

### **Extension Agronomy**

# eUpdate

### 04/13/2018

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.

Subscribe to the eUpdate mailing list: https://listserv.ksu.edu/cgibin?SUBED1=EUPDATE&A=1

#### eUpdate Table of Contents | 04/13/2018 | Issue 686

1. Effect of cold temperatures to newly planted corn	3
2. What are the causes of yellow wheat?	5
3. Latest information on alfalfa pest activity in Kansas	12
4. Weed control strategies in grain sorghum	16
5. Soybean fertilizer requirements in Kansas	
6. Update on wheat stripe rust in southeast Kansas and risk of severe disease	
7. On-farm Research Collaborative Project: Non-biased, research-based, and grower-	
driven	
8. Kansas drought update - April 12, 2018	
9. K-State Composting School to be held in two locations in May	
10. Kansas wheat management survey - Producer input needed	
11. 2018 In-Depth Wheat Diagnostic School, May 9-10 in Garden City	
12. KDA now accepting approved on-line dicamba applicator training	

#### 1. Effect of cold temperatures to newly planted corn

Cold temperatures can result in injury to the germinating seed (Figure 1) as it is absorbing moisture – a problem called imbibitional chilling injury. When soil temperatures remain at or below 50 degrees F after planting, damage to germinating seed can occur.

Soil temperatures at the 4-inch depth during the first 24-72 hours after planting, when the kernels imbibe water and begin the germination process, are critical. Kernels naturally swell when hydrating – taking in water. If the cell tissues of the kernel are too cold, they become less elastic and may rupture during the swelling process, resulting in "leaky" cells. Injury symptoms may include swollen kernels that fail to germinate or aborted growth of the radicle and/or coleoptile after germination has begun.



#### Figure 1. Germination and emergence process in corn.

Chilling injury can also occur following germination as the seedlings enter the emergence process, reducing plant metabolism and vigor, potentially causing stunting or death of the seminal roots, deformed elongation ("corkscrewing") of the mesocotyl, leaf burn (Figure 2), and either delayed or complete failure of emergence, often leafing out underground. Chilled seedlings may also be more sensitive to herbicides and seedling blights.

Before making any decisions, fields should be scouted 4-7 days after the cold occurred since the extent of the damage and potential for new growth will be evident during this time.



Figure 2. Leaf burn from freeze damage early after corn emergence. Photo by Ignacio Ciampitti, K-State Research and Extension.

Ignacio Ciampitti, Crop Production and Cropping Systems Specialist <u>ciampitti@ksu.edu</u>

#### 2. What are the causes of yellow wheat?

There may be large areas, small patches, or streaks of yellowish wheat in some fields this spring. What are some of the main causes of yellow wheat in the spring? The most common causes of yellow wheat in the spring include:

Poor root growth. This may be due to dry soils, later sowing, waterlogging, or elevated crown height caused by shallow planting depth or excessive residue in the root zone (Figure 1). If the plants have a poor root system, then the plants are yellow because the root systems are not extensive enough to provide enough nutrients. This situation is characteristic of a large wheat area around Kansas this growing season, mostly led by a combination of late-sown fields (delayed due to early-October rainfalls), dry winter and spring conditions, and extremely dry conditions since sowing.



Figure 1. Left panel shows the lack of development of the crown rooting system of a wheat field sown early- to mid-October near Leoti, Wichita County, KS. The lack of root development is likely due to drought conditions in the topsoil. Photo taken mid-March 2018 by Romulo Lollato, K-State Research and Extension. Right panel shows a slightly more developed but also extremely shallow rooting system, likely due to a restrictive dry topsoil layer. Photo taken by Tyler Ediger, wheat producer in Meade County, KS.

Cold weather injury at the tillering stage. A sudden drop in temperatures after the wheat has greened up but before it reaches the jointing stage will burn back the top-growth, often giving the field a yellowish cast but not reducing yield potential (Figure 2). For north central, west central, and northwest Kansas, the cold temperatures experienced in early April would have reached the crop at these stages of growth and likely caused some level of leaf injury. This injury is likely cosmetic, provided the growing point is still healthy. Variety release from winter dormancy can also affect the extent of the symptoms, as early varieties would have been less cold hardy and thus likely sustain more injury.



left (WB-Grainfield) has a later release from winter dormancy as compared to WB-Cedar (variety depicted in the right). Thus, WB-Cedar sustained more leaf injury. Photo by Romulo Lollato, K-State Research and Extension.

