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These e-Updates are a regular weekly item from K-State Extension Agronomy and Kathy Gehl, Agronomy e-Update Editor. All of the Research and Extension faculty in Agronomy will be involved as sources from time to time. If you have any questions or suggestions for topics you'd like to have us address in this weekly update, contact Kathy Gehl, 785-532-3354 kgehl@ksu.edu, or Curtis Thompson, Extension Agronomy State Leader and Weed Management Specialist 785-532-3444 cthompso@ksu.edu.

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1. Identifying nutrient deficiency symptoms in soybeans

This time of year, soybeans may begin showing signs of chlorosis or other leaf discoloration in all or parts of the field. There may be many causes of discoloration. Nutrient deficiencies are one possibility.

General considerations

The relative mobility of the nutrient within the plant will determine if the deficiency symptom will first be noticeable on the lower leaves or upper leaves.

<u>Mobile Nutrients:</u> These nutrients can be transferred from older tissues to the youngest tissues within the plant. Deficiency symptoms are first noticeable on the lower, oldest leaves.

- Nitrogen (N)
- Phosphorus (P)
- Potassium (K)
- Magnesium (Mg)

<u>Immobile Nutrients:</u> These nutrients are not easily transferred within the plant. Therefore, symptoms occur first on the upper, youngest leaves.

- Boron (B)
- Calcium (Ca)
- Copper (Cu)
- Iron (Fe)
- Manganese (Mn)
- Molybdenum (Mo)
- Sulfur (S)
- Zinc (Zn)

Possible causes of nutrient deficiencies:

1. Low soil levels of the nutrient
2. Poor inoculation (in the case of N deficiency)
3. Unusually low or high soil pH levels depending on the nutrient in question
4. Roots are unable to access sufficient amounts of the nutrients - due to poor growing conditions, excessively wet or dry soils, cold weather, or soil compaction
5. Root injury due to mechanical, insect, disease, or herbicide injury
6. Genetics of the plant

The following is a brief description of the symptoms of some of the most common nutrient deficiencies in soybeans.

Nutrient deficiency symptoms

Nitrogen. Chlorotic or pale green plants starting with the lower leaf (Figure 1a). Within the plant, any available nitrogen (N) from the soil or from nitrogen fixation within nodules on the roots goes to the new growth first. Soybeans prefer to take up N from the soil solution as much as possible, since this requires less energy than the nitrogen fixation process. However, both sources of N are important for soybeans since they are a big user of N. Nitrogen deficiency can be associated with poor nodulation (Figure 1b).

Figure 1a. Soybean field showing signs of chlorosis. Photo by Dorivar Ruiz Diaz, K-State Research and Extension.

Figure 1b. Lack of nodulation on far right soybean plants. Photo by Dorivar Ruiz Diaz, K-State Research and Extension.

Iron. Iron chlorosis, occurs in calcareous soils (contains calcium carbonates) with high soil pH. The classic symptom is chlorosis (yellowing) between the veins of young leaves since iron is not mobile within the plant (Figures 2 and 3). A side effect of iron deficiency can be N deficiency, since iron is necessary for nodule formation and function. If iron is deficient, N fixation rates may be reduced. Iron deficiency occurs on calcareous soils, in addition to high pH, plant stress can favor the development of iron chlorosis, and therefore the severity can vary significantly from year to year in the same field.

More information concerning iron chlorosis in soybeans is available in a previous eUpdate article from Issue 690 on April 27, 2018, "Management strategies to minimize iron chlorosis in soybeans".

Figure 2. Iron chlorosis in soybeans; the upper leaves become chlorotic. Photo by Dorivar Ruiz Diaz, K-State Research and Extension.

Figure 3. Close-up of iron chlorosis in soybeans. Photo by Dorivar Ruiz Diaz, K-State Research and Extension.

Magnesium. Lower leaves will be pale green, with yellow mottling between the veins. At later stages, leaves may appear to be speckled bronze. This deficiency may occur on very sandy soils.

