



Extension Agronomy

eUpdate

04/20/2018

These e-Updates are a regular weekly item from K-State Extension Agronomy and Kathy Gehl, 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 Kathy Gehl, 785-532-3354 kgehl@ksu.edu, or Curtis Thompson, Extension Agronomy State Leader and Weed Management Specialist 785-532-3444 cthompso@ksu.edu.

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1. Wheat graze-out decision during the 2017-18 growing season

The development of the Kansas wheat crop is behind this year as compared to historical values due to a delayed sowing, colder-than-average winter and spring seasons, and the extreme drought conditions experienced. Thus, there are parts of the state in which the crop is still approaching first hollow stem, such as northwest, west central, parts of southwest, and into north central Kansas.

Producers who currently have cattle grazing the crop are faced with the decision of whether to graze it out or to remove the cattle and harvest the grain. This decision will be especially important in areas where the crop currently is stressed by drought; infected by virus diseases, such as wheat streak mosaic; or has a very poor stand. The dry conditions has resulted in little cool-season native pasture growth prompting producers to consider grazing out poor wheat and delaying grazing of native pasture. Furthermore, producers in areas that have been affected by wildfires may also be looking to wheat pasture as an emergency forage source. It is important that this decision is made prior to first hollow stem, as grazing past first hollow stem will decrease the wheat yield potential by as much as 5% per day.

Factors affecting the decision of whether to graze-out or harvest for grain include estimates of future wheat grain yield, prices of wheat and beef, stocking rate and stocker gains, weather, and grazing length during the spring. Most of these factors are field-specific and need to be customized for each producer-field situation. The paragraphs below offer some insight on some of the factors above.

Potential grain yield

Wheat grain yield cannot be estimated with complete accuracy at this early stage of growth. However, there are ways to make a good estimate. A good start is to look at the yield record from the last 5-10 years for each field. The long-term average yield can provide a good estimate of expected yield from a particular field, and the expectations for this year's crop. If wheat has never been grazed during the last 5-10 years, producers should account for a 10-15% yield decrease if they plan to graze their crop and take it for grain this year. Another tool producers can use is a handheld active optical sensor that measures the crop's NDVI, which is a method of quantifying the crop's current condition.

Years of research at K-State demonstrated that an optical sensor measurement, when taken at spring greenup or Feekes 4, can be used with a certain degree of confidence to estimate wheat yield potential. Given the dry conditions in most of the western region of the state, the yield potential will most likely be below average. Producers will need to consider whether it would be better to graze these fields out or potentially receive a lower yield and potential crop insurance payment. Some fields may be eligible to file an insurance claim now if yield potential is very poor, receiving a crop insurance payment and still having grazing opportunities. This becomes complicated however if not all fields in the crop insurance unit are looking poor (such as enterprise units on a large farm). Before making any decision, it is very important to talk to your crop insurance agent.

Stocking rate and stocker gains

When planning to harvest the crop for grain, stocking rates should be conservative to preserve the crop's yield potential, generally ranging from 250 to 500 pounds of live animal per acre. Producers who will graze out the crop can increase these rates during the spring, usually to as much as 1,000 pounds of live animal per acre. Average stocker gains range from 1.5 to 2.5 pounds per day, which in part depends on the amount of forage available.

Weather

The weather will be an important factor dictating the wheat's recovery from grazing, when planning to harvest the crop. Growing seasons characterized by cool and moist early spring (following grazing termination) will favor crop recovery and help minimize any yield penalty from grazing. Dry early springs (like we are currently experiencing), or hot temperatures, will increase the yield penalty associated with grazing as the crop will be less likely to recover the leaf area prior to jointing. Yield potential will be reduced under those circumstances.

Grazing length during the spring

Soil temperatures during the spring dictate how soon the crop reaches first hollow stem, the critical period for removing cattle from wheat fields that will be taken for grain. Air temperature during the 2018 spring have been below normal for the majority of the state, delaying crop development. Most varieties have already reached first hollow stem at several parts of the state, such as south-central into central Kansas, and many varieties are approaching this stage in southwest Kansas. Most likely, producers interested in harvesting the crop for grain will have to remove cattle by mid-April in western Kansas, which is later than other years on record. Again, also follow your insurance deadline for removing cattle, which may occur prior to first hollow stem.

Scenario analysis

Producers are encouraged to perform a scenario analysis based on each field's history. For instance, exploring low grain/forage yields, versus average grain/forage yields, versus high grain/forage yields, might be helpful. These different scenarios are explored in the following paragraphs. These scenarios assume stocker cattle are already grazing on the field and the producer is trying to decide whether to graze out the wheat or to harvest it for grain (pulling the cattle off now). The partial budget below explores potential costs and income differences if making the graze-out decision. Producers can download the spreadsheet perform the analysis for their own system [here](#). All inputs in blue should be adjusted to fit the producer's own scenario.

In the example shown in Figure 1, three different grain yield scenarios are explored: 15, 30, or 45 bushels per acre, with low, average, and high forage yield respectively. All factors remain constant except that stocking rate varies from 0.7 stockers per acre in the low-forage scenario to 1.3 stockers per acre in the high-forage scenario. The default scenario assumes it is too dry to top dress wheat, so "Additional Fertilizer" is set to "No". If used, the formula assumes 30 pounds of additional nitrogen for every 100 pounds of beef per acre. In this scenario, the producer is anticipating one of the three yield categories and is changing management decisions to match expectations.

Wheat grain income given up by graze-out is currently valued at \$4.50 a bushel, multiplied by 15, 30, and 45-bushel yield scenarios. Assuming a producer insured this wheat crop at 75%, a 15-bushel yield scenario would produce a crop insurance payment. If the field is not released at the time of the graze-out decision, the producer will also be giving up this potential payment so it is deducted from

potential income. If the field is already released and the crop insurance payment will be received regardless of graze-out, then use the dropdown menu to select "Field Released" (see Figure 2).

By grazing the wheat out, some agronomic costs will be reduced. Obviously, there will not be harvesting, hauling, or drying costs. The producer could also save application and chemical costs of fungicide and herbicide, if they were planning to apply it for the grain crop. Using default values in the spreadsheet, this adds up to a per acre savings of \$75.00. Additional fertilizer is recommended to improve forage yields; however, because of the dry conditions many farmers are not considering it a worthwhile investment so the default scenario is set at "No".

Summing up all of these changes to a normal wheat grain budget, the producer is giving up \$31.13, \$60.00, and \$127.50 per acre, respectively, on the 15, 30, and 45-bushel potential yield scenarios. As a side note, this would be the minimum the producer would want to charge to lease the field out for grazing, or they would be better off harvesting it for grain.

Partial Budget of Wheat Graze-out vs. Grain Harvesting						Low Grain/Forage Yield	Average Grain/Forage Yield	High Grain/Forage Yield
						15	30	45
Loss of Grain Sales			Yield in bu/acre					
	Reduced Income at \$4.50 per bushel					(\$67.50)	(\$135.00)	(\$202.50)
	Crop Insurance		Not Released			(\$38.63)	\$0.00	\$0.00
Reduced Input Costs								
	Harvesting/Hauling/Drying	\$35.00	per acre					
	Fungicide Chemical & Application	\$20.00	per acre					
	Herbicide Chemical & Application	\$20.00	per acre	=		\$75.00	\$75.00	\$75.00
Increased Input Costs								
	Additional fertilizer?	No				0.00	0.00	0.00
Loss in income per acre by grazing instead of harvesting						(31.13)	(60.00)	(127.50)
Potential Cattle Income								
	April Price	\$144.00						
	March Weight	750	\$1,080.00					
	End of May Price	\$140.00						
	End of May Weight	840	\$1,176.00					
	Death Loss	\$10.80						
			\$85.20 per animal					
Additional Cattle Costs								
	Mineral	\$2.25						
	Labor/Machinery	\$11.00						
	Other	\$5.00						
	Total		(\$18.25) per animal					
	Income		\$66.95 per animal					
			Stockers per acre =			0.7	1.0	1.3
			Stocker income			\$46.87	\$66.95	\$87.04
						\$15.74	\$51.95	-\$40.47

Figure 1: An example of partial budget analysis using different grain/forage yield level scenarios (low, average, and high forage yield).

To bring in the potential cattle income and costs, if the stockers are sold today at 750 pounds, they could receive around \$144 per cwt. By grazing them on wheat pasture until the end of May, they

could gain 90 pounds (2 pound ADG) and be potentially sold for \$140 per cwt (a favorable price slide given the current market). Assuming a 1% death loss on their current value, this gives a potential income of \$85.20 per animal by grazing them until the end of May. Additional costs of mineral, labor/machinery, etc. should be applied if they differ from what would have been performed anyway. For example, hauling and marketing costs would be incurred whether the stockers are sold now or in May, so they are not applied. The default values show potential returns of \$66.95 per animal after costs.

The number of stockers per acre ties the animal income and per acre costs together. Figure 1 uses one acre per stocker animal as an average yield scenario with low being set at .7 animals/acre and high being 1.3 animals/acre. The default values in the spreadsheet show that for the low yielding scenario, this producer would be better off grazing-out the wheat than pulling the cattle now and carrying the crop out for grain, even assuming they are giving up their crop insurance payment by doing so. They will bring in \$15.74 per acre more than if they carried the crop to harvest and it only yielded 15 bushels. If the field is released and the crop insurance payment will be received, this would increase to \$54.37 per acre (see Figure 2). This producer would be saving \$7.50 an acre by not harvesting in addition to income gained by grazing.

The average yield scenario only slightly favors grazing the wheat out but is close to breakeven at \$6.95 per acre. Even a couple bushels more than average would make this scenario favor a grain crop, so it will be a hard scenario to make a decision on. The high-yielding scenario would decisively pencil out better as a grain crop, showing over \$40 per acre loss by grazing it out.

Partial Budget of Wheat Graze-out vs. Grain Harvesting									
							Low Grain/Forage Yield	Average Grain/Forage Yield	High Grain/Forage Yield
Loss of Grain Sales				Yield in bu/acre			15	30	45
		Reduced Income at	\$4.50	per bushel			(\$67.50)	(\$135.00)	(\$202.50)
		Crop Insurance		Field Released			\$0.00	\$0.00	\$0.00
Reduced Input Costs									
	Harvesting/Hauling/Drying		\$35.00	per acre					
	Fungicide Chemical & Application		\$20.00	per acre					
	Herbicide Chemical & Application		\$20.00	per acre	=		\$75.00	\$75.00	\$75.00
Increased Input Costs									
	Additional fertilizer?	No					0.00	0.00	0.00
Loss in income per acre by grazing instead of harvesting							7.50	(60.00)	(127.50)
Potential Cattle Income									
	April Price		\$144.00						
	March Weight	750	\$1,080.00						
	End of May Price		\$140.00						
	End of May Weight	840	\$1,176.00						
	Death Loss		\$10.80						
				\$85.20	per animal				
Additional Cattle Costs									
	Mineral		\$2.25						
	Labor/Machinery		\$11.00						
	Other		\$5.00						
	Total			(\$18.25)	per animal				
	Income			\$66.95	per animal				
				Stockers per acre =			0.7	1.0	1.3
				Stocker income			\$46.87	\$66.95	\$87.04
Return per Acre for grazing out vs. harvesting for grain							\$54.37	\$6.95	-\$40.47

Figure 2. Partial budget analysis when low grain/forage yield has crop insurance release.

Planting a summer crop after wheat graze-out

Another key item to consider is that by grazing out wheat, a summer crop could be planted, if desired, and if herbicide carryover considerations allow. Crop insurance final planting dates for soybeans and grain sorghum both leave an adequate window to do this (again, the crop insurance agent needs to be notified). Depending on moisture conditions, this might even make the high-yielding scenario attractive to graze-out instead of carrying the crop to grain yield, as the reduced income could be made up for with returns from another crop.

Download of partial budget spreadsheet

Producers are encouraged to download the spreadsheet used in the examples above ([here](#)) and run their own numbers before they make this decision. Uncertainties exist in yield, wheat and cattle prices, cattle performance, etc., so those risks should be considered by being conservative on estimates or performing "what-if" scenarios. If any doubts exists on the use of this spreadsheet, don't hesitate to contact one of the specialists listed below.

Romulo Lollato, Wheat and Forages Specialist

lolato@ksu.edu

John Holman, Southwest Research-Extension Center Cropping Systems Agronomist

jholman@ksu.edu

Robin Reid, Extension Associate, Agricultural Economics

robinreid@k-state.edu

2. Soybean seeding rates and optimum plant populations

Deciding on the right seeding rate is one of the most influential factors for increasing soybean profitability as seed cost is one of the most expensive inputs.

Soybean seeding recommendations, row spacing, and planting date are all tied together. The final number of seeds per linear foot of row decreases as row spacing narrows. For example, at a target population of 105,000 plants per acre and 85 percent germination, 30-inch rows will need twice the number of seeds per linear foot as 15-inch rows -- 6 vs. 3 seeds per linear foot (Table 1). Seeding rates will need to increase at later planting dates to compensate for the reduction in the growing season since more plants are needed to increase early light interception and biomass production.

The environment also exerts an influence on deciding the final seeding rate. Dry and hot conditions require fewer plants to maximize yields; while favorable environments need higher seeding rates to capture the maximum yield potential. Under high-yielding irrigated environments, the final seeding rate should be greater than 160,000 seeds per acre (assuming high % emergence) with a final plant population close to 150,000 plants per acre.

Table 1. Recommended soybean plant density and seed spacing.

	Target plants per acre (x 1,000)					
	<45	45-70	70-90	90-115	115-140	>140
	Seeds per acre (x 1,000; 85% emergence)					
	<50	50-80	80-100	100-130	130-160	>160
Row Spacing	Seeds per linear foot (assuming 85% field emergence)					
8-inch	<1	1	1	1-2	2	>2
10-inch	<1	1	1-2	2	2-3	>3
15-inch	<1	1-2	2-3	3	3-4	>4
20-inch	<2	2-3	3-4	4	4-5	>5
30-inch	<3	3-4	4-5	5-7	7-8	>8

Summary of past seeding rate studies

In recent years, a summary of 21 on-farm strip trials and 5 replicated experiment station studies in Kansas prepared by Kraig Roozeboom, K-State Cropping Systems Agronomist, provided an opportunity to revisit current soybean recommendations. Most of the studies were performed in dryland environments (23 out of 26, with 3 studies under irrigation) and under no-till systems. All were in central and eastern Kansas counties: Butler, Harvey, Nemaha, Republic, Riley, Saline, and Shawnee.

