



## Extension Agronomy

# eUpdate

---

*03/30/2018*

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](mailto:kgehl@ksu.edu), or Curtis Thompson, Extension Agronomy State Leader and Weed Management Specialist 785-532-3444 [cthompso@ksu.edu](mailto:cthompso@ksu.edu).

Subscribe to the eUpdate mailing list: <https://listserv.ksu.edu/cgi-bin?SUBED1=EUPDATE&A=1>

---

<b>1. First hollow stem update: March 28, 2018.....</b>	<b>3</b>
<b>2. Starter fertilizer rates and placement for corn.....</b>	<b>6</b>
<b>3. K-State scientists discover breakthrough in understanding glyphosate resistance in pigweeds.....</b>	<b>9</b>
<b>4. Kansas Soil of the Month for March: Dwight.....</b>	<b>12</b>
<b>5. Ten commonly asked questions when pondering dry ponds.....</b>	<b>17</b>
<b>6. Kansas drought update - March 27, 2018.....</b>	<b>23</b>
<b>7. 2018 In-Depth Wheat Diagnostic School, May 9-10 in Garden City.....</b>	<b>31</b>
<b>8. KDA now accepting approved on-line dicamba applicator training.....</b>	<b>33</b>
<b>9. 2017 Census of Agriculture - It's not too late to be counted!.....</b>	<b>34</b>

## 1. First hollow stem update: March 28, 2018

Cattle should be removed from wheat pastures when the crop reaches first hollow stem (FHS). Grazing past this stage can severely affect wheat yields (for a full explanation, please refer to eUpdate article “Optimal time to remove cattle from wheat pastures: First hollow stem” in the Feb. 23, 2018 issue).

### First hollow stem update

In order to screen for FHS during this important time in the growing season, the K-State Extension Wheat and Forages crew measures FHS on a weekly basis in 28 different commonly grown wheat varieties in Kansas. The varieties are in a September-sown replicated trial at the South Central Experiment Field near Hutchinson.

Ten stems are split open per variety per replication (Figure 1), for a total of 40 stems monitored per variety. The average length of hollow stem is reported for each varieties in Table 1. **As of March 28, all except four varieties had already reached first hollow stem.**



**Figure 1. Ten main wheat stems were split open per replication per variety to estimate first hollow stem for this report, for a total of 40 stems split per variety. Photo by Romulo Lollato, K-State Research and Extension.**

**Table 1. Length of hollow stem measured Feb. 21, Feb. 28, Mar. 6, Mar. 14, Mar. 21, Mar. 23, and Mar. 28 2018, of 28 wheat varieties sown mid-September 2017 at the South Central Experiment Field near Hutchinson. The critical FHS length is 1.5 cm (about a half-inch or the diameter of a dime). Least significant difference (LSD) between varieties for statistical significance is also shown.**

<b>Variety</b>	<b>2/21</b>	<b>2/28</b>	<b>3/6</b>	<b>3/14</b>	<b>3/21</b>	<b>3/23</b>	<b>3/28</b>
AM Eastwood	0.19	0.28	0.30	0.52	0.79	<b>2.35</b>	--
NE10478-1	0.15	0.25	0.24	0.44	0.71	1.11	<b>1.66</b>
LCH13-22	0.16	0.21	0.24	0.40	0.65	1.39	<b>1.99</b>
LCH14-55*	0.17	0.19	0.25	0.42	0.51	1.12	<b>2.06</b>
LCH14-89	0.15	0.22	0.24	0.39	0.58	1.16	<b>1.72</b>
LCS Chrome	0.16	0.20	0.25	0.30	0.42	0.81	1.15
LCS Pistol	0.17	0.22	0.27	0.41	0.63	<b>1.55</b>	--
Bentley	0.12	0.22	0.23	0.35	0.58	1.20	1.46
Doublestop CL Plus	0.15	0.21	0.26	0.32	0.48	1.17	1.39
Gallagher	0.18	0.26	0.30	0.50	0.69	<b>1.64</b>	--
Iba	0.16	0.20	0.26	0.41	0.53	1.31	<b>1.63</b>
Lonerider	0.15	0.21	0.26	0.41	0.74	<b>1.78</b>	--
OK12716	0.15	0.21	0.28	0.35	0.61	1.36	<b>1.51</b>
Ruby Lee	0.13	0.19	0.25	0.46	0.57	1.46	<b>2.28</b>
Smith's Gold	0.18	0.27	0.24	0.48	0.89	1.29	<b>2.42</b>
Spirit Rider	0.19	0.24	0.31	0.47	0.55	<b>1.65</b>	--
Stardust	0.18	0.23	0.25	0.43	0.73	<b>1.68</b>	--
Paradise	0.19	0.23	0.32	0.43	0.78	1.24	<b>2.37</b>
Bob Dole	0.19	0.25	0.28	0.35	0.75	1.35	<b>1.78</b>
SY Achieve CL2	0.18	0.26	0.25	0.54	1.33	<b>2.52</b>	--
SY Benefit	0.18	0.26	0.30	0.52	1.02	<b>2.43</b>	--
SY Rugged	0.13	0.23	0.23	0.39	0.73	1.05	<b>1.75</b>
1863	0.21	0.24	0.30	0.63	1.27	<b>1.57</b>	--
Joe	0.16	0.21	0.27	0.37	0.59	1.18	<b>1.62</b>
Larry	0.15	0.22	0.25	0.39	0.58	1.31	<b>1.52</b>
Oakley CL	0.14	0.21	0.28	0.37	0.43	0.57	1.34
Tatanka	0.12	0.22	0.24	0.38	0.66	1.20	<b>1.70</b>
Zenda	0.19	0.23	0.28	0.41	0.54	1.08	<b>1.72</b>
Differences among varieties	No	Yes	No	Yes	Yes	Yes	Yes
LSD	-	0.04	-	0.33	0.90	0.79	0.39

The varieties that reached FHS between March 23 and 28 were NE10478-1, LCS13-22, LCH14-558, LCS14-89, Iba, OK12716, Ruby Lee, Smith's Gold, Paradise, Bob Dole, SY Rugged, Joe, Larry, Tatanka, and Zenda. Hollow stem will continue to develop quickly in the next few days across all varieties; thus, even varieties that had not reached FHS at time of this report should be scouted closely to avoid grazing past FHS.

The intention of this report is to provide producers an update on the progress of first hollow stem

development in different wheat varieties. Producers should use this information as a guide, but it is extremely important to monitor FHS from an ungrazed portion of each individual wheat pasture to take the decision of removing cattle from wheat pastures.

Contact author:

Romulo Lollato, Wheat and Forages Specialist  
[lolato@ksu.edu](mailto:lolato@ksu.edu)

Co-authors:

Larissa Bonassi, Visiting Assistant Scientist

Felipe Spolidorio, Visiting Assistant Scientist

Jose Guilherme Cesario Pereira Pinto, Visiting Assistant Scientist

Gustavo Bacco, Graduate Research Assistant

## 2. Starter fertilizer rates and placement for corn

Many producers in Kansas could benefit by using starter fertilizer when planting corn. Starter fertilizer is simply the placement of a small rate of fertilizer, usually nitrogen (N) and phosphorus (P), near the seed at planting time. The idea is this fertilizer "jump starts" growth in the spring. It is not unusual for a producer to see an early season growth response to starter fertilizer application. But whether that increase in early growth translates to an economic yield response is not a sure thing in Kansas. The crops response to starter fertilizer depends on soil fertility levels, tillage system, soil temperature, and N placement method. Phosphorus source is not an important factor.

### Soil fertility levels

The lower the fertility level, the greater the chance of an economic response to starter fertilizers. A routine soil test will reveal available P and potassium (K) levels.

- **If soils test low or very low in P**, below 20 ppm, there is a very good chance that producers will obtain an economic yield response to applying a starter fertilizer containing P, even in some low-yield environments.
- **If the soil test shows a medium level of P**, 20-30 ppm, it's still possible to obtain a yield response to P fertilizer. But the yield response will not occur as frequently, and may not be large enough to cover the full cost of the practice.
- **If the soil test is high**, above 30 ppm, economic responses to starter P fertilizers are rare. The chances of an economic return at high P soil test levels are greatest when planting corn early in cold, wet soils. In general, the same principles apply with K.
- **If soil tests are low**, below 130 ppm, the chances of a response to K in starter are good. The lower the soil test level, the greater the odds of a response.

All of the recommended P and/or K does not need to be applied as starter. If the soil test recommendation calls for high rates of P and K in order to build up or maintain soil test levels, producers will often get better results by splitting the application between a starter and a preplant broadcast application. As a general rule, starter fertilizer should be limited to the first 20-30 pounds of P or K per acre, with the balance being broadcast for best responses.

### Phosphorus source

Many producers ask the same questions regarding P in starter fertilizer:

- Does the type of phosphorus used as a starter make any difference?
- In particular, what about the ratio of orthophosphate to polyphosphate in the fertilizer product?