Manganese. Stunted plants with interveinal chlorosis (Figure 4). Can be a problem in soils with high pH (>7.0), or on soils that are sandy or with a high organic matter content (>6.0%OM). Manganese activates enzymes which are important in photosynthesis, as well as nitrogen metabolism and synthesis. Symptoms are hard to distinguish from iron chlorosis.

Figure 4. Manganese deficiency symptoms are similar to symptoms of iron chlorosis in soybeans. Photo by Jim Camberato, Purdue University.

Phosphorus. Phosphorus deficiency may cause stunted growth, dark green coloration of the leaves, necrotic spots on the leaves, a purple color to the leaves, and leaf cupping. These symptoms occur first on older leaves. Phosphorus deficiency can also delay blooming and maturity. This deficiency may be noticeable when soils are cool and wet, due to decrease in phosphorus uptake.

Potassium. Soybean typically requires large amounts of potassium. Like phosphorus deficiency, potassium deficiency occurs first on older leaves. Symptoms are chlorosis at the leaf margins and between the veins (Figure 5). In severe cases, all but the very youngest leaves may show symptoms.

Figure 5. Potassium deficiency: chlorosis of the lower leaves. Photo by Dave Mengel, K-State Research and Extension.

Sulfur. Stunted plants, pale green color, similar to nitrogen deficiency except chlorosis may be more apparent on upper leaves. Plant-available sulfur is released from organic matter. Deficiency is most likely during cool wet conditions or on sandy soils with low organic matter content.

For more information, see K-State Research and Extension publication MF-3028, *Diagnosing Nutrient Deficiencies in the Field* at: http://www.ksre.ksu.edu/bookstore/pubs/MF3028.pdf

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2. June heat in Kansas: High temperatures can stress livestock and corn

The heat continues in Kansas, particularly with the warm minimum temperatures (Figure 1). For the 11-day window of June 10-20, parts of the South Central and Southeast divisions had lows above 70 degrees F almost every night. Most of the eastern half of the state saw those elevated lows for over half of the nights. Only the western third of the state had two or less nights with minimum temperatures above 70 degrees F.

Night time temperatures in excess of 70 degrees F for more than two consecutive days will increase the risk of stress to livestock. As with people, the stress is cumulative.