As related to final field establishment, the current recommendations assume 80% emergence. Emergence in the studies ranged from less than 50% to 100%, illustrating the importance of knowing just how many dropped seeds will produce plants in each situation (Figure 1). Studies that have

compared planters and drills indicate that the 80% estimate is not far off for planters, but emergence for drills is usually closer to 65%. There is tremendous variability around both of these averages, but it illustrates the need to drop more seed per acre if field emergence is less than the 80% assumed for the current recommendations.

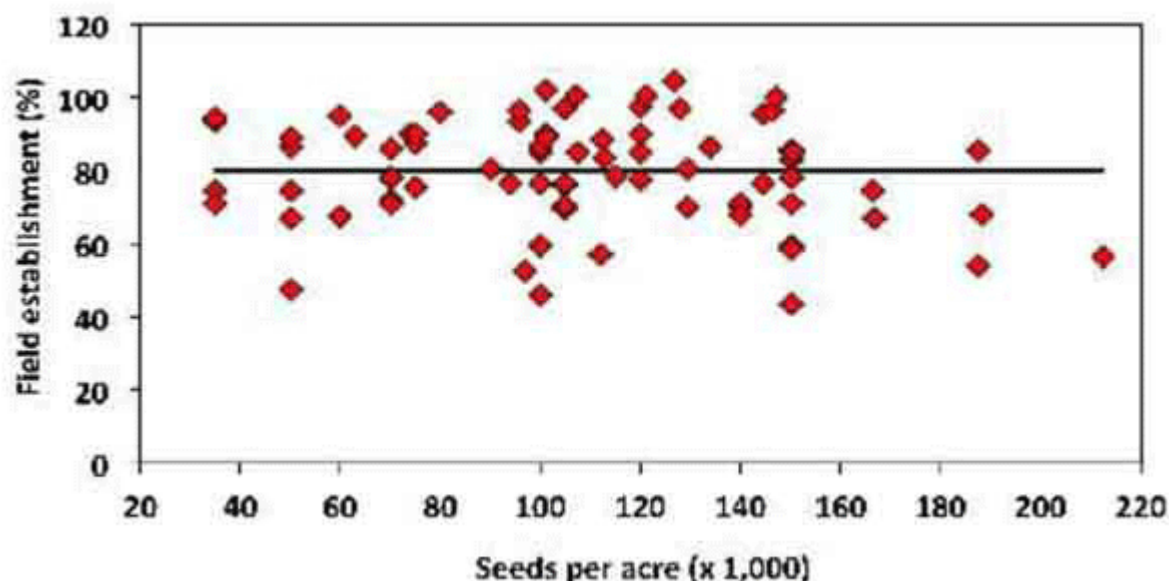


Figure 1. Percentage of field establishment and final seeding rate.

The primary conclusion from the summary of soybean seeding rate studies was that the optimum number of seeds per acre seemed to be highly dependent on the yield level attained at each location. Table 2 depicts the soybean seeding rate summary stratified by yield range.

Table 2. Recommended soybean plant density and seed spacing

	Yield range	Mean yield	Optimum population
Environment	bu a ⁻¹	bu a ⁻¹	plants a ⁻¹
Low	< 30	24	70-75,000
Medium low	30 - 40	36	75-80,000
Medium high	40 - 50	43	≈ 120,000
High	> 50	68	≈ 105,000
Average	12-78	42	

A) Low yielding environments (test average <30 bushels per acre):

Yields were maximized at plant populations of less than 75,000 plants per acre. Optimum final plant population was achieved around 70,000 to 75,000 plants per acre (Figure 2). Thus, if we assume 80% emergence (as presented in Figure 1), the optimum seeding rate for this environment will range from 85,000 to 90,000 seeds per acre.

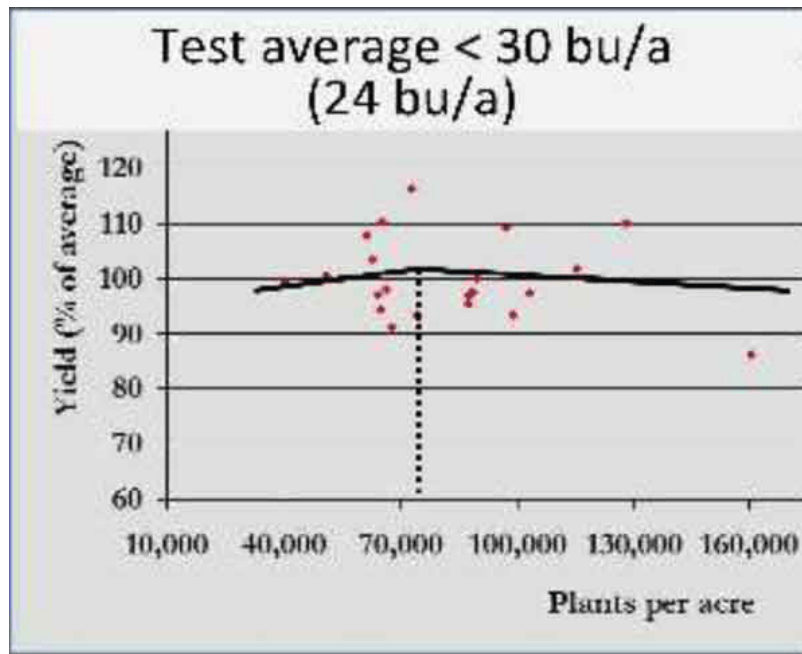


Figure 2. Optimum plant population, final plants per acre, for “low” yielding environments across Kansas, less than 30 bushels per acre.

B) Medium-low yielding environments (average ranged from 30 to 40 bushels per acre):

Yields were maximized with final plant populations around 75,000 to 80,000 plants per acre, presenting an evident plateau in maximum yield as the number of plants per acre increases beyond 80,000 plants per acre (Figure 3). Seeding rates ranging from 90,000 to 95,000 plants per acre were required to achieve these final plant populations (assuming overall 80% emergence).

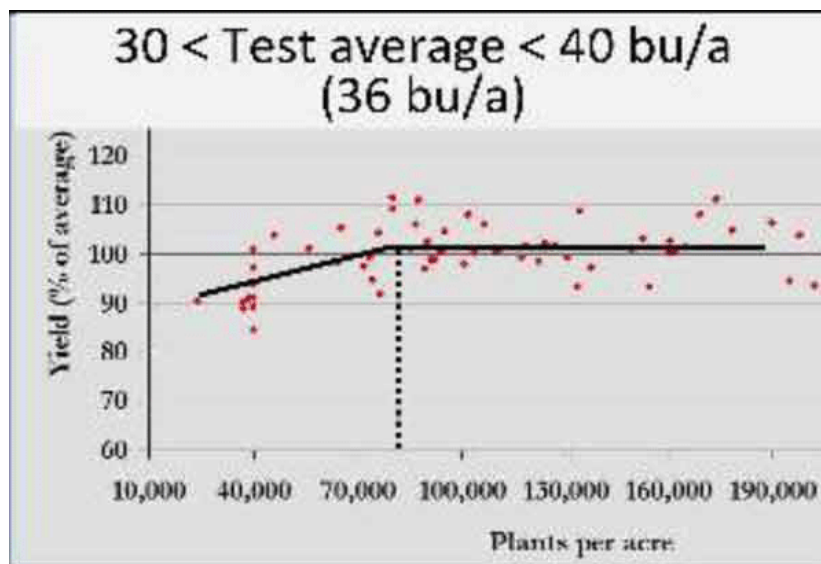


Figure 3. Optimum plant population, final plants per acre, for “medium-low” yielding environments across Kansas, ranging from 30 to 40 bushels per acre.

C) Medium-high yielding environments (average ranged from 40 to 50 bushels per acre):

Yields were usually maximized at populations of 105,000 to 120,000 plants per acre in this yield environment. The break-even point for the association between yield and plant population was set at around 120,000 plants per acre (Figure 4). Increasing the population above 130,000 plants per acre did not increase yields. Considering an average 80% field establishment, optimum seeding rate for this yield environment was 140,000 seeds per acre.

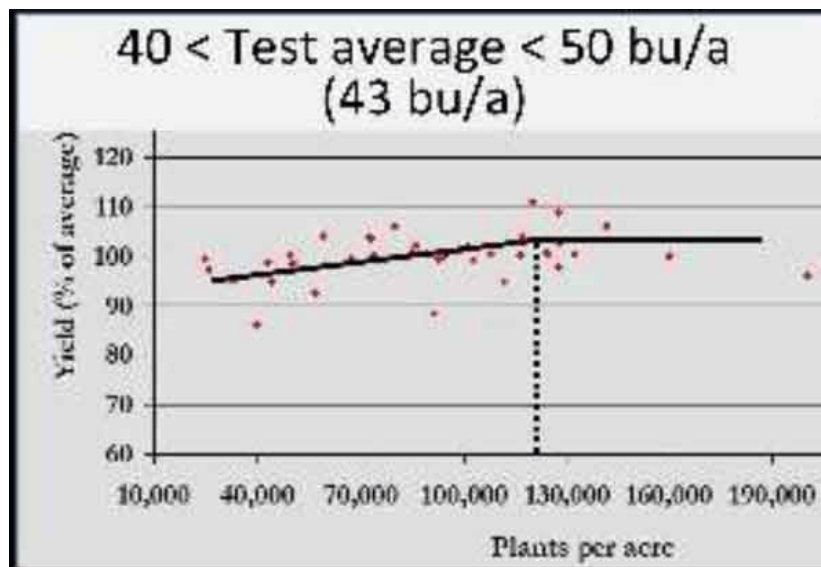


Figure 4. Optimum plant population, final plants per acre, for “medium-high” yielding environments across Kansas, ranging from 40 to 50 bushels per acre.

D) High yielding environments (test average above 50 bushels per acre):

The highest yields, under irrigation, were achieved with 105,000 plants per acre (or close to 130,000

seeds per acre with 80% emergence; Table 2). There were relatively few experiments with yields in this range, so this may not represent a typical response. However, it does illustrate the tremendous ability of soybean plants to adjust the number of pods (and seeds) per plant to available resources. Other studies have shown that, given favorable growing conditions, yields of 80 to 90 bushels per acre can be achieved with 100,000 to 120,000 plants per acre.

Seeding rates for high-yielding soybeans

Information gathered from the Kansas Soybean Yield contest shows that maximum yield (more than 90 bushels per acre) could be achieved with 120,000 seeds per acre, with yields tending to decrease from the maximum when seeding rates were above 180,000 seeds per acre (Figure 5). Maximum yield for soybeans did not seem to change for the seeding rate ranging from 120,000 to 150,000 seeds per acre. Before deciding your seeding rates, also take into consideration potential soil and weather conditions that could affect the success of your final stand establishment.

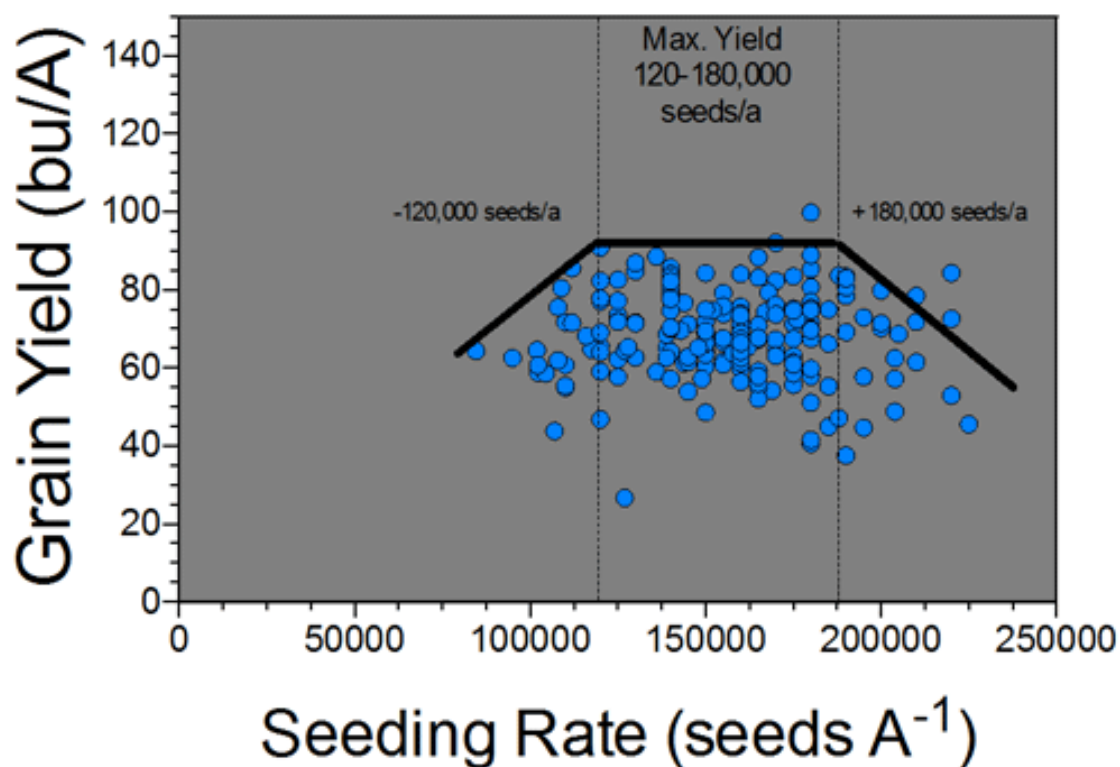


Figure 5. Yield versus seeding rate relationship for Kansas Soybean Yield contest data.

