Issue 978

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Extension Agronomy

eUpdate

10/12/2023

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. Managing forages after a hard freeze

Freezing temperatures change plant metabolism and composition, and different forage species respond differently to cold stress as the fall progresses. Still, damaging frosts significantly reduce forage quality in most forage species. Depending on plant species, these changes in metabolism resulting from freezing temperatures can create possible feeding-related animal disorders, and therefore, there may be a need to alter grazing management.

Prussic acid poisoning

Plants that contain cyanogenic glucosides, such as warm-season annual grasses in the sorghum family, produce larger amounts of cyanide (prussic acid) when damaged by frost (Figure 1). Greater potential for harmful cyanide levels occur in soils with nitrogen content and low in phosphorus or potassium.

Consuming large amounts of prussic acid interferes with oxygen utilization, potentially causing animals to die from asphyxiation (respiratory paralysis). Symptoms such as cherry-red colored blood, staggering, difficulty breathing, spasms, foaming at the mouth, excess salivation, falling, and severe convulsions appear rapidly after forage consumption, sometimes leading to animal death within minutes.

Figure 1. Mid-October morning freeze on sorghum-sudangrass. Photo from K-State Research and Extension MF3607**.**

It is extremely important to use caution when grazing these species during the fall. Most toxins are produced within hours of a freeze event, so grazing animals should be removed from the field before a frost or freeze occurs. If there is a killing frost, it is advised to avoid livestock grazing these pastures for up to three days after the frost – as the toxin usually dissipates within 72 hours or until plant tissue is dried out. Fresh forage is riskier as cyanide levels will be higher as compared to dry tissue, silage, or hay. After non-killing frosts, we advise you to wait 10-14 days without additional frost action before grazing.

Prussic acid content decreases significantly when the forage is cut for hay/used for silage, as large amounts are lost as gas during fermentation. Still, it is recommended to delay feeding silage for six to eight weeks following ensiling. Forage cut for hay that contained high concentrations of cyanide before harvest may still have dangerous levels even after drying. Testing is cheap compared to dead

cows. Producers can consider mixing nonthreatening forages into the diet to dilute any potentially damaging residual cyanide.

Forages with differing potentials for prussic acid production:

- High: grain sorghum, forage sorghum, and sorghum-sudangrass hybrids
- Intermediate: sudangrass
- Low: piper sudangrass, pearl millet, and foxtail millet

Other species that have the potential to contain toxic levels of prussic acid after frost include Johnsongrass, chokecherry, black cherry, and elderberry. Refer to these publications for more information: Prussic Acid Poisoning and Managing the Prussic Acid Hazard in Sorghum.

Nitrate toxicity

The summer of 2023 was extremely dry in many areas of Kansas. Drought-stressed annual and perennial forages can accumulate toxic nitrate levels. This can be worsened after a frost, as freezing damage slows down metabolism and can accumulate nitrate in parts of the plants that are still growing. Examples of forages that may have high nitrate levels include alfalfa, corn, oats, and other small grains, millet, sudangrass, sorghum sudangrass, Johnsongrass, etc. Before feeding or grazing drought-stressed forage, send a forage sample to a commercial lab to be tested for nitrates. Follow your lab's specific instructions about how to collect and handle the sample. The cost of sampling and analysis is well below that of losing animals.

For more complete information on nitrate toxicity, see this publication: Nitrate Toxicity.

Managing alfalfa after a hard freeze

If cutting alfalfa for hay, the final cutting should occur right after the first killing freeze, before too many leaves have dropped, to reduce losses in nutritive value. A killing freeze commonly requires temperatures below 25^0F for more than four hours. Producers should be prepared to enter the fields when soil moisture conditions allow. After a killing freeze, the remaining forage, if any, can be hayed safely. However, the producer should act quickly because the leaves will soon drop off.

If grazing alfalfa fields, the best practice is to wait a few days after the freeze before releasing livestock to the field as frost-damaged alfalfa, while not toxic in terms of prussic acid, does have an increased potential for bloat for a few days. Other forage legumes, such as clovers, also have the potential to cause bloating after a freeze. Bloat chances decrease once wilting starts or the plant starts growing again. Another option is to swath legume pastures ahead of grazing so that animals graze dry hay instead.

