



**K-STATE**  
Research and Extension

## Extension Agronomy

# eUpdate

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*12/06/2019*

These e-Updates are a regular weekly item from K-State Extension Agronomy and Kathy Gehl, Agronomy eUpdate Editor. All of the Research and Extension faculty in Agronomy will be involved as sources from time to time. If you have any questions or suggestions for topics you'd like to have us address in this weekly update, contact Kathy Gehl, 785-532-3354 kgehl@ksu.edu, or Dalas Peterson, Extension Agronomy State Leader and Weed Management Specialist 785-532-0405 dpeterso@ksu.edu.

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## 1. Sulfur deficiency in wheat

In recent years, sulfur (S) deficiency in wheat has become common in many areas of Kansas, particularly in no-till wheat. The likely reasons for this is a reduction in sulfur additions to the crop from atmospheric deposition (there is less S in the air now) and cooler soil temperatures as a result of no-till which slows S mineralization in the soil. Some crops in the rotation, such as soybean, can also take up significant amounts of S resulting in an S deficit for the following wheat crop.

Historically, S deficiency was most common on high-yielding crops grown on irrigated, sandy soils that are low in organic matter and subject to leaching. However, due to reasons discussed above, an increasing number of finer-textured soils have shown S deficiency in recent years.

### Identification of S deficiency

The photos below are good representations of S deficiency in wheat. Generally, S-deficient wheat is yellow and stunted and is observed in patches in the field, especially in areas where there has been previous soil erosion or soil movement (Figure 1). The patchy S-deficient areas of the field are often found on hilltops or sideslopes where erosion has occurred and soil organic matter is reduced, or where leaching is more pronounced. Wheat in areas where topsoil was removed or significant cuts were made (i.e. terraced or leveled fields) also commonly shows symptoms.



**Figure 1. Patches of sulfur deficiency in a wheat field. Photo by Dave Mengel, K-State Research and Extension.**

Sulfur deficiency in growing crops is often mistaken for nitrogen (N) deficiency. However, unlike N deficiency where older leaves show firing and yellowing, with S deficiency, the pale yellow symptoms often appear first on the younger or uppermost leaves. Wheat plants with S deficiency eventually become uniformly chlorotic (yellow leaf tissue; Figure 2).



**Figure 2. Close-up of sulfur deficiency in wheat. The wheat is exhibiting yellowing (chlorosis)**

**which is a sign of insufficient sulfur. Photo by Dorivar Ruiz Diaz, K-State Research and Extension.**

Sulfur deficiencies in wheat have been showing up early in the spring, shortly after green-up, before organic S is mineralized from soil organic matter, and before wheat roots can grow into the subsoil to utilize any available S (sulfate) accumulations. Deficiencies of S are often difficult to identify because the chlorosis is not always obvious. Crops lacking S also may be stunted, thin-stemmed, and spindly. In the case of wheat and other cereal grains, maturity is delayed. Winter annual weed competition is also enhanced due to the slower growth and lack of good tillering.

At present, many fields in north central and northeast Kansas have an established history of S deficiency for wheat. In this situation, rather than waiting for symptoms to appear in the spring, farmers may want to consider a winter topdress application of S as a preventive measure.

#### Forms of sulfur in soil

The majority of S in soils is present in organic forms in surface soils and as sulfate ( $\text{SO}_4^{2-}$ ), an inorganic form. Sulfate is relatively soluble, so it tends to leach down into the subsoil. In many of our Kansas soils, it will accumulate in the B horizon (subsoil) in two forms. Clay surfaces and coatings will retain some sulfate, and sulfate will also be present in the subsoil of many Kansas soils as gypsum (calcium sulfate).

#### Testing soil for sulfur

There is a soil test for available sulfate-S in the soil profile. For proper interpretation of this test, soil organic matter, soil texture, the crop to be grown, and the expected yield level all need to be considered. Accurate estimates of S needs cannot be made from a surface sample alone. Since sulfate is mobile, sampling to a **24-inch depth** is important. However, due to the relatively high demand for S during the rapid vegetative growth phase of wheat, and relatively shallow rooting by the wheat crop at this time, the S measured in the deeper, subsoil levels by the test may not be available to wheat in the early spring, especially where soils are cold.