Freeze injury at the jointing stage. Jointing wheat can usually tolerate temperatures in the mid-toupper 20's with no significant injury. But, if temperatures fall into the low 20's or below for several hours, the lower stems, leaves, or developing head can sustain injury (Figure 3). Temperatures were held below this critical threshold for several hours in south central Kansas during April 7-8; thus, producers should scout their fields to assess the yield potential. If the leaves of tillers are yellowish when they emerge from the whorl, this indicates those tillers have been damaged.



# Figure 3. Comparison between a healthy developing wheat head (left hand side, typically light green and firm) versus a developing wheat head that sustained freeze injury (right hand side, whitish/brown and mushy). Photo by Romulo Lollato, K-State Research and Extension.

While the extent of potential freeze damage depends on minimum temperatures achieved, duration of cold temperatures, and stage of wheat development; other factors such as crop residue, position on the landscape, wind speed, snow cover, and soil temperatures also play a role. Figure 4 shows an example of the effect of heavy residue on potential wheat damage. In this photo, parts of the field with a heavier layer of residue show greater cold damage than lighter residue. This can be partially explained because under a thicker layer of residue, the wheat crown tends to form closer to the surface and therefore is more exposed to freezing temperatures.



# Figure 4. Effect of soil residue on wheat freeze damage. Wheat is showing more damage from freezing temperatures in thicker residue layers. Photo by Tyler Ediger, wheat producer in Meade County, KS.

Nitrogen deficiency. Nitrogen deficiency causes an overall yellowing of the plant, with the lower leaves yellowing and dying from the leaf tips inward (Figure 5). Nitrogen deficiency also results in reduced tillering, top growth, and root growth. The primary causes of nitrogen deficiency are insufficient fertilizer rates, application problems, applying the nitrogen too late, leaching from heavy rains, denitrification from saturated soils, and the presence of heavy amounts of crop residue, which immobilize nitrogen. This year, the lack of soil moisture might also restrict the amount of nitrogen uptake by the wheat crop, as nitrogen is primarily taken up together with water via mass flow.



Figure 5. Nitrogen deficiency on wheat. The lower leaves are the first to become chlorotic (yellow). Photo by Dorivar Ruiz Diaz, K-State Research and Extension.

Sulfur deficiency. Sulfur deficiency is not as common as nitrogen deficiency, but there has been an increase in the numbers of fields with sulfur deficiency in recent years. Deficiency can be more common in areas where organic matter levels are low -- especially on sandier soils or eroded areas of a field. It can also occur where soils are cold and dry in the spring. Under these conditions, the rate of release of sulfur from organic matter is greatly reduced. The symptoms of sulfur deficiency are very similar to nitrogen deficiency. However, sulfur deficiency does differ from nitrogen deficiency in that the whole plant is pale, with a greater degree of chlorosis (yellowing of plant tissue) in the young leaves (Figure 6). The pattern of chlorosis may show gradation in intensity with the younger leaves at the tip yellowing first because sulfur is not easily translocated within the plant. But the entire plant can quickly become totally chlorotic and take on a light yellow color. Symptoms often become more pronounced when plants begin growing rapidly while soil conditions are such that organic matter mineralization and sulfur release rates are low. Symptoms may disappear as the temperature warms up and moisture conditions improve, which increases the rate of mineralization of sulfur from organic matter of root growth in the plants.



#### Figure 6. Sulfur deficiency in wheat, with symptoms appearing first on the younger leaves. Photo by Romulo Lollato, K-State Research and Extension.

Iron chlorosis. Iron chlorosis is not common in wheat in Kansas, but does occur on certain high-pH, calcareous soils in western Kansas. Newly emerging leaves will have green veins, with yellow striping between the veins. Eventually, the entire leaf may turn yellow or white.

Soilborne mosaic or spindle streak mosaic. Soilborne mosaic and spindle streak mosaic are viral diseases that occur primarily in eastern and central Kansas and are rare in western Kansas. These diseases are most common in years with a wet fall, followed by a cool, wet spring. The disease is often most severe in low areas of a field where soil conditions favor infection. Symptoms are usually most pronounced in early spring, then fade as temperatures warm. Leaves will have a mosaic of green spots on yellowish background. Infected plants are often stunted in growth.

Wheat streak mosaic complex. This viral disease is vectored by the wheat curl mite. Yellow areas in field will appear in spring around that jointing stages of growth; usually on field edges adjacent to volunteer wheat. Leaves will have a mosaic of yellow streaks, stripes, or mottling. Plants infected with wheat streak mosaic are often smaller than healthy plants.