Always take into consideration the yield potential for each environment when deciding soybean seeding rates. Yield potential is primarily defined by the weather conditions (before and after planting), genetic potential, soil type and supplemental fertility program, and use of best management practices for producing the crop (proper weed, insect, and disease control from planting until harvest). Using seeding rates higher than those recommendations seldom reduced

yield, but did increase seeding cost.

For more information, see *Kansas Soybean Management 2018*, MF-3154, available online at: <http://www.ksre.ksu.edu/bookstore/pubs/MF3154.pdf>

On-farm soybean seeding rate studies

During the 2016 growing season, several on-farm research studies were established in collaboration with Kansas Soybean, United Soybean Board (USB), and K-State Research and Extension. The experimental layout, field variability, and strip-trial position in the field for those studies are presented below.

Experimental layout

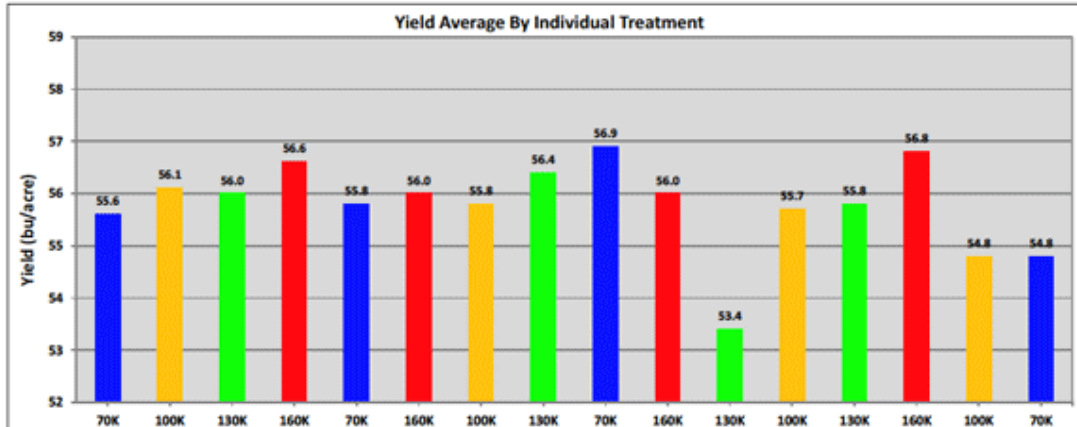
An example of the experimental design proposed for the 2016 soybean seeding rate trials is presented below. In this example, four seeding rate levels were investigated with four replications (completely randomized) in all 16 soybean strips.

Yield outcomes

In this example, four seeding rates were evaluated in an east central Kansas location (Figure 6). Maximum soybean yield (single strip, replication) was approximately 57 bushels per acre, with a narrow variability among all treatments of 53 to 57 bushels per acre. At this site, increasing seeding rates did not significantly promote an improvement in yields, with a yield difference of 0.6 bushel per acre between the seeding rates of 70,000 (55.8 bushels per acre) and 160 thousand (56.4 bushels per acre) seeds per acre.

Trial Results and Rainfall

Trial Type	Crop Management - Population
Trial Detail	High vs Low Population
Row Spacing	30 inch
Planting Date	5/7/2016
Harvest Date	10/21/2016 (Weigh Wagon)



Treatment	70K	100K	130K	160K	Least Significant Difference (LSD _{0.10})=3.1 bu/acre.
Yield Averages (bu/acre)	42.7 b	44.2 ab	46.1 a	45.5 ab	

Treatments with the same letter are not statistically significant at 10% significance level.

Figure 6. 2016 on-farm soybean seeding rate study.

Similar soybean seeding rate studies were performed in 2016 in collaboration with Extension agents and producers, resulting in diverse soybean yield responses to seeding rates.

The example above is just one study and one site. Thus, one should be careful in interpreting the results. The goal of this information is to motivate producers to perform more on-farm research evaluations and to understand the complexity of our soybean farming systems. In addition to this, the on-farm data emphasizes the need for further site-specific, on-farm evaluations on the response of yields to seeding rates and how management practices interact with the environment.

For more information of previous studies and other states, please visit:

<http://www.iasoybeans.com/USB/DataViewer/index.htm>

Ignacio Ciampitti, Crop Production and Cropping Systems Specialist
ciampitti@ksu.edu

3. Soybean planting dates and maturity group: Trends and K-State recommendations

Trends in Kansas

After considering the effects of genetic yield potential and the environment, planting date is one of the primary management practices under the farmer's control that can highly influence soybean yields. In recent decades, Kansas producers have been planting soybeans slightly earlier -- at the rate of about one third-of-day per year (Figure 1). The past two growing seasons, however, the "50% planting date" mark was achieved at a similar time (first week of June) statewide.

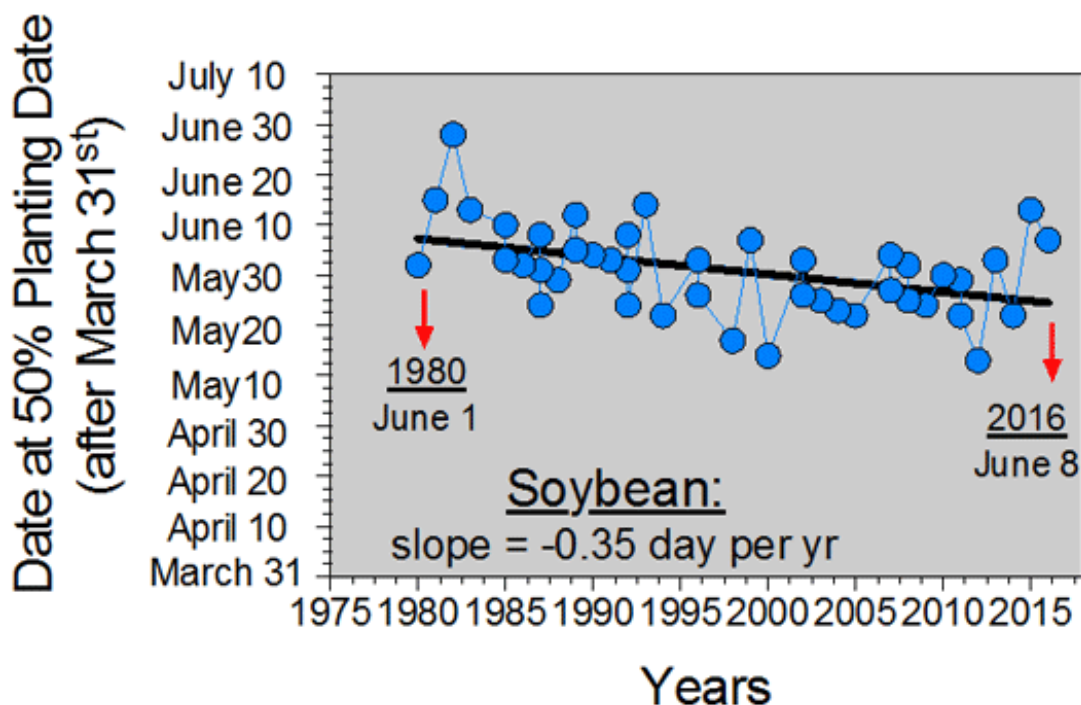


Figure 1. Trend in the date at which 50% of planting progress was achieved for soybean from 1980 to 2016 in Kansas. Source: USDA-NASS.

Kansas Planting Dates and Maturity Groups

Soybeans can be planted over a wide range of planting dates (Figure 2, upper panel) with adequate soil moisture conditions, although germination and emergence could be reduced and/or delayed in cool soils (less than 60 degrees F). The recommended maturity groups vary across Kansas by area (Figure 2, lower panel).

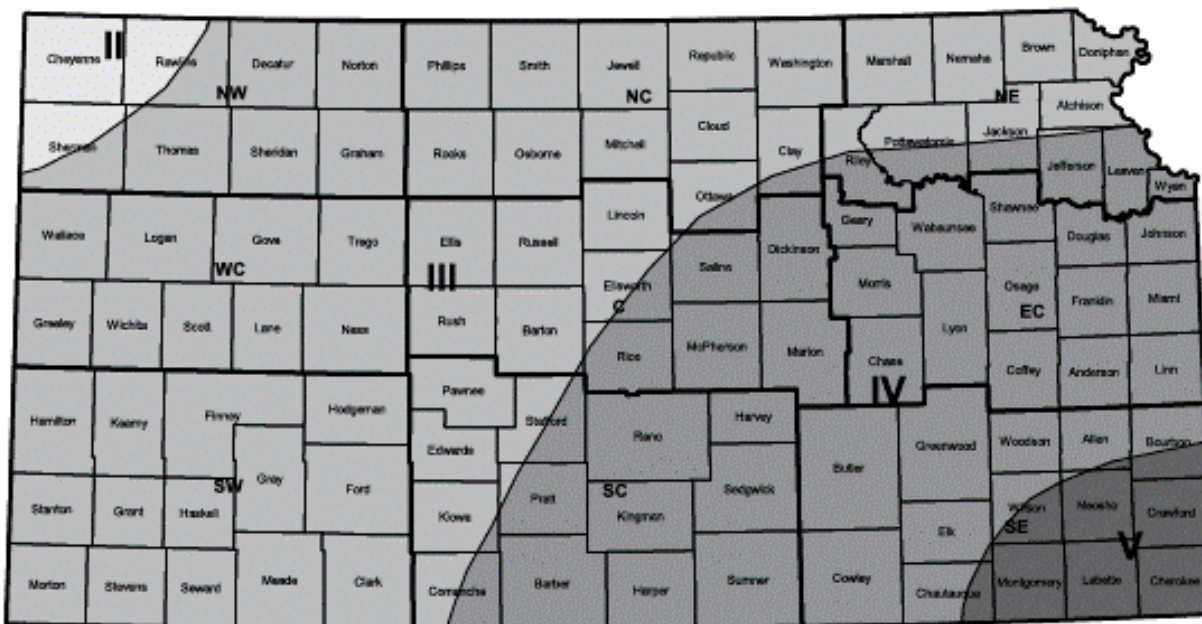
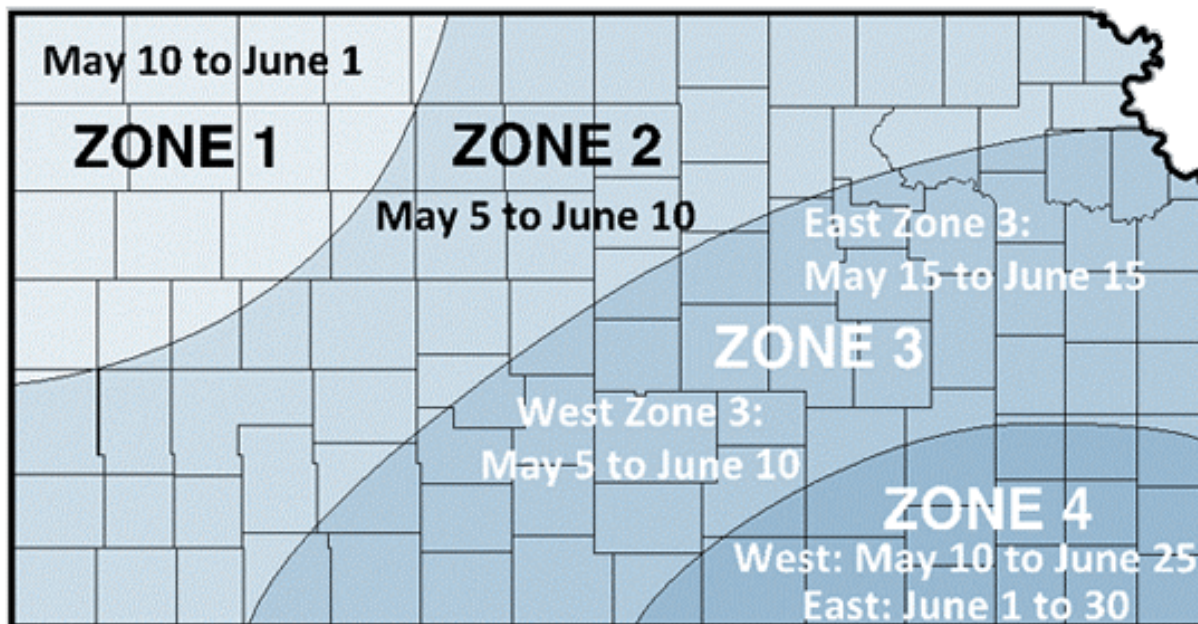


Figure 2. Recommended soybean planting dates (upper panel) and suggested maturity groups (bottom panel) across Kansas. Maps from K-State Research and Extension

K-State research: Planting date by maturity group

A summary of four studies on soybean planting date by maturity group performed during the 2014 season is available at: <http://newprairiepress.org/kaesrr/vol1/iss2/21/>; *Soybean Planting Date x Maturity Group: Eastern Kansas Summary*, Kansas Agricultural Experiment Station Research

The 2014 study was continued for the 2015 and 2016 growing seasons at sites across Kansas. Environment (site) was the determining factor for the optimum combination of soybean planting date x maturity group. The optimum combination of soybean planting date x maturity group was governed by the environment (site) evaluated.

In this research, three soybean varieties (early-, medium-, and late-maturity groups) were planted at three planting dates during the 2014, 2015, and 2016 seasons, at Topeka/Rossville, Manhattan, Hutchinson, Parsons, and Ottawa. A full description of all planting dates and maturity groups evaluated is summarized in Table 1.

Table 1. Location, year, planting date, soybean maturity group and water condition.

