Issue 930

K-STATE Research and Extension

Extension Agronomy

eUpdate

10/27/2022

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. Considerations for fall applications of anhydrous ammonia

Soils across Kansas are still running above 50°F at the 4-inch depth (Figure 1). It is best to delay application of anhydrous ammonia until soil temperatures drop below this threshold. Applying anhydrous ammonia in the fall ahead of the next corn crop has some appeal to producers. For one thing, fall fertilizer application spreads out the workload so there's more time to focus on corn planting in the spring. Secondly, wet conditions in the spring sometimes prevents producers from applying lower-cost anhydrous ammonia ahead of corn planting, and forces them to apply more expensive sources after planting. Equally important for many producers have been issues with anhydrous ammonia availability at times in the spring.

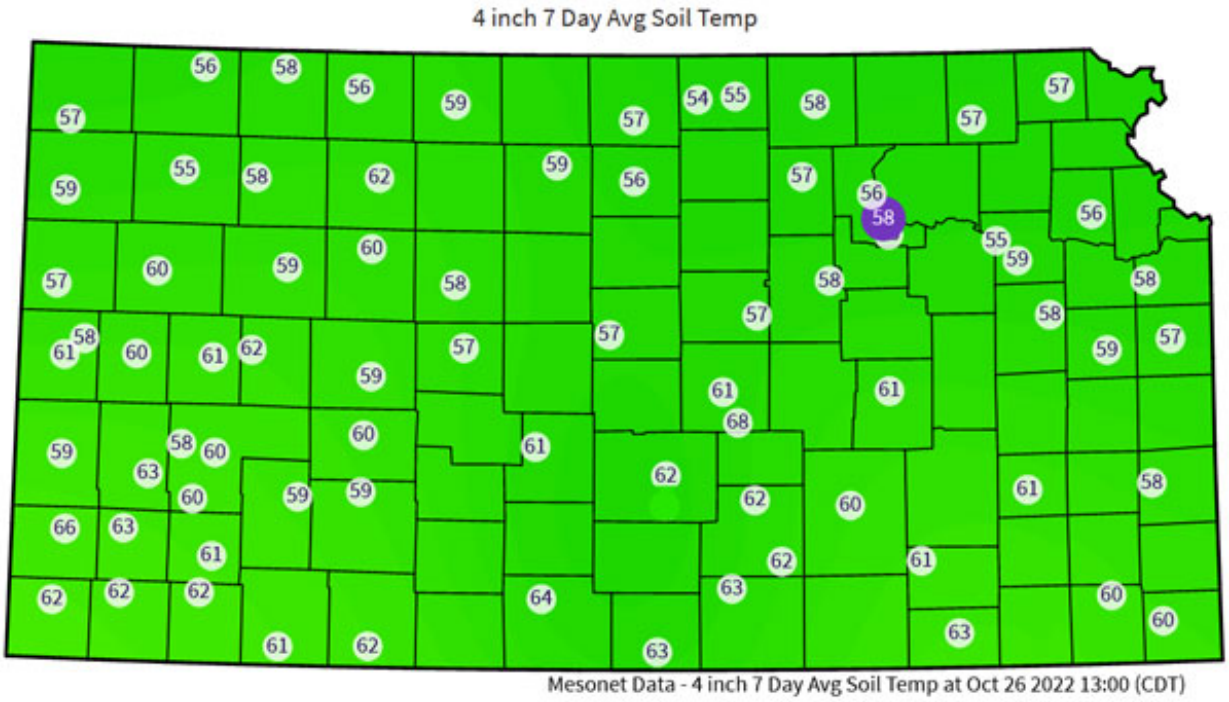

Figure 1. Average soil temperature (°F) at 4 inches for the 7-day period ending on October 26, 2022. Soil temperatures in individual fields in any given area will vary with differences in vegetative cover, soil texture, soil moisture, and other factors. (Kansas Mesonet)

Despite those advantages, producers should be aware that there is potential for higher nitrogen (N) loss in the spring following a fall application, as a result of nitrification of the ammonium during late winter and very early spring and subsequent leaching, or denitrification**.**

Reactions of anhydrous ammonia in the soil

Anhydrous ammonia has a strong affinity for water (hydrophilic), and readily reacts with water in its surrounding environment. This hydrophilic nature can be detrimental if the ammonia comes in direct contact with plants or exposed skin, but it can also be advantageous when applied correctly as a

fertilizer.