Barley yellow dwarf. This viral disease is vectored by bird cherry oat aphids and greenbugs. Small or large patches of yellow plants will occur, typically around boot stage. Leaf tip turns yellow or purple, but midrib remains green. The yellowing caused by barley yellow dwarf are less botchy than the yellowing caused by other viral diseases. Plants infected by barley yellow dwarf are often stunted.

Romulo Lollato, Wheat and Forages Specialist lollato@ksu.edu

Dorivar Ruiz Diaz, Nutrient Management Specialist ruizdiaz@ksu.edu

Erick DeWolf, Extension Plant Pathologist <u>dewolf1@ksu.edu</u>

#### 3. Latest information on alfalfa pest activity in Kansas

The following information is an update on alfalfa pest activity from K-State Entomology.

Samples were taken from alfalfa fields in north central Kansas on April 11th. Despite the recent cold weather and lack of measurable moisture, the alfalfa did not show obvious signs of stress and had even grown a little since the April 4-5 when the fields were last checked.

#### Alfalfa weevil

The recent cold temperatures apparently took a toll on some of the small alfalfa weevil larvae. However, it did not kill them all as live larvae of different sizes was found still feeding in terminals and often live ones feeding right beside dead ones (see photos below; all photos taken by Holly Davis, K-State Research and Extension).





![](_page_13_Picture_0.jpeg)

No case with more than a 5% infestation was found. In addition, no adults or larvae were found in the leaf litter below the canopy. So, apparently, the recent record cold temperatures killed 40-50% of the small alfalfa weevil larvae that had started feeding. It remains to be seen how many eggs are still to hatch, but so far infestation levels we have noted are not anywhere near treatment thresholds.

#### Other pests

Pea aphids were also noted as were parasitized pea aphids (mummies). Lady beetles were also active.

![](_page_14_Picture_0.jpeg)

For management decisions relative to alfalfa pests, please see the Alfalfa Insect Management Guide, available at: <u>https://www.bookstore.ksre.ksu.edu/pubs/mf809.pdf</u>

Jeff Whitworth, Extension Entomologist jwhitwor@ksu.edu

Holly Davis, Entomology Research Associate holly3@ksu.edu

#### 4. Weed control strategies in grain sorghum

Severe grass and broadleaf weed pressure will reduce grain sorghum yields and can make harvest very difficult. Good crop rotation and herbicide selection are essential components of managing weeds in grain sorghum.

In sorghum, the best choice of herbicides will depend on the weed species present. Broadleaf weeds generally can be controlled with a two pass system consisting of the combination of preemergence and postemergence applied herbicides. With the development of herbicide-resistant weeds, however, complete weed control is becoming increasingly difficult.

#### Controlling weeds prior to planting: Burndown and soil-applied residuals

In a wheat-sorghum-fallow rotation, it is essential that broadleaf and grassy weeds do not produce seed during the fallow period ahead of grain sorghum planting. Always control those summer annual weeds after wheat harvest soon enough to prevent seed production. It is equally important that winter annual grasses and broadleaf weeds are not allowed to head/flower in spring, producing seed before the sorghum is planted. Most winter annuals produce seed in April and early May.

If you are anticipating problems with glyphosate-resistant pigweeds, it may be very important to include in the April burndown treatment a soil residual product. This can help minimize pigweed (Palmer amaranth and waterhemp) emergence in late April and May, prior to planting sorghum. A pound of atrazine may provide the needed protection unless the pigweed population is atrazine-resistant. Atrazine + chloracetamide herbicides can be used effectively, however.

The Valor label allows the use of 2 oz product/acre applied 30 days or more prior to sorghum planting. It is essential that at least one inch of precipitation fall during the window between Valor application and sorghum planting. Valor will control glyphosate-resistant and triazine-resistant pigweeds as it has a different mode of action than glyphosate and atrazine.

An effective burndown prior to planting is essential if any weeds have emerged. Sorghum should always be planted into a weed-free seedbed. The addition of a dicamba product or 2,4-D with glyphosate generally will control broadleaf and grass weeds effectively, provided an earlier burndown treatment has been applied in March or April. There is a waiting period of 15 days between application and sorghum planting when using 8 fl oz of Clarity. Current 2,4-D labels do not address a waiting period ahead of planting sorghum; however, for corn or soybeans a 7-day waiting period is required for 1 pint or less of 2,4-D ester when used in the burndown.

Control of pigweeds in sorghum is an increasing concern across the state. Using a soil-applied chloracetamide herbicide with atrazine (such as Bicep II Magnum, Bicep Lite II Magnum, Outlook + atrazine, Degree Xtra, Fultime NXT, or generic equivalents of these products) will greatly enhance controlling pigweeds. Some of the broadleaf escapes producers can expect when using the chloracetamide/atrazine mixtures are devilsclaw, puncturevine, velvetleaf, morningglory, and atrazine-resistant kochia.