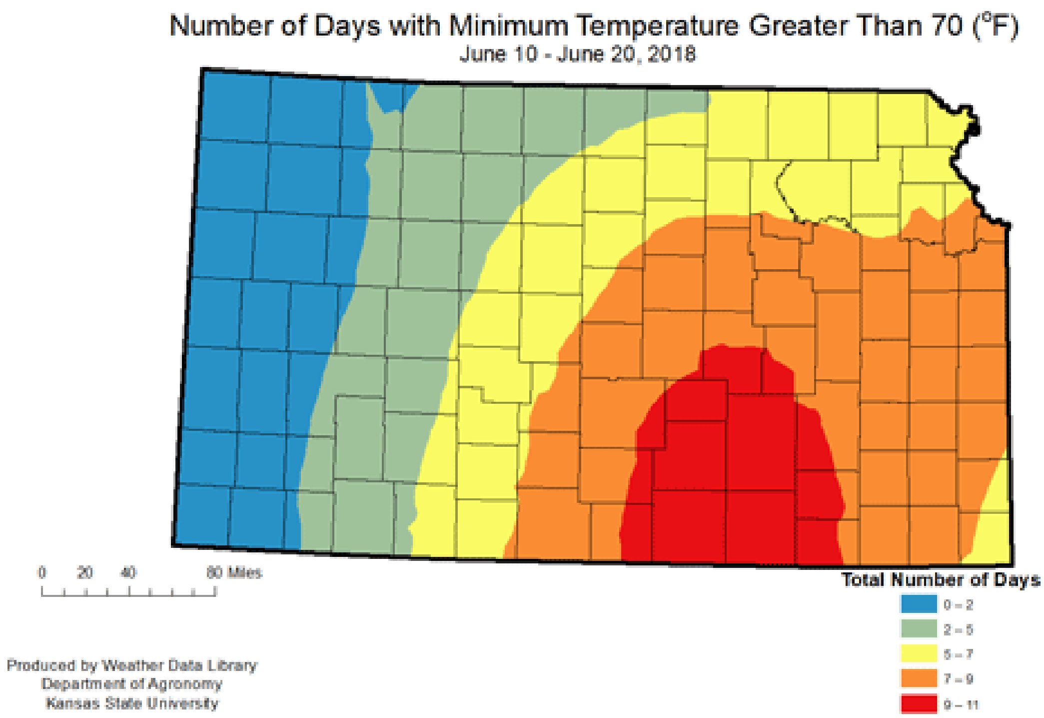

Figure 1. Total days with minimum temperature greater than 70 degrees F. Source: Weather Data Library

The heat this June can also cause problems for corn in Kansas (Figure 2). The effect of combined heat and drought stresses can reduce plant size, primarily when the plant is entering the stem elongation process. When the crop reaches the V10 (tenth-leaf) stage, nutrient and water demands (0.25 inch/day) are high. At this specific point, a combination of heat plus drought stresses will affect potential number of kernels and ear size. Overall mean temperatures above 90 degrees F, and more importantly, lower fluctuations between day and night temperatures, will produce critical impacts on plant and potential ear sizes and the yield components of corn.

Heat stress will have more of an impact on corn at this stage of growth when combined with drought stress. But even in the absence of drought stress, heat stress alone can still hasten vegetative phases and tasseling, potentially increasing the asynchrony between pollen shed and silk extrusion when corn reaches flowering time. The potential for yield reductions from stress at this stage of growth is small, however, compared with severe stress occurring right around pollination.

Figure 2. Leaf rolling in corn from the combined effect of heat and drought. This can also affect final plant size. Photo by Ignacio Ciampitti, K-State Research and Extension.

The K-State Mesonet web site has a special page that tracks the current heat index at: http://mesonet.k-state.edu/weather/heat/

There is also a page that tracks growing degree accumulation for multiple crops. With this tool, you can pick the planting/emergence date for the start of the interval. Selecting the graph will illustrate the growing degree accumulation for this season versus normal and plant stage. You can access the page at: http://mesonet.k-state.edu/agriculture/degreedays/

The data updates every five minutes when you refresh the page and is available for all 58 stations.

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3. Management options for stressed corn

High temperatures can cause problems in corn even when soil moisture is adequate -- and will compound problems in drought-stressed corn. Hot, dry conditions are particularly damaging during pollination (VT-tassel through R1-silk). Much of the corn crop in Kansas is just now entering this critical period for determining grain yield. While many areas of Kansas received much needed rainfall recently, extreme temperatures are returning this week and drought conditions are still present in many locations.

Effects of stress at pollination time

There are several reasons why the four weeks centered around pollination are so critical for determining grain yield. During the last couple of weeks before tassels emerge, the potential ear length is being determined. Extreme stress at this time can reduce the number of kernels per row – affecting potential ear size. Extremely high temperatures prior to and during pollen shed can reduce pollen viability.

Drought stress can slow silk elongation so much that the pollen may be shed before the silks emerge. Lack of water can also result in poor tassel exertion. Combined with the leaf rolling associated with drought stress, the pollen may be shed before the tassel has emerged. Even if pollination does occur successfully, kernels may abort during the first several days of development under severe heat/drought stress. All of these factors can reduce successful pollination, kernel set, and kernel development, reducing the number of kernels per acre – the greatest determinant of grain yield.

Management options for stressed corn

Where dryland corn has been under severe drought stress, you'll have to decide whether to let it go and hope for some kind of grain yield, salvage the crop for silage or hay, or leave the crop in the field for its residue value. It likely will pay to wait until after pollination is complete before making this decision to get some idea of kernel set. If kernel set is good, the ears at least have the potential to produce grain. If kernel set is severely reduced, the first step is to estimate potential grain yield based on kernel numbers per acre and average to slightly below average kernel size. This can help you make the grain vs. forage decision.

Economically, should you leave the corn, cut it for silage or hay, or leave it for residue?