Liquid 10-34-0 is composed of a mixture of ammonium polyphosphates and ammonium orthophosphates. The dissolved ammonium orthophosphate molecules are identical to those found in dry MAP (e.g. 11-52-0) and/or DAP (e.g. 18-46-0). Ammonium polyphosphates are simply chains of orthophosphate molecules, formed by removing a molecule of water, and are quickly converted by soil enzymes back to individual orthophosphates identical to those provided by MAP and/or DAP.

Polyphosphates were developed primarily to improve the storage characteristics of fluid phosphate products (and other fertilizers made from them) and to increase the analysis of liquid phosphate fertilizers. Ammonium polyphosphate is equal in agronomic performance to ammonium orthophosphates when applied at the same  $P_2O_5$  rates in a similar manner. Liquid phosphate products are equal in agronomic performance to dry phosphate products if applied at equal  $P_2O_5$  rates in a similar manner. When polyphosphate is added to soil, a process called hydrolysis breaks down the polyphosphate chains into orthophosphates. The concern of many people is the length of time it takes for this process to occur. Previous studies indicate that **although it may take a few days to complete the hydrolysis process, the majority is completed in 48 hours**. As a result, phosphorus in soil solution will typically be similar from either source shortly after application.

### Tillage system

No-till corn will almost always respond to a starter fertilizer that includes N – along with other needed nutrients – regardless of soil fertility levels or yield environment. This is especially so when preplant N is applied as deep-banded anhydrous ammonia or UAN, or where most of the N is sidedressed in-season. That's because no-till soils are almost always cooler and wetter at corn planting time than soils that have been tilled, and N mineralization from organic matter tends to be slower at the start of the season in no-till environments.

In reduced-till systems, the situation becomes less clear. The planting/germination zone in strip-till or ridge-till corn is typically not as cold and wet as no-till, despite the high levels of crop residue between rows. Still, N and P starter fertilizer is often beneficial for corn planted in reduced-till conditions, especially where soil test levels are very low, or low, and where the yield environment is high. As with no-till, reduced-till corn is also less likely to respond to an N starter if more than 50 pounds of N was broadcast prior to or shortly after planting.

Conventional- or clean-tilled corn is unlikely to give an economic response to an N and P starter unless the P soil test is low.

### Starter fertilizer placement

Producers should be very cautious about applying starter fertilizer that includes N and/or K, or some micronutrients such as boron, in direct seed contact. It is best to have some soil separation between the starter fertilizer and the seed. The safest placement methods for starter fertilizer are either:

- A subsurface-band application 2 to 3 inches to the side and 2 to 3 inches below the seed, or
- A surface dribble-band application 2 to 3 inches to the side of the seed row at planting time, especially in conventional tillage or where farmers are using row cleaners or trash movers in no-till.

If producers apply starter fertilizer with the corn seed, they run an increased risk of seed injury when applying more than 6 to 8 pounds per acre of N and K combined in direct seed contact on a 30-inch row spacing. Nitrogen and K fertilizer can result in salt injury at high application rates if seed is in contact with the fertilizer. Furthermore, if the N source is urea or UAN, in-furrow application is not recommended regardless of fertilizer rate. Urea converts to ammonia, which is very toxic to seedlings and can significantly reduce final stands.

Previous work in Kansas compared in-furrow, 2x2, and surface band placement of different starter fertilizer rates in a multi-year study on irrigated corn. Excellent responses from up to 30 pounds of N combined with 15 pounds of P were obtained with both the 2x2 and surface-band placement. In-furrow placement was not nearly as effective. This was due to stand reduction from salt injury to the germinating seedlings, likely from the high application rate of N plus K in furrow, indicating the importance of monitoring the N+K rates for in furrow application. Where no starter, or the 2x2 and surface band placement, was used, final stands were approximately 30,000-31,000 plants per acre. However, with the 5-15-5 in-furrow treatment, the final stand was approximately 25,000. The final stand was just over 20,000 with the in-furrow 60-15-5 treatment.

**Table 1. Effect of starter fertilizer placement on corn yield at North Central Experiment Field**

<b>Fertilizer applied (lbs)</b>	<b>In-Furrow placement</b>	<b>2x2 Band placement</b>	<b>Surface Band placement</b>
	Yield (bu/acre)		
Check: 159 bu	--	--	--
5-15-5	172	194	190
15-15-5	177	197	198
30-15-5	174	216	212
45-15-5	171	215	213
60-15-15	163	214	213
Average	171	207	205

Dorivar Ruiz Diaz, Nutrient Management Specialist  
[ruizdiaz@ksu.edu](mailto:ruizdiaz@ksu.edu)



### 3. K-State scientists discover breakthrough in understanding glyphosate resistance in pigweeds

*The following is an edited version of a recent Kansas State Research and Extension news story written by Pat Melgares, Communication Coordinator, News Media Services. The full version of the story can be found at: <http://www.ksre.k-state.edu/news/stories/2018/03/glyphosate-resistance-pigweed.html>*

Kansas State University researchers have discovered how weeds develop resistance to the popular herbicide glyphosate, a finding that could have broad future implications in agriculture and many other industries.

Their work is detailed in an article that appears in the March 12 edition of the [Proceedings of the National Academy of Sciences](#), known as PNAS and considered to be one of the most-cited journals for scientific research in the world. According to its website, PNAS receives more than 21 million hits per month.

“Herbicide resistance in weeds has been a huge problem, not only in Kansas and the U.S. but many parts of the world,” said Mithila Jugulam, a K-State weed scientist and co-author of the PNAS article.

“What we found that was new was how these weeds have evolved resistance to glyphosate in such a short time. If you look at the evolution of glyphosate resistance in Palmer amaranth, based on our research, it appears to have occurred very rapidly.”

Palmer amaranth and common waterhemp are the two troublesome pigweeds in Kansas agricultural fields, as well as other parts of the United States. Glyphosate – the key ingredient in the Roundup brand – is the herbicide that is widely used for controlling many weeds. But Jugulam notes that glyphosate resistance is becoming more prevalent in many states.

“We found that glyphosate-resistant Palmer amaranth plants carry the glyphosate target gene in hundreds of copies,” Jugulam said. “Therefore, even if you applied an amount much higher than the recommended dose of glyphosate, the plants would not be killed.”

Bikram Gill, director of Kansas State University’s [Wheat Genetics Resource Center](#) who has worked in plant genetics for nearly 50 years, said the researchers knew pretty quickly that the genetic makeup of resistant weeds was different.

“Normally, the genetic material in all organisms – including humans – is found in long, linear DNA molecules, called chromosomes,” said Gill, another co-author of the study. “But when (K-State researchers) Dal-Hoe Koo and Bernd Friebe, the chromosome experts on the team, looked at these glyphosate-resistant weeds, the glyphosate target gene, along with other genes actually escaped from the chromosomes and formed a separate, self-replicating circular DNA structure.”

Scientists refer to this structure as extra-chromosomal circular DNA ([eccDNA](#)). Each eccDNA has one copy of the gene that produces an enzyme that is the target for glyphosate.

“Because of the presence of hundreds of eccDNAs in each cell, the amount of the enzyme is also abundant,” Gill said. “Therefore, the plant is not affected by glyphosate application and the weed is resistant to the herbicide.”

Gill said the indications are that once a weed has acquired eccDNA, the resistance may evolve as quickly as in one generation.

“We think that the resistance via eccDNA is transitory: It can be passed to the weed’s offspring and other related weed species,” he said. “We have somehow caught it in between becoming permanently resistant. Eventually, we think that these eccDNAs can be incorporated into the linear chromosome. If that happens, then they will become resistant forever.”

Armed with their new knowledge, the researchers can begin work on developing strategies to negate resistance in weeds.

“It’s been known that these circular DNA/chromosomal structures can be unstable,” Jugulam said. “What we want to explore is, for example, if we do not apply glyphosate repeatedly or reduce the selection by glyphosate, can we make these ring-structured chromosomes unstable and once again make these plants susceptible to glyphosate.”

The research team (Figure 1) notes that farmers should incorporate best management strategies – such as rotating herbicides and crops – to reduce weed pressure: “This may allow evolving resistance to dissipate as we know that these eccDNAs and ring chromosomes are unstable and can be lost in the absence of herbicide selection pressure,” Jugulam said.

“Glyphosate has a lot of good characteristics as an herbicide molecule,” she added. “The recommendations that K-State and many others are promoting is ‘do not abuse glyphosate.’ Use the recommended integrated weed management strategies so that we do not lose the option of using glyphosate for the sustainability of our agriculture.”

Funding for this research was provided in part by grants from the Kansas Wheat Commission; the Kansas Crop Improvement Association; a National Science Foundation grant received through the Wheat Genetics Resource Center; the K-State Department of Agronomy (College of Agriculture); and USDA’s Agricultural Research Service. Kansas State University worked in collaboration with researchers at Clemson University, the USDA Agricultural Research Service (Mississippi) and Michigan State University.

The full research article can be accessed on the [website for the Proceedings of the National Academy of Sciences](#).