Location	Year	Planting Date	Maturity Group (early, medium, late)	Water
Manhattan	2014	April 22, May 15, and June 3	2.0, 3.8, and 4.8	Dryland
Topeka	2014	May 2, May 20, and June 18	2.0, 3.8, and 4.8	Irrigated
Ottawa	2014	May 5, May 28, and June 26	3.7, 4.2, and 4.8	Dryland
Parsons	2014	May 2, June 3, and June 26	3.9, 4.8, and 5.6	Dryland
Hutchinson	2014	June 3 and July 2	3.7, 4.5, and 5.6	Dryland
Manhattan	2015	April 14, May 12, and June 5	3.0, 3.7, and 4.5	Dryland
Rossville	2015	April 30, May 13, and June 9	3.0, 3.7, and 4.5	Irrigated
Ottawa	2015	May 4, June 10, and June 29	3.7, 4.2, and 4.8	Dryland
Parson	2015	May 5, June 2, and July 1	3.9, 4.8, and 5.6	Dryland
Hutchinson	2015	April 29, June 10, and July 6	3.7, 4.5, and 5.2	Dryland
Manhattan	2016	April 14, May 5, and June 2	3.0, 3.7, and 4.5	Dryland
Ottawa	2016	June 3, June 23, and July 15	3.8, 4.2, and 4.9	Dryland
Topeka	2016	May 5, May 23, and June 8	3.0, 3.9, and 4.5	Irrigated

2014 Results

The 2014 yield results of these tests are presented in Figure 3.

Under rainfed conditions at Manhattan, the mid-maturity group (3.8) was the highest-yielding at both early- and late-planting date. The late maturity group (4.8) out yielded the other maturity groups at the mid-planting date (May 15).

Under irrigation at Topeka, group 3.8 and 4.8 (medium and late) varieties maximized yields at the earliest planting date (May 2), with yields above 70 bu/acre. Lower yields were observed for the mid-May planting date, with the exception of the late-maturing group (4.8). For the late planting time (June 18), group 3.8 (yields >60 bu/a) significantly out yielded groups 2.0 and 4.8 (yields <45 bu/a).

Under rainfed conditions at Ottawa, yields were similar, but generally greater for May 28 (mid-planting date) as compared with May 5 (early) across all maturity groups (about 35 bu/acre). At the late planting date (June 26), yields increased with the later maturity groups. At Parsons (rainfed), group 3.9 (early) out yielded the other maturity groups for the May 2 planting date. Conversely, later-maturing soybean groups yielded better at the other planting dates (June 3 and 26). Although a trend in the data supported timing of planting to capture fall rains to enhance yield, the results were not statistically significant between the later maturity groups. At Hutchinson (rainfed), early planting (June 3) produced a significant yield benefit as compared with the late planting time (July 2).

At Ottawa, cumulative precipitation decreased as the planting date was delayed in 2014 (Figure 4). Overall, the later planting date received close to 10 inches less precipitation over the growing season than the early and mid-planting times. Despite that, yields were slightly higher at the later planting dates. For this site, the timing of the rain on the latest planting date was more critical than the quantity. Soybean planted at the early- and mid-planting date received close to 50% of the total rainfall in the first months of the growing season. The importance of adequate moisture for soybean yield development is most apparent from the lower yields for the late planting date at Hutchinson. This location received the lowest cumulative precipitation compared to the early planting date and compared to other locations.

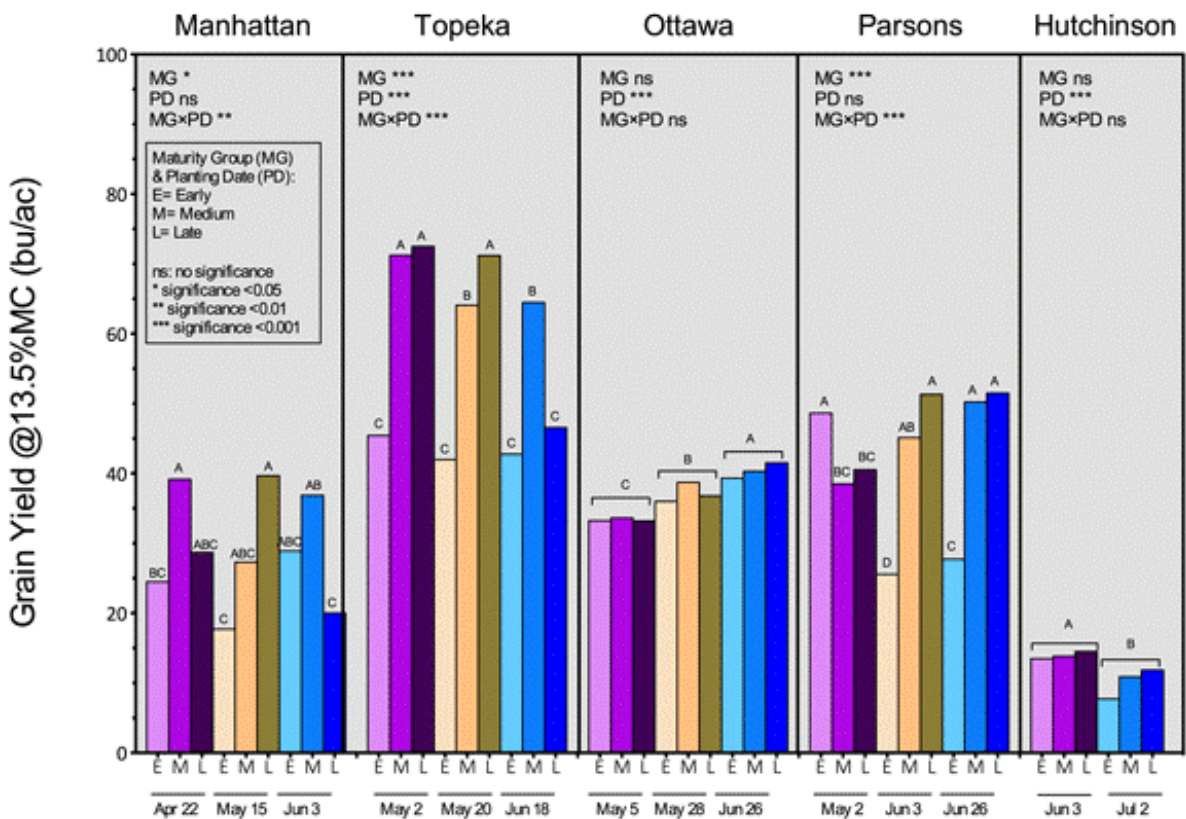


Figure 3. Soybean yields with different planting dates (early, mid, and late) and maturity groups (E = early, M = medium, L = late maturing groups) at five locations across Kansas for the 2014 growing season. Information related to maturity groups (MG) is presented in Table 1.

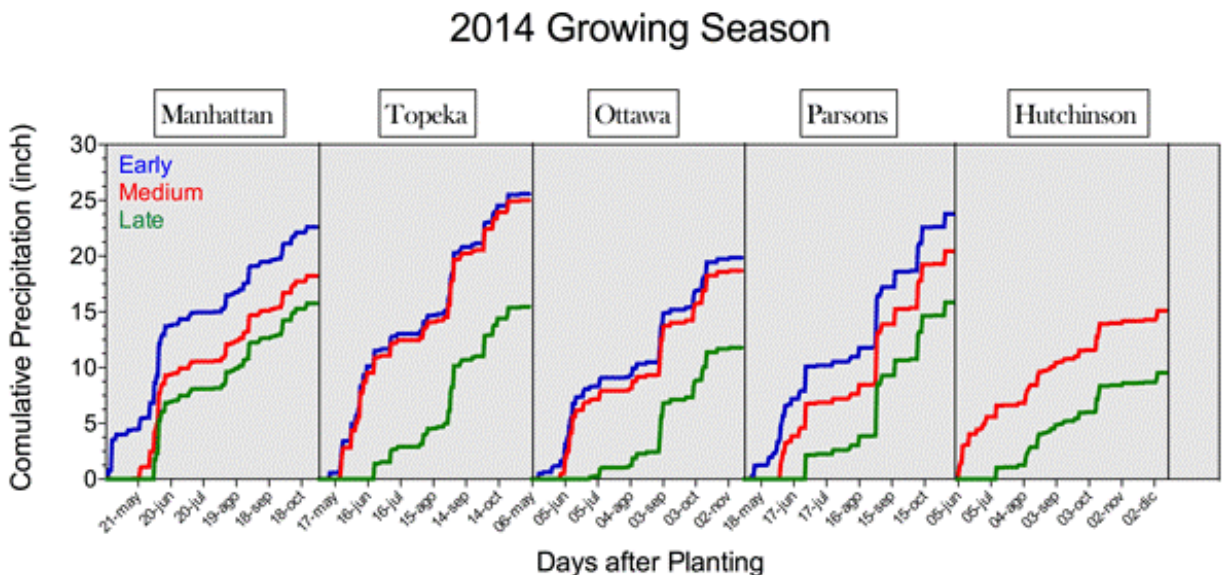


Figure 4. Cumulative precipitation (inches, without including the irrigation at Topeka site) for different planting dates (early, mid, and late) at five locations across Kansas for the 2014 growing season. Information related to specific planting dates per site is presented in Table 1.

2015 Results

The 2015 yield results of these tests are presented in Figure 5.

For the 2015 season at Manhattan, both mid- (3.7) and late-maturity group (4.5) resulted in the highest yield across all planting dates, and out yielded the early-maturity (3.0). Under irrigation at Rossville, the early planting date produced the highest soybean yield (>70 bu/a) in both the mid- (3.7) and late-maturity groups (4.5). At later planting dates, the mid-maturity group (3.7) out yielded both the early and late-maturity groups. Potential soybean yields were reduced when planting date was delayed. Under rainfed conditions at Ottawa, yields were similar for early (May 4) and mid-planting dates (June 10). Yield was reduced when planting on June 29 (late planting date), with a maximum of close to 40 bu/acre. At all planting dates, maturity groups did not present a significant yield difference at Ottawa.

For Parsons, yields in 2015 were strikingly different from those observed in 2014. The lowest yield reported at this site was 53 bu/acre for the earlier maturity group (3.9) for the early planting date. This was greater than any yield reported for any maturity group or planting date in 2014. A trend was documented with the mid-maturity group (4.8) having the highest yield of all cultivars at 75 bu/acre for the earliest planting date. No differences in yield were observed between maturity groups planted at the later dates. While there was a trend for lower yields at the later planting date (58 bu/acre at July 1 vs. 64 bu/acre at June 2 across all cultivars), the difference was not significant.

For Hutchinson, soybean planted at the late April and early June planting dates out yielded the late-planting time (July 6) by more than 10 bu/acre. When considering maturity group, the early- and mid-maturity groups (3.7 and 4.5) showed a yield increase for the early June planting date, but a significant decrease for the early July planting time.

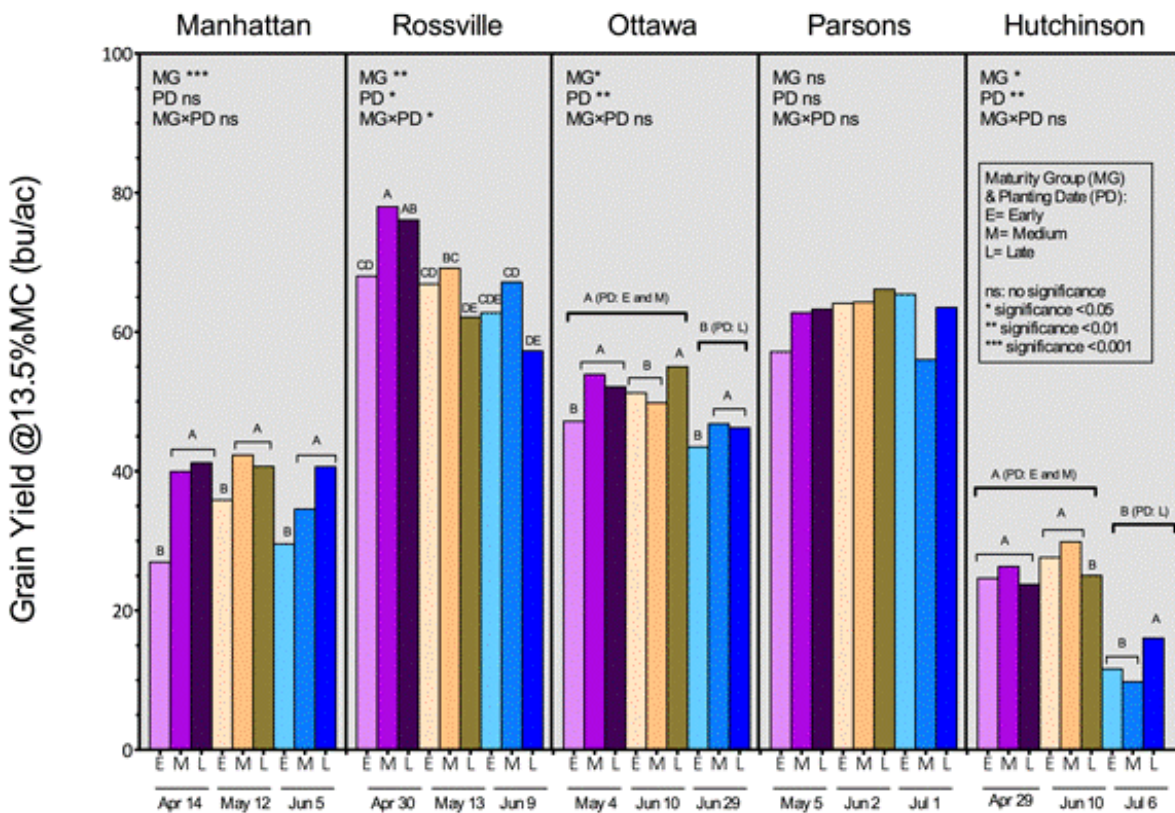


Figure 5. Soybean yields with different planting dates (early, mid, and late) and maturity groups (E = early, M = medium, L = late maturing groups) at five locations across the state of Kansas for 2015 growing season. Information related to maturity groups (MG) is presented in Table 1.

