Issue 713

K-STATE
Research and Extension

Extension Agronomy

eUpdate

10/05/2018

These e-Updates are a regular weekly item from K-State Extension Agronomy and Kathy Gehl, Agronomy eUpdate 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 Kathy Gehl, 785-532-3354 kgehl@ksu.edu, or Dalas Peterson, Extension Agronomy State Leader and Weed Management Specialist 785-532-0405 dpeterso@ksu.edu.

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1. Consider sampling now for soybean cyst nematode

After harvest is an excellent time to soil sample for the soybean cyst nematode (SCN). Currently, 58 of Kansas's 105 counties are known to be infested (Figure 1).

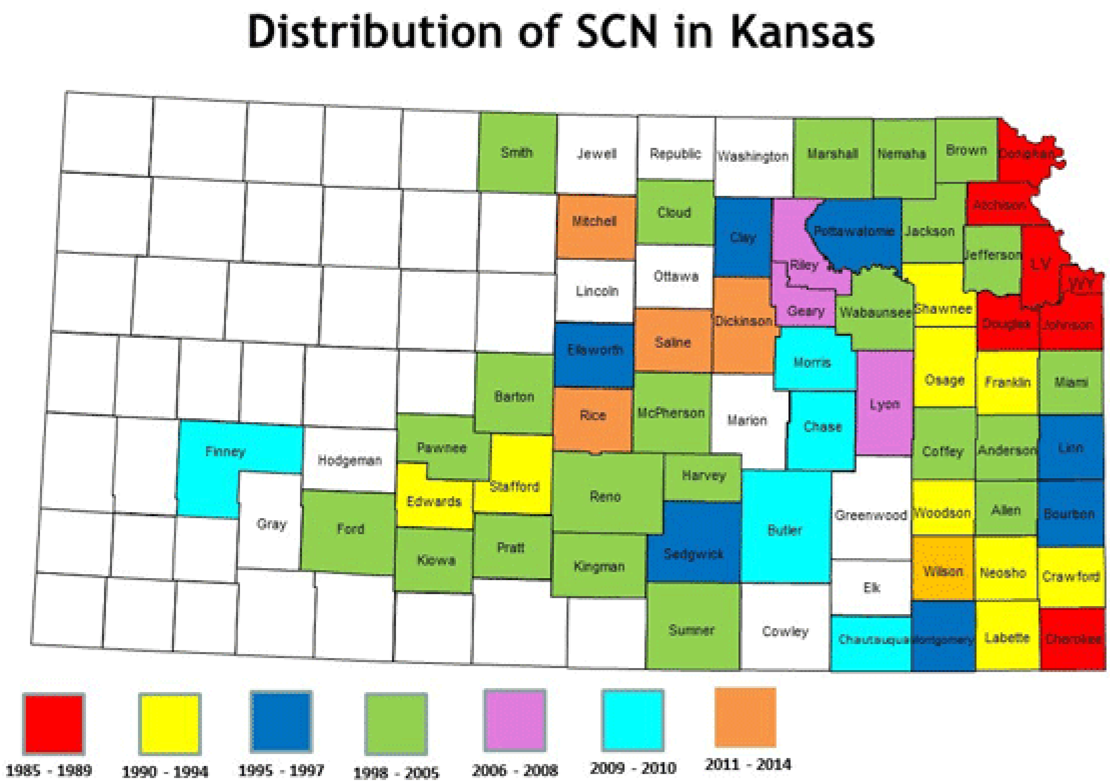

Figure 1. Current known soybean cyst nematode infested counties in Kansas. Map created by Doug Jardine, Extension Plant Pathologist.

In fields currently infested, knowing your nematode population numbers is an excellent way to determine if your management plan is working. If numbers are going up, you know that the population of nematodes in your field have overcome the resistance in the most recently planted soybean variety and that use of that variety should be discontinued in infested fields.

Sampling the soil in a known infested field is very similar to collecting a soil fertility sample. You will need a soil probe, a bucket, and a little elbow grease (Figure 2). Walk a "Z" or "W" pattern across the field. If the field was in soybeans in 2018, collect the cores from directly in the row, since that is where the nematodes are most likely to be found. One difference from fertility sampling is that the probe should be inserted to a depth of 6 – 8 inches. Collect 18 - 24 cores in the bucket. Mix the soil thoroughly, and then remove about a pint for the actual sample. Soil can be placed into the same type of white sampling bag used for fertility samples or into a re-sealable, gallon-size plastic bag. Avoid freezing the soil or exposing it to excessive heat after collection.

Figure 2. Tools needed for nematode sampling. Photo by Iowa State Extension Service.

For fields with no history of SCN, you should concentrate on areas of the field that might be hot spots (Figure 3). Other than targeting potential hot spots, the sampling procedure is the same as outlined above.

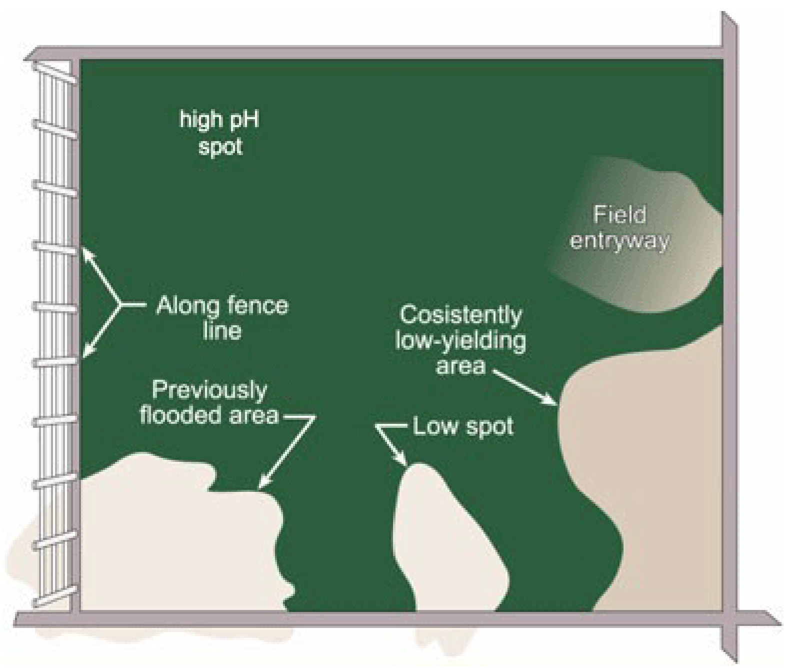

Figure 3. Hot spots in fields where soybean cyst nematodes are likely to be found. Photo courtesy of the Soybean Cyst Nematode Coalition.

Samples can be taken to any K-State Research and Extension county office for shipping. They can also be sent directly to the K-State Plant Disease Diagnostic Laboratory:

1712 Claflin Rd
4024 Throckmorton PSC
Manhattan, KS 66506

Cost per sample ranges from $25 - $34. Keep in mind that if you are too busy to sample this fall, any time is a good time to sample for SCN. Unlike other nematodes that move up and down in the soil profile depending on the season, the cysts are always there and move only with tillage.

For more information, visit the SCN Coalition website at https://www.thescncoalition.com.

What's your number?
Take the test. Beat the pest.
The SCN Coalition™
Funded by the soybean checkoff

Doug Jardine, Extension Plant Pathologist
jardine@ksu.edu

2. Look for a wet start to October for much of Kansas

An opening round of moisture has set the stage for an extremely wet weekend. The 24hr rainfall totals ending on October 4 show the heaviest amounts in south central and east central Kansas (Figure 1)

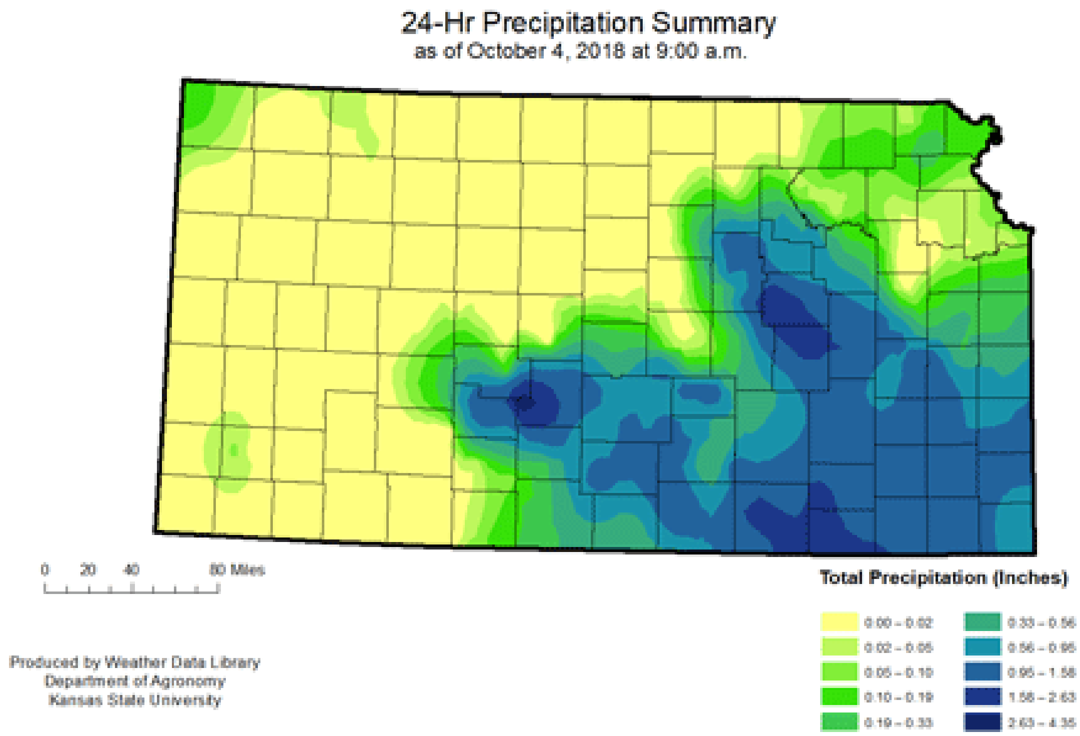

Figure 1. 24-hour measured precipitation totals for October as of October 4, 2018 (WDL).

