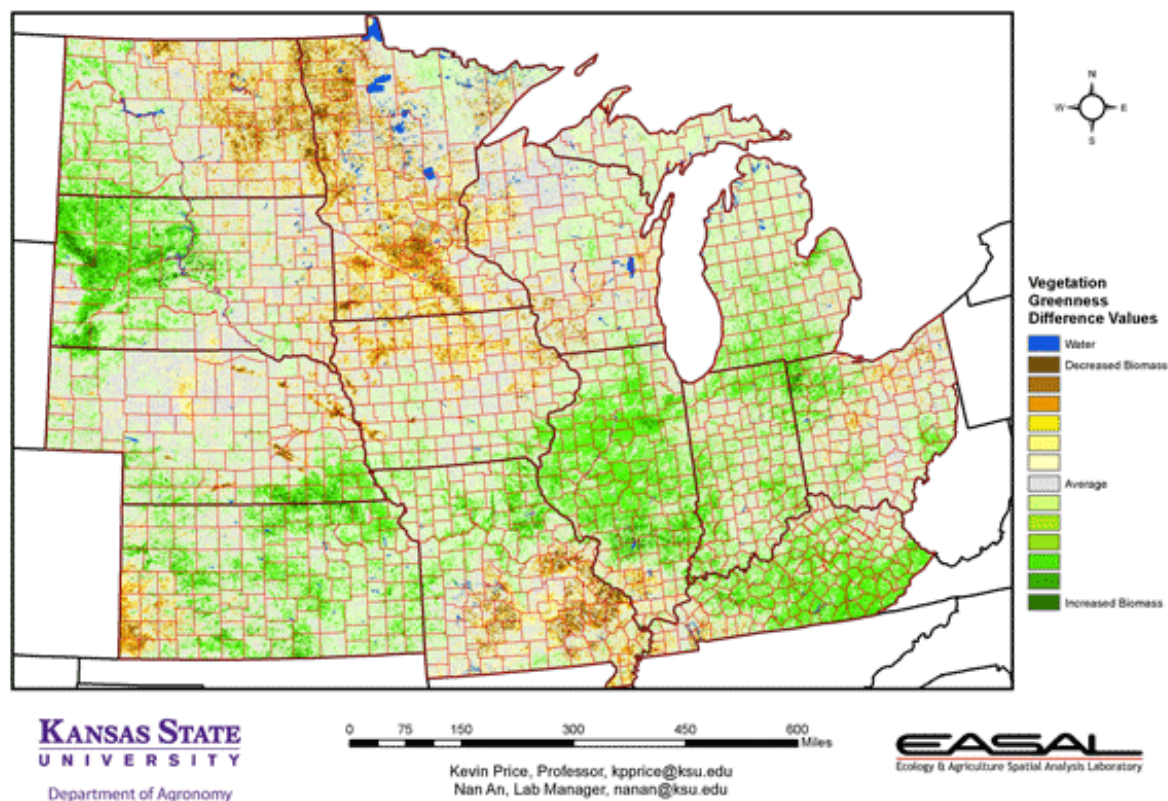


Figure 6. Compared to the 25-year average at this time for the Corn Belt, this year's Vegetation Condition Report for July 1 – 14 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows the center of the region has the biggest area of below-average photosynthetic activity. Cool, wet conditions have been the biggest factor in this decrease, although extreme drought is the culprit in southwest Kansas.