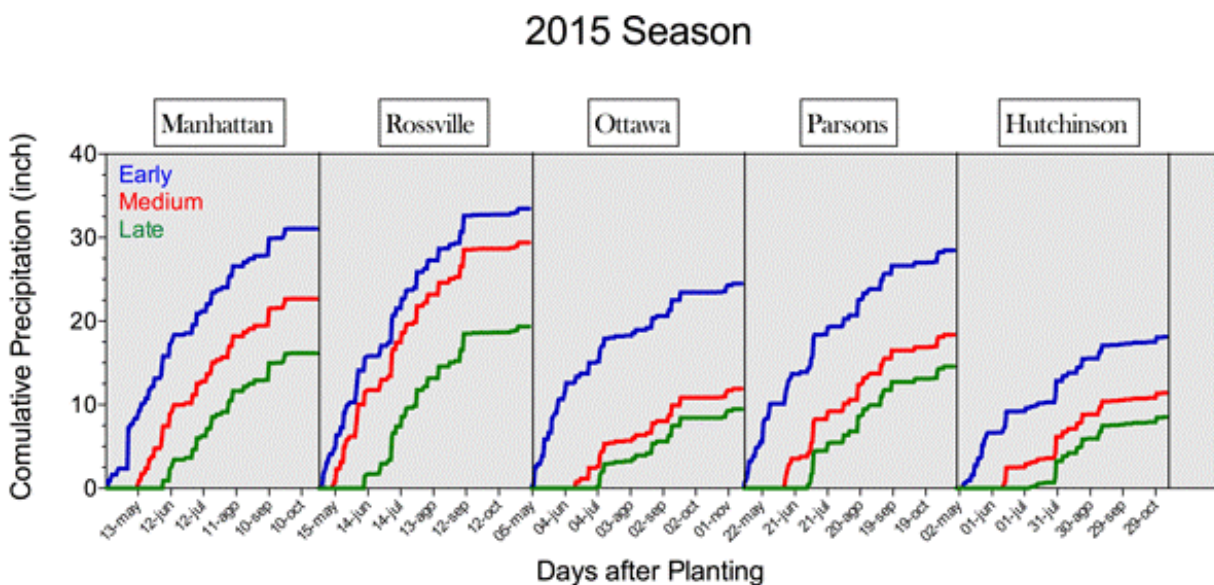


Figure 6. Cumulative precipitation (inches, without including the irrigation at Rossville site) for different planting dates (early, mid, and late) at five locations across the state of Kansas for the 2015 growing season. Information related to specific planting dates per site is presented in Table 1.

At Rossville, the main difference for the latest planting date compared to the early- and mid-planting times was the lower amount of cumulative precipitation received (Figure 6). At Ottawa, cumulative precipitation decreased from early to mid- and late-planting dates. For this site, lower yields were documented for the latest planting date, and this was correlated lower precipitation and timing of the precipitation. Shorter season cultivars suffered from low precipitation during grain-filling. A similar analysis could be extended to the yield pattern measured at Hutchinson during the 2015 growing season. Soybean at the latest planting date received less cumulative precipitation in a shorter growing season, penalizing the crop with an approximately 10 bu/acre yield reduction as compared with early- and mid-planting date.

2016 Results

The 2016 yield results of these tests are presented in Figure 7.

Planting date significantly influenced yields at Manhattan and Ottawa sites. For Manhattan site, early planting time (04/14) portrayed a yield advantage when compared with the late planting (06/02) scenario, with the latter presenting a 12 bu/ac reduction (Figure 7). At the Ottawa site, yield presented the following trend from high to low values: early- (63 bu/acre) > medium- (57 bu/acre) > late-planted (45 bu/acre) (Figure 7). For Manhattan and Ottawa sites, maturity group factor did not present a significant influence in yields, meaning that regardless of the maturity group selected yields did not differ. For Topeka site (irrigated), planting date significantly influenced yields, with comparable yields for the early- and medium-planted treatments, averaging 67 bu/acre (Figure 7). The late-planted time resulted in a 6 bu/acre (61 bu/acre) reduction as compared with both early- and medium-planted scenarios. In the same location the maturity group factor significantly affected yields, with early and medium maturity groups (63 bu/acre) out yielding the late variety (54 bu/acre).

Cumulative precipitation at the Manhattan site favored early season growth for the early-planted time with small differences for the medium- and late-planted scenarios (Figure 8). At Topeka and Ottawa sites, cumulative precipitation was similar across all planting dates, with a larger separation between medium- and late-planted time for Topeka relative to Ottawa site (Figure 8).

In summary for the 2016 season, the main factor influencing yield for Manhattan and Ottawa was planting date – increasing yields with earlier planting dates. Later planting time reduced the overall length of the growing season, which diminished maximum yield potential in addition to other factors that could have limited yields (i.e. insects, disease, etc.). The maturity group factor reduced yields when the shortest maturity group was utilized in the irrigated site, with a 15% overall yield reduction (across all planting times).

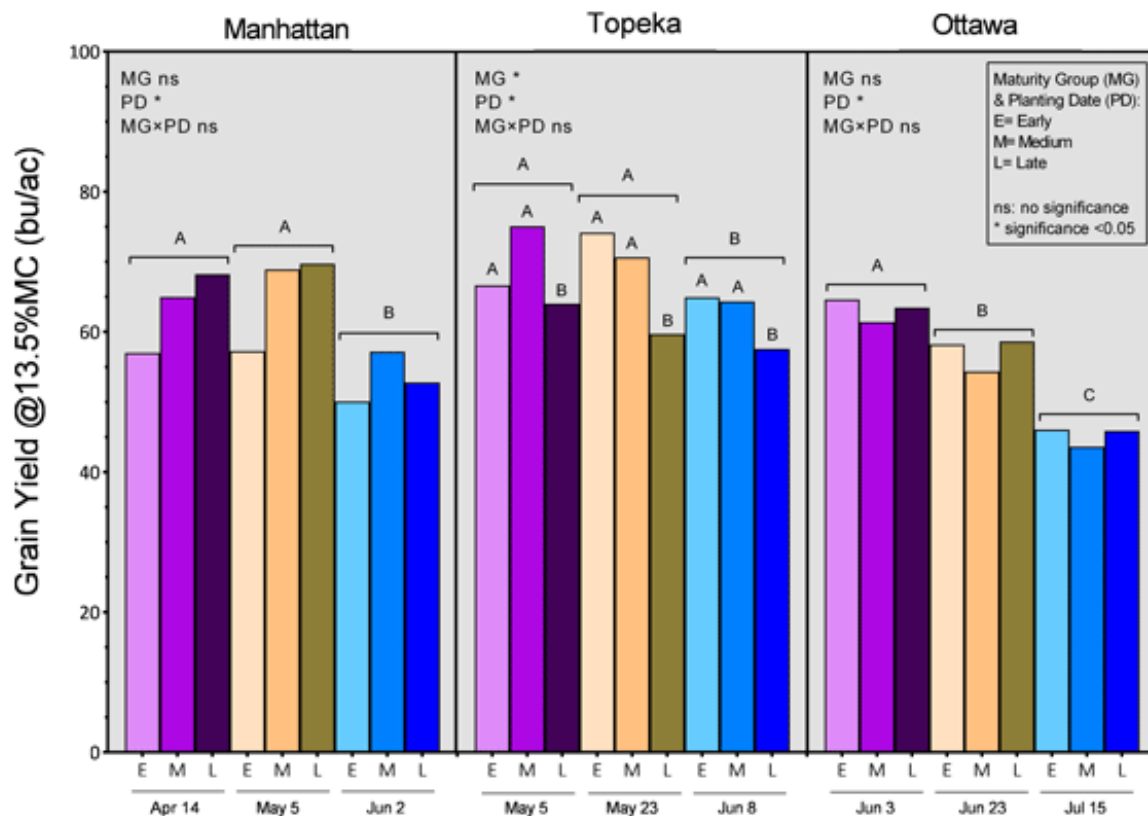


Figure 7. Soybean yields with different planting dates (early, mid, and late) and maturity groups (E = early, M = medium, L = late maturing groups) at three locations across the state of Kansas for 2016 growing season.

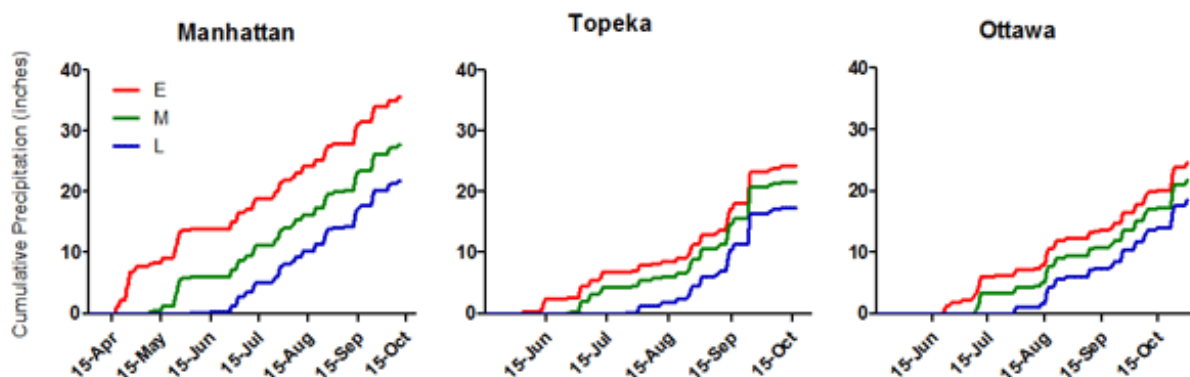


Figure 8. Cumulative precipitation (inches) for all soybean studies with different planting dates (early, mid, and late) at three locations across Kansas during the 2016 growing season. Information related to planting dates per site is presented in Table 1.

Conclusions and recommendations

- Ultimately, weather patterns dictate soybean yields, especially under dryland conditions. There is no guarantee that any certain planting date will always work out the best when it comes to soybean yields in Kansas. In fact, the distribution and amount of rainfall and the day/night temperature variations around flowering and during the grain filling periods have large impacts in defining soybean yield potential. Thus, when the risk of drought stress during the growing season is high, diversifying planting dates may be a good approach to consider.
- When planting early, seed should be treated with a fungicide and insecticide. Selecting varieties with resistance to soybean cyst nematode and sudden death syndrome is advisable. Do not plant into soils that are too wet. Also, do not plant until soil temperatures are close to 60 degrees F. If planted into soils cooler than that, seedlings may eventually emerge but will have poor vigor.
- In drier areas of Kansas and on shallow soils, yields have been most consistent when planting soybeans in late May to early June. By planting in that timeframe, soybeans will bloom and fill seed in August and early September, when nights are cooler and the worst of heat and drought stress is usually over.
- In our 2014, 2015, and 2016 planting date by maturity group studies, interactions with the environment were the primary factor in the yields and maturity group responses.
 - Under full irrigation, the earliest planting date maximized yields for cultivars from the late 3, mid- and late 4 maturity groups at Topeka and Rossville sites.
 - For our rainfed sites (2014, 2015, and 2016), no single rule can apply to all conditions, but late planting (late June) showed good yields at Ottawa and Parsons for later-maturing groups in 2014, with a different pattern for the 2015 and 2016 seasons (for example, Ottawa had the highest yields at early and mid-planting dates those years).
- Cumulative amount and timing of precipitation primarily influenced soybean planted later in the growing season.
- New studies are planned for the 2018 growing season for similar locations.

Ignacio Ciampitti, Cropping Systems Specialist, KSUCROPS Production Lab
ciampitti@ksu.edu

Osler Antonio Ortiz, MS Graduate Student, KSUCROPS Production Lab
oaortez@ksu.edu

Guillermo Balboa, PhD Fulbright Scholar, KSUCROPS Production Lab
balboa@ksu.edu

Eric Adey, Agronomist-In-Charge, Kansas River Valley and East Central Experiment Fields
eadey@ksu.edu

Jim Kimball, East Central Kansas Experimental Field
jkimball@ksu.edu

Gretchen Sassenrath, Southeast Agricultural Research Center Crop Production Agronomist
gsassenrath@ksu.edu

Stu Duncan, Northeast Area Crops and Soils Specialist
sduncan@ksu.edu

4. How dry and windy has it been in Kansas during 2018?

The dry weather that has persisted into April has raised concerns. In western Kansas, and indeed the entire state, this has been among the driest starts to the year on record. A map showing the total rainfall for 2018 through April 15th by division and the historical rank since 1895 is shown below (Figure 1).

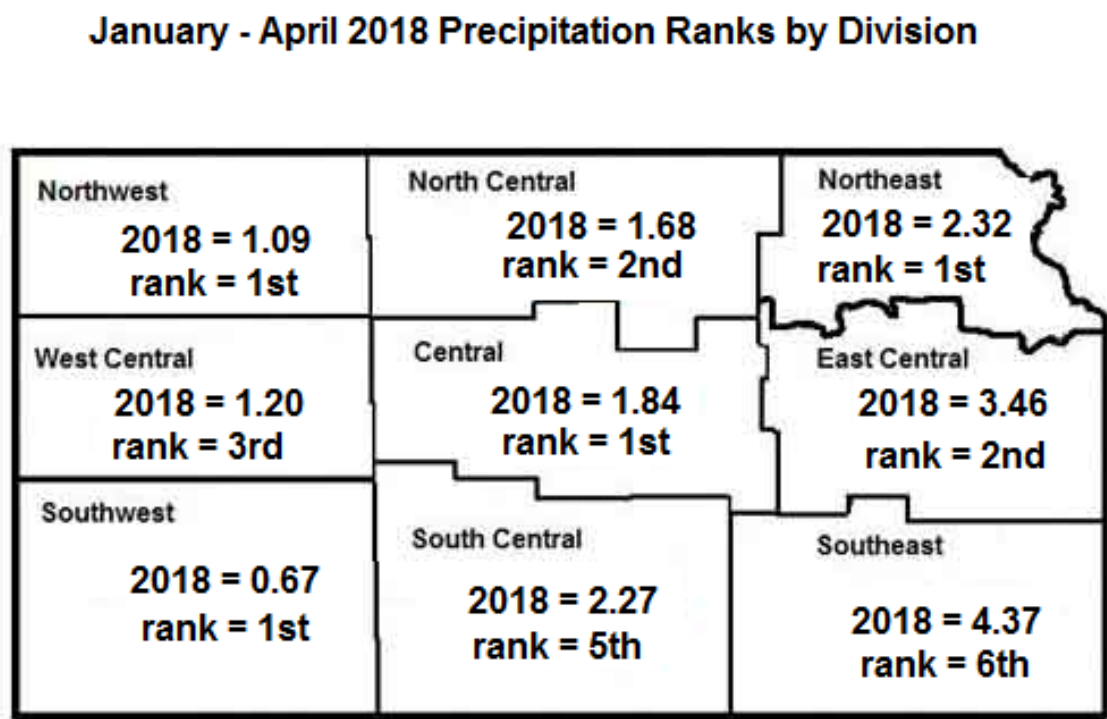


Figure 1. January-April precipitation ranks for Kansas since 1895 (NCEI data).