Much of the state saw less than a tenth of an inch, although parts of south central, southeast and east central Kansas saw over an inch, with isolated areas reporting over two inches.

So how much moisture might be on tap with the storms expected through next week?

The National Weather Service Weather Prediction Center (WPC) uses a product known as the quantitative precipitation forecast (QPF) to indicate the amount of liquid precipitation that might be received. The QPF is available in a range of time scales from 1-day accumulation to 7-day accumulations. The most recent 7-day accumulation (Figure 2) shows isolated parts of Kansas receiving 7 to 10 inches in the week ending on October 12. Most of central and eastern Kansas could receive 4 inches or more.

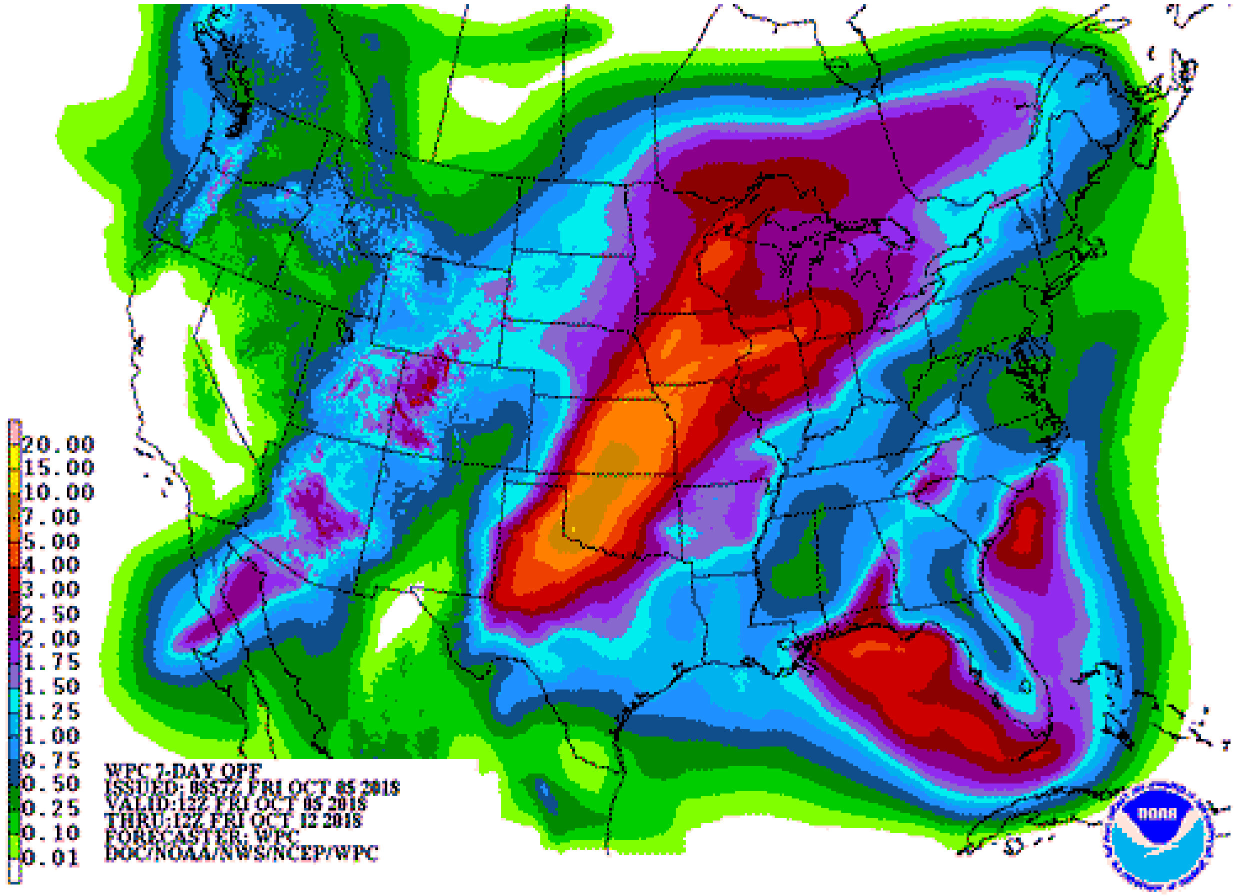

Figure 2. Seven day forecasted rain amounts (NWS WPC)

Meteorological factors contributing to the heavy rain

A very unseasonal weather pattern and atmospheric blocking are to blame for the forecasted heavy rain amounts. This active pattern situated across the western United States, more attuned to spring, brings strong southerly surface flow into the Great Plains. This air mass consists of very warm/moist Gulf of Mexico air. Warm/moist air is unstable and is easily lifted up and over a very cold air mass across the High and Northern Plains. This is normal for these strong cold fronts… but the event duration is quite abnormal.

With a very strong ridge of high pressure stationed over the eastern United States, more typical of summer, it prevents the cold front (and associated upper level trough pictured in Figure 3 across the western U.S.) from pushing east out of the Plains. Instead, it wavers eastward with each push of the trough (and associated wind maximum) and brings a round of very heavy thunderstorms with abundant rain (similar to that observed October 3). The front stalls again and begins to push back west and north after the wind maximum passes (similar to the weather observed on October 4). That allows the warm air/moisture to pool up once again before the next system repeats the process. This "ebb and flow" pattern is forecasted to continue until mid-to-late next week (October 11-13).

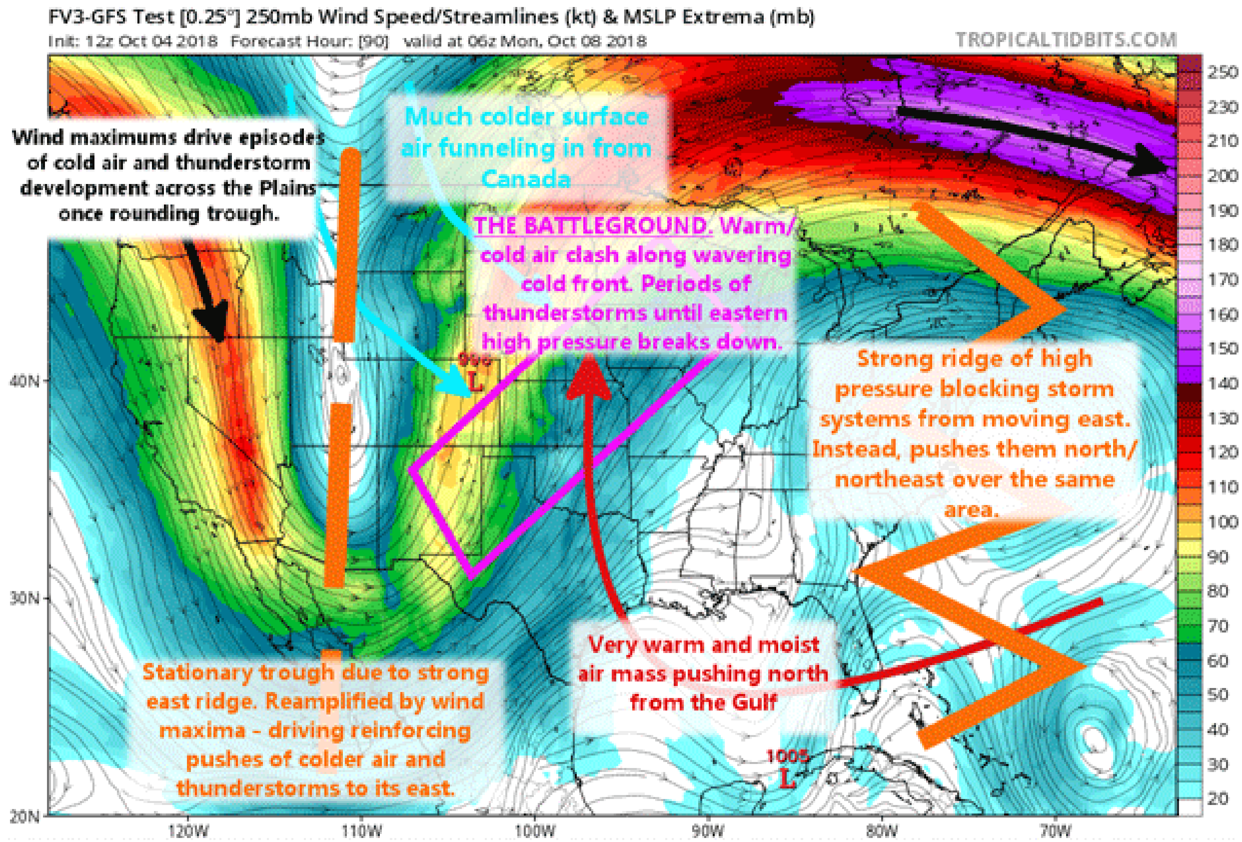

Figure 3. Upper level winds forecasted for Sunday, October 7 with added descriptions of influences developing heavy rain in central Kansas (Tropicaltidbits.com)

The good: it is bringing much needed moisture to areas that need it for drought mitigation and storage ponds in advance of the driest time of the year.

The bad: very heavy rain is likely where thunderstorms persist. Areas of 3 inches or more will likely not be quite as widespread as forecasted. However, it only takes a few thunderstorms over a short time to likely see some very localized totals in excess of 8 inches. Any moisture, however, has unfortunate timing for those in the process of harvest/plant operations underway across the state. Delaying the drying down (before maturity) could increase the probability of potential impacts, primarily for soybeans and sorghum, related to freeze damage.