The addition of 10 oz of Verdict, which is a mix of 2 oz of Sharpen and 8.3 oz of Outlook, with a chloracetamide/atrazine herbicide can help control triazine-resistant pigweeds and kochia, and control large-seeded broadleaf weeds such as velvetleaf, morningglory, sunflower, and others. The

chloracetamide/ atrazine herbicides will do a very good job of controlling most annual grassy weeds. Using a product such as Lumax EZ or Lexar EZ, which contains mesotrione (Callisto), preemergence will help control triazine-resistant pigweeds and kochia. With the lower price of generic herbicides and generic mesotrione, these treatments are becoming very economical.

A weakness of all soil-applied programs is that precipitation is required for activation. Without activation, poor broadleaf and grass control can be expected. Once precipitation is received, the herbicides are activated and weed control measures are in place. Weed escapes prior to this activation will need to be controlled with early postemergence applied herbicides.

#### **Grass control options**

Grass control in sorghum can be a difficult task. If a field has severe shattercane, johnsongrass, or longspine sandbur pressure, planting grain sorghum is not recommended. For other annual grassy weeds, it will be important to apply one of the chloracetamide herbicides. Grasses that emerge before the soil-applied herbicides are activated will not be controlled with the PRE herbicide. Currently, there are no herbicides labeled for postemergence grass control in conventional grain sorghum. Although atrazine and Facet L have grass activity and can control tiny grass seedlings, it's generally not a good practice to depend on these herbicides for grass control. Facet L is a liquid formulation of quinclorac (previously Paramount 75 DF) that has activity on certain grasses and has excellent activity on field bindweed.

A new technology for grass management is Inzen sorghum, a non-GMO type of sorghum. Growing Inzen sorghum will allow the use of nicosulfuron ("Zest"- an ALS grass herbicide) applied postemergence to control labeled small annual grasses. This technology will likely not be commercially available until the 2019 growing season at the earliest.

#### **Postemergence options**

Postemergence broadleaf herbicides for sorghum are most effective when applied in a timely manner. Weeds that are 2-4 inches tall will be much easier to control than weeds that are 6-8 inches tall, or larger. Controlling weeds in a timely manner will result in less weed competition with the crop compared to waiting too long to control the weeds. Atrazine combinations with Huskie, Banvel, 2,4-D, Buctril, or Aim (or generic versions of these herbicides) can provide excellent broad-spectrum weed control.

![](_page_17_Picture_0.jpeg)

Figure 1. Atrazine + 2,4-D ester applied too late to provide adequate Palmer amaranth control. The application was made to 20 inch Palmer amaranth and 20 inch sorghum on July 6. Photo by Curtis Thompson, K-State Research and Extension.

Huskie should be applied at 12.8 to 16 fl oz/acre with 0.25 to 1.0 lb of atrazine, NIS 0.25% v/v or 0.5% v/v HSOC (high surfactant oil concentrate), and spray grade ammonium sulfate at the rate of 1 lb/acre to sorghum from 3-leaf to 12 inches tall. Huskie alone, without atrazine, can now be applied to sorghum up to 30 inches tall prior to flag leaf emergence, however it will be less effective if weeds are large. Huskie is effective on kochia, pigweeds, and many other broadleaf weed species. Huskie is most effective on small weeds. The larger pigweed and kochia, the more difficult they are to control. Temporary injury to sorghum is often observed with Huskie.

The presence of certain weed species will affect which postemergence herbicide programs will be most effective. See the grain sorghum section in the K-State <u>2018 Chemical Weed Control Guide</u> (SRP 1139 P. 50-51) to help make the selection.

The crop stage at the time of postemergence herbicide applications can be critical to minimize crop injury. Delayed applications to large sorghum increase the risk of injury to the reproductive phase of grain sorghum, thus increasing crop injury and yield loss from the herbicide application. Timely applications not only benefit weed control, but can increase crop safety. Always read and follow label guidelines.

Curtis Thompson, Extension Agronomy State Leader and Weed Management Specialist <u>cthompso@ksu.edu</u>

Compared to corn, wheat, and sorghum, soybeans remove significant amounts of nutrients per bushel of grain harvested. Nutrient uptake in soybeans early in the season is relatively small. However as they grow and develop, the daily rate of nutrient uptake increases. Soybeans need an adequate nutrient supply at each developmental stage for optimum growth.