**Figure 1. K-State researchers have made a groundbreaking discovery in identifying the pathway by which weeds develop resistance to the herbicide glyphosate. Pictured, left to right, are Mithila Jugulam, Dal-Hoe Koo, Bernd Friebe, and Bikram Gill. Photo courtesy of Kansas State Research and Extension.**

Mithila Jugulam, Weed Physiology  
[mithila@ksu.edu](mailto:mithila@ksu.edu)

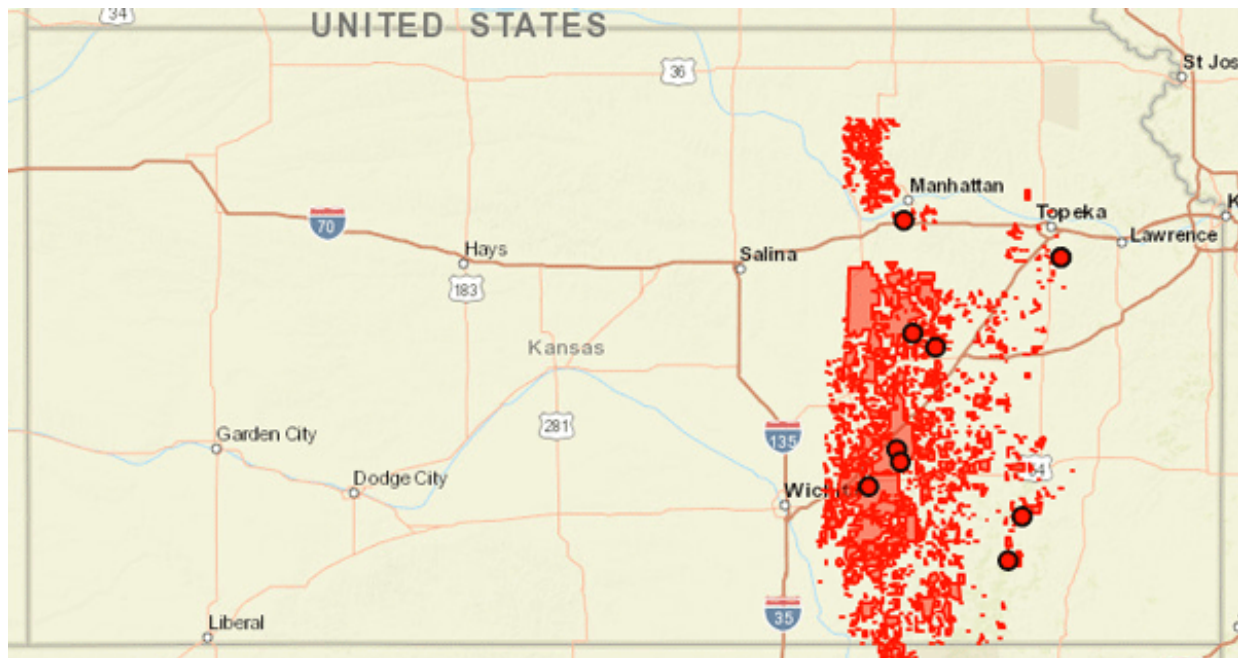
Bikram Gill, KSU Wheat Genetics Resource Center – Director  
[bsgill@ksu.edu](mailto:bsgill@ksu.edu)

#### 4. Kansas Soil of the Month for March: Dwight

In our last article, we highlighted two soils from western Kansas that are excellent for crop production, Colby and Ulysses. Cropland in Kansas represents the largest land use of non-federal rural land, but not far behind is range and pastureland. As of the last USDA National Resources Inventory report in 2012, Kansas had approximately 19 million acres of range and pastureland. Although grazing lands represent such a significant portion of Kansas (36% of the land area), most of them are not suitable for crops. These soils support native grasses such as big bluestem and numerous species of native wildflowers. Native plants are uniquely suited to survive in the Great Plains and one reason is because of their roots. Did you know that more than 75% of the biomass of native prairie plants are located underground? Healthy grazing lands support more than just cattle, they are important habitats for a variety of large and small mammals, birds, reptiles, and insects.

Dwight soil series

[Dwight](#) is a common soil series in eastern Kansas, encompassing over 280,000 acres in the state (Figure 1). It formed under tallgrass prairie vegetation, and even today most of the acres are in rangeland (more on that later). It's mapped on flat uplands in the Flint Hills, so a typical profile is a rather clayey soil with bedrock at a depth of anywhere from 3 to 5 feet below the soil surface (Figure 2).



**Figure 1. Soil series extent map in Kansas for the Dwight soil series. Map created using [USDA-NRCS Official Soil Series Description](#) website.**

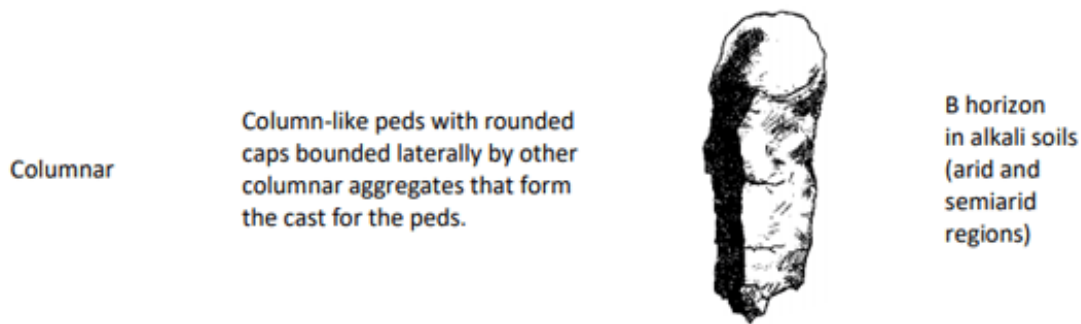




**Figure 2. Dwight soil profile monolith. Photo by DeAnn Presley, K-State Research and Extension.**

Salty like the ocean

Dwight soils are unique because they contain high levels of salts, and in particular, they contain a lot of sodium. The word sodium comes from the English word soda and from the Medieval Latin word sodanum, which means "headache remedy." Sodium's chemical symbol "Na" comes from the Latin word for sodium carbonate, natrium. What does this have to do with Dwight? The Dwight series is a "Natrustoll" and that means it's a mollisol (high in decomposed organic matter which is a good thing) but, when you combine lots of sodium with the clayey subsoil, the clay swells. Swelling clay reduces the soil's permeability, and it also creates an interesting looking structure called columnar. Columnar structure looks like rectangles with round tops—as the sodium causes the clay particles to swell in three dimensions, pore space is squeezed out in every direction, and the tops of the rectangles puff up like biscuits (Figure 3.)



**Figure 3. Columnar soil structure looks like rectangles with rounded, puffed tops (Moorberg and Crouse, 2017).**

Chicken or egg? Bison or wallow?

Dwight soils occur on broad, flat uplands and if you see a little depression in a pasture in eastern Kansas (Figure 4), there's a good chance that this is a Dwight soil. Some might look at that and call it a buffalo wallow, but a Kansan would quickly say "actually, it's a bison wallow". There are a lot of people that will say bison create wallows, however, [might it be that that bison used pre-existing bathtubs?](#) Created because sodium accumulated in shallow upland depressions?

For any trivia buffs out there, check out this factsheet on the American bison (scientific name *Bison bison*), our new national mammal - <https://www.doi.gov/blog/15-facts-about-our-national-mammal-american-bison>





**Figure 4. Upland depression. Photo by DeAnn Presley, K-State Research and Extension.**

Wallow: To roll about in a lazy, relaxed, or ungainly manner

Oklahoma State researchers studied the wallowing behavior of bison from 1993-1995. Before they turned the bison into the pasture they counted the number of depression areas, and “observed 170 wallowing incidents” and found that bison weren’t using clayey shallow depressions (which were high in sodium) but rather, were making new wallows on less-clayey, low-sodium soils for the purpose of dust-bathing (Coppedge et al., 1999).

Aren’t soils fascinating?

If you missed the Jan/Feb Soil of the Month, you can read all about the Colby and Ulysses soils here: <http://ksu.ag/2EMia5z>.

Stay tuned for the next Soil of the Month, coming out the last Friday in April.

DeAnn Presley, Soil Management Specialist  
[deann@ksu.edu](mailto:deann@ksu.edu)

Kathy Gehl, eUpdate editor and soil scientist  
[kgehl@ksu.edu](mailto:kgehl@ksu.edu)

## References

Coppedge, B.R., S.D. Fuhlendorf, D.M. Engle, B.J. Carter, and J.H. Shaw. 1999. Grassland soil depressions: Relict bison wallows or inherent landscape heterogeneity? *Am. Midl. Nat.* 142:383-392.

Moorberg, Colby J. and David A. Crouse. 2017. *Soils Laboratory Manual, K-State Edition*. 2017. NPP eBooks. 15. <http://newprairiepress.org/ebooks/15>



## 5. Ten commonly asked questions when pondering dry ponds

Rural landowners often get a good look at the bottom of their ponds during winter and particularly after a drought, and so they might be considering corrective actions such as cleaning the sediment out or adding sealants to leaky ponds.