Implications for Wheat Planting

The two major implications of the potential excessive moisture for wheat planting are 1) the development of detrimental conditions to fields already planted, and 2) delayed wheat sowing in the fields yet to be planted due to mechanical and biological challenges.

1. Detrimental conditions to the fields already planted include the development of waterlogged and anaerobic conditions in low-lying areas of the field, which are not as well drained as other portions of the field. The potential poor soil aeration that might result from excessive rains

can cause seedling death and the need for replanting. Another potential detrimental condition to fields already planted, but not emerged, include soil crusting by heavy rains. These can prevent the coleoptile from breaking through the soil surface. If the coleoptile remains underground for more over a week or so, it will start losing viability. At that point, the producer will need to consider replanting.

2. Delayed wheat sowing in itself can have several consequences to the wheat crop, but perhaps the greatest one is decreased yield potential. A wheat crop planted beyond the optimal window will have less time to tiller during the fall, and considering that fall tillers are often the most productive ones, the crop will have a lower yield potential. In addition, late-planted crop has less time to become winterhardy, increasing the chances of winterkill depending on the weather conditions during the winter.

Wet soils provides many operational challenges, often precluding a good sowing operation; thus, producers should not hurry and sow wheat into extremely moist soils. Planting wheat under wet conditions can present either mechanical or biological challenges.

Mechanical challenges:

- Not being able to get the equipment in the field to perform plowing or sowing operations.
- Mudding up the equipment after field operations are started.
- Increased soil compaction due to machinery traffic in moist soils, which can restrict adequate root growth, affecting plant anchorage and decreasing its ability to uptake water and nutrients.

Biological challenges include:

- Delayed crop emergence
- Increased early-season disease problems.

Implications for Harvest

Overall, late-season wet conditions can slow down harvesting progress in summer row crops. In general, harvest continues to advance but these weather conditions will slow its progress. Corn has been reported to be close to 50% harvested across the state with much progress needed for north central and western parts of the state; soybean and sorghum harvest has just started with close to 10% harvested across the state. For corn, late-season precipitation increased fungal colonization of corn ears (e.g. Diplodia issues), and reduced final test weight and grain quality. For soybeans, delay in harvest time could represent losses related to quality and potential issues on shattering. For both soybeans and sorghum crops, wet conditions are affecting the drydown grain rate and final maturity.

You can track rainfall data from the Kansas Mesonet is available at: http://mesonet.k-state.edu

Additional precipitation maps for Kansas can be found on the Kansas Climate website at: http://climate.k-state.edu/

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3. Kochia accessions with cross-resistance to dicamba and fluroxypyr identified in western Kansas

Kochia is a problematic weed species across the Great Plains states, including Kansas. Kochia emerges early in the spring (February – March) and continues in flushes through late spring (late May to early June), then slows down with occasional plant emergence into summer months. Kochia produces enormous amount of seeds (>100,000 seeds/plant) and spread those seeds through wind-mediated tumbling over landscapes. Season-long competition of kochia at higher densities is known to cause significant crop yield reductions (up to 58% yield losses in wheat).

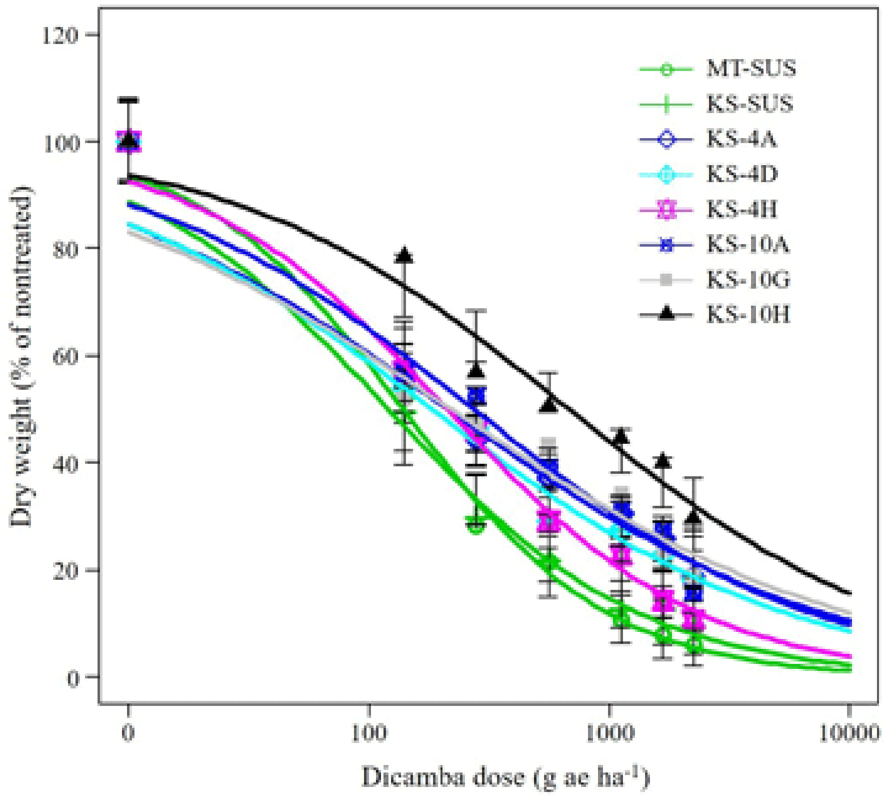
Since the discovery of glyphosate-resistant (GR) kochia in western Kansas in 2007, the utility of auxinic herbicides (Banvel/2,4-D/Starane Ultra) alone or in tank-mixtures with other burndown herbicides has increased dramatically for kochia control. In general, Kansas fields receive 3 to 4 applications of a tank-mixture of glyphosate with Banvel and/or 2,4-D for weed control during summer fallow. In addition, Kansas growers also rely on PRE/POST applications of Clarity, Diflexx Duo, Starane Ultra, and Status for kochia control in wheat and corn.

In late summer of 2017, seeds of kochia plants surviving preemergence applications of Banvel (dicamba) at 16 fl oz/a, followed by two separate applications of a tank mixture of Roundup PowerMax at 32 fl oz/a and Starane Ultra (fluroxypyr) at 6.4 fl oz/a, were collected from two different corn fields (designated as KS-4 and KS-10) near Garden City. The sampled fields were under wheat–fallow–wheat rotation for > 6 years followed by corn (for KS-4 field) or a wheat–corn–fallow rotation (for KS-10 field) with frequent use of auxinic herbicides. Progeny seeds collected from individual kochia plants were kept separately and were designated as KS-4A, KS-4D, KS-4H, and KS-10A, KS-10G, KS-10H accessions.

Greenhouse studies on kochia resistance to dicamba and fluroxypyr

Dose-response experiments were conducted in a greenhouse at the K-State Agricultural Research Center (KSU-ARC) near Hays to characterize the levels of resistance to dicamba (Banvel) and fluroxypyr (Starane Ultra) in selected kochia accessions. Doses of Banvel herbicide tested were 0, 4, 8, 16, 32, 48, and 64 fl oz/a. Similarly, doses of Starane Ultra herbicide used were 0, 2.4, 4.8, 9.6, 19.2, 28.8, and 38.4 fl oz/a. In these studies, seeds of an herbicide-susceptible kochia accession (KS- SUS) that were originally collected from pastureland at KSU-ARC research field near Hays were used. Seeds of another susceptible kochia accession (MT-SUS) from Huntley, Montana were also included. Data on shoot dry weights were determined at 28 days after treatment (DAT) and were analyzed using a 3-parameter log-logistic model in R software.

Results indicated that selected kochia accessions had 2.7- to 7.2-fold resistance to Banvel herbicide, relative to the averaged GR_{50} values (dose of Banvel herbicide causing 50% reduction in shoot dry weights) of the MT-SUS and KS-SUS accessions on the basis of shoot dry weights (Figure 1). All suspected kochia accessions had survivors with Banvel at highest dose (64 fl oz/a) at 28 DAT and eventually produced seeds when they were transplanted in 10-L plastic pots containing commercial potting mixture under greenhouse conditions (Figure 2).



Accession	GR_{50} (g ae ha^{-1})	R/S
MT-SUS	78	-
KS-SUS	64	-
KS-4A	364	5.1
KS-4D	234	3.2
KS-4H	221	3.1
KS-10A	277	3.9
KS-10G	353	4.9
KS-10H	674	9.4

Figure 1. Shoot dry weight response of six suspected auxinic herbicide-resistant (Aux-HR) and two susceptible kochia accessions in a dose-response experiment with Banvel herbicide at 28 DAT.