The value of the residue for moisture retention, soil quality, and future crop productivity will vary depending on the situation, and can be hard to quantify -- but it is considerable. As for the silage/hay vs. grain decision, if the yield potential is less than 25 bushels per acre, it's probably best to cut it for silage or hay. If the yield potential is 50 bushels or more, it's probably best to harvest it for grain. If the yield potential is between 25 and 50, the decision will depend on the price of corn, the quality of the silage, and on a producer's ability to use or sell the silage.

Of the two options for dryland corn that has limited yield potential – silage or hay -- silage is normally the preferred option. However, you need the facilities to make silage (or sell it to someone who does), and there must be enough moisture in the plants to properly ensile. And where there's no ear at all, silage may not be a good option. Where the ear is very small, or has poor seed set, the silage will have lower energy value (TDN) and lower overall forage quality than normal. Even at normal yield levels, silage quality begins to decline when grain yield drops below roughly 150 bushels per acre, and continues to decrease as grain yields keep going down.

To cut corn for silage, you need 65 to 75 percent moisture in the plant. If plants are suffering from drought, they may have lost some of the bottom leaves. The top leaves may have browned off or turned white. In that case, the plants probably do not have 65 percent moisture, depending on how much moisture is in the stalk. Where that's the case, your only option is probably to chop and graze, or hay the crop like a summer annual forage. The pasture/hay shortage that exists in some areas of the state may make haying the failing corn crop a more desirable option this year.

When chopping or cutting for hay, stalks should be cut at least six to eight inches off the ground to avoid nitrate toxicity that may result when feeding forage made from drought-stressed corn. Under drought conditions, the plant does not grow normally and high levels of nitrate can accumulate, especially in the lower portions of the stalk. You should also have corn hay (or stubble if you plan to graze) tested for nitrates. A forage nitrate test costs only $5-15 and it's the only sure way to make sure the hay is okay to feed to cattle. Ensiling the corn, if possible, is preferred to chopping or grazing because of that potential for nitrate toxicity. For more information on nitrate toxicity please read the companion article, "Nitrate toxicity in drought-stressed corn", available in this eUpdate issue.

If you plan to have cattle graze the corn field after it has been chopped or cut for hay or silage, watch for any shattercane or Johnsongrass that comes up after a rain. New regrowth from these sorghum-type plants after a drought can be dangerously high in prussic acid.

How much silage can producers get from drought-stressed corn?

A publication from the University of Wisconsin estimates that for corn that has been stressed, with limited grain yield potential, producers can expect about one ton of silage per acre for every five bushels of grain yield. For corn that is not stressed, producers can get about one ton of silage for each six to seven bushels of grain yield. If little or no grain is expected, a very, very rough pre-harvest estimate of yield can be made by assuming that one ton of silage can be obtained for each foot of plant height, excluding the tassel.

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4. Nitrate toxicity in drought-stressed corn

During times of drought, plants such as corn and grain sorghum tend to accumulate high levels of nitrate in the lower leaves and stalk. The accumulation is because the plant assimilation of these nitrates into amino acids is slowed because of the lack of water, a crucial component to numerous plant processes. Nitrate toxicity in livestock is because of its absorption into the bloodstream and binding to hemoglobin, rendering it unable to carry oxygen throughout the body. The result is eventual asphyxiation and death.

It is wise for producers to test their drought-stricken forage prior to harvest. Nitrate testing can be done through several labs including the K-State Soil Testing Laboratory. Harvesting the forage 8 to 12 inches above the ground to avoid the highest concentrations of nitrate in the plant is a good practice. Producers should collect a good representative forage sample above this cutting height to get an accurate determination of what the nitrate level could be.

Depending on the planned feeding method, a producer may wish to harvest different parts of the plant. If wrapping the forage into a bale and feeding it directly to livestock, a producer may want to test the lowest part of the stalk to determine the greatest risk of nitrate forage that could be ingested by the animal. If a producer was planning on grinding the bale, a whole-plant sample above what will be left in the field may be a more accurate representation of what will be eaten. If a harvested forage is high in nitrate, blending the feed with another forage such as prairie hay or brome will dilute the total nitrates in the animal's diet and could potentially reduce the risk of poisoning.