DeAnn Presley, K-State Soil Management specialist, and Herschel George, K-State Watershed specialist, answer some frequently asked questions regarding dry ponds and what to consider before deciding to clean or amend a pond.

### **Q: Should I clean my pond or make a new pond somewhere else?**

**A:** Normally the “best” pond site was taken by the initial pond. However, if a suitable site is available, it is usually less expensive to construct a new pond than to clean sediment from an existing one. Thus, a new pond should be fully considered before deciding to clean one. Be sure to include fencing around the pond and providing a remote watering site in the cost.

### **Q: What is the purpose(s) of the pond?**

**A:** Many ponds were originally built as a water source for livestock and that may have been the best option at the time. But, is a pond the best option for the purpose now? Connection to a pressurized system either from a public water supply or a farm well can be an economic choice. Piping water to a pasture should be a financial decision. A solar pump from a pond or well might be less than half the cost of a new or cleaned-out pond and would have better quality water. See KSU Extension Pub: S-147 Waterers and Watering Systems: A Handbook for Livestock Producers and Landowners.

### **Q: What is the pond’s value (how much are you willing to spend) for the intended purpose?**

**A:** Ponds are expensive. The cost to build and the future cost to rebuild the pond when necessary should always be considered. The risks of livestock loss in the mud or falling through the ice are often forgotten until the loss occurs. Not all ponds hold water well in spite of corrective measures. The most proactive thing a producer can do is place a waterer for the livestock to drink and a fence to exclude the cattle from direct access to the pond edges. Ponds require considerable maintenance. Unless you have a reliable cost estimate from a local business person, a good estimate to clean the pond is \$10 per cubic yard.

### **Q: What do you do with sediment once the pond is cleaned?**

**A:** Often this sludge from a pond cleanout has the consistency of pancake batter - it just keeps sliding down hill. It may require a period of time to de-water before the material can be used. Placing the sediment on the back side of the dam is the best and recommended place. This sediment could be used to fill some low spots, small gullies, or ruts on the property. Putting it right next to or upslope from the pond is not a good spot because it could wash right back in.

### **Q: Can the removed sediment be used as a building or topsoil material?**

**A:** Pond fill (sediment) will not have any soil structure, so it will have very little strength. It is probably not a good idea to use pond fill under a supporting wall of a building, but it might have some value

for amending a degraded soil.

**Q: Why is my pond dry?**

**A:** Not all ponds are built on sites with good soil texture (% sand/silt/clay). The clay content is important for a pond to seal. Starting the pond construction with a core trench is essential. The core trench is constructed by digging a trench the length of the dam. The trench is dug down through the top soil, rock, sand or all material until a good clay soil layer is reached. Most core trenches are at least 4 feet. Clay soil is then packed back into the trench. The lack of a core trench is one of the major reasons ponds leak. Often a pond is built near a rock layer. If rock is encountered during construction, all rock layers must be padded with 6 inches or more of a high clay content material.

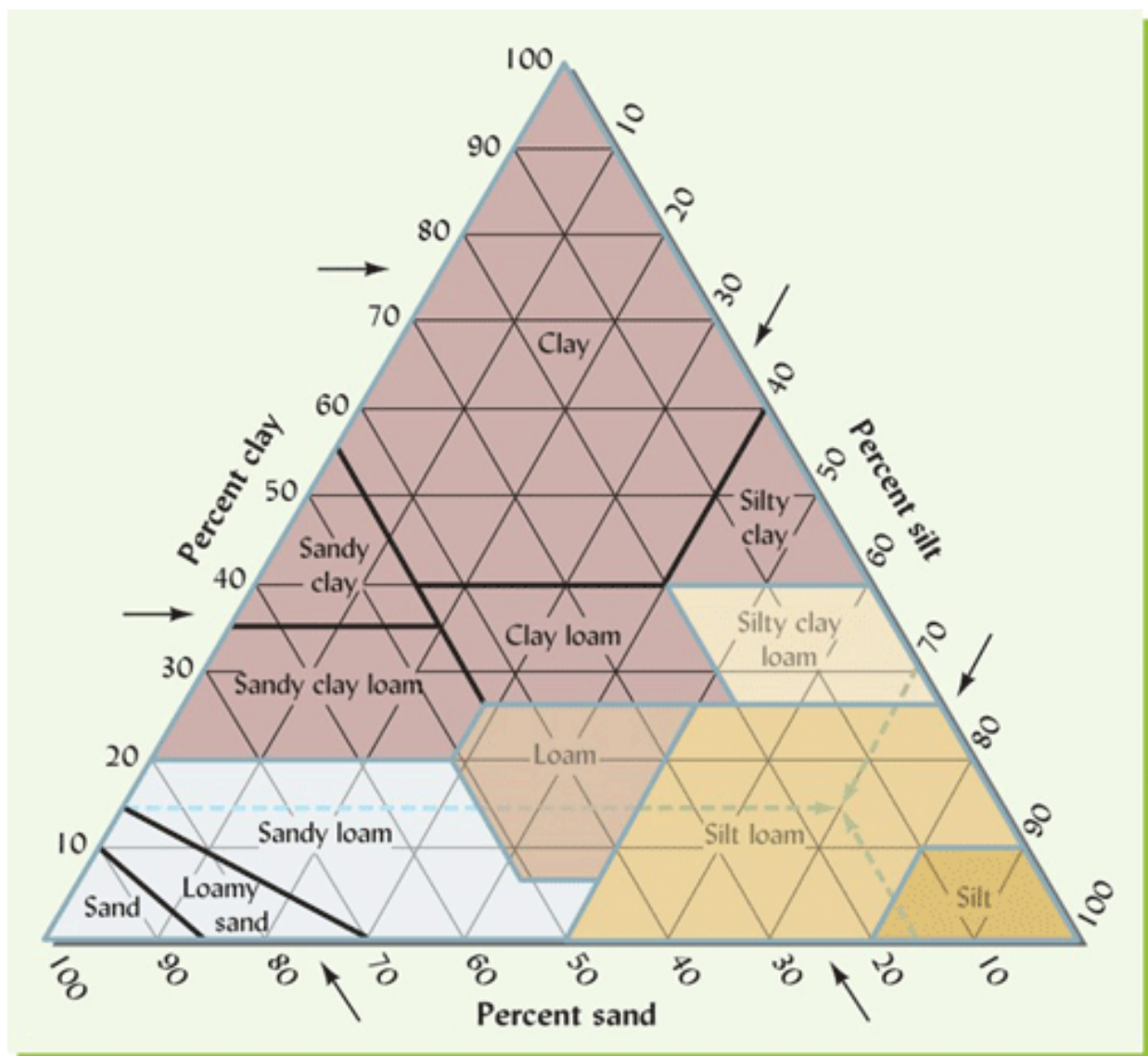
**Q: How can you tell if a soil has enough clay?**

**A:** Perform a ribbon test.

Ribbon test – Squeeze a moistened ball of soil into a ribbon between thumb and fingers.

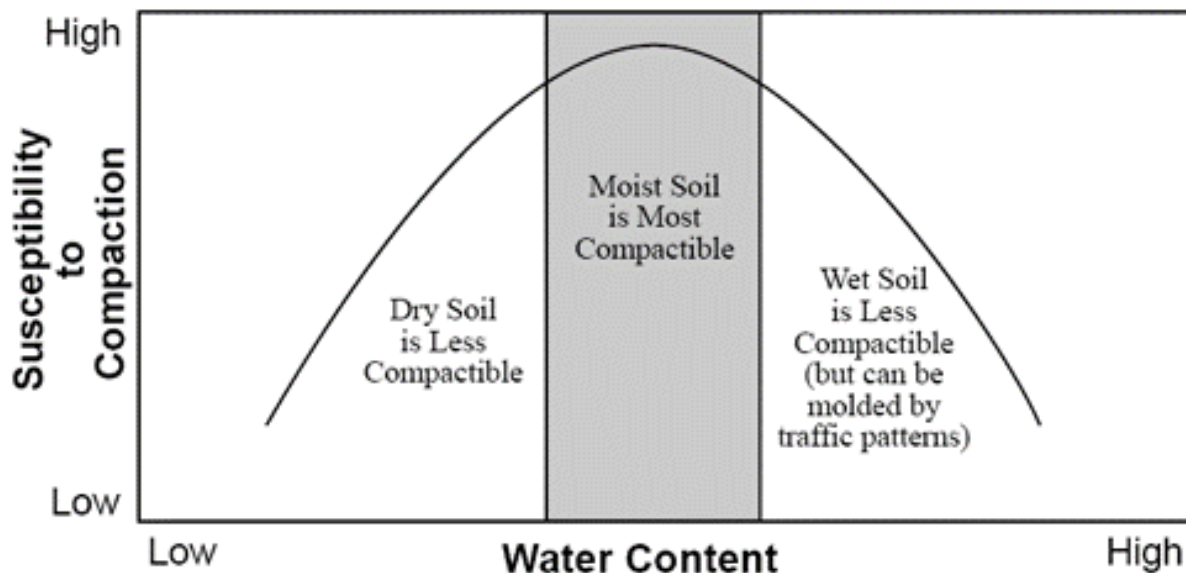
- Ribbons less than 1 inch,
  - Feels gritty = coarse texture (sandy) soil
  - Not gritty feeling = medium texture soil, high in silt
- Ribbons 1 to 2 inches
  - Feels gritty = medium texture soil
  - Not gritty feeling = fine texture soil
- Ribbons greater than 2 inches = fine texture (clayey) soil
  - Good for pond construction

Note: A soil with as little as 20% clay will behave as a clayey soil. A soil needs 45% to over 60% medium to coarse sand to behave as a sandy soil. In a soil with 20% clay and 80% sand, the soil will behave as a clayey soil.