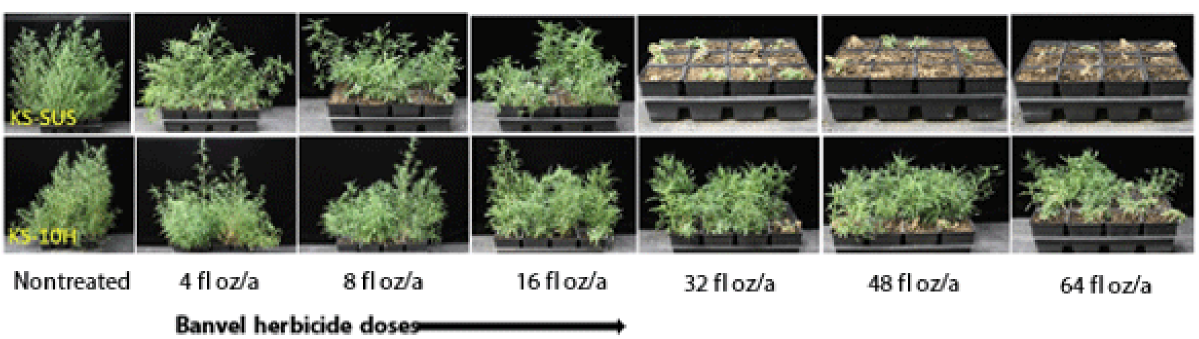
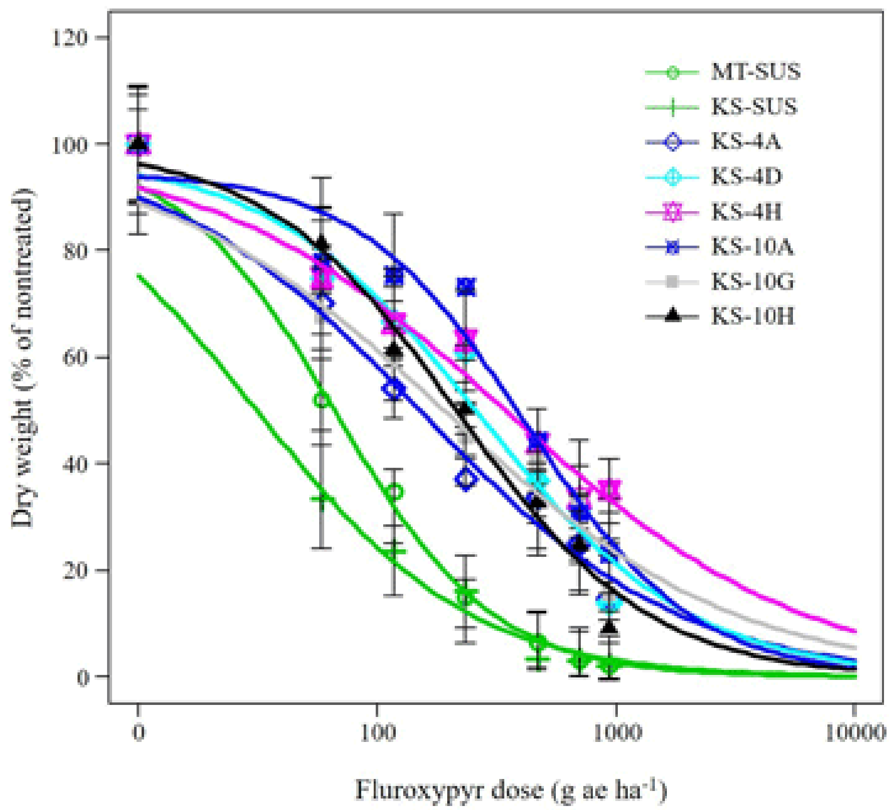


Figure 2. Visual response of KS-SUS and KS-10H kochia accessions to Banvel doses at 28 DAT. Photo by Vipan Kumar, K-State Research and Extension.

In addition, the lethal dose of Starane Ultra herbicide causing 50% shoot dry weight reduction (GR_{50} values) of selected kochia accessions was estimated between 6.3 and 18.7 fl oz/a as compared to 2.7 and 1.2 fl oz/a for MT-SUS and KS-SUS accessions (Figure 3). Based on the GR_{50} values, the selected kochia accessions also showed 3.2- to 9.5-fold level of resistance to Starane Ultra relative to the MT-SUS and KS-SUS accessions (Figures 3 and 4).



Accession	GR_{50} (g ae ha^{-1})	R/S
MT-SUS	66	-
KS-SUS	32	-
KS-4A	151	3.0
KS-4D	271	5.5
KS-4H	351	7.1
KS-10A	423	8.6
KS-10G	194	3.9
KS-10H	217	4.4

Figure 3. Shoot dry weight response of six suspected auxinic herbicide-resistant (Aux-HR) and two susceptible kochia accessions in a dose-response experiment with Starane Ultra at 28 DAT.

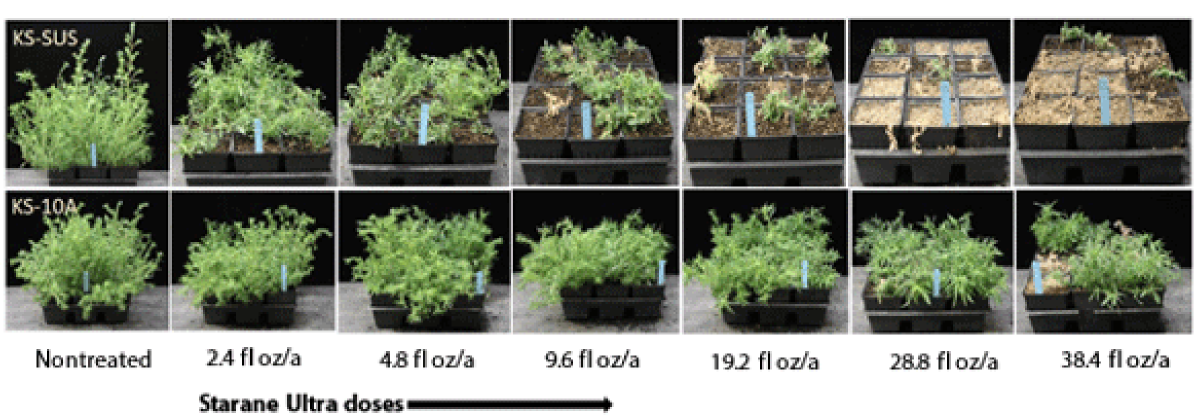


Figure 4. Visual response of KS-SUS and KS-10A kochia accessions to Starane Ultra doses at 28 DAT. Photo by Vipan Kumar, K-State Research and Extension.

Summary

These results confirm the co-evolution of kochia accessions with low to high levels of cross-resistance to dicamba and fluroxypyr (auxinic herbicides) in western Kansas. Evolution of these kochia accessions with cross-resistance to PRE dicamba and POST applications of fluroxypyr would be a significant concern for their management. Additionally, the rapid adoption of newly-developed dicamba-tolerant (DT) soybeans may further exacerbate the problem of dicamba resistance in kochia populations. Therefore, growers are advised to adopt proper dicamba and fluroxypyr use stewardship programs and are encouraged to utilize alternative herbicides with multiple sites of action in conjunction with other cultural and mechanical practices to prevent the evolution of auxinic-resistant kochia on their production fields.

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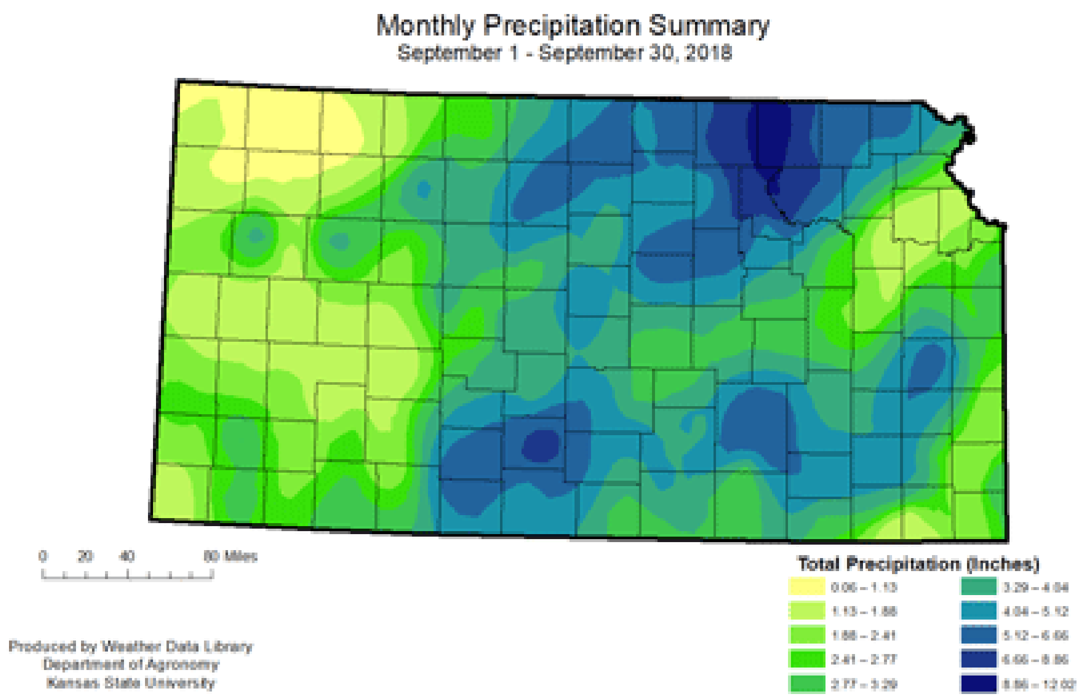
4. September 2018 Kansas weather summary - Variability was the trend