High-nitrate forages chopped for silage and properly ensiled are a safer option for livestock feeding. During the ensile process, potentially 50 percent of the nitrates in the forage will be metabolized by the microbes and can vastly reduce the risk of poisoning. It is still not a bad idea to leave 6 inches of stubble in the field. That is the portion of the stem with the highest concentration of nitrates.

Grazing high nitrate forages is a dangerous practice. Although animals tend to consume the leaves and the top portions of the plant, which contain less nitrates, the risk of consuming a high-nitrate portion of the plant still exists. In addition, the longer the animal is left on a field and the more that animal is forced to eat the remaining forage at the lower portions of the plant, the greater risk of nitrate poisoning.

For more information, see K-State Research and Extension publication MF3029, "Nitrate Toxicity", at your local county Extension office, or at https://bookstore.ksre.ksu.edu/pubs/MF3029.pdf

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5. Plant analysis for testing nutrient levels in corn

Plant analysis is an excellent "quality control" tool for growers interested in high-yield crop production. It can be especially valuable for managing secondary and micronutrients that don't have high quality, reliable soil tests available, and for providing insight into how efficiently you are using applied nutrients.

Plant analysis can be used by Kansas farmers in two basic ways: for diagnostic purposes, and for monitoring nutrient levels at a common growth stage. Diagnostics can be done any time, and is especially valuable early in the season when corrective actions can easily be taken. Monitoring is generally done at the beginning of reproductive growth.

Diagnostic sampling

Plant analysis is an excellent diagnostic tool to help understand some of the variation among corn plants in the field. When using plant analysis to diagnose field problems, try to take comparison samples from both good/normal areas of the field, and problem spots. This can be done at any growth stage.

When sampling for diagnostic purposes, collecting specific plant parts is less important than obtaining comparison samples from good and bad areas of the field. As a general rule, if plants are less than 12 inches tall, collect the whole plant. Cut off the plant at ground level. With plants more than 12 inches tall and until reproductive growth begins, collect the top fully developed leaves (those which show leaf collars). Once reproductive growth starts, collect the same plant parts indicated for monitoring purposes, described below.

Along with taking plant tissue samples, it is also helpful to collect a soil sample from both good and bad areas when doing diagnostics. Define your areas, and collect both soil and plant tissue from areas that represent good and bad areas of plant growth. Soil samples can help define why a problem may be occurring. The soil sample may find certain nutrient levels are very low in the soil, helping to explain why a deficiency is occurring. However, other factors can also cause nutrient problems. Soil compaction, or saturation of soils for example, often limits the uptake of nutrients, especially potassium, which are otherwise present in adequate amounts in the soil.

Plant analysis for nutrient monitoring

For general monitoring or quality control purposes, plant leaves should be collected as the plant enters reproductive growth. Sampling under stress conditions for monitoring purposes can give misleading results, and is not recommended. Stresses such as drought or saturated soils will generally limit nutrient uptake, and result in a general reduction in nutrient content in the plant.

In the case of corn, 15-20 ear leaves, or the first leaf below and opposite the ear, should be collected at random from the field at silk emergence, before pollination, and before the silks turning brown.

Handling and shipping plant sample

How should you handle samples, and where should you send the samples? The collected leaves should be allowed to wilt over night to remove excess moisture, placed in a paper bag or mailing envelope, and shipped to a lab for analysis. Do not place the leaves in a plastic bag or other tightly sealed container, as the leaves will begin to rot and decompose during transport, and the sample won't be usable. Most of the soil testing labs working in the region provide plant analysis services, including the K-State testing lab.

What nutrients should be included in the plant analysis?

In Kansas, nitrogen (N), phosphorus (P), potassium (K), sulfur (S), zinc (Zn), chloride (Cl), and iron (Fe) are the nutrients most likely to be found deficient. Recently questions have been raised concerning copper (Cu), manganese (Mn), and molybdenum (Mo), though widespread deficiencies of those micronutrients have not been found in the state. Normally the best values are the "bundles" or "packages" of tests offered through many of the labs. They can be as simple as N, P and K, or can be all the mineral elements considered essential to plants. K-State offers a package which includes N, P, K, Ca, Mg, S, Fe, Cu, Zn, and Mn.