#### Choosing a fertilizer material

There are many S-containing fertilizer materials. Several dry materials are available that can be blended with dry phosphorus or nitrogen fertilizers for winter/spring topdressing. However, some of these products are best used in pre-plant applications.

#### *Dry S-containing fertilizers:*

- Elemental S (typically 90-95 percent S) is a dry material marketed by several manufacturers. Before it becomes available for plant uptake, elemental S must first be oxidized by soil microorganisms to sulfate. This can be a slow process when surface-applied. As a result, elemental S is not well suited for corrective applications to S-deficient wheat in the spring, due to the time required for oxidation to sulfate.
- Ammonium sulfate, AMS (21-0-0-24S) is a dry material that is a good source of both N and S. However, it has high acid-forming potential and soil pH should be monitored. Ammonium

sulfate is a good source to consider for either pre-plant or topdressing to correct existing sulfur deficiencies.

- Gypsum (analysis varies) is calcium sulfate and is commonly available in a hydrated form containing 18.6 percent S. This material is commonly available in a granulated form that can be blended with other materials. Since it is a sulfate source, it would be immediately available and is another good source for spring topdressing. However, gypsum is not as water soluble as many fertilizer materials such as ammonium sulfate.
- New N-P-S products such as Microessentials, 40-rock and others that are typically ammonium phosphate materials formulated with S, and in some cases micronutrients such as zinc. In most of these products the S is present as a combination of elemental S and sulfate.

*Liquid S-containing fertilizers:*

- Ammonium thiosulfate, ATS, (12-0-0-26S) is the most popular S-containing product used in the fluid fertilizer industry as it is compatible with N solutions and other complete liquid products.
- Potassium thiosulfate, KTS, (0-0-25-17S) is a clear liquid product that can be mixed with other liquid fertilizers.

Topdressing with thiosulfate and UAN can be done early, before Feekes 5 growth stage (green up), and at temperatures below 70 degrees F. Be aware that some leaf burn may be expected with some of these liquid fertilizers. These products would be good sources for pre-plant application as well.

For more information see K-State publication MF 2264 *Sulfur in Kansas*,  
<http://www.ksre.ksu.edu/bookstore/pubs/MF2264.pdf>

For estimations of required application rates of S see *Soil Test Interpretation and Fertilizer Recommendations*, K-State publication MF-2586  
<http://www.ksre.ksu.edu/bookstore/pubs/mf2586.pdf>

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

## 2. Safety first when planning deep tillage or earthwork: Call before you dig!

After harvest, many producers might head to the field for deep tillage such as ripping, or to make earthwork repairs around the farm. A few days before you want to start these activities, it's worth a call to 811 for your safety and to prevent expensive damage to underground utilities. The website, <http://call811.com>, has easy-to-follow instructions for requesting this free service and detailed information concerning why you need to know what's below.

A video produced by Marathon Oil tells the story of a farm family and their close-call with a pipeline when installing tile drains. The landowner knew where the pipeline entered and exited the field, and they assumed the pipeline was straight— it wasn't. Watch this 6-minute, eye-opening video for the whole story; <https://youtu.be/oe-iknpYzF8>.

Sadly, fatal accidents do happen in soil excavations. If you dig any trenches or soil pits, safety should be considered from the very beginning of the project. Soils with sandy textures are more susceptible to a collapse than soils with a higher clay content. If standing water is present in the pit, the walls are more apt to collapse.

There are Occupational Safety and Health Administration (OSHA) [guidelines](#) on excavation safety, such as when it is necessary to shore the walls of a soil pit or trench. One important consideration is soil should be piled a minimum of 2 feet away from the walls of the trenches for two reasons:

1. Soil clods or excavating tools could roll back into the trench and cause injury to occupants.
2. Helps reduce the risk of a trench collapse by keeping the weight of the soil piles away from the trench edges.