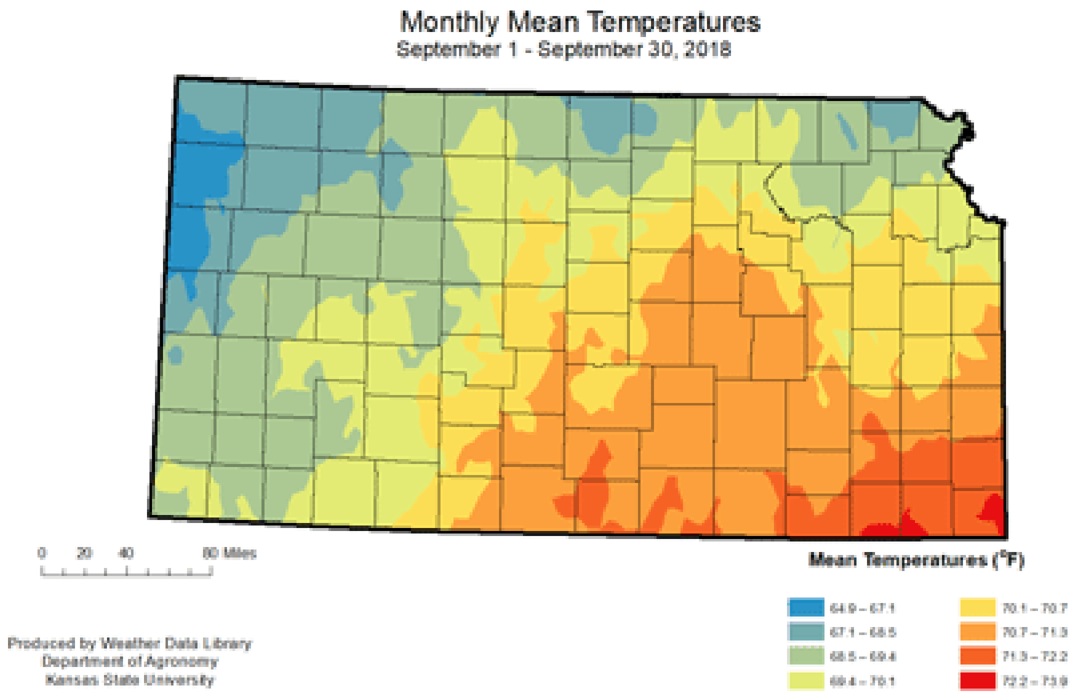
September precipitation – Large variation across Kansas

Average divisional precipitation ranged from 0.98 inches in the Northwest Division to 4.36 inches in the North Central. This resulted in a 0.56 inch deficit in the Northwest (61% of normal) and a 1.73 inch surplus in the North Central division (164% of normal). Statewide average was 1.36 inches, which is a 0.66 inch surplus, or 133 percent of normal. The greatest monthly total for a National Weather Service Cooperative station was at Marysville, Marshall County, with 12.23 inches. The Community Collaborative Rain, Hail and Snow (CoCoRaHS) network station with the greatest monthly precipitation was Manhattan 3.7 N, Riley County, with 11.37 inches. Among the Kansas Mesonet stations, the Manhattan station at the Agronomy North Farm, had the greatest monthly total with 8.00 inches. Most of the rainfall occurred during the first week of the month, particularly over the Labor Day weekend. The flooding produced by the intense rains resulted in a Governor's disaster declaration that covered five counties: Jewell, Kingman, Marshall, Pratt, and Riley.



Temperature variations for September

Temperatures across Kansas for September were also highly variable. Statewide average temperature for the month was 69.9 degrees F, which is 1.8 degrees warmer than normal. All divisions were warmer than normal. The Northwest Division had the largest departure, with an average of 67.9 degrees F, or 2.6 degrees warmer than normal. The South Central Division came closest to normal with an average of 71.3 degrees F or 1.1 degrees warmer than normal. The variability showed in the range of temperatures. The warmest maximum temperature was 105 degrees F at Johnson, Stanton County, on the September 1. The coldest minimum temperature was 30 degrees F, recorded at Brewster 4W, Sherman County, on the 27th. There were 10 record daily high maximum temperatures in the month, and 10 record daily low maximum temperatures. On the minimum temperature side, there were 27 record high minimums compared to only one record low minimum.



September severe weather

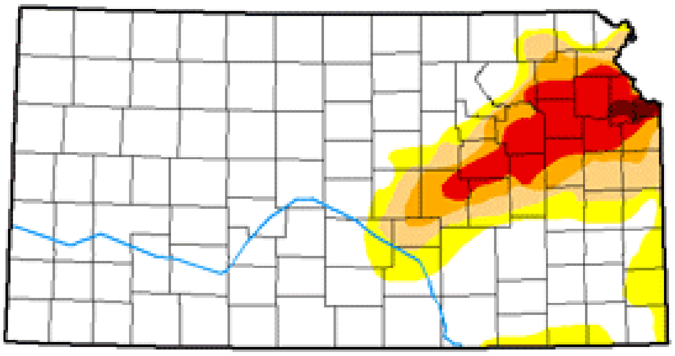
While hail and high winds were again major contributors to severe weather in Kansas during September, the big story was the Labor Day flood event. Damage in these counties featured washed out roads, bridges, culverts and flooding to some businesses and residential properties. Complete damage estimates are not yet available. There was one tornado report during the month consisting of land spout funnels in Hamilton County, on September 3. They were short lived.

Drought update

The near normal temperatures in the west moderated the impacts of below-normal precipitation. Drought was completely removed from the west and greatly improved in the central divisions. Exceptional drought continues in eastern Kansas, and extreme drought has shifted into east central Kansas. Currently, over 77 percent of the state is drought-free, while under 1 percent is in exceptional drought conditions. The October outlook has increased chances for above-normal precipitation across most of the state. However, a more even distribution across the month will be needed to continue improvement of drought conditions across the state. The temperature outlook is for warmer than normal temperatures statewide.

U.S. Drought Monitor

Kansas



October 2, 2018

(Released Thursday, Oct. 4, 2018)

Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0	D1	D2	D3	D4
Current	77.69	7.51	5.07	4.06	5.29	0.38
Last Week 09-25-2018	78.54	6.66	5.07	4.06	5.29	0.38
3 Months Ago 07-03-2018	27.21	17.11	26.86	23.15	5.67	0.00
Start of Calendar Year 01-02-2018	0.00	67.30	23.95	8.75	0.00	0.00
Start of Water Year 09-25-2018	78.54	6.66	5.07	4.06	5.29	0.38
One Year Ago 10-03-2017	59.19	30.73	8.73	1.35	0.00	0.00

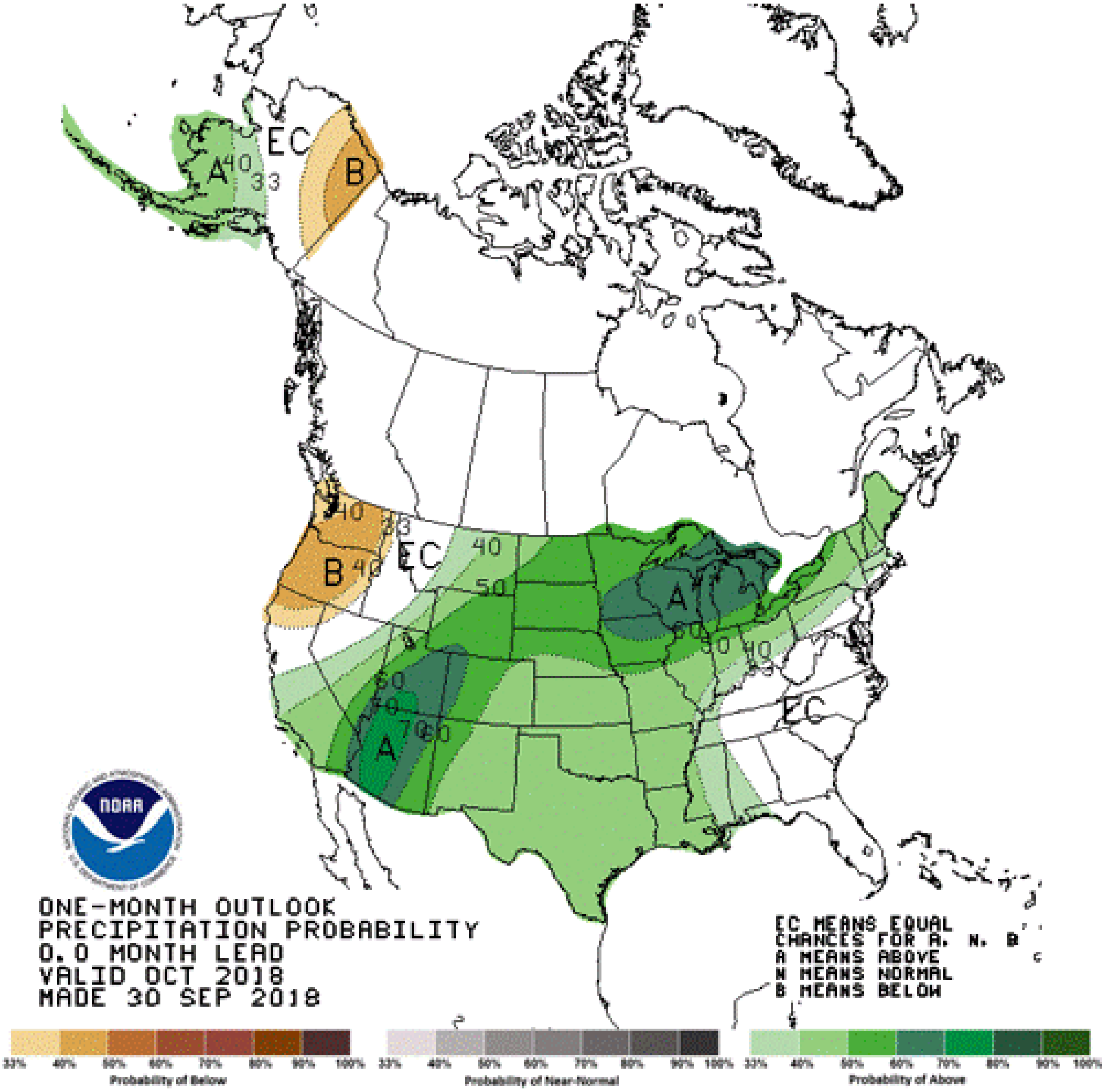
Author:
David Miskus
NOAA/NWS/NCEP/CPC

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://droughtmonitor.unl.edu/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ONE-MONTH OUTLOOK
PRECIPITATION PROBABILITY
0.0 MONTH LEAD
VALID OCT 2018
MADE 30 SEP 2018
EC MEANS EQUAL
CHANCES FOR A, N, B
A MEANS ABOVE
N MEANS NORMAL
B MEANS BELOW
33% 40% 50% 60% 70% 80% 90% 100%
Probability of Below
33% 40% 50% 60% 70% 80% 90% 100%
Probability of Near-Normal
33% 40% 50% 60% 70% 80% 90% 100%
Probability of Above