Grazing tall fescue after a freeze

Tall fescue has a waxy layer that reduces the damage caused by frosts; consequently, forage quality remains relatively high when compared to other species and can even result in an increase in sugar content, making tall fescue ideal for stockpiling and winter grazing use. Native grass species retain leaves better than annual forages and are better suited for grazing after annual forages.

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2. Fall soil testing of hayfields and pastures

Knowing the soil nutrients is a requirement to establish an adequate soil fertility program for forages. Soil testing can be done in either spring or fall on hayfields and pastures. Given a choice, fall would be the preferred time because it allows more time for any needed lime applications to have an effect before the main growing season begins, and it gives the producer some flexibility for planning nutrient applications.

Figure 1. Fertility management effect in bermudagrass pastures. The left side of the pasture received an application of nitrogen fertilizer, while the right side did not. Photo credit: K-State Research and Extension.

Soil sampling is typically recommended at least every 3-4 years, but more frequent sampling (every two years) can keep you from applying excessive and unnecessary amounts of fertilizer or manure and can increase yields by revealing exactly which soil nutrients are too low for optimum productivity, this is particularly important given the high fertilizer prices.

Tips for collecting a representative soil sample

It is best to use a soil probe to take accurate soil samples. You can borrow a probe from many county Extension or NRCS offices. A shovel or spade can be used, but make sure to dig a hole first and then take a nice, even slice to the correct depth. A shovel or spade that angles to a point at the bottom can easily result in misleading soil test results because the sample is biased by having more soil from the surface and less from lower depths.

When taking soil samples, it is important to have a representative composite soil sample from the field by combining several soil cores (in a clean container, avoiding contamination) and mixing thoroughly. Ideally, one composite soil sample should represent a uniform and treatable area, not exceeding 40 acres, and no more than 10 acres for more variable fields. In these areas, take 15 to 20 cores or subsamples to make up your representative composite sample. If the field has areas where different forages or crops have been grown or have different soil types, then soil sampling from these areas should be done separately.

Sampling depth for pastures and hayfields should be 3 to 4 inches for pH evaluation. For phosphorus and potassium, a 6-inch depth is preferred when submitting samples to the K-State Soil Testing Laboratory since that is the depth we have used to calibrate recommendations.

Soil pH is important

Soil pH is one key soil property for forage production, especially with legumes. The optimal pH level is 6 to 7, depending on the forage species. Grasses such as brome or fescue do well at lower pH than legumes, especially alfalfa, which requires a near-neutral pH (~pH 7). Nutrient uptake can be reduced if the soil pH is too low or too high. The impact of pH on nodulation and nitrogen fixation is especially important for legumes such as alfalfa and clover. At low soil pH, aluminum toxicity can also be an issue.

When you lime a new pasture, it is important to apply the lime 6 to 12 months before planting. If you want to get a more rapid response from liming, use fine-ground liming materials with a high effective calcium carbonate (ECC). Fields that will be planted to alfalfa next spring should also be evaluated for phosphorus and potassium levels and make corrections before planting. Sulfur and boron may also be a limiting nutrient for legumes, especially in eastern Kansas.

For more information on soil sampling and submitting samples to the K-State Soil Testing Laboratory, visit their website at http://www.agronomy.k-state.edu/services/soiltesting/. You can also access two previous eUpdate articles discussing fall soil sampling and collecting a representative soil sample in Issue 974, September 14, 2023.

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3. After harvest is the optimal time for Soybean Cyst Nematode sampling

Soybean cyst nematode (SCN) is a major problem in soybean fields throughout eastern and central Kansas (Figure 1). It is important to monitor SCN levels regularly to determine if management strategies, such as variety resistance and crop rotation, have been successful.