High-yielding soybeans remove substantial nutrients from the soil. This should be taken into account in an overall nutrient management plan. A 40-bushel-per-acre soybean crop removes approximately 30 pounds of  $P_2O_5$  and 50 pounds of  $K_2O$  with the grain; in addition, approximately 10 pounds of  $P_2O_5$  and 40 pounds of  $K_2O$  can be removed with the stover.

#### Nitrogen

Nitrogen is supplied to soybeans mainly by nitrogen fixation, and fertilizer nitrogen application is not recommended if the plants are well nodulated. Soybeans are heavy users of nitrogen, removing a total of 130 pounds per acre, and about 44 pounds with the stover for a 40-bushel-per-acre soybean crop. Soybeans use all the nitrogen they can fix plus nitrogen from the pool of available nitrogen in the soil. Nitrogen fertilizer application to soybean seldom results in any yield benefit, and efforts should focus on proper inoculation.

#### Phosphorus

Phosphorus applications should be based on a soil test. Responses to direct phosphorus fertilization is generally consistent in soils testing very low or low in soil test phosphorus. Response to starter phosphorus fertilizer application in soybeans can occur, but it depends on several factors. The most important factor is the soil test level. Generally, warmer soils at soybean planting, compared to corn, also may contribute to typically lower response to starter fertilizers in soybeans. However, starter fertilizer in soybeans can be a good way to complement nutrients that may have been removed by high-yielding crops in the rotation like corn. Banding fertilizer at planting is an efficient application method for soybeans. Soybean seeds are easily injured by fertilizer, therefore, no direct seed contact with fertilizer is advised.

#### Potassium

Soybean seeds are relatively high in potassium and removal of potassium by soybeans is greater than for other crops on a per-bushel basis when only the grain is removed. As with phosphorus, a soil test is the best index of potassium needs. Soils testing very low or low should be fertilized with potassium, either as a banded starter at planting or broadcast and incorporated. Potassium should not be placed in contact with the soybean seed because of possible salt injury. Yield increases from potassium can be comparable to those with phosphorus under very low and low soil test levels.

#### Sulfur

Sulfur is mobile in the soil (leaching is common), but fairly immobile in the plant. High soil test variability along with significant uptake by crops generates the need for proper sulfur management, especially in sandier soils and fields with several different soil types. Recent Kansas studies suggest a

low probability of soybean response to sulfur application. However, sulfur removal with soybean can be significant, and more sensitive crops in the rotation such as wheat may require sulfur fertilization.

#### Iron

Iron deficiency symptoms appear in irregularly shaped spots randomly distributed across a field, primarily in fields with a previous history of iron deficiency. Different annual weather patterns can make iron chlorosis (yellowing of leaves) more or less prevalent. Iron chlorosis also differs under different soil conditions. In general, high soil pH and high carbonates (free lime) can increase the incidence of iron deficiency. Iron chlorosis can be a big limitation in some regions of western Kansas. Iron fertilizer using chelated sources, and in direct contact with the seed (in-furrow) has shown significant yield responses in soils with a history of iron chlorosis. If iron chlorosis has been a common problem in the past, producers should select a soybean variety tolerant to iron chlorosis. It may be beneficial to use a chelated iron in-furrow application. Foliar iron treatments seldom result in yield increase.

#### Others

Zinc, manganese, and boron are other nutrients that can be limiting in soybeans. The need for zinc should be determined by soil tests. Zinc fertilizer can be either banded at planting or broadcast preplant with little difference in response when applied at an adequate rate. Both organic and inorganic zinc sources (chelates and non-chelates) can be used, but chelates are considered more effective than the inorganic sources.

Manure applications also are effective at eliminating micronutrient deficiency problems, including iron. Monitoring nutrient levels with tissue analysis along with soil tests conducted during the crop season should be used to diagnose potential nutrient deficiencies. Stresses such as drought, heat, and pest pressure can all influence tissue test results. Some micronutrients also can cause phytotoxicity if prevalent in large quantities. Nutrient removal by soybean is very high in high-yielding environments so fertilizer application rates should be high or soil test levels will drop. Regular soil testing (every 2 to 3 years) is essential for optimum nutrient management. Soybeans take advantage of residual phosphorus and potassium, but keep in mind the total nutrient needs in the rotation.