**Figure 1. Soil textural triangle. Graphic from The Nature and Properties of Soil, 15e, Weil and Brady.**

You can also perform a moisture-by-feel test: Roll out a small clump of soil into a wire. The ideal soil moisture condition would be for it to roll out to 1/8 inch diameter without breaking or crumbling (Figure 2). If it breaks, rewet it. If it still does not roll out to 1/8 inch diameter, it may not contain enough clay, and therefore, might need a soil additive.



**Figure 2. Relationship between soil water content and susceptibility to compaction. Graphic taken from KSRE publication AF-115, Soil Compaction.**

**Q: Can you add materials to help seal a pond?**

**A:** Dispersants such as soda ash or rock salt are used for sealing lagoons or ponds. Dispersants work by causing clay particles to swell and repel each other, thus destroying soil structure. All dispersants are to be incorporated and compacted in six-inch layers during the construction. It should be noted that adding the dispersants to an existing pond may not work. It will likely be necessary to drain the pond, clean out the sediment, scarify the bottom of the pond, add the sealant, and then compact the pond.

Soda Ash

Application rate: 10-25 lbs/100 sq. ft.

Notes: Makes a good seal. Soil must contain >15% clay, and >50% clay + silt

Rock Salt

Application rate: 20 to 33 lbs/100 sq. ft.

Notes: Least expensive. (One reference suggested rates as high as 400 lbs per 100 sq. ft. during new construction would not harm fish or inhibit vegetation).

**Q: What about adding bentonite to help create a seal?**

**A:** Bentonite is a special type of clay that swells when water is added to it so it can also be used to line a pond. However, using bentonite is an expensive option. When bentonite dries out, it will crack, and so it is not recommended for use in a pond where the water level fluctuates greatly. If bentonite is



used, it should be added during the construction process and be mixed and compacted with the rest of the soil being used to construct the pond.

Bentonite

Application rate: 100-150 lbs/100 sq. ft. (silty soil)

200-300 lbs/100 sq. ft. (sandier soil)

Notes: Most expensive option

**KANSAS STATE UNIVERSITY** | Department of Agronomy

# Ask an AGRONOMIST

What materials can I use to seal a pond?

- Sodium Bentonite**  
Silty Soil: 100-150 lbs / 100 sq. ft.  
Sandy Soil: 200-300 lbs / 100sq. ft.
- Soda Ash**  
10-25 lbs/ 100 sq. ft.  
Soil must contain greater than 15% clay and greater than 50% clay silt
- Rock Salt**  
20 - 33 lbs / 100 sq. ft.

@KStateAgron  
@soilsdiva

**Q: How can I test the level of soil compaction for a pond?**

**A:** Use a soil penetrometer. Cone penetrometers are often used to locate compaction. The penetrometer rod should be driven in the soil at a rate of approximately 1 inch per second.

- Level at which root growth is impossible: 300 psi
- Level at which lagoons and ponds should be compacted: 625 psi for lagoons and 725 psi for ponds.

For more information on ponds, see the USDA-NRCS publication: *"Ponds – Planning, Design, Construction"* at: [https://www.nrcs.usda.gov/Internet/FSE\\_DOCUMENTS/nrcs144p2\\_030362.pdf](https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_030362.pdf)

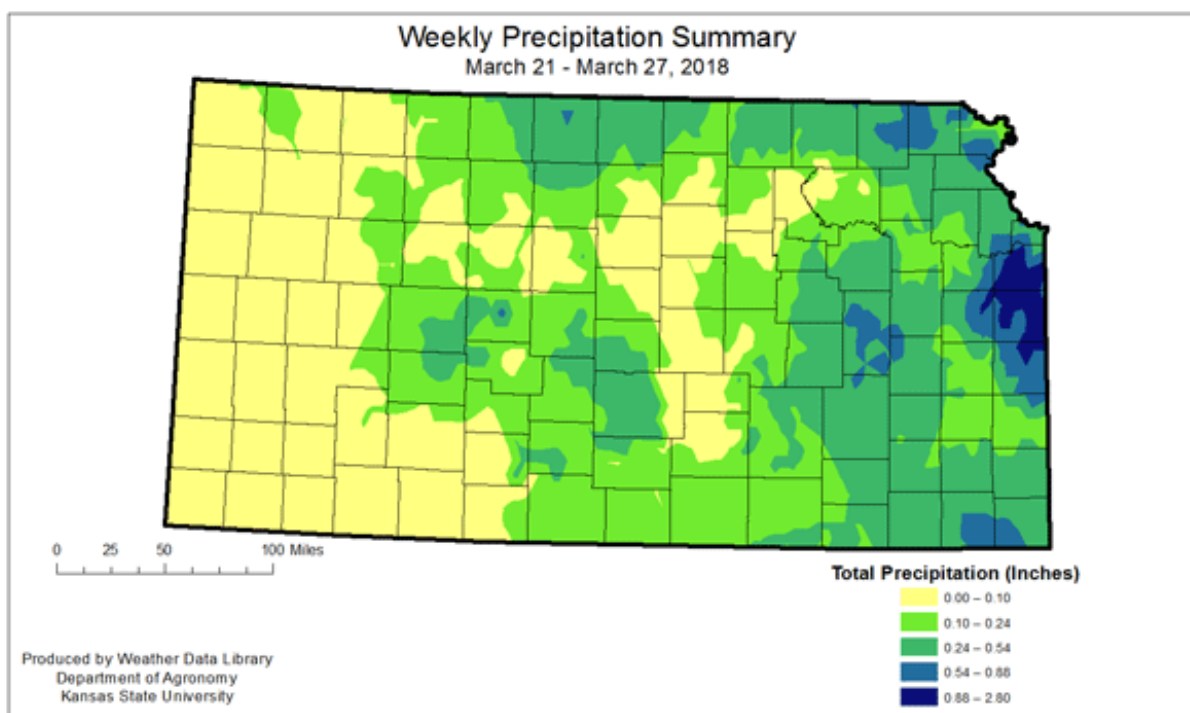
DeAnn Presley, Soil Management Specialist  
[deann@ksu.edu](mailto:deann@ksu.edu)

Herschel George, Watershed Specialist  
[hgeorge@ksu.edu](mailto:hgeorge@ksu.edu)

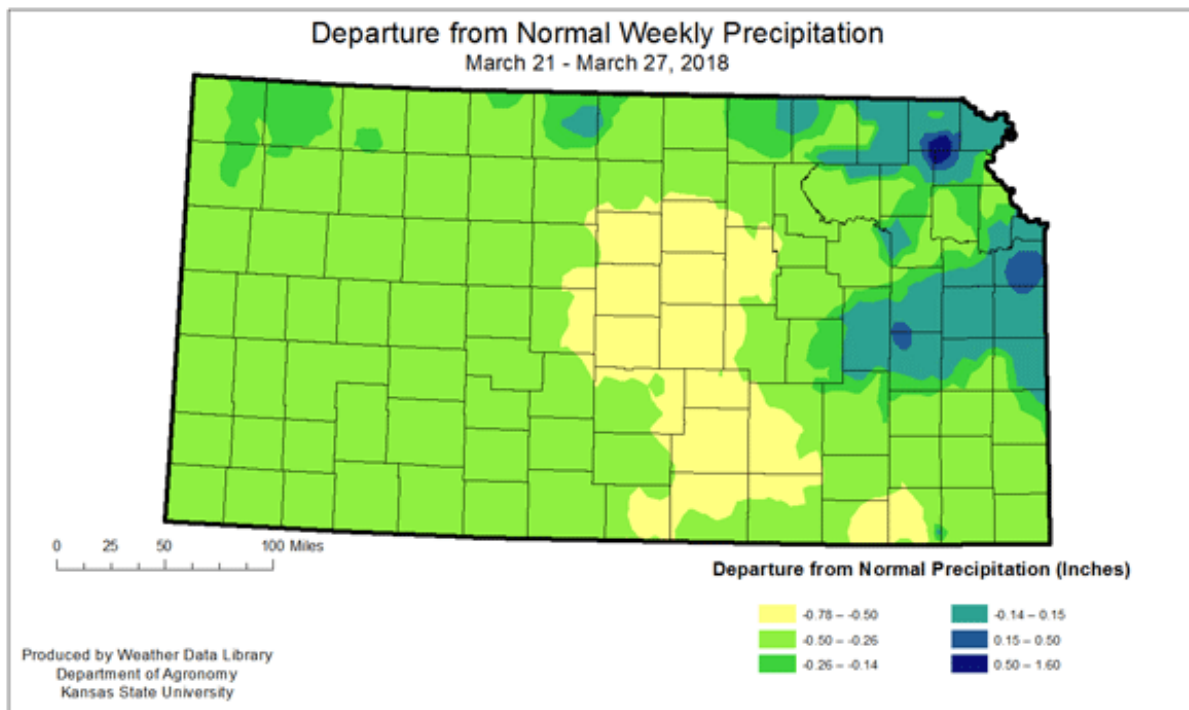
## 6. Kansas drought update - March 27, 2018