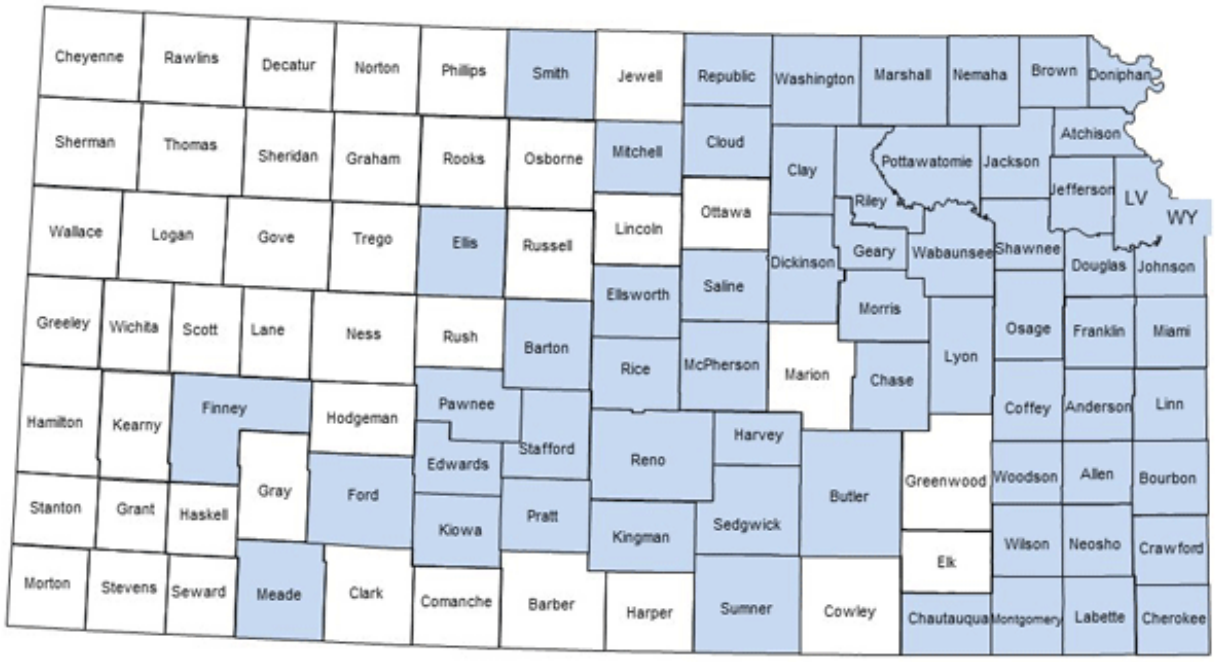

Figure 1. As of October 1, 2023, SCN was identified in 62 Kansas counties that produce >85% of Kansas soybeans. Graphic by Timothy Todd and Chandler Day.

Immediately following harvest is the best time to check fields for SCN and start planning for next season. Confirming the presence of SCN, determining population levels, and monitoring the effectiveness of resistant varieties are the basis for a successful integrated management program.

To collect a SCN sample, you will need:

1. A soil probe (or sharpshooter spade)
2. A bucket
3. A labeled bag. The label should include the following information:
    a. Field identification (*i.e.,* Field ID: North Farm, near Doe Creek)
    b. Size of the area being sampled (*i.e.,* 20 acres)
    c. Crop rotation history (*i.e.,* soybean, corn, and soybean)

Recommended field pattern for sample collection:

If your field is fairly uniform, divide it into quadrants for your SCN sample collection. Sections of the field that have had different cropping histories or have different soil types should be sampled separately. **For each quadrant or area of the field, you will collect 10 to 20 cores to a depth of 6**

to 8 inches.

It is important that when collecting soil cores, you walk in a systematic pattern, such as a "Z" pattern (Figure 2). Collect a total of 10 to 20 soil cores, emptying each into the bucket after collection. All core samples should be mixed well to account for minor variation between cores. After mixing, collect 1 pint of soil, approximately 2 cups, in a labeled plastic bag and seal.