In addition to the dry conditions, strong winds have created increasing problems with blowing soil and dust storms. Table 1 compares this year’s average wind speeds at the National Weather Service 1st Order stations to data at the same location from 1930-1996. In addition, you can see how many days in 2018 experienced average wind speeds greater than or equal to 20 miles per hour for each location (≥ 20 mph).

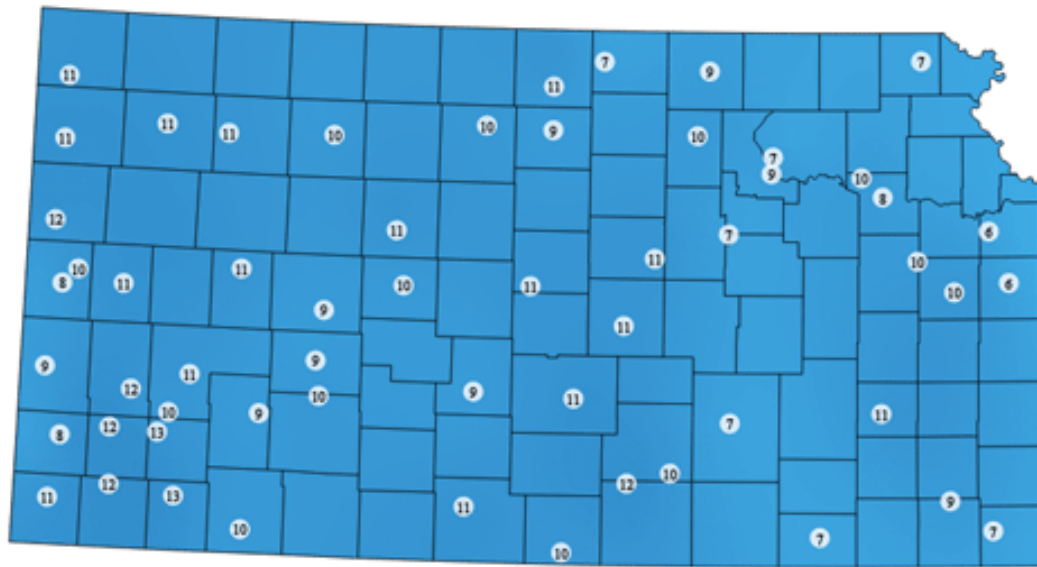
Table 1. Comparison of average wind speeds from 2018 in Kansas to the historical average (1930-1996)

Location		January	February	March	April
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Concordia	Historical Wind Speed*	12	12	14	14
	2018 Average	10.5	11.5	12.7	13.7
	2018 days avg \geq 20 mph	0	0	3	1
	Historical Peak Gust	60	52	54	64
	2018 Peak Gust	50	53	56	57
Dodge City	Historical Wind Speed*	11	11	12	12
	2018 Average	12.4	13.6	14.3	16.2
	2018 days avg \geq 20 mph	3	1	8	5
	Historical Peak Gust	66	57	48	61
	2018 Peak Gust	64	59	66	66
Topeka	Historical Wind Speed*	13	13	14	14
	2018 Average	11.7	12.2	13.6	16
	2018 days avg \geq 20 mph	2	1	4	4
	Historical Peak Gust	64	51	53	54
	2018 Peak Gust	57	52	69	77
Wichita	Historical Wind Speed*	10	10	12	12
	2018 Average	8.2	8.9	10.3	11.7
	2018 days avg \geq 20 mph	0	0	0	0
	Historical Peak Gust	49	47	43	47
	2018 Peak Gust	47	43	47	53
<div> <div>All speeds are in miles per hour (mph); Historical data is in bold</div> <div>*From "Climatic Wind Data for the United States; NCDC Nov. 1998; based on 1930-1996 data.</div> </div>					

Note that in April, Topeka, and Concordia had winds that matched the historical average. In Dodge City, the wind speed in April was more than 4 mph above (or 15% greater) than the historical average; and in Goodland wind speeds were 2 mph above average for April. The Kansas Mesonet also shows very high average wind speeds for April 1 – April 15th (Figure 2). In 2018 there has also

been many days with severe wind (≥ 20 mph). There are not good historical records for the number of days with wind speed ≥ 20 mph, but it is likely 2018 has seen more days than normal since average wind speed is considerably greater. Besides having a greater average wind speed and number of severe windy days, the peak wind gusts have also been greater. The peak gust in April was 5 mph higher in Dodge City, 23 mph higher in Goodland, and 6 mph higher in Topeka. With these severe winds there has likely been more property damage than normal and caused quite a bit of soil blowing and wind erosion.



Kansas Mesonet - Average 2m Windspeed for April 1 - April 17, 2018

Figure 2. Average wind speeds at 2 meters from April 1-17, 2018. (Kansas Mesonet)

What conditions create high winds?

The jet stream plays the main role in creating wind events. The pattern for much of the year has been northwest flow aloft across the Central Plains (Figure 3). This pattern is associated with cooler conditions, dry air, and frequent dry cold fronts across Kansas. A day in advance of a cold front, winds shift southerly and increase (and temperatures warm) due to a strong pressure gradient. Winds shift northwesterly with the passage and typically remain gusty for 1-2 days after the front. Dry conditions actually help to fuel stronger winds, so it is not surprising we have experienced increased winds with the extremely dry spring. With persisting dry air masses across the state, when the sun comes out, air is able to rise more effectively. This in turn pushes stronger winds aloft downward to replace it. Therefore, repeatedly mixing them down provides windier-than-normal conditions especially combined with the increased frequency of cold fronts (which is typical for March and April).

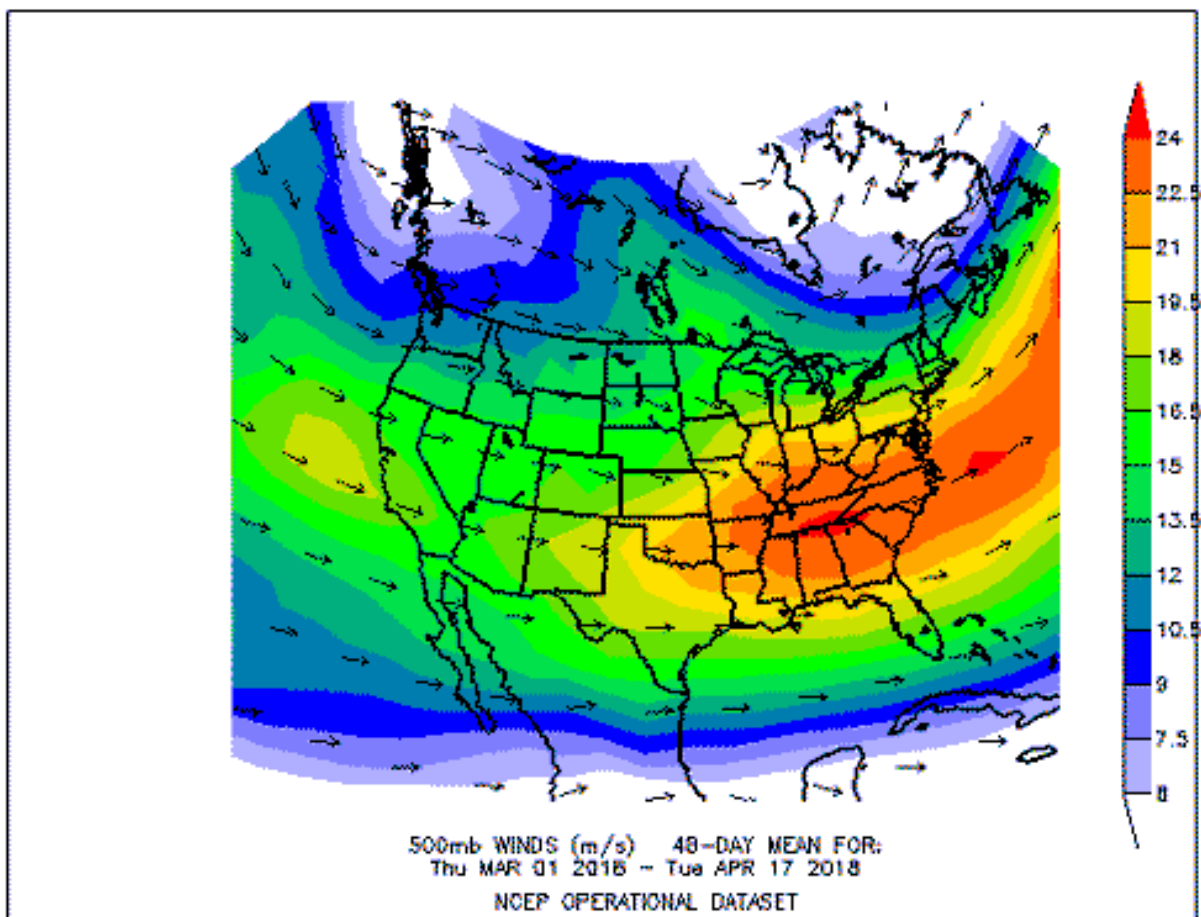


Figure 3. 48-day average 500mb winds (NCEP).

As a result of the drought and windy weather, dust storms have been common this year (Figure 4).



Figure 4. Dust storm in Ford County, April 16, 2018. Photo by John Holman, K-State Research and Extension.

For information on protecting your soil during high winds, check out the recent eUpdate article: "[Emergency measures to control wind erosion](#)" in the April 18, 2018 issue and the KSRE publication MF2206, "[Emergency Wind Erosion Control](#)"

You can find up-to-date information on the drought status in Kansas on the Kansas Climate page at <http://climate.k-state.edu/reports/weekly/2018/>

John Holman, Cropping Systems Agronomist, Southwest Research-Extension Center
jholman@ksu.edu

Chip Redmond, Kansas Mesonet Manager
christopherredmond@ksu.edu

Mary Knapp, Weather Data Library
mknapp@ksu.edu

5. What tools are used to monitor and track drought?

Drought has many definitions. The Glossary of Meteorology defines drought as “A period of abnormally dry weather sufficiently prolonged for the lack of water to cause serious hydrologic imbalance.” In lay terms, it’s generally defined as a period when water is insufficient for existing demands. In Kansas, drought declarations, which trigger specific actions, are issued by the Governor’s office.

Palmer Drought Severity Index

One of the most common tools to measure drought is the Palmer Drought Severity Index (PDSI). The PDSI was originally developed by Palmer [1965] with the intent to measure the cumulative departure in surface water balance. It incorporates antecedent (past) and current moisture supply (precipitation, P) and demand (potential evapotranspiration, PE) into a hydrological accounting system, which includes a 2-layer bucket-type model for soil moisture calculations. The PDSI is a standardized measure, ranging from about -10 (dry) to +10 (wet) with values below -3 representing severe to extreme drought (Dai, 2017). The Kansas Climate Office has animated maps of the PDSI from the 1900s through 2011. A snapshot of PDSI values for Kansas from August 1936 is shown in Figure 1.

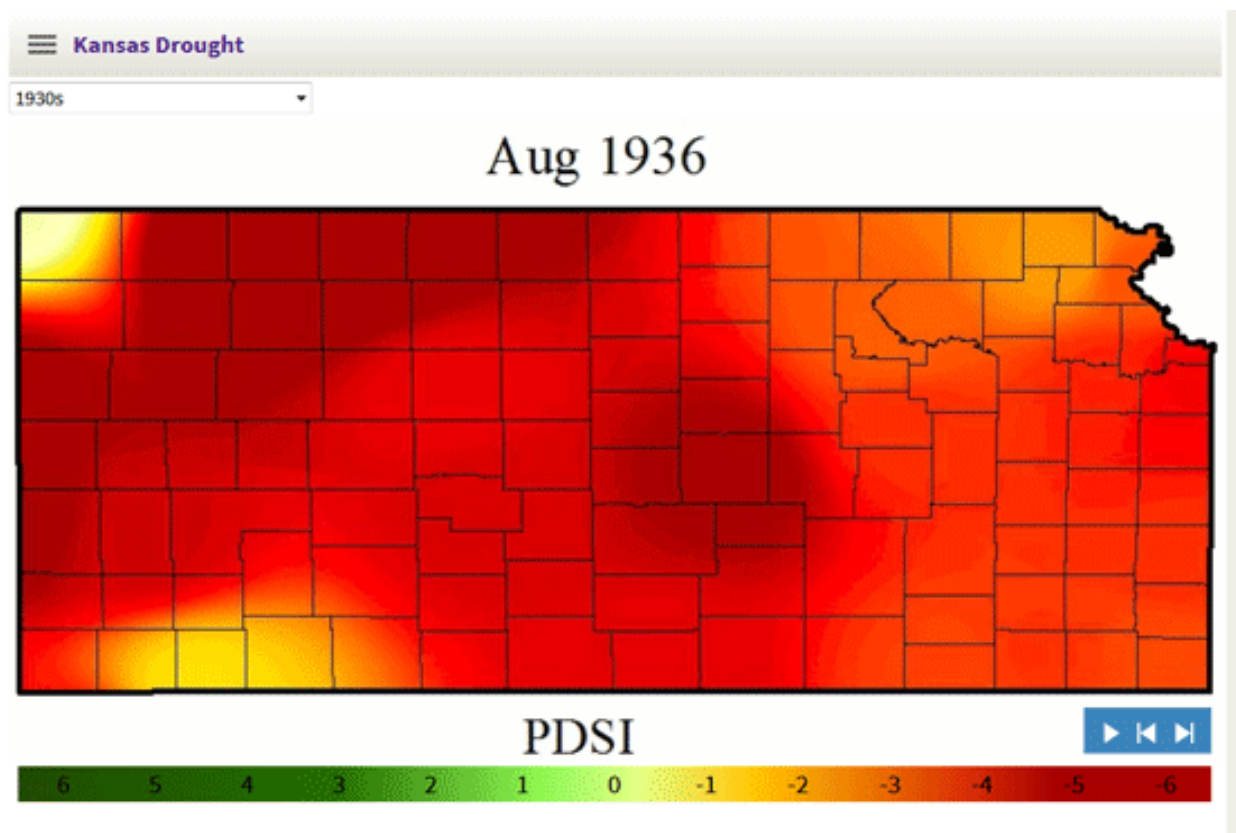


Figure 1. Palmer Drought Severity Index (PDSI) values from August 1936.
(<http://climate.ksu.edu/drought/pdsi>)

Standardized Precipitation Index

Another drought tracking tool is the Standardized Precipitation Index (SPI). Developed at Colorado State University, the SPI is a tool which allows an analyst to determine the rarity of a drought at a given time-scale (temporal resolution) of interest for any rainfall station with historic data. The SPI allows more temporal flexibility than the PDSI. The latest SPI map shows how the northwest corner of Kansas has a positive SPI for the last 120 days ending on April 11, 2018 (Figure 2).