What will you get back from the lab?

The data returned from the lab will be reported as the concentration of nutrient elements, or potentially toxic elements, in the plants. Units reported will normally be in "percent" for the primary and secondary nutrients (N, P, K, Ca, Mg, S, and Cl) and "ppm," or parts per million, for most of the micronutrients (Zn, Cu, Fe, Mn, B, Mo, and Al).

Most labs/agronomists compare plant nutrient concentrations to published sufficiency ranges. A sufficiency range is simply the range of concentrations normally found in healthy, productive plants during surveys. It can be thought of as the range of values optimum for plant growth. The medical profession uses a similar range of normal values to evaluate blood work. The sufficiency ranges change with plant age (generally being higher in young plants), vary between plant parts, and can differ between hybrids. A value slightly below the sufficiency range does not always mean the plant is deficient in that nutrient. It is an indication that the nutrient is relatively low. Values on the low end of the range are common in extremely high-yielding crops. However, if that nutrient is significantly below the sufficiency range, you should ask some serious questions about the availability and supply of that nutrient.

Keep in mind also that any plant stress (drought, heat, soil compaction, saturated soils, etc.) can have a serious impact on nutrient uptake and plant tissue nutrient concentrations. A low value of a nutrient in the plant doesn't always mean the nutrient is low in the soil and the plant will respond to fertilizer. It may be that the nutrient is present in adequate amounts in the soil, but is either not available or not being taken up by the plant for a variety of reasons. Two examples are drought, which can reduce plant uptake of nutrients and cause low nutrient values in the plant; and high-pH soils, which can cause low iron availability.

On the other extreme, levels above "sufficiency" can also indicate problems. High values might indicate over-fertilization and luxury consumption of nutrients. Plants will also sometimes try to compensate for a shortage of one nutrient by loading up on another. This occurs at times with nutrients such as iron, zinc, and manganese. Plants will sometimes load up on iron in an attempt to compensate for low zinc. In some situations very high levels of a required nutrient can lead to toxicity. Manganese is an example of an essential nutrient that can be toxic when present in excess. This can occur at very low soil pH levels, generally well below 5.

Table 1 gives the range of nutrient contents considered to be “normal” or “sufficient” for corn seedlings below 12 inches tall, and for the ear leaf of corn at silking. Keep in mind that these are the ranges normally found in healthy, productive crops.

Table 1. Range of nutrient contents considered “normal” or “sufficient” at two growth stages in corn

Nutrient	**Units**	**Whole Plant <12” tall**	**Corn Ear Leaf at Green Silk**
Nitrogen	%	3.5-5.0	2.75-3.50
Phosphorus	%	0.3-0.5	0.25-0.45
Potassium	%	2.5-4.0	1.75-2.25
Calcium	%	0.3-0.7	0.25-0.50
Magnesium	%	0.15-0.45	0.16-0.60
Sulfur	%	0.20-0.50	0.15-0.50
Chloride	%	Not established	0.18-0.60
Copper	ppm	5-20	5-25
Iron	ppm	50-250	20-200
Manganese	ppm	20-150	20-150
Zinc	ppm	20-60	15-70
Boron	ppm	5-25	4-25
Molybdenum	ppm	0.1-10	0.1-3.0
Aluminum	ppm	<400	<200

Summary

In summary, plant analysis is a good tool to monitor the effectiveness of your fertilizer and lime program, and a very effective diagnostic tool. Consider adding this to your toolbox.

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6. Chinch bug activity is high in Kansas corn and grain sorghum

All life stages of chinch bugs seem to be extremely active at the present time in both corn and grain sorghum. Nymphs and adults started migrating out of wheat fields at least two weeks ago, moving into any adjacent corn or grain sorghum fields. Those smaller reddish nymphs (Figure 1) have grown considerably since then, and are now either late instar nymphs or adults.