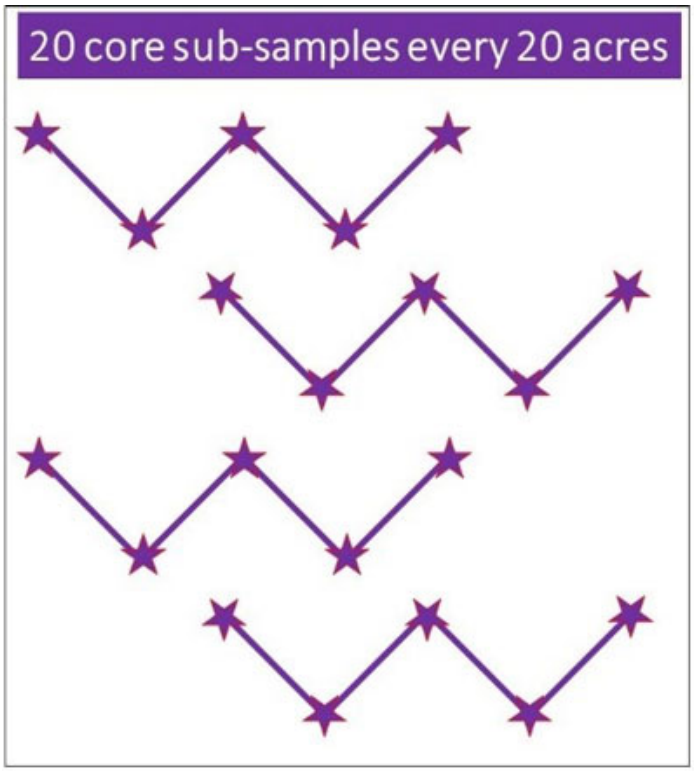

Figure 2. Example of a good sampling pattern for collecting soil to test for SCN.

When sending your samples to the diagnostic lab, make sure to:

1. Ship overnight or as fast as possible
2. Avoid leaving bags in the sun
3. Send the samples to the Plant Disease Diagnostic Lab in the K-State Plant Pathology Department.
4. Fill out the **Plant Disease Diagnostic Check sheet** at https://www.plantpath.k-state.edu/extension/diagnostic-lab/documents/2021_PP_DiseaseLabChecksheet.pdf.pdf

Shipping address:

K-State Plant Disease Diagnostic Lab
4032 Throckmorton PSC
1712 Claflin Road
Manhattan, KS 66506
clinic@ksu.edu
785-532-1383

SCN Diagnostic Fee: https://www.plantpath.k-state.edu/extension/plant-disease-diagnostic-lab/services-and-fees.html

Internal Clients (KSRE agents) = $25
External Clients (crop consultants, individual producers, etc.) = $35

Remember, your results will only be as good as the sample you send to the lab!

Check out this short, informative video from our lab: Soybean Cyst Nematode-SCN Sampling 2022, https://youtu.be/b6Eo0isI1I0 .

For more information, feel free to contact us at the K-State Plant Pathology Department.

Soil sampling for fertility, too?

Save some time in the field if you plan on sampling your fields for soil fertility. The sampling protocol is very similar to the protocol for SCN. All you need to do is split the samples into two sets – one for the Soil Testing Laboratory and one for the Plant Disease Diagnostic Laboratory. Remember to keep the soil for the Plant Disease Lab in the field-moist state and follow all the shipping and handling instructions listed above. More information on soil fertility testing can be found here: https://www.agronomy.k-state.edu/outreach-and-services/soil-testing-lab/

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4. Kansas Ag-Climate Update for September 2023

The Kansas 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.

September 2023: Improved drought conditions except for the southeast

The average statewide temperature for September was 72.3°F, or 3.5°F above normal. This was the 14th warmest September out of 129 years of records, dating back to 1895. All nine climate divisions were above normal. Anomalies ranged from +3.0°F (southwest) to +4.0°F (central and east central). Rankings across all nine climate divisions ranged from 12th to 20th warmest.

Average statewide precipitation for September was 1.60", or 64% of normal. This amount was 0.92" below normal and ranked as the 25th driest September on record. Only Southwest Kansas had above-normal precipitation (2.03", departure +0.60"); all other divisions were below normal. It was the 7th driest September on record in northeast Kansas and the 10th driest in central Kansas. Northwest Kansas was the driest division (0.56", departure -1.10"), ranking 14th driest.