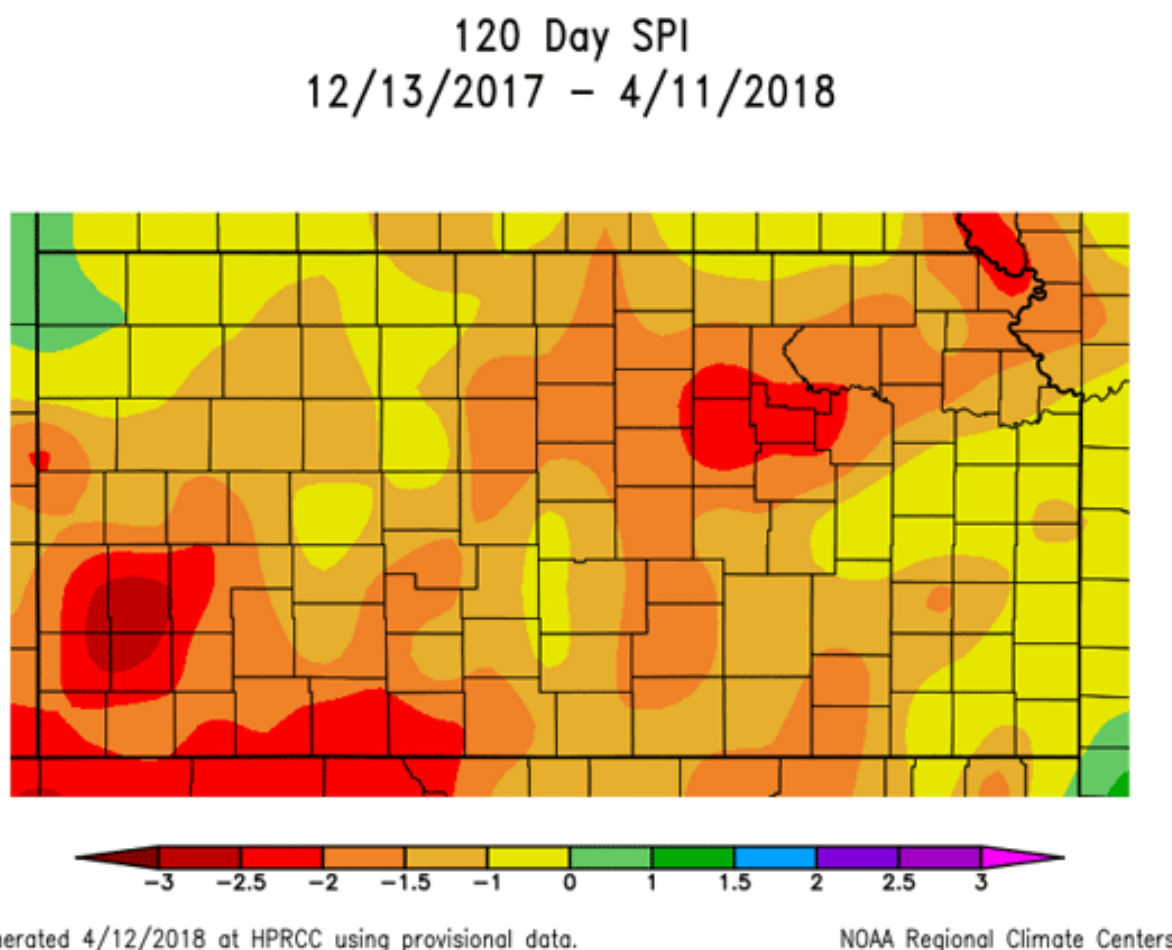


Figure 2. Standardized Precipitation Index (SPI) for Kansas for the last 120 days ending on April 11, 2018. (<https://hprcc.unl.edu/maps.php?map=ACISClimateMaps>)

U.S. Drought Monitor

In 1999, the U.S. Drought Monitor was developed. This resource is produced jointly by the National Oceanic and Atmospheric Administration (NOAA), the U.S. Department of Agriculture (USDA), and the National Drought Mitigation Center at the University of Nebraska-Lincoln. The U.S. Drought

Monitor website is hosted and maintained by the National Drought Mitigation Center. The weekly monitor integrates the PDSI and the SPI, as well as hundreds of other measures, including stream flow, evaporative demand, soil moisture and vegetative health. Inputs are cutoff on Tuesday and the new map is issued on Thursday morning.

The U.S. Drought Monitor is used by policymakers and media in discussions of drought and in allocations of drought relief. As part of its response to the drought of 2012, the U.S. Department of Agriculture streamlined the process for secretarial disaster declarations, making declarations nearly automatic for a county shown in severe drought on the U.S. Drought Monitor for eight consecutive weeks.

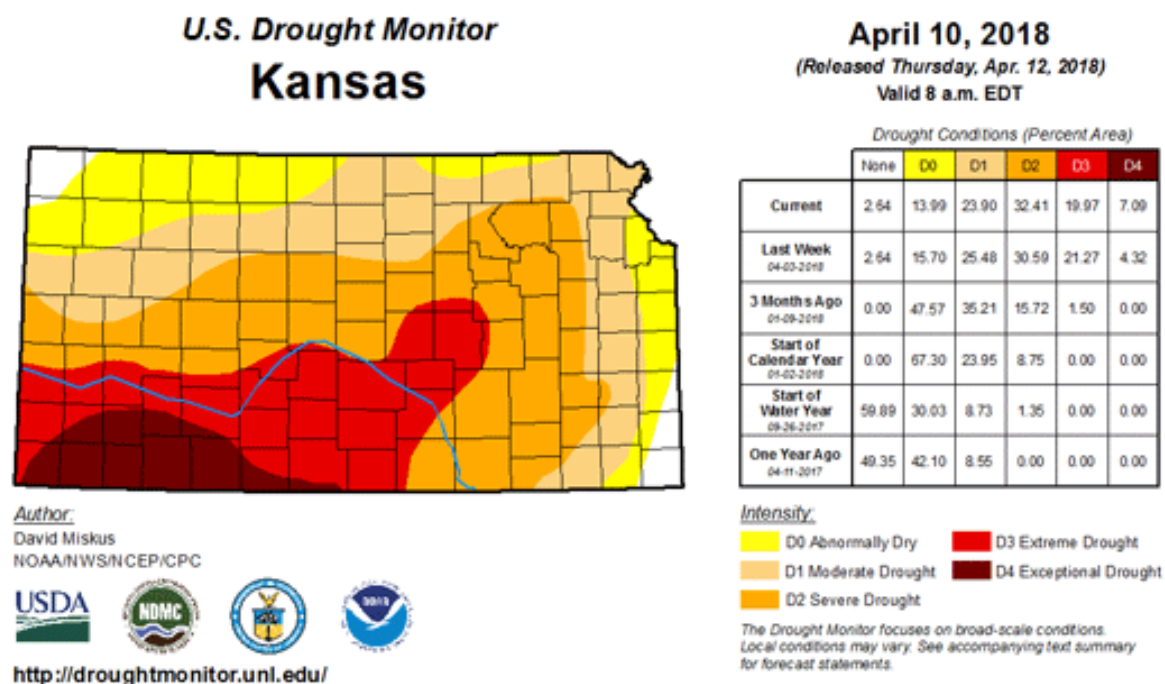


Figure 3. Latest U.S. Drought Monitor for Kansas.
(<http://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?KS>)

References:

Dai, Aiguo & National Center for Atmospheric Research Staff (Eds). Last modified 12 Jul 2017. "The Climate Data Guide: Palmer Drought Severity Index (PDSI)."

<http://drought.unl.edu/monitoringtools/climatedivisionspi.aspx>

Mary Knapp, Weather Data Library
mknapp@ksu.edu

Chip Redmond, Kansas Mesonet Manager
christopherredmond@ksu.edu

Xiaomao Lin, State Climatologist
xlin@ksu.edu

6. Midwest Cover Crops Field Scout mobile app now available

The popular “Midwest Cover Crops Field Guide”, written by members of the Midwest Cover Crops Council (MCCC), is now available as a mobile application. The *Midwest Cover Crops Field Scout* mobile app brings the resources of the pocket-sized field guide, including additional photos, to your tablet or smartphone.

“Producers who want to prevent soil erosion, improve nutrient cycling, sustain their soils, and protect the environment have been returning to a very old practice: planting cover crops. Although farmers have been using cover crops for centuries, today’s producers are part of a generation that has little experience with them. Many growers find they lack the experience and information necessary to take advantage of all the potential benefits cover crops can offer. That inexperience can lead to costly mistakes.” – Excerpt taken from the “Getting Started” section of mobile app.

This app will help producers effectively select, grow, and use cover crops in your farming systems. While this app isn’t the final word on cover crops, it is meant to be a useful resource.

On the opening menu, users can access several different cover crop related resources on the mobile app (Figure 1). When users click the “Getting Started” section, they will be able to find a wide variety of information, ranging from choosing a cover crop, when to plant, climate considerations, and much more (Figure 2). Other opening menu options will lead users to detailed information on seeding methods, weed and herbicide concerns, pests, cover crop species, and a pure live seed calculator.

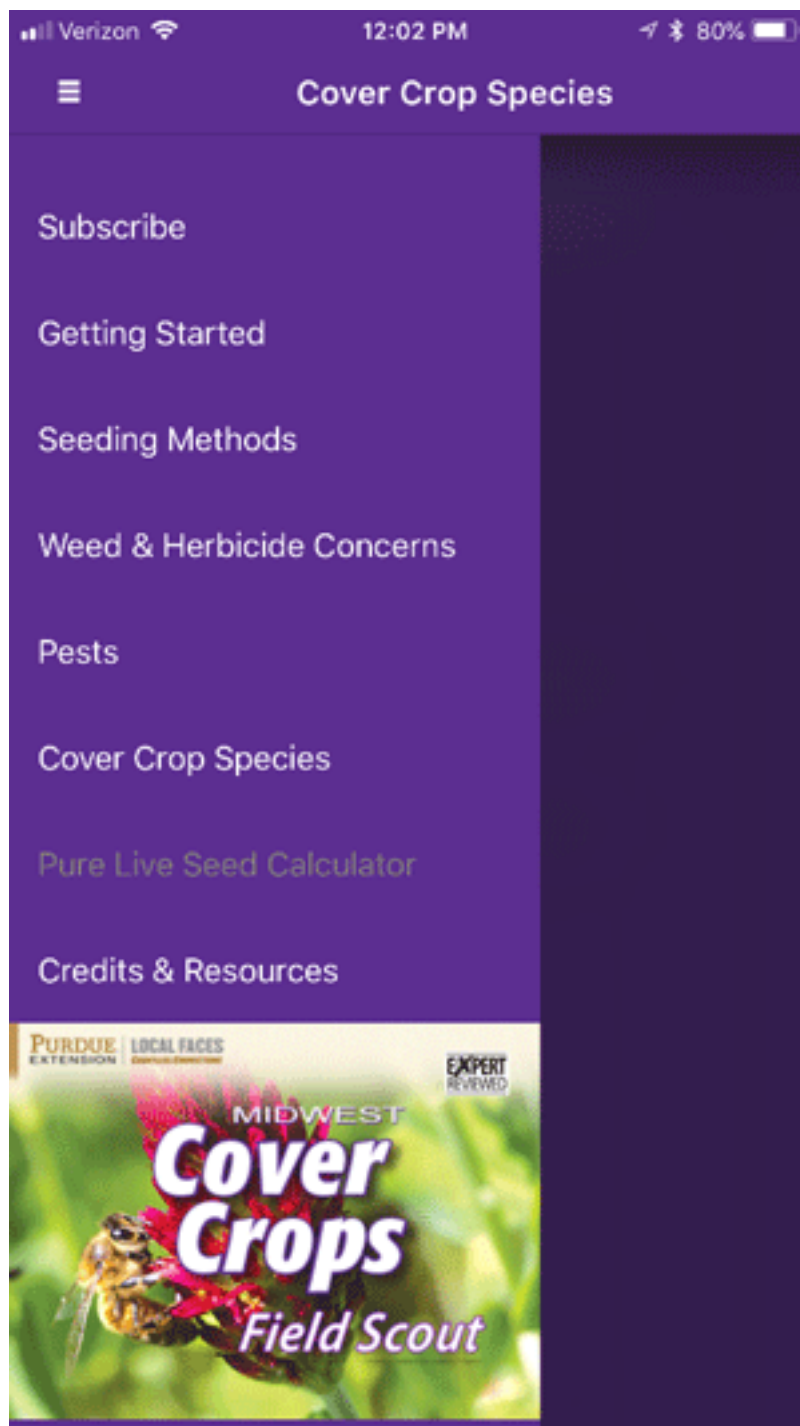


Figure 1. Screenshot of the opening menu on the Midwest Cover Crops Field Scout mobile app.