Continental U.S. Vegetation Condition

Period 28: 07/01/2014 - 07/14/2014

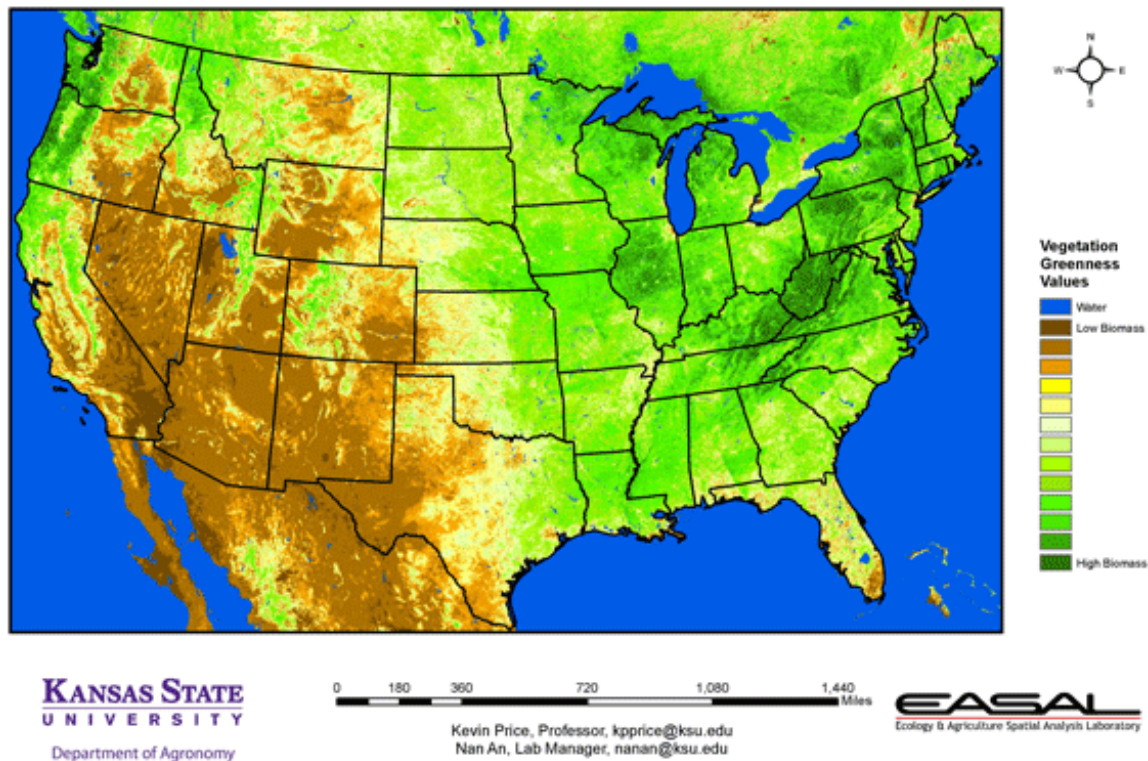


Figure 7. The Vegetation Condition Report for the U.S. for July 1 – 14 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that the greatest level of photosynthetic activity is in the Northeast. Areas from West Virginia through upstate New York have high biomass production at this time.

Continental U.S. Vegetation Condition Comparison
Early-July 2014 Compared to Early-July 2013