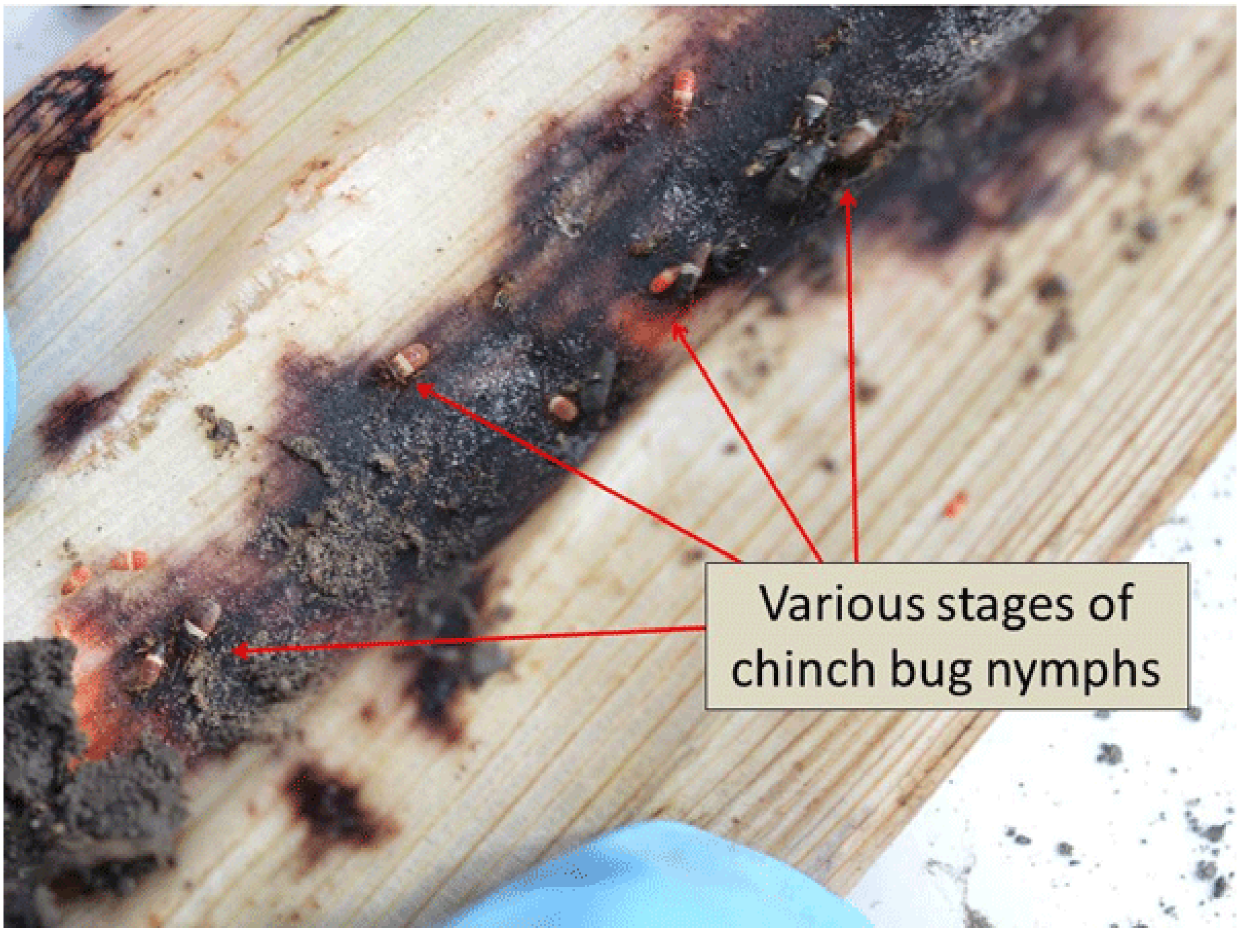

Figure 1. Stages of chinch bug nymphs. Photo by Holly Davis, K-State Research and Extension.