Table 1. Kansas Climate Division Summary										
September 2018										
	Precipitation (inches)						Temperature (ºF)			
	Sept 2018			2018 through September					Monthly Extremes	
Division	Total	Dep. [1]	% Normal	Total	Dep. [1]	% Normal	Ave	Dep. [1]	Max	Min
Northwest	0.98	-0.54	61	18.54	0.13	100	67.9	2.6	99	30
West Central	2.20	0.60	141	19.21	1.32	106	68.8	2.3	101	34
Southwest	2.54	0.92	155	20.34	3.28	119	69.8	1.2	105	36
North Central	4.36	1.73	164	24.14	0.20	101	69.5	1.6	100	38
Central	3.84	1.33	155	22.87	-2.12	92	70.5	1.4	101	39
South Central	4.12	1.52	162	26.16	0.09	101	71.3	1.1	101	40
Northeast	4.28	0.67	124	23.77	-5.50	82	69.7	2.3	96	41
East Central	2.94	-0.72	80	22.00	-9.26	69	70.1	1.9	98	39
Southeast	4.09	0.08	106	29.92	-3.50	89	71.6	1.9	97	38
STATE	3.28	0.66	130	23.19	-1.43	96	69.9	1.8	105	30

1. Departure from 1981-2010 normal value

2. State Highest temperature: 105 oF at Johnson, Stanton County, on the 1st.

3. State Lowest temperature: 30 oF at Brewster 4W, Sherman County, on the 27th.

4. Greatest 24hr: 7.00 inches at Marysville, Marshall County, on the 3rd (NWS); 11.00 inches at Manhattan 9.8 NW , Riley County, on the 3rd (CoCoRaHS).

Source: KSU Weather Data Library

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mknapp@ksu.edu

5. Water, temperature, and crop productivity research

This article is part 3 of a 4-part series focusing on agriculture, climate, and change. The first two articles in the series, "Is Kansas agriculture likely to be affected by a changing climate?" and "A brief on global research on drought monitoring" can be found on the eUpdate website in Issues 710 and 712, respectively.

Planting an agricultural crop requires a degree of optimism. In semi-arid western Kansas, water and temperature frequently limit crop productivity. These components of weather, along with sunshine and relative humidity, comprise the weather-related risks which limit the productivity of the crop just planted. Several questions arise concerning weather and climate:

- Are there periodic behaviors in weather patterns?
- Are there long-distance signals indicating wetting and drying trends?
- Is long-term weather forecasting feasible? If so, accurate forecasts can inform the optimism required to plant that crop, infusing an additional hope that the "bet has been hedged".

Weather forecasting skill is related to 'teleconnections,' a topic addressed at the 2018 American Meteorological Association meetings. The El Nino-Southern Oscillation (ENSO) phenomena serves as an example. Warming and cooling trends in the surface waters of the equatorial Pacific Ocean impact fisheries and rainfall in coastal Peru. Indeed, ENSO trends impact the productivity of winter wheat growing in the Texas High Plains. Louis Baumhardt, an USDA-ARS soil scientist, and his colleagues found a degree of association between ENSO patterns and winter wheat yields in the Texas Panhandle (1). Does this ENSO signal convey information about wheat productivity further north, in the Central High Plains?

Winter wheat is vulnerable to drought conditions; wheat can also respond positively to wet conditions, though subject to disease impacts. The Standardized Precipitation-Evapotranspiration Indicator (SPEI) provides a metric for wetting and drying conditions, generally varying between values of -4 and 4 to indicate drying (negative) and wetting (positive) conditions. Aiken et al (2017) compared wheat yields, reported for counties (USDA-NASS) in Kansas (1970 through 2007) against monthly SPEI values, after removing linear historic trends attributed to improved genetics and production technologies (2). R-squared (r^2) is a statistical measure that indicates the fraction (0 -1.0) of observed variation which can be accounted for by a regression relationship. Generally, the higher the R-squared value, the better the regression model fits the data. A moderate relationship ($R^2 = 0.41$) emerged for wheat yields reported for counties in western Kansas, indicating positive effects of weather conditions in February, March and April. A weaker relationship ($R^2 = 0.25$) resulted for counties in sub-humid eastern Kansas, indicating both positive (October, February, April) and negative (August, December, May, June) relationships with the SPEI metric. This regression analysis quantified the relationship of winter wheat productivity to weather variation during the growing season. However, the utility of forecasting skill depends on information available prior to planting decisions.

Thus, we evaluated a hypothesized ENSO signal: Is winter wheat grain productivity in western Kansas related to equatorial Pacific Ocean surface temperatures in preceding years? We tested this hypothesis using multiple regression for western Kansas county yield reports and monthly ENSO data for the 24-month period prior to wheat planting (September, year prior to harvest). We found that the answer is a resounding YES. A stronger relationship ($R^2 = 0.53$) resulted from regression analysis (Figure 1).

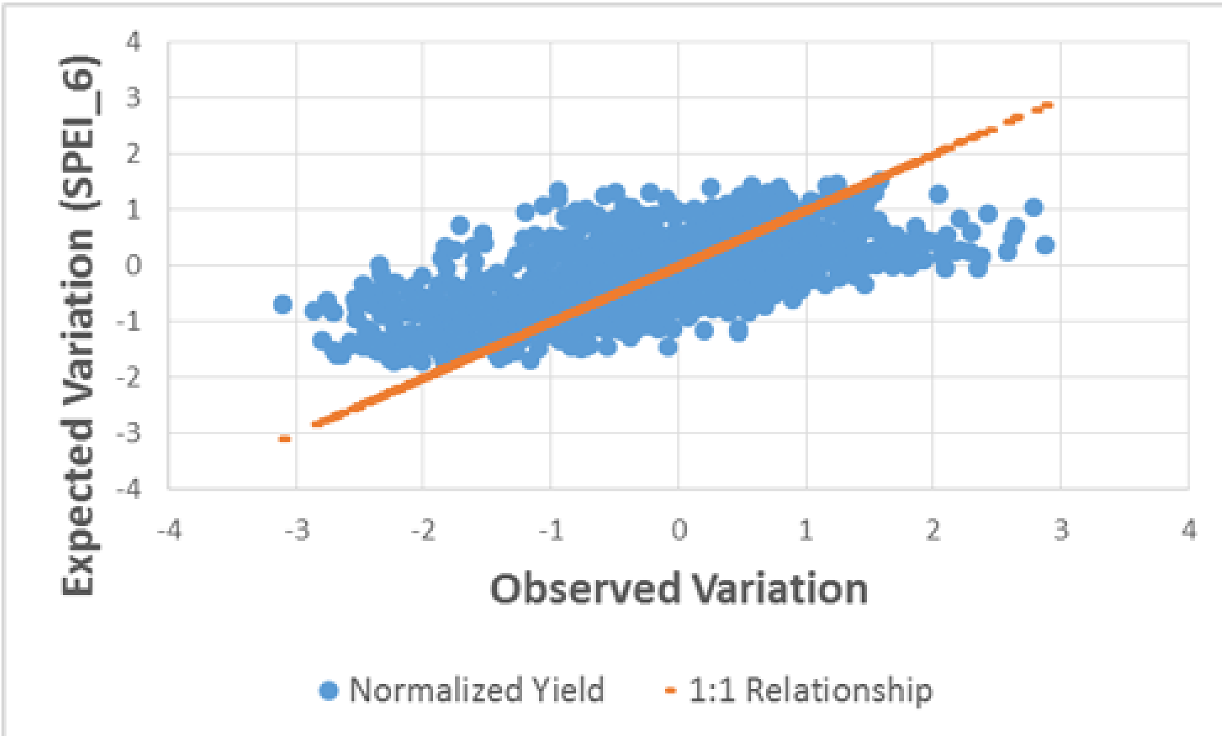

Figure 1. The in-sample predictive ability for wheat yield variation of multiple regression based on the NINO_3 surface temperatures of the Equatorial Pacific is compared against observed yield variation for wheat yield in Kansas counties W of the 99th Meridian. Observed variation represents variation after removal of a linear historic trend (1970 – 2007 period) as normalized by dividing by the standard deviation of the time series for each county.

Interestingly, the strongest influences were ENSO values 18- and 16-months prior to the wheat-planting period (Figure 2). This indicates that complex patterns in equatorial Pacific Ocean temperatures can convey information that is pertinent to subsequent winter wheat yields in western Kansas.