Even if a soil pit is 4 feet deep or less, it is a good idea to angle the edges of the soil pit. This does create more disturbance, but if it prevents an accident, it's worth it.

For more information on trenching and excavation safety, see the following OSHA publication:

*Trenching and Excavation Safety*, <https://www.osha.gov/Publications/osha2226.pdf>

**You Never  
Know What's  
Below.**



**REMEMBER!**

811 is the number  
you should call  
before you begin  
any digging project.

Smart digging means  
calling 811 before  
each job. Whether you  
are a homeowner or a  
professional excavator,  
one FREE call to 811  
gets your underground  
utility lines marked  
for FREE.

**Know what's below.  
Call before you dig.**

Progressive Agriculture Safety Day in  
Partnership with Common Ground Alliance  
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[www.call811.com](http://www.call811.com)

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

### 3. Ag-Climate Update for November 2019

The Ag-Climate Update is a joint effort between our climate and extension specialists. Every month the update includes a brief summary of that month, agronomic impacts, relevant maps and graphs, 1-month temperature and precipitation outlooks, monthly extremes, and notable highlights.

#### **November 2019 – The Block of Rockies: A cool and dry November**

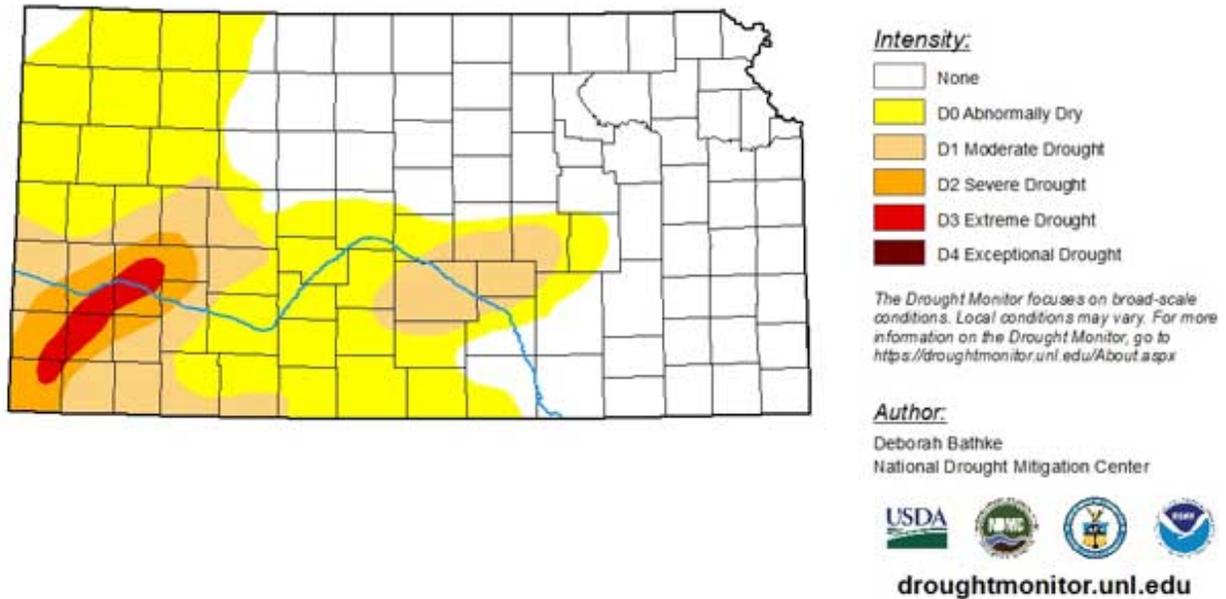
November was cooler and drier than normal, falling in the bottom third ranking for both temperature and precipitation. The only precipitation records set during the month were for daily snowfall amounts, at seven locations. Severe weather was limited, and confined to winter weather conditions.

The blocking pattern in the Rockies contributed to several high wind days, with blowing snow hampering travel. The high winds and relatively dry air also contributed to increased fire danger. Cheyenne County saw a major fire on the 9<sup>th</sup>, resulting in a disaster declaration by the Governor.