### Current status

Moisture was limited this week. State-wide, the precipitation averaged 0.13 inches or 19 percent of normal. Unfortunately, this was concentrated in the eastern third of the state, and even in those areas, divisional averages were below normal. The Northeast Division fared the best with an average of 0.42 inches, or 69 percent of normal. The Southwest Division had the lowest average at zero inches or zero percent of normal. The deficit for that division was -0.36 inches. The greatest weekly total for the National Weather Service Cooperative Stations was 2.03 inches at Horton in Brown County. The highest weekly total at a Community Collaborative Rain Hail and Snow network station was 2.46 inches at Pomona 4.6 NNE, Franklin County. For the Kansas Mesonet, the greatest total was 2.80 inches at the Miami County station in Paola. Only trace amounts of snow were reported during the week, although hail was part of the mix. That included reports of baseball size hail in north central Kansas on March 23rd and hail up to 1.5 inches in east central Kansas on the 25th.



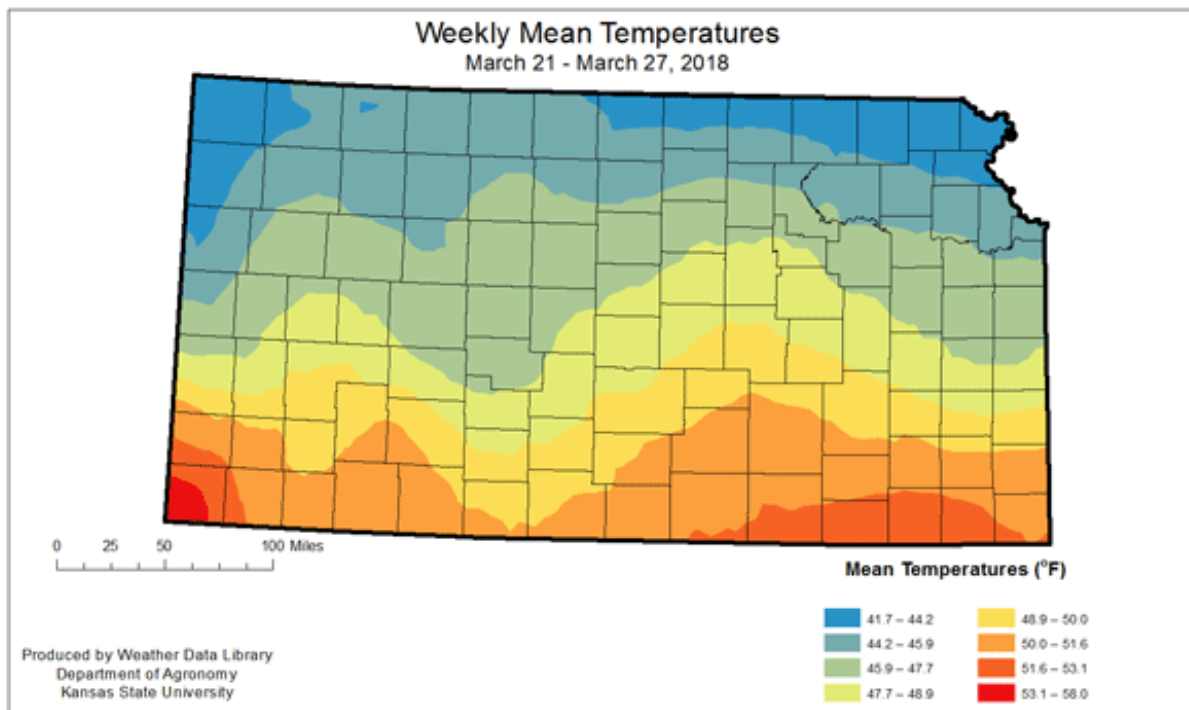
**Figure 1. Weekly total precipitation for Kansas during the week of March 21 -27 via Cooperative Observer (COOP) and Kansas Mesonet.**



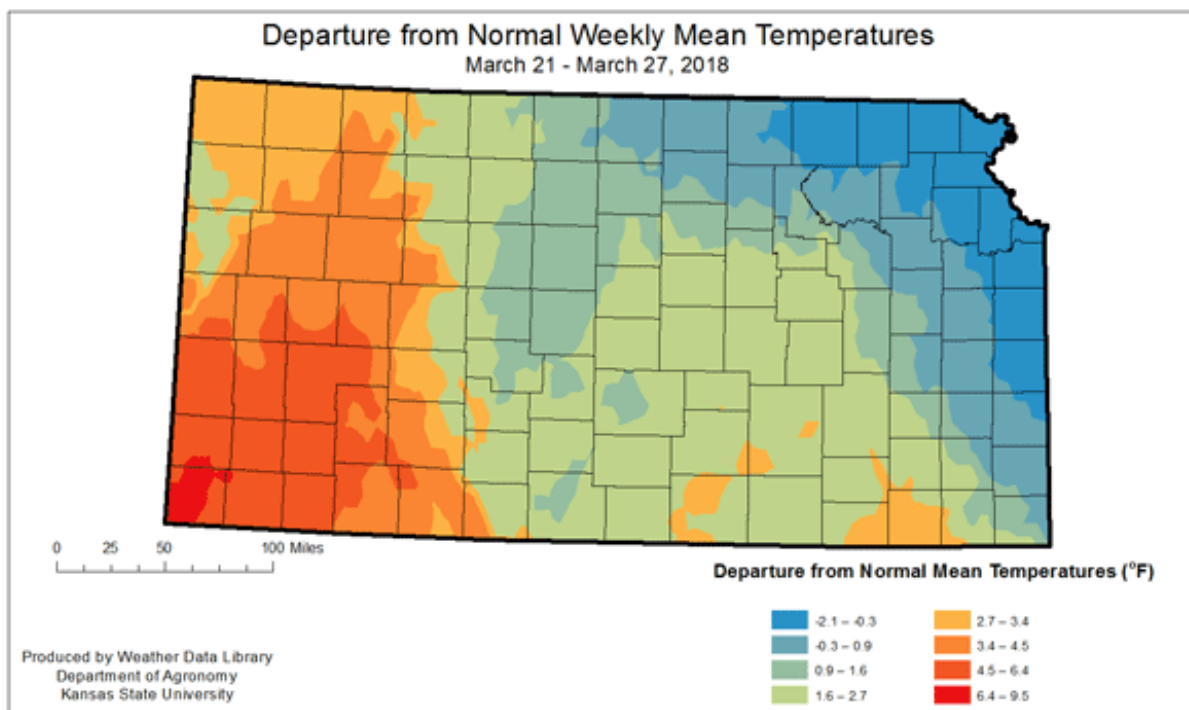
**Figure 2. Departures of weekly precipitation from normal for Kansas during the week of March 21 -27 via Cooperative Observer (COOP) and Kansas Mesonet.**

Temperatures were on the milder side, although lows did drop into the mid-twenties to mid-teens in all divisions. The statewide average temperature was 48.2 degrees F, or 2.4 degrees warmer-than-normal. The Northeast Division came closest to normal with an average of 44.6 degrees F, or 0.6 degrees cooler-than-normal. The Southwest Division had the largest departure, with an average of 52.0 degrees F or 5.7 degrees warmer-than-normal. Both the warmest and the coldest readings were recorded in the Southwest Division: highest maximum temperature was 93 degrees F at Ashland in Clark County on the 24th; lowest minimum temperature was 17 degrees F at Ulysses in Grant County on the 21st.