See K-State Research and Extension publication *Soil Test Interpretations and Fertilizer Recommendations*, MF2586 for more complete soybean fertilizer recommendations: <u>http://www.ksre.ksu.edu/bookstore/pubs/MF2586.pdf</u>

For more information, see *Kansas Soybean Management 2018*, K-State Research and Extension publication MF3154: <u>http://www.ksre.ksu.edu/bookstore/pubs/MF3154.pdf</u>

Dorivar Ruiz Diaz, Nutrient Management Specialist ruizdiaz@ksu.edu

#### 6. Update on wheat stripe rust in southeast Kansas and risk of severe disease

Wheat stripe rust was reported this week in southeast Kansas. The report came from Josh Coltrain, Extension Agent in the Wildcat District located in the southern corner of the state (Figure 1). Josh reports that several hot spots of stripe rust were detected in a field of "Everest" wheat in southern Montgomery County. The wheat in this field was at flag leaf emergence and the disease was active on the low-middle portion of the canopy. Disease was not found in other wheat fields in that region. There are no other reports of stripe rust in the state. Dry conditions are likely holding the disease in check for the time being (Figure 2).

Several states to our east (TN, AR, and KY) are reporting stripe in wheat. In most cases, disease in these states does not spread to Kansas. Texas and Oklahoma continue to report lower-than-normal levels of stripe rust. The dry conditions and lack of disease in the Southern Great Plains continue to suppress disease development. At this point, the risk of yield loss from stripe rust and other diseases is currently low in Kansas.

![](_page_21_Figure_3.jpeg)

#### Distribution of Wheat Stripe Rust April 13, 2018

Disease Risk

Disease obsevation map based on reports from: KSU E. De Wolf, R. Lollato, D. Shoup, L. Haag, A.J. Foste J. Cart, J. Coltrain, J. Falk-Jones, A. Esser, D. Hallauer, T. Husa, S. Lincoln, C. Long, S. Marston, T. Maxwell, C L. Russel, Z. Simon, K. VanSkike, S. Wick; Growers: V. Ehmka

Stripe rust not observed

Stripe rust observed on lower leaves

Stripe rust observed on upper leaves

Figure 1. Distribution of wheat stripe rust in Kansas on April 13, 2018. The report from southeast Kansas represents an isolated field with several hot spots of disease. Disease was not found in other fields in the southeast region or other areas of the state. Map created by Erick DeWolf, K-State Research and Extension.

![](_page_22_Figure_1.jpeg)

Figure 2. Recent drought monitor indicates that dry conditions continue to dominate many key wheat producing regions of the Southern Great Plains. These dry conditions are likely holding stripe rust and other disease in check at the present time.

Erick DeWolf, Extension Plant Pathologist dewolf1@ksu.edu

K-State Extension state specialists, area agronomists, and county/district agents are again seeking to collaborate with producers in establishing on-farm and large-scale research plots in 2018. Last year, we had on-farm projects in diverse areas around Kansas, setting up tests involving primarily corn and soybeans, with a few studies on sorghum as well. Funding support from Kansas Corn and Kansas Soybean is helping to increase our on-farm network.

The goal of our on-farm research collaborative project is to establish a network of on-farm research collaborators with the main purpose of providing research results on production practices at the state, regional, or local scale, under a wide set of growing conditions and soil types.

There are no losers in this program. All parties will benefit. Farmers involved in this collaborative research effort will be empowered to solve their own problems and will have greater confidence in making decisions related to their production practices. The standard practice of the program involves producers having a question, then researching the answer on their own farm and soil with a simple strip trial designed with the assistance of K-State researchers. With this information, K-State Extension specialists will be able to check the validity of previous findings conducted with traditional research in small plots and more controlled environments, and to identify and communicate areas for future research.

The on-farm research collaborative project is farmer-run research; thus, information will be produced and used by farmers. Farmer participation is the key component of this project and farmers will be the main beneficiary.

Why should I get involved in this project?

- 1. The project has a main goal of improving yields and/or minimizing input costs, increasing overall efficiency.
- 2. The project will help producers learn the best ways to design an on-farm test so they can obtain reliable information on a specific question related to their own farms.
- 3. The outcomes from this project will empower our producers to make sound decisions with confidence and will aid researchers in identifying and communicating areas for future research.

Who are the key players?

- 1. Kansas farmers: Farmers are the main players, the ones who will implement the trials, collect the data and utilize the results.
- 2. Extension Agricultural Agents: The agents are the "gatekeepers" of this project. They will work very closely with farmers and can assist, if needed, with information and/or help on implementing the trials.
- 3. K-State Extension State and Area Specialists: K-State faculty will assist Extension agents and Kansas farmers in developing the protocols, implementing trials and analyzing the data generated at the on-farm scale.