The normal expected winter precipitation amount is small; forecast trends indicate a gradient from the northeast to the southwest. This means there is little chance for drought improvement in the western parts of the state (Figure 1). Normal precipitation in Colby for December is 0.5 inches. For Columbus, the normal is 2.5 inches.

**U.S. Drought Monitor**  
**Kansas**

**December 3, 2019**  
(Released Thursday, Dec. 5, 2019)  
Valid 7 a.m. EST



**Figure 1. Drought map for Kansas as of December 3, 2019.**

View the entire November 2019 Ag-Climate Summary, including the accompanying maps and graphics (not shown in this summary), at <http://climate.k-state.edu/ag/updates/>.

#### 4. Registration is open for the K-State Winter Crop Schools - Corn, Soybean, and Sorghum

Looking ahead to 2020, please mark your calendars to attend the K-State Winter Crop Schools. Registration is now open for all the Crop Schools. Look for the registration links within their respective section outlined below. Detailed information on agendas, speakers, and locations will be added in upcoming eUpdate articles.

Each Soybean School will be free to attend and attendees will be treated to either lunch or dinner. There will a targeted program on location-specific issues related to soybean production. You can register online at: <http://bit.ly/KSUSoybean>

##### 2020 Soybean Schools

- Smith Center  
**January 13**, Monday – 9:00 am to 1:30 pm
- Salina  
**January 13**, Monday – 3:00 pm to 7:30 pm
- Mulvane  
**January 14**, Tuesday – 9:00 am to 1:30 pm
- Emporia  
**January 21**, Tuesday - 3:00 pm to 7:30 pm
- Atchison  
**January 22**, Wednesday – 9:00 am to 1:30 pm
- Marysville  
**January 22**, Wednesday - 3:00 pm to 7:30 pm

##### 2020 Corn Schools

K-State Research and Extension and Kansas Corn have teamed up once to again to host six regional corn schools in 2020. While each school's agenda varies, the schools will connect to the overall theme of "maximizing advancement in your operation." These schools are free to attend and open to farmers and industry partners. Each school will run from 9:00 am to 2:00 pm with lunch provided. All attendees registered at least one week in advance will receive a free pair of gloves.

Online registration is open for all the Corn Schools at <https://kscorn.com/schools/>. This link will also provide more detailed information on the specific topics to be offered at each location.

The dates and locations are:

- **January 6** - Montezuma (optional Corn-Fed Beef Seminar to follow), Hy-Plains Feedyard
- **January 8** – Parsons, Southeast Area Extension Office

- **January 10** – Wichita, Sedgwick Co. Extension Office
- **February 3** - Oakley, Buffalo Bill Cultural Center
- **February 5** - Salina, Hilton Garden Inn
- **February 7** - Olathe, John Deere Ag Marketing Center

## 2020 Sorghum Schools

A series of three K-State Sorghum Production Schools will be offered in late January to provide in-depth training targeted for sorghum producers and key-stakeholders. The schools are sponsored by Kansas Grain Sorghum Commission. Each school will cover a number of issues facing sorghum growers: risk management, marketing opportunities, weed control, crop production practices, nutrient and soil fertility, and insect management. Topics will vary depending on the location.

The final dates and specific locations have been set focusing with Schools across the state. More details on speakers, topics, and specific locations will be in an upcoming eUpdate. Online registration is available at: <http://bit.ly/KSUSorghum>

- Scott City, KS  
**January 29**, Wednesday – 2:30 pm to 7:00 pm
- Great Bend, KS  
**January 30**, Thursday – 8:30 am to 1:00 pm
- Hutchinson, KS  
**January 30**, Thursday – 2:30 pm to 7:00 pm

Ignacio Ciampitti, Crop Production and Cropping Systems Specialist  
[ciampitti@ksu.edu](mailto:ciampitti@ksu.edu)

Kathy Gehl, eUpdate Editor and Extension Program Coordinator  
[kgehl@ksu.edu](mailto:kgehl@ksu.edu)