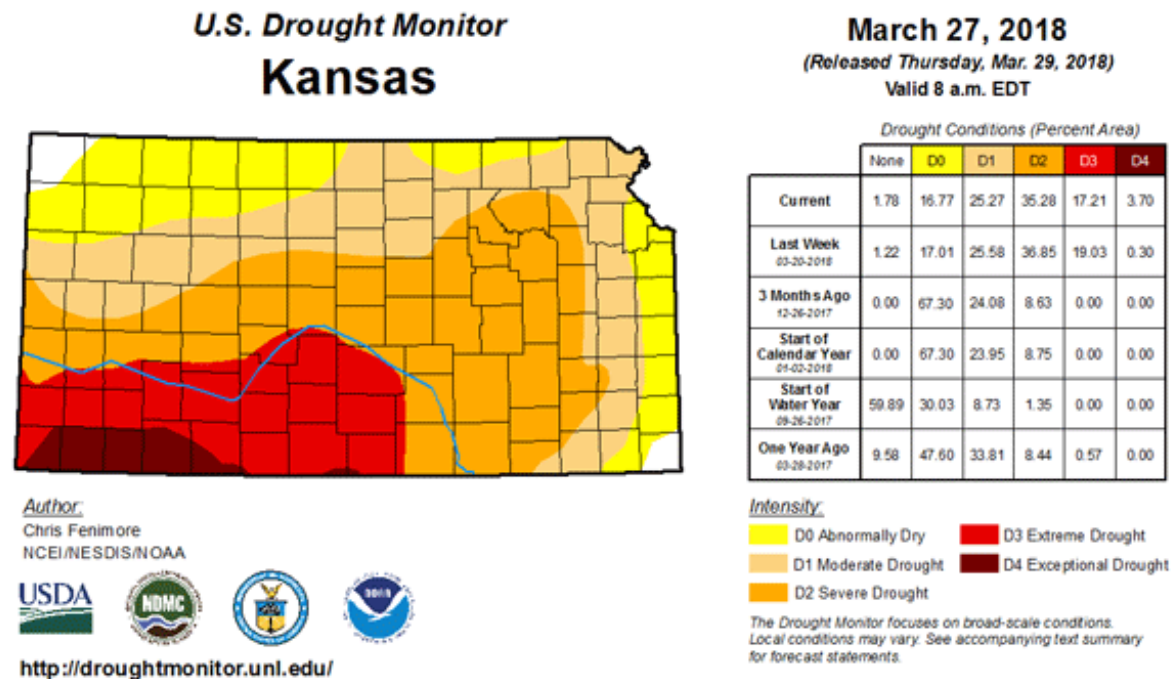


**Figure 3. Weekly mean temperatures for Kansas during the week of March 21 -27 via Cooperative Observer (COOP) and Kansas Mesonet.**

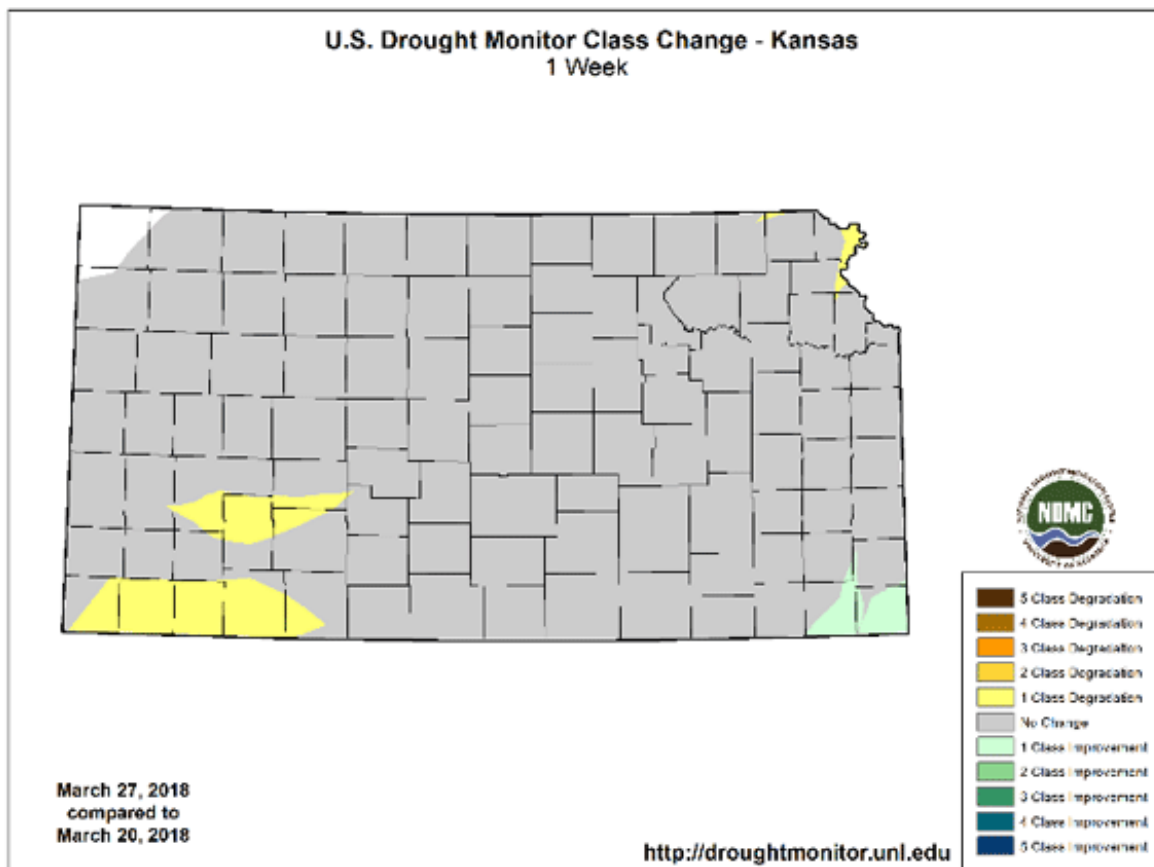


**Figure 4. Departures of weekly mean temperatures for Kansas during the week of March 21 -27 via Cooperative Observer (COOP) and Kansas Mesonet.**

Another drier-than-normal week resulted in expansion of the exceptional drought in Southwest Kansas (Figure 5). The minimal change in drought categories (Figure 6) shows how little the moisture received changed the overall short fall. Only very slight improvements can be seen where the heaviest rains fell.