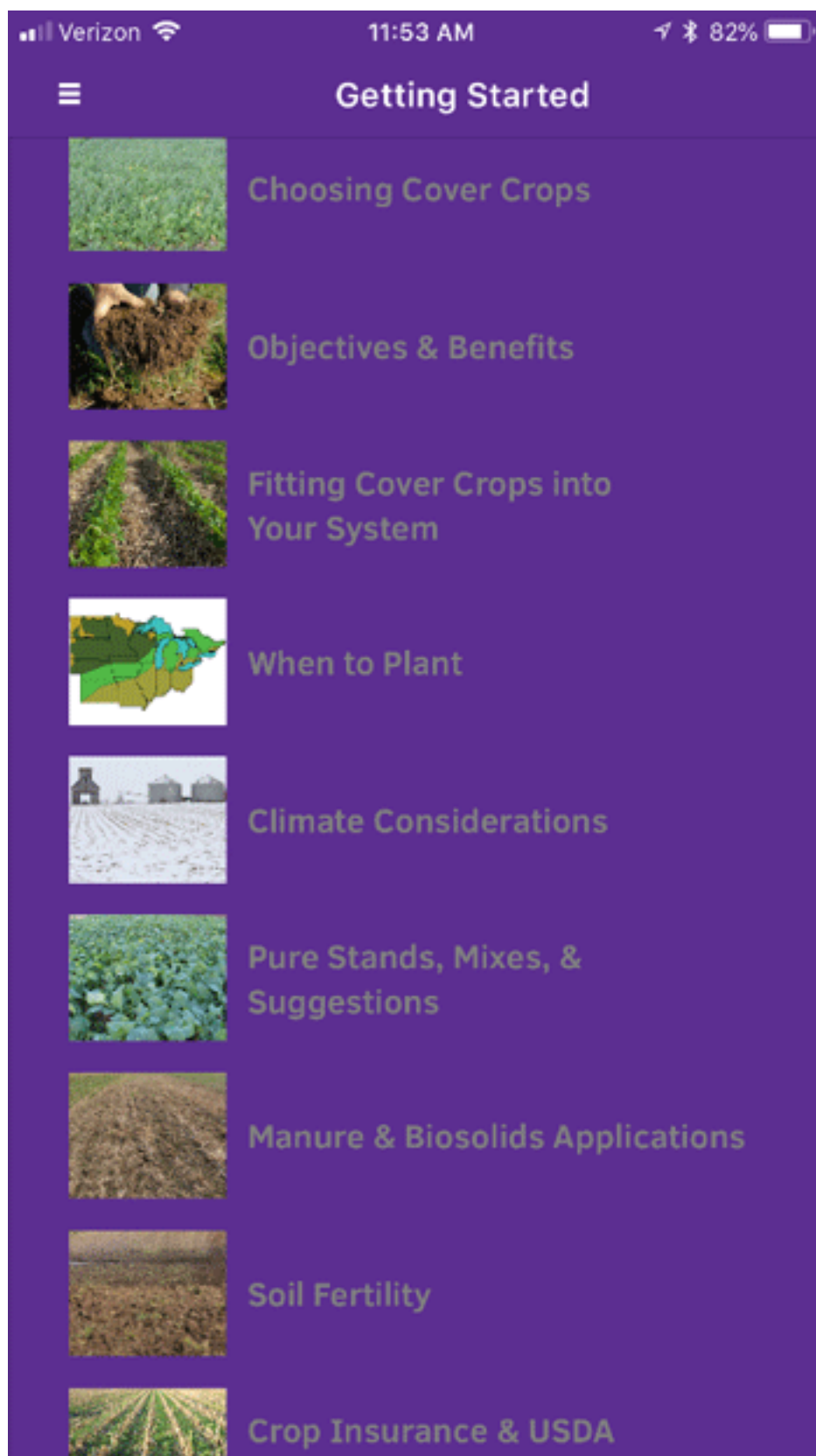


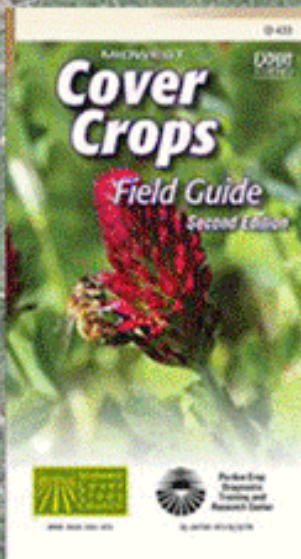
Figure 2. Screenshot of the Getting Started menu.

The app is free to download, but does require a minimal annual subscription of \$2.99 to unlock all

the content. The app is available in both an Android and iOS version. Simply type “cover crop” in the search bar in the Android Market or Apple’s App Store to find the app.

The app was produced cooperatively by the MCCC and the Purdue Crop Diagnostic Training and Research Center.

Midwest Cover Crops Council



Field Guide Mobile App

For iOS and Android

Available for \$2.99 per year

Search "cover crop" in the App Store or Google Play

Kansas State University Department of Agronomy

2004 Throckmorton Plant Sciences Center | Manhattan, KS 66506

www.agronomy.ksu.edu | www.facebook.com/KState.Agron | www.twitter.com/KStateAgron

DeAnn Presley, Soil Management specialist
deann@ksu.edu

7. K-State Composting School to be held in two locations in May

The Kansas Composting Operators' School provides hands-on training in municipal, agricultural, and commercial large-scale composting for operators and managers of compost facilities who want to gain knowledge and experience in composting. Regulatory staff, environmental consultants, and compost equipment company employees also frequently attend. This year there will be two offerings that will cover the same material but the tours will be different (see below):

- **Hays, May 9-10** – Tour a feedyard and learn about dead animal and manure composting. Classroom is located at the Western Kansas Agricultural Research Center in Hays.
 - Instructors: DeAnn Presley, KSU Agronomy; staff from KDHE Bureau of Waste Management; and Brittany Howell, Fort Hays State University.
- **Winfield, May 15-16** – Tour the city of Winfield's compost facility. Classroom is located at the Cowley County Fairgrounds.
 - Instructors: DeAnn Presley, KSU Agronomy; and staff from KDHE Bureau of Waste Management.

The program includes two full days of classroom and laboratory instruction along with field activities. Field activities will include a demonstration of composting equipment such as a turner, and collection of compost samples for testing for maturity as well as chemical and physical properties.

Training topics:

- Composting science and methods
- Compost biology
- Compost feedstocks
- Food waste composting
- Mortality composting
- Determining compost mixes
- Permit and legal requirements
- Site design and maintenance
- Compost equipment
- Windrow construction and aeration
- Compost moisture
- Field and laboratory monitoring
- Learn to measure moisture, temperature, pH, soluble salts, maturity, interpreting laboratory data
- Compost quality and use
- Methods of composting: static versus active

The fee for the school is \$180 and includes lunches, breaks, and training materials. Hotels are not included, however both cities have several options for overnight stay. Payment must accompany registration (payable to KSU Agronomy).

A registration form can be downloaded and printed [here](#). Mail to: Extension Agronomy, 2014 Throckmorton Plant Sciences Center, Kansas State University, Manhattan, KS 66506.

Online registration is available for those who wish to pay with a credit card (additional fees apply), <http://www.agronomy.k-state.edu/extension/soil-management/>

Registration is due by May 4, 2018. Class size is limited to 20 people so don't wait too long to sign up!

For more information contact DeAnn Presley, 785-532-1218, deann@ksu.edu

Kansas Composting Operators' School



Hays: May 9-10, 2018
Winfield: May 15-16, 2018



The Kansas Composting Operators' School provides hands-on training in municipal, agricultural, and commercial large-scale composting for operators and managers of compost facilities who want to gain knowledge and experience in composting. This year we will have two classes.

- Hays, May 9-10, 2018: Tour a feedyard and learn about dead animal and manure composting. Classroom: KSU Research Farm.
- Winfield, May 15-16, 2018: Tour City of Winfield's facility. Classroom: Cowley County Fairgrounds.

The program includes classroom and laboratory instruction along with field activities. Field activities will include a demonstration of composting equipment such as a turner, and collection of compost samples for testing for maturity as well as chemical and physical properties.

Training Topics

- ✓ Composting science and methods
- ✓ Compost biology
- ✓ Compost feedstocks
- ✓ Food waste composting
- ✓ Determining compost mixes
- ✓ Permit and legal requirements
- ✓ Site design and maintenance
- ✓ Compost equipment
- ✓ Windrow construction and aeration
- ✓ Compost moisture
- ✓ Field and laboratory monitoring:
- ✓ Learn to measure moisture, temperature, pH, soluble salts, maturity, interpreting laboratory data
- ✓ Compost quality and use
- ✓ Methods of composting: static versus active

For information:

DeAnn Presley
KSU Agronomy Department
2014 Throckmorton Plant Sci. Ctr.
Manhattan, KS 66506
785-532-1218
email: deann@ksu.edu

REGISTRATION: Kansas Composting Operators' School

Name _____ I prefer to attend (circle): Hays Winfield
Address _____ City _____ State _____ ZIP _____
Phone _____ E-Mail _____
Company/Agency: _____

Please mention any mobility issues or dietary preferences here: _____

Fee: \$180 – Includes lunches, breaks, and training materials. (Hotels are not included, both cities have several options to choose from). Payment (payable to KSU Agronomy) must accompany registration. Mail to: Extension Agronomy, 2014 Throckmorton Plant Sciences Center, Kansas State University, Manhattan, KS 66506. Online registration available for those who want to pay with a credit card (additional fees apply), <http://www.agronomy.k-state.edu/extension/soil-management/>. Registration due by May 4, 2018. Class size is limited to 20 people.

8. Kansas wheat management survey - Producer input needed

The Wheat Production Group at Kansas State University has joined forces with the Kansas Wheat Commission to learn from wheat producers around Kansas. We are conducting a **wheat management survey** across several fields around the state so we can analyze and evaluate the collected data later in order to **develop best management practices** for different regions around the state.

On-farm research surveys are different than a typical controlled research experiment as they collect management strategies which a producer has adopted on their individual fields. The **main objective** of this project is to collect field-level information about wheat management for hundreds of wheat fields around Kansas so we can **learn about the most successful management practices adopted for each region**. We are currently collecting data from the past two growing seasons (2015-16 and 2016-17), and from 2017-18 in the near future.

This project is funded through the Kansas Wheat Commission and the **survey can be completed on-line, in person, or over the phone** – whichever is the most convenient for you, the wheat producer. Your identity will be confidential and no personally identifiable information will be associated with your responses. Data will only be presented as aggregated and never on a field by field basis.

If you could spend a few minutes to help us learn more about successfully management practices in your own operation, we would be extremely grateful. You will be helping Kansas State University and the Kansas Wheat Commission **improve our current management recommendations with your own experiences**.

To complete the online survey, please visit: <http://kswheat.com/on-farm-research-survey>

If you prefer in person or a phone survey, please contact Brent Jaenisch at 785-370-1273 or at bjjaenisch@ksu.edu.

By participating in this survey, you will be automatically entitled to a **detailed report in the end of the project** so you learn about our findings before anyone else.

If you have any questions or concerns don't hesitate to contact us.



Brent Jaenisch, Graduate Student

bjjaenisch5@ksu.edu

Romulo Lollato, Wheat and Forages Specialist

lolato@ksu.edu

Kansas State University Department of Agronomy

2004 Throckmorton Plant Sciences Center | Manhattan, KS 66506

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9. 2018 In-Depth Wheat Diagnostic School, May 9-10 in Garden City

K-State Research and Extension will hold the 2018 Wheat In-Depth Diagnostic School on May 9th and 10th at the Southwest Research-Extension Center, 4500 E Mary Street, Garden City. The hours on May 9 are 9 a.m. to 4:30 p.m. On May 10, the hours are 8 a.m. to 2 p.m.

Registration cost is \$140 before May 1 and \$180 after May 1, including walk-ins. Breakfast and lunch is included with your registration along with an extensive take-home field book.

The latest techniques and technology in agriculture are within your reach! Join us for this year's In-Depth Wheat Diagnostic School to learn from KSRE experts and discover cutting edge breakthroughs in wheat production.

Topics to be covered this year include:

- Wheat growth and development
- Weed management
- Disease identification and management
- Growing 100 bushel dryland wheat in western KS
- Irrigation technology
- Wheat fertilizer management
- Insect management in wheat and canola
- Canola production
- Weed identification
- Production cost of wheat and canola
- Farmer's success story of growing canola in western KS

Speakers at the event include:

- Romulo Lollato
- Stu Duncan
- Dallas Peterson
- Erick DeWolf
- Horton Seed Services representative
- Jonathan Aguilar
- Ajay Sharda
- Dorivar Ruiz Diaz
- AJ Foster
- Sarah Zukoff
- Mike Stamm
- John Holman
- Kevin Donnelly
- Monte Vandever
- Tyson Good

This event will also offer Certified Crop Advisory and Commercial Applicator credits.

Interested individuals can register online at <http://www.global.ksu.edu/wheat-diagnostic>

For registration questions, please contact registration@ksu.edu or call 785-532-5569



2018 In-Depth Wheat Diagnostic School

9:00 a.m. – 4:30 p.m. May 9th *and* 8:00 a.m. – 2:00 p.m. May 10th

Location

K-State SW Research-Extension Center
4500 E Mary Street
Garden City, KS 67846

Cost:

\$140 before May 1; \$180 for registrations after May 1 and walk-ins. Breakfast & lunch is included with registration and will be provided.

The latest techniques and technology in agriculture are within your reach. Join us for this year's Wheat Diagnostic School to learn from K-State Research and Extension experts and discover the cutting edge breakthrough in wheat production. Registration is \$140 before May 1, and includes access to renowned speakers and an extensive take-home field book.

Topics

- Wheat growth and development
- Weed management
- Disease identification & management
- Growing 100 bu. Dryland wheat in Western KS
- Irrigation Technology
- Fertilizer Application Technology
- Wheat Fertilizer management
- Insect Management Wheat & Canola
- Canola Production
- Weed Identification
- Production Cost of wheat & canola
- Farmer's success story in growing canola in Western Kansas

Speakers

- Romulo Lollato
- Stewart Duncan
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or

call 785-532-5569.

Kansas State University is committed to making its services, activities and programs accessible to all participants. If you have special requirements due to a physical, vision, or hearing disability, contact AJ Foster, 620-275-9164.

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