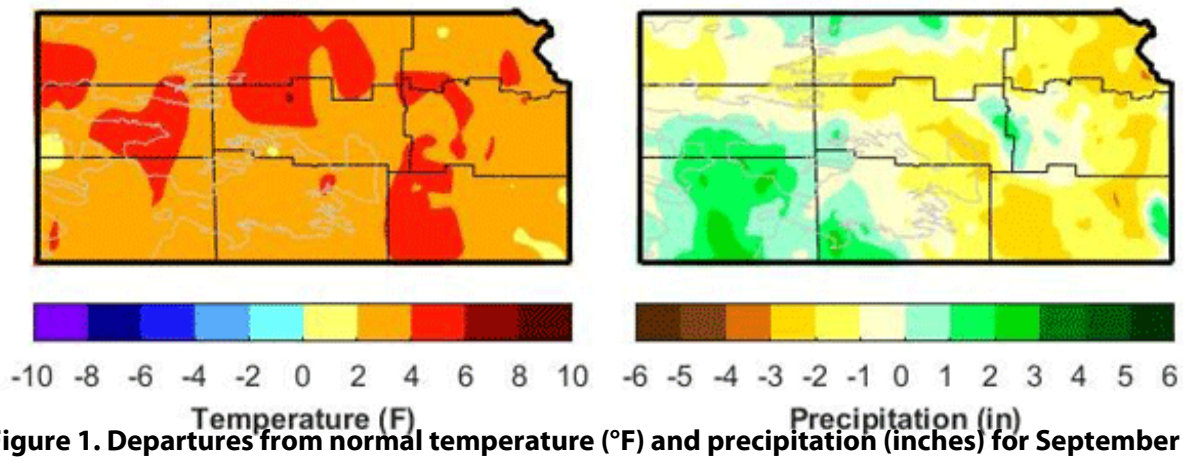

Figure 1. Departures from normal temperature (°F) and precipitation (inches) for September 2023.

View the entire September 2023 Ag-Climate Update, including the accompanying maps and graphics (not shown in this eUpdate article), at http://climate.k-state.edu/ag/updates/.

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5. 2023 Kansas Soybean Yield and Value Contest

The Kansas Soybean Association is calling all soybean farmers in Kansas to enter their competitive soybean crop into the Kansas Soybean Yield Contest by December 1.

Continuing in 2023, the Kansas Soybean Association will sponsor three participants to attend the Commodity Classic in Houston, TX, in late February 2024. First place in both contests, as well as one randomly drawn participant who entered both contests, earn the trip. Airfare, parking, accommodations, and registration will be covered.

The Kansas Soybean Commission sponsors a monetary prize for the top three finishers in each district, as well as an additional $1,000 for the overall dryland and irrigated winners and any who top

the 114.3 bushel-per-acre record. The amounts per district are that first place receives $300, second place receives $200, and third place receives $100. All participants receive a T-shirt for entering.

Districts are determined by region, tillage method, and irrigation status, with a total of 18 districts in consideration. No-till on the Plains supplies additional awards in the no-till categories. Farmers may enter multiple categories but only one entry per field.

Eligible fields must consist of at least five contiguous acres as verified by the Farm Service Agency, GPS printout, or manual measurement. A non-relative witness, either Kansas State Research and Extension personnel or a specified designee, must be present at harvest and should ensure that the combine grain hopper is empty prior to harvest. Official elevator-scale tickets with moisture percentage and foreign matter included must accompany entries to be considered.

The statewide Kansas Soybean Value Contest, which analyzes protein, oil, and other soybean qualities, is also open for entries. Entrants submit 20-ounce samples, which Ag Processing, Inc. evaluates to determine the value. Monetary awards are also given to the three highest-value entries. Farmers may enter both the yield and value contests.

The results of the contests will be announced at the 2024 Kansas Soybean Expo in Topeka.

A full guide of contest rules and regulations, as well as the digital entry form, are available at kansassoybeans.org/association/contests/. Questions may be directed to the Kansas Soybean office by phone at 877-KS-SOYBEAN (877-577-6923) or local KSRE offices.

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