Many of these recently matured adults are now mating (Figure 2) and have even started egg deposition. These eggs are, and will continue to be, hatching which means more bugs and thus more feeding on these plants. Fortunately, most corn is large enough to withstand considerable feeding by chinch bugs. Plus, the recent rains greatly enhanced growing conditions, which increases the plant's tolerance for chinch bug feeding.

Figure 2. Mating chinch bugs. Photo by Holly Davis, K-State Research and Extension.

Figure 3. Adult chinch bugs in the whorl of a corn plant taken the weekend of June 23, 2018. Photo by Holly Davis, K-State Research and Extension.

Most grain sorghum is much less developed than corn and won't be able to tolerate as many chinch bugs as the larger corn plants. Treating plants much after the V6/V7 growth stages is not as effective as treating smaller plants. Like corn, good growing conditions significantly help sorghum plants withstand chinch bug feeding. However, if dry conditions return, chinch bug feeding can significantly weaken stalks and cause lodging later in the season.

For more information on chinch bugs, management decisions, and insecticide recommendations, please see:

Chinch Bugs, MF3107: https://www.bookstore.ksre.ksu.edu/pubs/mf3107.pdf

2018 Sorghum Insect Management Guide, MF742:
https://www.bookstore.ksre.ksu.edu/pubs/mf742.pdf

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7. Great Plains Grazing to host beef cattle producer conference on June 28-29

Great Plains Grazing will host "Adapting Grazing Management for Future Needs", a conference aimed for beef cattle producers across Kansas, Oklahoma, and Texas. The conference is scheduled for June 28-29, 2018 at the Grand Casino Hotel and Resort in Shawnee, Oklahoma.

Almost five years ago, a team of nearly 50 scientists from Kansas State University, the University of Oklahoma, Oklahoma State University, Tarleton State University, the Noble Research Institute, and the USDA Agricultural Research Service (ARS) began collaboration to increase the resiliency of beef cattle operations on grazing lands and wheat pastures under changing climate, land use, and markets across the Southern Great Plains. As the Great Plains Grazing project nears its completion, cattle producers across the region are invited to attend a conference tailored specifically to help producers manage their operations more effectively.

Registration for the conference is free and will include lunch and dinner on June 28, breakfast on June 29, and a lunch to conclude the event.

The event kicks off with registration at 10:30 a.m. on June 28. A buffet lunch will begin at 11:30 a.m. with opening remarks to start at 12:30 p.m. The conference will feature 5 sessions over the two days. The topics and speakers include:

- **The Impact of Grazing Animals on Methane Emissions**
  - Field scale methane emissions from grazing systems – Rick Todd, USDA-ARS
  - The role of enteric methane on climate change – Andy Cole, Retired USDA-ARS
  - Methanotrophic bacteria and their potential role in the methane cycle – Brekke Munks, USDA-ARS

- **Grazing Management Impacts on Resilience and Productivity**
  - Rotational grazing – Walt Fick, K-State
  - Moderate continuous stocking – Laura Goodman, OSU
  - Patch burning – Corey Moffet, USDA-ARS
  - Grazing cover crops in the Southern Plains – Jaymelynn Farney, K-State

- **Dynamic Grazing Management**
  - Dynamic forage management using field measurements – Alex Rocateli, OSU
  - Forecasting forage production with soil moisture estimates – Sonisa Sharma, USDA-ARS
  - Matching cows to forage resources – David Lalman, OSU

- **Weather, Climate, and Cattle**
  - Dynamics in weather and climate change – Jeff Basara, Univ. of Oklahoma
  - Utilizing the cattle comfort advisor – Wes Lee, Oklahoma Mesonet

- **Sustainable Beef Production**
  - Consumer perspectives – Bailey Norwood, OSU
  - Industry perspectives – Sara Place, National Cattlemen's Beef Association

All beef cattle producers in the region are encouraged to attend this conference. Registration for the event is free. Interested individuals are encouraged to register online at: http://bit.ly/GrazCAPCon

For more information about the conference, contact Jason Warren at Jason.warren@okstate.edu or 405-744-1721 or visit the Great Plains Grazing website at www.greatplainsgrazing.org.

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ADAPTING GRAZING MANAGEMENT FOR FUTURE NEEDS

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