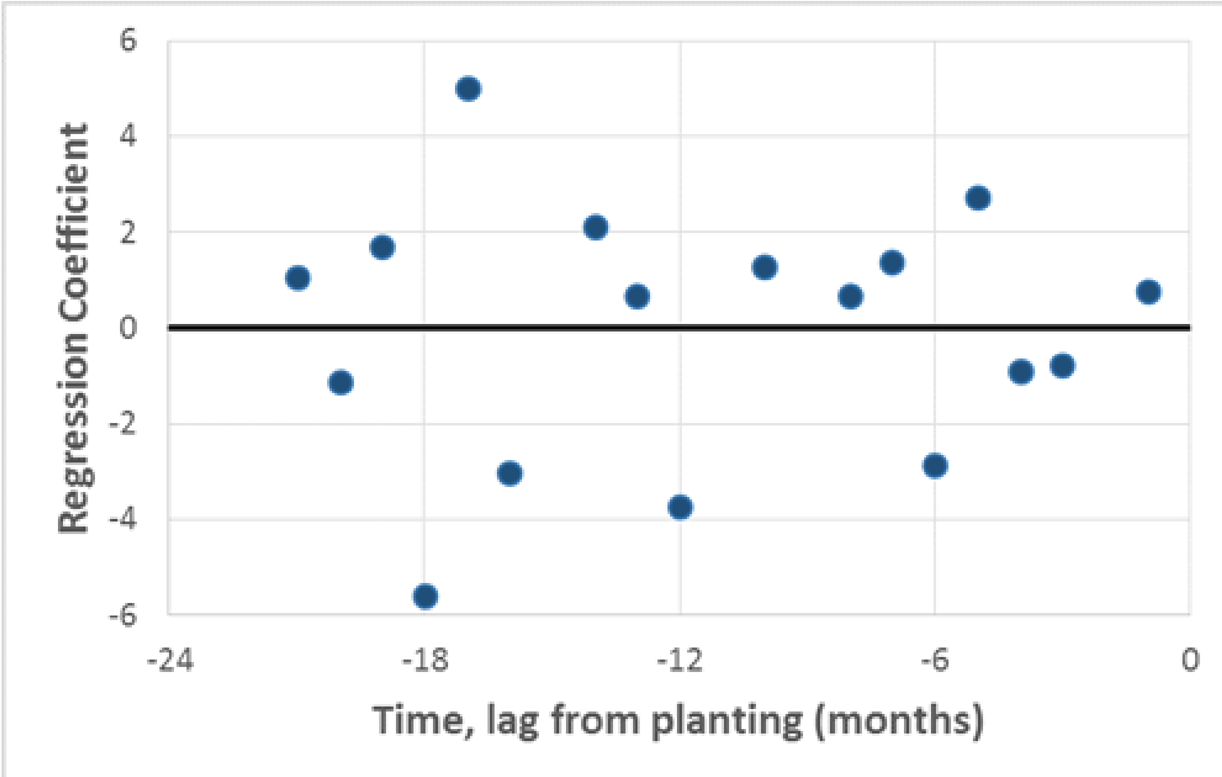

Figure 2. Regression coefficients of the NINO_3 multiple regression model are shown in relation to corresponding time lag (months prior to a September planting period for winter wheat in Kansas). Positive coefficient values for a given time lag indicate a positive association with expected wheat yields for that lag interval; negative coefficient values indicate a negative association.

In summary, there is opportunity to develop climate-informed decision-support tools for cropping systems in the Central High Plains.

Stay tuned for the last installment of this series focusing the creeping trends of a changing climate.

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2) Aiken, R., X. Lin and Z. Zambreski. 2017. Winter wheat yield responses to climate variation in the U. S. Central Great Plains. ASABE Paper No. 1701661 DOI: https://doi.org/10.13031/aim.201701661

6. Agronomy seminar on using industrial hemp as a commodity crop, October 16

The Department of Agronomy at K-State is hosting a special seminar on industrial hemp production and all are invited to attend this free event. Dr. David Williams will present "**Industrial Hemp as a Modern U.S. Commodity Crop**" on **Tuesday, October 16 at 3:30 pm** in room 1018 in Throckmorton Plant Sciences Center, Manhattan. Refreshments, provided by the Kansas Department of Agriculture, will be served prior to the seminar at 3:00 pm.

Dr. Williams, professor of agronomy, is also the Director of the Robinson Center for Appalachian Resource Sustainability at the University of Kentucky. He has lead the industrial hemp agronomic research efforts at UK since 2014. Research at the Robinson Center has included agronomic and production management for fiber, oil, and CBD production. He will share their experiences and his view of current knowledge gaps.

Industrial Hemp as a Modern U.S. Commodity Crop

October 16th
3:30 pm
Kansas State University
Throckmorton Plant Sciences Center
Room 1018

Speaker: David W. Williams, Ph.D.
Professor of Agronomy and Director
University of Kentucky Robinson Center for Appalachian Resource Sustainability

Dr. Williams has lead the industrial hemp agronomic research efforts at UK since 2014. Research at the Robinson Center has included agronomic and production management for fiber, oil, and CBD production. He will share their experiences and his view of current knowledge gaps.

Refreshments will be served in the lobby at 3:00 pm, sponsored by the Kansas Department of Agriculture

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7. 2018 Kansas Soybean Yield and Value Contest

Soybean harvest is just beginning in Kansas. It is a good idea for producers to keep in mind the Kansas Soybean Yield and Value contest as they fire up the combines.

Each year the Kansas Soybean Association, with help from K-State Research and Extension, and sponsorship from the Kansas Soybean Commission, conducts the Kansas Soybean Yield and Value Contest. The contest is a fun way for producers to showcase their high yielding and high quality soybean with other growers in Kansas and to provide information on what production practices they did to achieve those excellent yields. In addition to grower recognition, cash prizes are awarded to the 1st, 2nd, and 3rd place winners for the 9 districts across Kansas and the top three finishers in the quality contest. Contest rules and entry forms are found online at: http://kansassoybeans.org/association/contests/

The yield contest first began in the early 1980's but more detailed historical data began in the early 2000's. When growers submit entry forms for the contest, they are asked to share some of their production practices that they used on the soybean crop. Using this information, we can identify shifts in producer practices over the last two decades from high yielding soybean growers.

When comparing yields over the last 20 years, state soybean yields have improved almost 8 bushels per acre (bu/acre) while contest entrants have gained nearly double that (15 bu/acre) in the same span of time (Figure 1). This indicates that soybeans are a crop that can be managed for higher yield when proper high yield practices are adopted. The 2017 state-average yield was 37.5 bu/acre versus average yield contest of 79 bu/acre, with an average yield gap between high yield and state-average close to 42 bu/acre, previous year gap was 37 bu/acre.

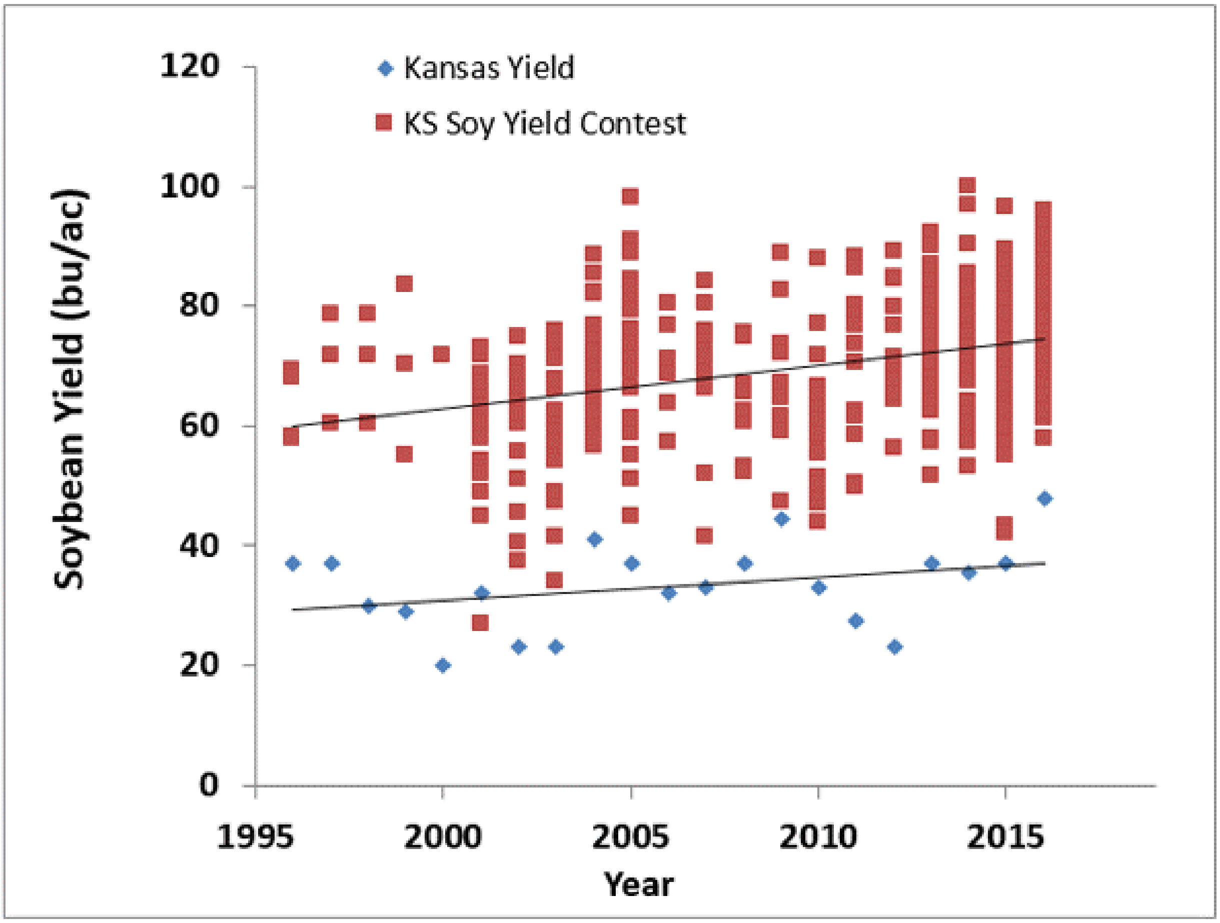

Figure 1. Difference in yield between state-average as reported by Kansas Ag Statistics and the entries in the Kansas Soybean Yield Contest from 1996 to 2016.

A few soybean production practices have changed over time as well. Over the last decade, producers in the soybean yield contest have moved to a lower seeding rate (Figure 2). In 2001, seeding rate averaged just over 165,000 seeds per acre while recently, seeding rates dropped below 150,000 seeds per acre, with an estimated annual rate of seeding rate drop of 1044 seeds/acre per year since 2000 (Figure 2). This may be a function of seed prices increasing over time and producers have more confidence in final plant stand with improved planting equipment and seed treatments. In addition to seeding rate changes, soybean row spacing has also seen a decline over time with narrower rows (<30 in) being adopted more by growers in the Kansas Soybean Yield Contest (Figure 3). This decline is likely due to reduction in use of drills and the increase use of planters to sow soybean.