Research data (small-plots) vs. On-farm data (large-plots): What is the main different between these

#### concepts?

Information produced at research stations has the following features:

- Small plot size = small variability ("controlled conditions")
- Intensive sampling = usually related to a graduate student project, with many samples taken throughout the growing season
- More complex and more treatments can be evaluated
- Small sample size = measurements may be less representative of "real" farm conditions

On-farm data have the following features:

- Large plot size = higher variability due to uncontrollable variation within each plot
- Less intensive sampling
- Less complex and fewer (two or three) treatments can be evaluated
- Large sample size = measurements may more closely represent "real" farm conditions

Are the on-farm protocols the same for all environments and farmers or should they be farmer- or site-specific?

Farmers have their own interests and specific questions that need to be properly addressed. Protocols will be designed to fit each farmer's situation. Some of the diverse topics that we have discussed include: corn/ soybean/ sorghum seeding rates; corn/ sorghum hybrids; sorghum/ soybean row spacing; corn/ soybean/ sorghum planting dates; full or limited irrigation; and other topics.

Crops: corn, soybean, grain sorghum, winter canola

Topics:

- Seeding Rates
- Planting Dates
- Row Spacing
- Hybrid/ Variety Selection
- Tillage
- Others

How many factors need to be evaluated?

The idea is to perform "simple" on-farm experiments evaluating one or two factors at a time.

How many levels for each factor?

This will depend on the availability of space in the field, but to properly understand the optimum crop management level, 4 to 5 levels of "treatments" or "variables" are usually needed. For example, if corn seeding rate is being evaluated, five seeding rates will allow the grower to properly identify the optimum seeding rate for each specific farm environment. The diagram below presents an example of 5 test levels for a seeding rate study.

![](_page_25_Figure_0.jpeg)

**Replications?** 

To obtain statistically sound and solid recommendations, a minimum of 3 replications are recommended.

Are crop production practices environment-specific?

The example in the graphic below shows how the optimum plant density to maximize corn grain yield will vary according to different environments. For the low yielding environment (<100 bu/acre), the economically optimum plant density was about 15,000 to 20,000 plants per acre; while for the high-yielding site, economically optimum maximum plant density is about 25,000 plants per acre. Therefore, different yield potentials in different environments have different "optimum" crop production practices to maximize net returns.

![](_page_25_Figure_5.jpeg)

Precision Ag technologies

In addition, on-farm studies in 2017 evaluated new technologies and added Precision Ag tools to the evaluation of variability and determination of zone management. Utilization of satellite imagery and precision soil sampling (soil type, altitude, slope), in combination with yield monitor data, allowed us to obtain high-resolution for spatial variability within a field in order to investigate crop production issues and properly address them. Below is an example of some fields for which utilization of satellite imagery, in combination with other data layers, allowed us to obtain "management-zones" from low to high productivity area within the field.

![](_page_26_Figure_1.jpeg)

Farmers interested in participating in this project can fill out an interest form online at:

http://bit.ly/KSUONFARMPROJECT

Ignacio Ciampitti, Cropping Systems Specialist, K-State On-Farm Research Project Coordinator ciampitti@ksu.edu

#### K-State Area Extension Agronomists:

Lucas Haag, Northwest Area Crops and Soils Specialist <u>Ihaag@ksu.edu</u>

AJ Foster, Southwest Area Crops and Soils Specialist <u>anserdj@ksu.edu</u>

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

Doug Shoup, Southeast Area Crops and Soils Specialist <u>dshoup@ksu.edu</u>

#### 8. Kansas drought update - April 12, 2018

#### Current status

For a change, the greatest precipitation was reported in the areas with the most extreme drought conditions – southwest and south central Kansas. Unfortunately, it was still much lower than normal. The Southwest Division averaged 0.12 inches, or 35 percent of normal. The South Central Division averaged 0.20 inches or 36 percent of normal. Statewide average precipitation was just 0.09 inches or 19 percent of normal. The highest precipitation total for a National Weather Service Coop station was 0.90 inches at Augusta in Butler County, in the South Central Division. The highest total for a Community Collaborative Rain Hail and Snow (CoCoRaHS) station was 0.42 inches at Hugoton 0.6 NNW, Stevens County, in the Southwest Division. For the Kansas Mesonet stations, the greatest total was 0.35 inches at Hodgeman. Other stations with 0.3 of an inch or more included Richfield, Lake City and St. John. Unfortunately, the ET (evapotranspiration) values for the western stations were also high, leaving effective moisture deficits of -0.60 to -0.90 inches for the week.

![](_page_28_Figure_3.jpeg)

Figure 1. Weekly total precipitation for Kansas during the week of April 4 – 10, 2018 via Cooperative Observer (COOP) and Kansas Mesonet.