**Figure 5. Current drought conditions for Kansas from the Drought Monitor.**



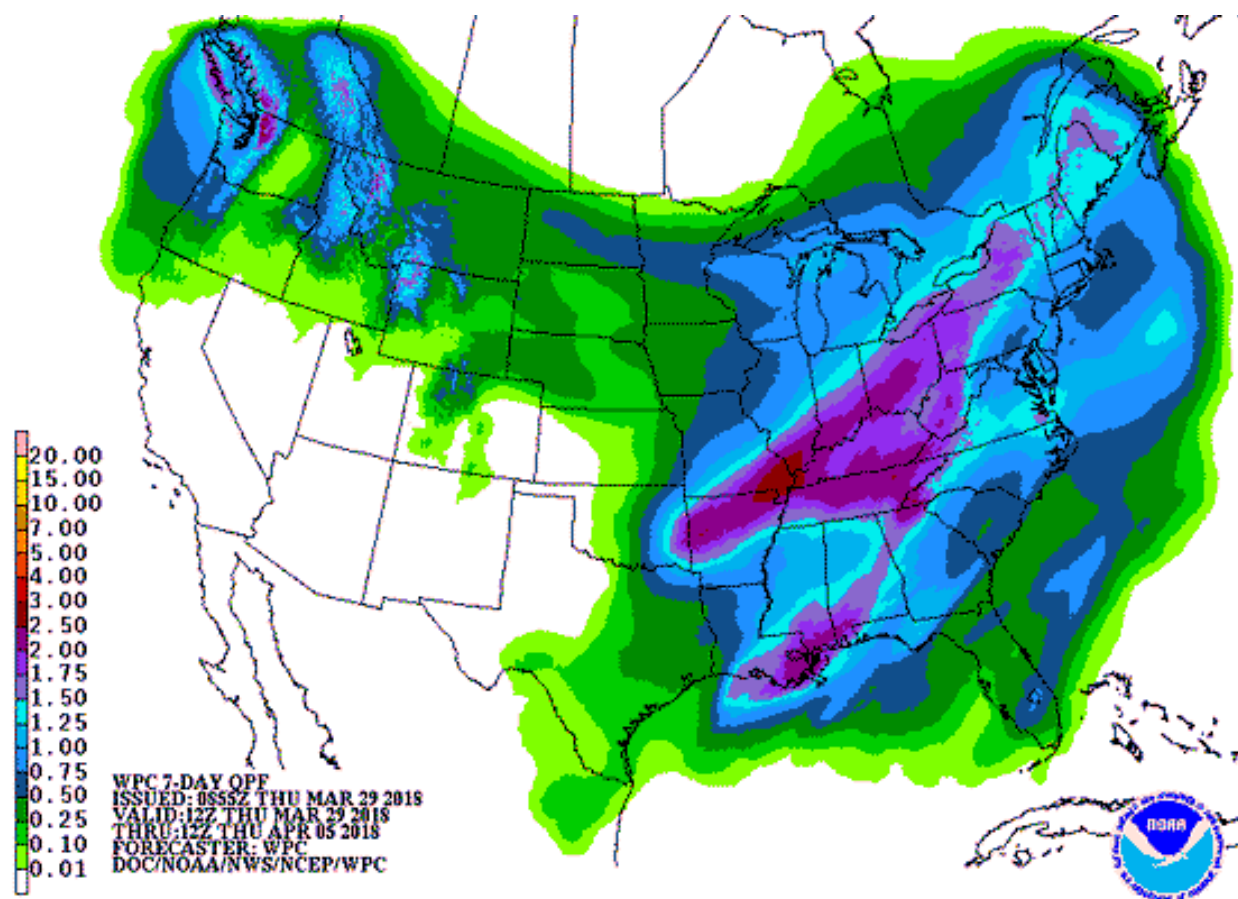
⊗

**Figure 6. Difference in drought categories.**

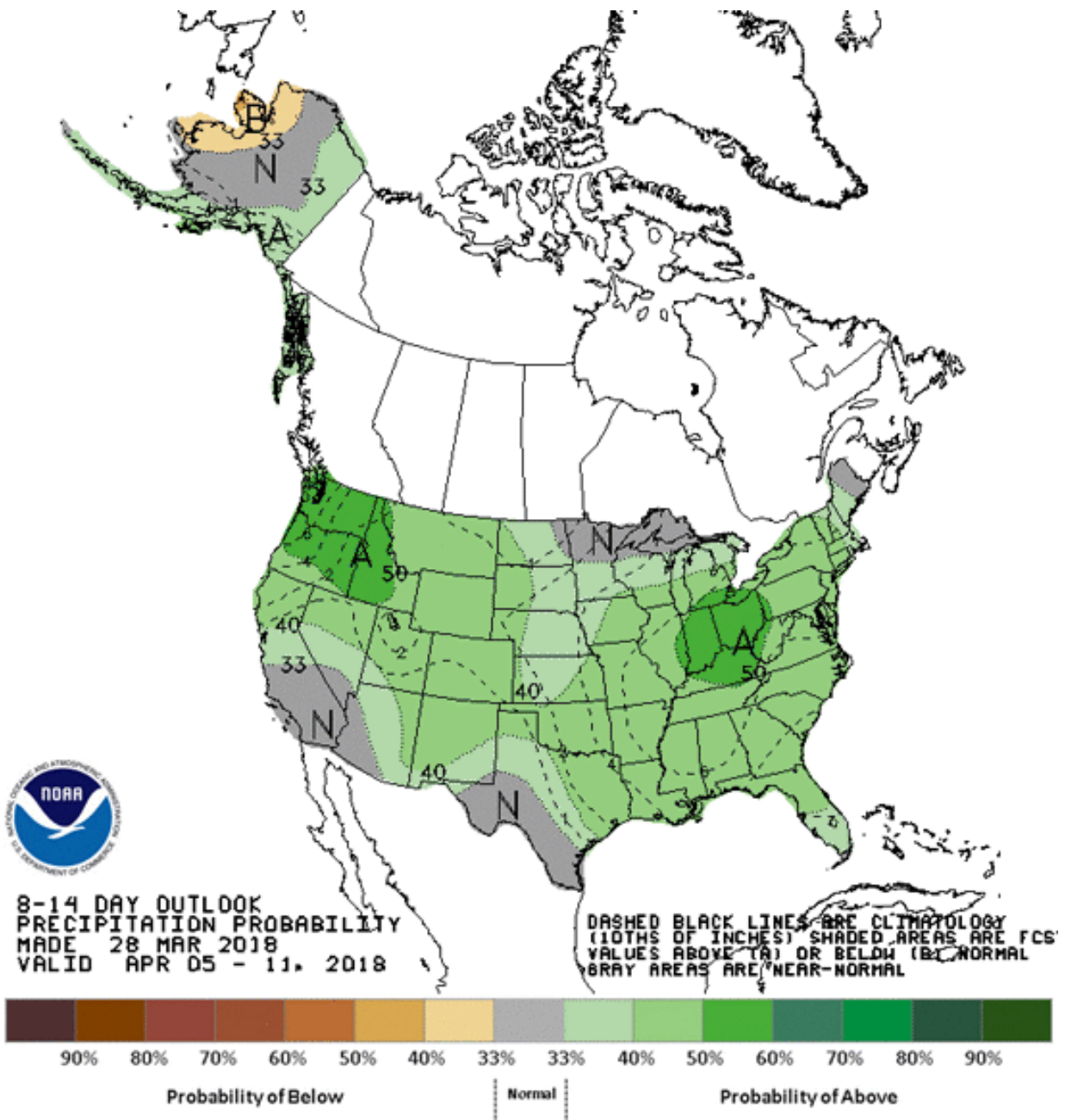
#### Precipitation and temperature outlooks

The quantitative precipitation forecast for the 7-day period ending on April 5th isn't encouraging. The areas with highest expected amounts are along the Kansas/Missouri border, particularly in the southeast corner of the state (Figure 7). That region may see up to a quarter of an inch. However, that would only be 80 percent of the normal for the week, and amounts drop sharply as you head west. From central Kansas to the southwest, the accumulation is expected to be less than a trace.

The 8 to 14-day precipitation outlook (Figure 8) indicates a slightly increased chance of above-normal precipitation across the state, but in those areas that is only a slight chance. The temperature outlook is neutral for all except the Southwest, where there is an increased chance of warmer-than-normal temperatures.



**Figure 7. Quantitative Precipitation Forecast for week ending April 5, 2018.**



**Figure 8. 8-10 day Precipitation Outlook for period ending April 11, 2018 (CPC)**

Additional information can be found in the latest Agronomy eUpdate at:

[https://webapp.agron.ksu.edu/agr\\_social/eu.throck](https://webapp.agron.ksu.edu/agr_social/eu.throck)

Or on the Kansas Climate website under weekly maps or drought reports: <http://climate.k-state.edu/maps/weekly> and <http://climate.k-state.edu/reports/weekly/2018/>

Mary Knapp, Weather Data Library  
[mnapp@ksu.edu](mailto:mnapp@ksu.edu)

Chip Redmond, Kansas Mesonet  
[christopherredmond@ksu.edu](mailto:christopherredmond@ksu.edu)

## 7. 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](mailto:registration@ksu.edu) or call 785-532-5569



## 2018 In-Depth Wheat Diagnostic School

9:00 a.m. – 4:30 p.m. May 9<sup>th</sup> and 8:00 a.m. – 2:00 p.m. May 10<sup>th</sup>

### 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
- Dallas Peterson
- Eric 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 also offers Certified Crop Advisory and Commercial Applicator credits.

Register online at <http://www.global.ksu.edu/wheat-diagnostic>

For registration questions, please contact [registration@k-state.edu](mailto:registration@k-state.edu)

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.

Kansas State Agricultural Experiment Station and Cooperative Extension Service  
K-State Research and Extension is an equal opportunity provider and employer

Kansas State University Department of Agronomy

2004 Throckmorton Plant Sciences Center | Manhattan, KS 66506

[www.agronomy.ksu.edu](http://www.agronomy.ksu.edu) | [www.facebook.com/KState.Agron](https://www.facebook.com/KState.Agron) | [www.twitter.com/KStateAgron](https://www.twitter.com/KStateAgron)



## 8. KDA now accepting approved on-line dicamba applicator training

The Kansas Department of Agriculture has announced that they will be accepting the label required dicamba specific training online in the state of Kansas starting April 1 for the dicamba products approved for use on Xtend crops. KDA has stipulated that the online training must have accountability built in to ensure that an individual must participate in the training module. On-line training is offered by some of the surrounding states, as well as from Monsanto, BASF, and DowDuPont.

Below are links to the company websites for additional information about application requirements and dicamba training:

Monsanto: <http://www.roundupreadyxtend.com/>

BASF: <https://www.engeniastewardship.com/#/training>

DowDuPont (Corteva): <http://www.dupont.com/products-and-services/crop-protection/soybean-protection/articles/fexapan-application.html>

Dallas Peterson, Weed Management Specialist  
[dpeterso@ksu.edu](mailto:dpeterso@ksu.edu)

## 9. 2017 Census of Agriculture - It's not too late to be counted!

Kansas farmers and ranchers still have time to be counted in the 2017 Census of Agriculture, according to the U.S. Department of Agriculture's (USDA) National Agricultural Statistics Service (NASS). Although the first deadline has passed, NASS will continue to accept Census information through the spring to get a complete and accurate picture of American agriculture that represents all farmers and ranchers.

"We thank everyone who has completed their Census to date. Kansas currently has a return rate of just 57 percent of the Census questionnaires mailed to producers last December," said Doug Bounds, Kansas State Statistician. "A lot is at stake if producers are not represented in this data. Census data have and will continue to influence important decisions for American agriculture. The data will affect every operation and every farming community at some point, whether it be through farm policy, disaster relief, insurance or loan programs, infrastructure improvements, or agribusiness setup. There is accuracy and strength in numbers, which is why NASS is committed to giving producers every opportunity to respond."

Federal law mandates that everyone who received the 2017 Census of Agriculture questionnaire complete it and return it even if not currently farming. NASS will continue to follow-up with producers through the spring with mailings, phone calls, and personal visits. To avoid these additional contacts, farmers and ranchers are encouraged to complete their Census either online at [www.agcounts.usda.gov](http://www.agcounts.usda.gov) or by mail as soon as possible. Responding online saves time by skipping sections that do not apply and automatically calculating totals. The online questionnaire is accessible on desktops, laptops, and mobile devices.

For more information about the 2017 Census of Agriculture, visit [www.agcensus.usda.gov](http://www.agcensus.usda.gov). For questions or assistance filling out the Census, call toll-free (888) 424-7828.