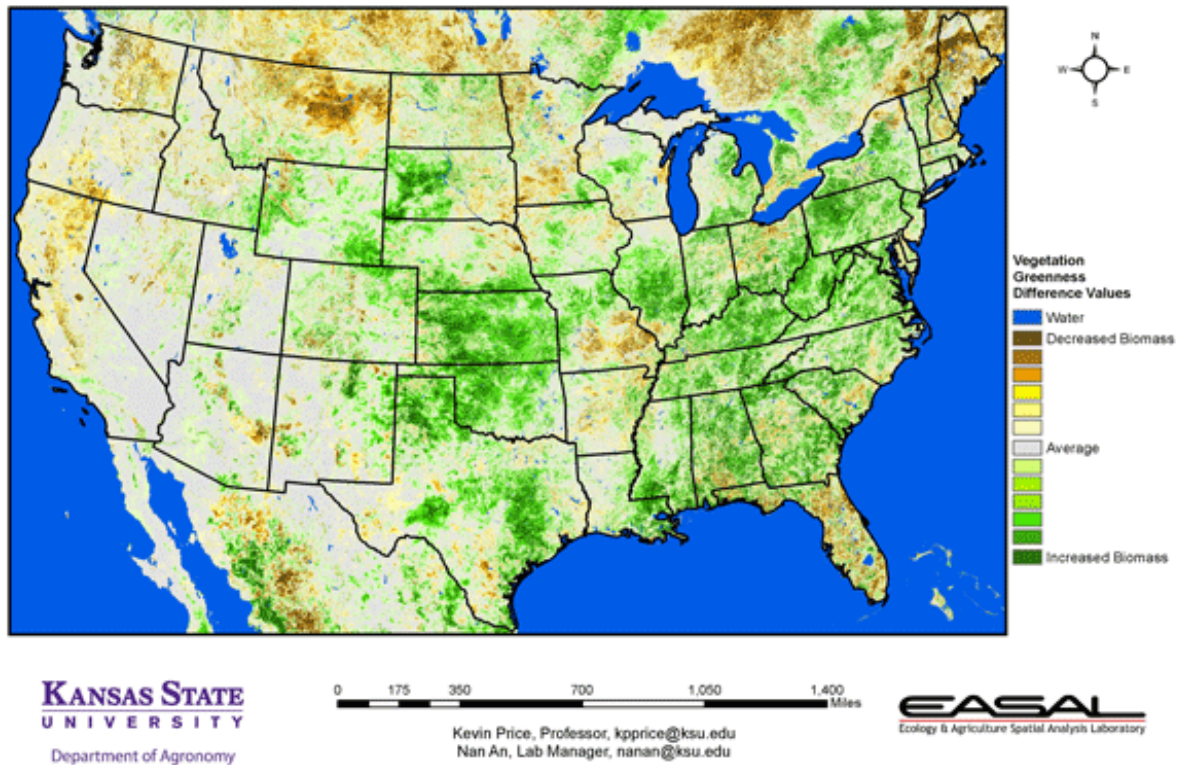


Figure 8. The U.S. comparison to last year at this time for the period July 1 – 14 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows increased photosynthetic activity in the central Plains and the East. Meanwhile, Montana and area along the Pacific Northwest have lower photosynthetic activity.

Continental U.S. Vegetation Condition Comparison
Early-July 2014 Compared to 25-year Average for Early-July

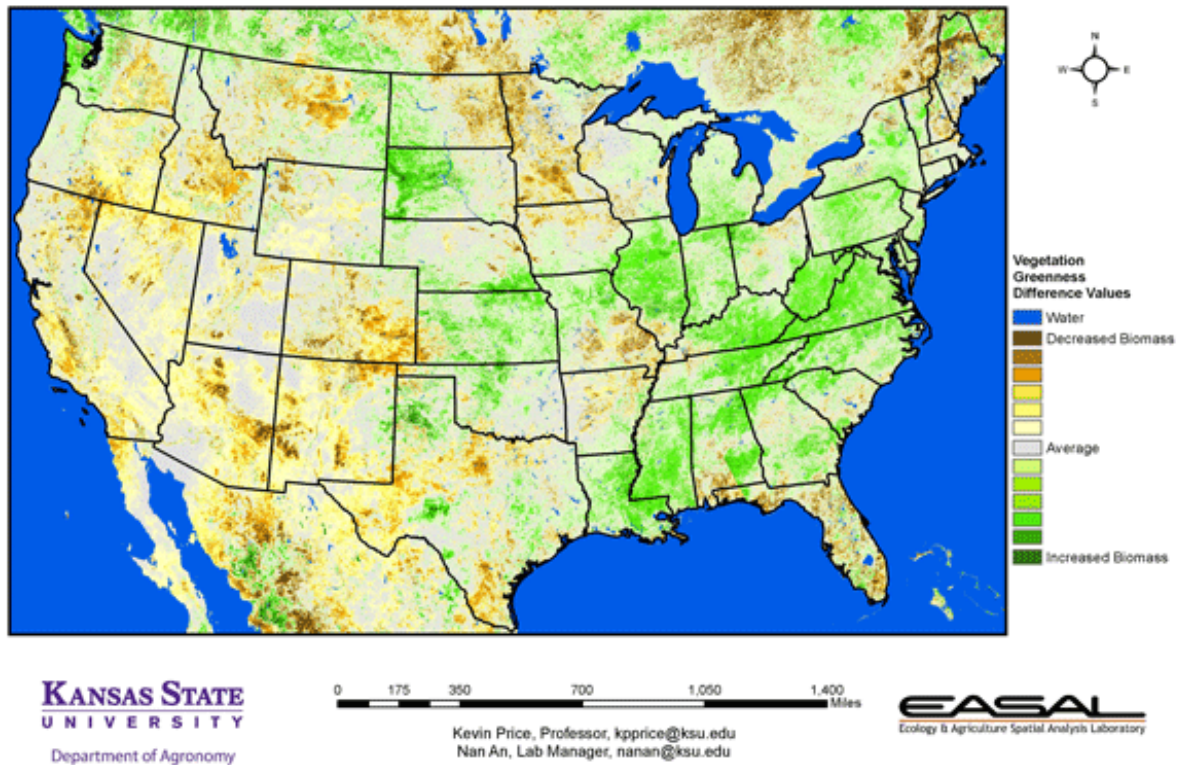


Figure 9. The U.S. comparison to the 25-year average for the period July 1 – 14 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that most of the country is near normal. The East has generally higher-than-average biomass production. The Plains region is a dividing line. To the east, the low productivity is the result of cool, wet conditions. To the west the low values are the result of continued drought.

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