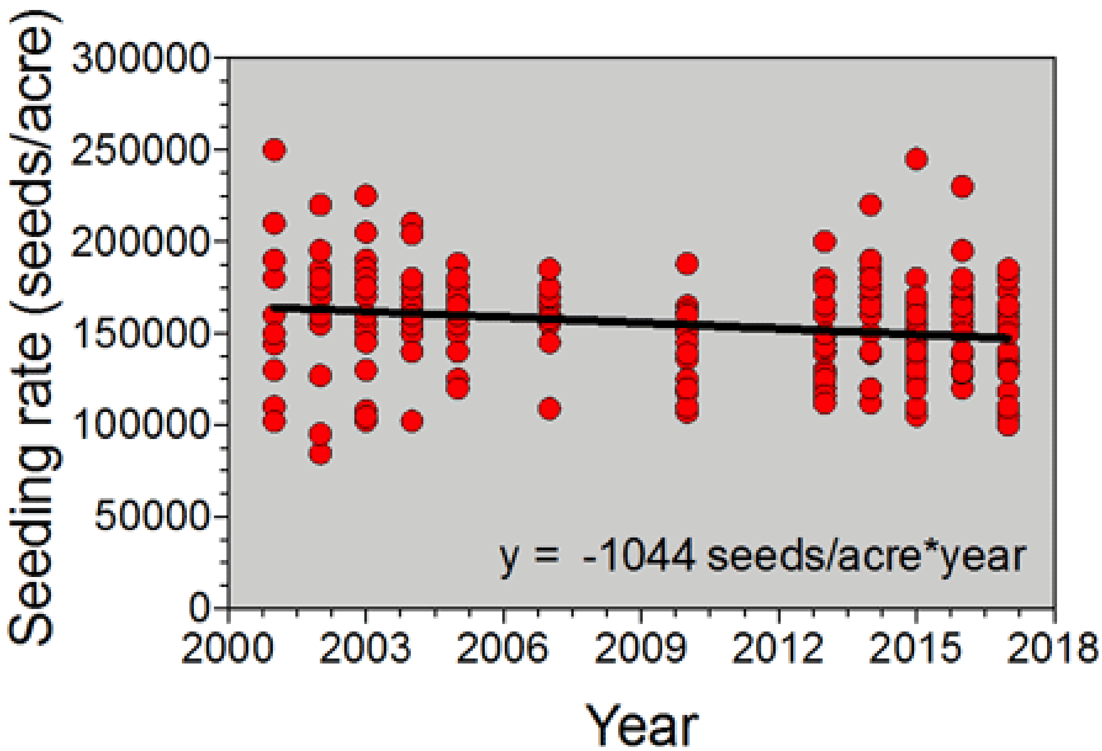

Figure 2. Seeding rate of contestants in the Kansas Soybean Yield Contest from 2001 to 2017.

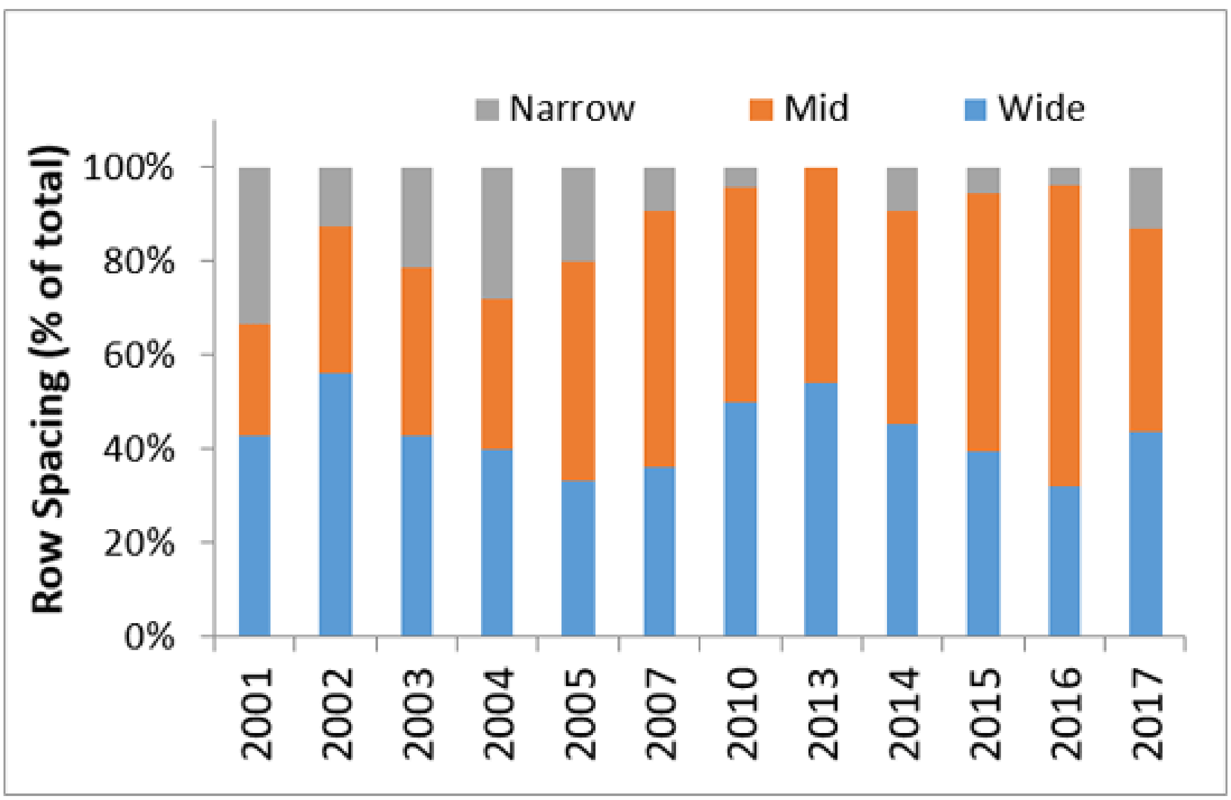

Figure 3. Row spacing of Kansas Soybean Yield Contest entrants from 2001 to 2017. Narrow rows were any spacing 10-in or less. Wide rows were any spacing 30-in or greater. Mid-rows were any spacing between 10- and 30-inch.

Since 2004, Kansas soybean producers have had the opportunity to enter their soybeans into the Value Contest. With this information, the contest is able to showcase the true end-use value of soybeans including protein, oil, and other value added products.

With many field crops, a relationship exists between yield and protein where protein decreases as yield increases. However, in the case of the Kansas soybean yield contest, there does not appear to be a strong relationship in protein (slight negative relationship) nor in oil (slight positive relationship) relative to yield (Figure 4).

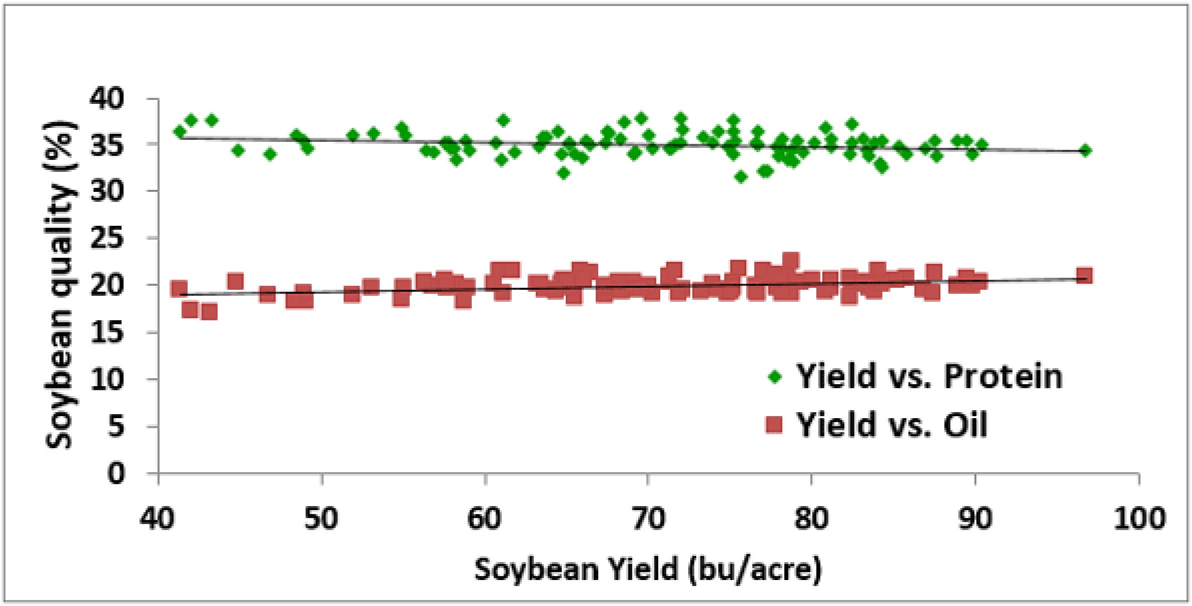

Figure 4. Relationship between soybean oil and protein vs. soybean yield for 100 entries in the Kansas Soybean Value Contest, more than 10 years data.

If a producer has interest in submitting an entry in the Kansas Soybean Yield Contest, they need:

1. A minimum of 5 contiguous acres of soybean
2. To contact their County Extension Agent for witnessing the harvest
3. Have the entry postmarked by December 1, 2018

The Soybean Yield and Value Contest is free to producers. One does not have to enter the Yield contest to enter the Soybean Value Contest, just fill out the entry form and mail a 20-ounce soybean sample to the Kansas Soybean Office by December 1, 2018. The contest winners will be announced at the Kansas Soybean Expo on January 9, 2019 in Topeka. To find complete rules and the entry form, visit http://kansassoybeans.org/association/contests/

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