![](_page_29_Figure_0.jpeg)

## Figure 2. Departures of weekly precipitation from normal for Kansas during the week of April 4 – 10, 2018 via Cooperative Observer (COOP) and Kansas Mesonet.

As the vigorous cold air that arrived over the weekend persisted through the beginning of the week, temperatures were cooler-than-normal in all divisions. The statewide average temperature was 38.7 degrees F, or 11.7 degrees cooler-than-normal. The Northeast Division had the greatest departure from normal with an average of 33.5 degrees F, or 16.9 degrees cooler-than-normal. The Southwest Division came closest to normal, with an average of 43.7 degrees F or 7.4 degrees cooler-than-normal. The highest maximum temperature was 78 degrees F at Russell 1E, Russell County, on April 10th. The lowest minimum temperature was 4 degrees F at both Alton 6ESE, Osborne County, and Atwood 2SW, Rawlins County, on April 7th.

![](_page_30_Figure_0.jpeg)

Figure 3. Weekly mean temperatures for Kansas during the week of April 4 – 10, 2018 via Cooperative Observer (COOP) and Kansas Mesonet.

![](_page_30_Figure_2.jpeg)

Figure 4. Departures of weekly mean temperatures for Kansas during the week of April 4 – 10, 2018 via Cooperative Observer (COOP) and Kansas Mesonet.

Another drier-than-normal week resulted in expansion of the exceptional drought category in southwest Kansas (Figure 5). The change in drought categories (Figure 6) shows how little the moisture received changed the overall deficit. The heaviest rainfall only slowed deterioration.

![](_page_31_Figure_1.jpeg)

#### Figure 5. Current drought from the Drought Monitor. (http://droughtmonitor.unl.edu/)

![](_page_32_Figure_0.jpeg)

# Figure 6. Change in drought categories from April 3, 2018 to April 10, 2018 (U.S. Drought Monitor).

Precipitation and temperature outlooks

The Quantitative Precipitation Forecast (QPC) for the 5-day period, ending on April 17th, is dismal. The areas with highest expected amounts are along the borders of the state, with the exception of the south central border to Oklahoma (Figure 7). The areas with heaviest amounts may see up to a half an inch. However, that would still be less than normal for the week, and amounts drop sharply across the rest of Kansas, where only a tenth to a quarter of an inch is expected.

The 8 to 14-day precipitation outlook (Figure 8) indicates a slightly increased chance of abovenormal precipitation across the state. The temperature outlook is neutral for all except the southwest, where there is an increased chance of warmer-than-normal temperatures.

![](_page_33_Figure_0.jpeg)

Figure 7. Quantitative Precipitation Forecast the 5-day period ending April 17, 2018.

![](_page_34_Figure_0.jpeg)

Figure 8. 8-10 day Precipitation Outlook for period ending April 26, 2018 (CPC)

Additional information can be found in the latest Agronomy eUpdate at: <u>https://webapp.agron.ksu.edu/agr\_social/eu.throck</u>

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 <u>mknapp@ksu.edu</u>

Chip Redmond, Kansas Mesonet Manager <u>christopherredmond@ksu.edu</u>

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

Kansas State University Department of Agronomy

2004 Throckmorton Plant Sciences Center | Manhattan, KS 66506

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 <u>here</u>. 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), <u>http://www.agronomy.k-state.edu/extension/soil-management/</u>

## 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

![](_page_38_Picture_0.jpeg)

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), <a href="http://www.agronomy.k-state.edu/extension/soil-management/">http://www.agronomy.k-state.edu/extension/soil-management/</a> Registration due by May 4, 2018. Class size is limited to 20 people.

#### 10. 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 online, 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: <u>http://kswheat.com/on-farm-research-survey</u>

If you prefer in person or a phone survey, please contact Brent Jaenisch at 785-370-1273 or at <u>bjaenisch@ksu.edu</u>.

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.

# W H E A T **K-STATE** Research and Extension

Brent Jaenisch, Graduate Student bjaenisch5@ksu.edu

Romulo Lollato, Wheat and Forages Specialist lollato@ksu.edu

#### 11. 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 Vandeveer
- 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

![](_page_42_Picture_1.jpeg)

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

K-S

Weed Identification

Research and Extension

- 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 Vandeveer
- 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

or call 785-532-5569

nrices, advities and programs accessible to all participants. If you have special required results of the second se

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

#### 12. 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: <u>http://www.roundupreadyxtend.com/</u>

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

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

Dallas Peterson, Weed Management Specialist dpeterso@ksu.edu