When anhydrous ammonia is injected into the soil, the ammonia gas (NH_3) reacts rapidly with moisture in the soil and is converted to ammonium (NH_4^+). This ammonium is no longer in a gas form, and, being positively charged, it can be bound to clay and organic matter particles within the soil. This bound ammonium does not readily move in most soils and, with the exception of some sandy soils with very low CEC, leaching is not an issue.

While this process does require moisture, the amount of water needed is actually quite low. The most common problems that arise when applying anhydrous ammonia to dry soils are caused by the physical properties of dry soils. Poor closure of the injection furrow and voids and cracks in the dry soil can allow the ammonia to escape back to the surface before it is converted to ammonium. Use of deeper injection depths and wing sealers in dry soils increases the amount of soil the gas comes into contact with, and can greatly reduce ammonia losses back through the surface. Closing disks can also help seal the injection furrow and prevent losses at the injection site. More information on applying anhydrous to dry soils is available in this recent eUpdate article: https://eupdate.agronomy.ksu.edu/article_new/can-dry-soils-affect-anhydrous-ammonia-applications-510-4

At soil temperatures above freezing, ammonium is converted by specific soil microbes into nitrate-N (NO_3^-) in a process called nitrification. Since this is a microbial reaction, it is very strongly influenced by soil temperatures. The higher the temperature, the quicker the conversion will occur. Depending on soil temperature, pH, and moisture content, it can take 2-3 months or longer to convert all the ammonia applied in the fall to nitrate.

By delaying application until cold weather, most of the applied N can enter the winter as ammonium, and over-winter losses of the applied N will be minimal. Producers should wait until soil temperatures are less than 50°F at a depth of 4 inches before applying ammonia in the fall or early winter. Nitrification does not cease below 50°F, but rather soils will likely become cold enough to limit the nitrification process. In many areas of Kansas, soils may stay warmer than 50 degrees well into late fall and only freeze for short periods during the winter.

The use of a nitrification inhibitor can help reduce N losses from fall N applications under specific conditions, particularly during periods when soil temperatures warm back up for a period after application.

One should also consider soil physical properties when considering fall application. Fall applications of N for corn should not be made on sandy soils prone to leaching, particularly those over shallow, unprotected aquifers. Rather, fall N applications should focus on deep, medium- to heavy-textured soils where water movement through the profile is slower.

When is nitrogen lost?

When considering fall application of N, keep in mind that loss of N during the fall and winter is not normally a problem in Kansas. The conversion of “protected” ammonium to “loss prone” nitrate during the fall and winter can be minimized by waiting to make applications until soils have cooled, and by using products such as nitrification inhibitors. The fact that essentially all the N may remain in the soil as ammonium all winter, coupled with our dry winters, means minimal N is likely to be lost over winter.

However, soils often warm up early in the spring and allow nitrification to get started well before corn planting. Generally, if the wheat is greening up, nitrification has begun! Thus, one of the potential downsides of fall application is that nitrification can begin in early March, and essentially be complete by late May and June.

Summary

If anhydrous ammonia is to be applied in the fall, there are a number of factors that must be considered, including soil texture, temperature, and soil moisture. Consider the following guidelines:

- Do not apply anhydrous ammonia in the fall on sandy soils.
- On silt loam or heavier-textured soils, wait to apply anhydrous ammonia until soil temperatures at the 4-inch depth are below 50 °F. Grass covered 2-inch depth typically reaches the 50 mark around the 20th of November in central Kansas (Figure 2). You can expect the 4-inch depth to lag behind that date depending on soil type and earlier if the ground is bare.
- Deeper injection depths (6 to 8 inches), wing sealers, and closing disks can help mitigate application problems when soils are dry.
- Use a nitrification inhibitor with anhydrous ammonia to help reduce fall nitrification.
- To check the soil temperature in your area, visit the K-State Research and Extension Weather Data Library at: http://mesonet.k-state.edu/agriculture/soiltemp/

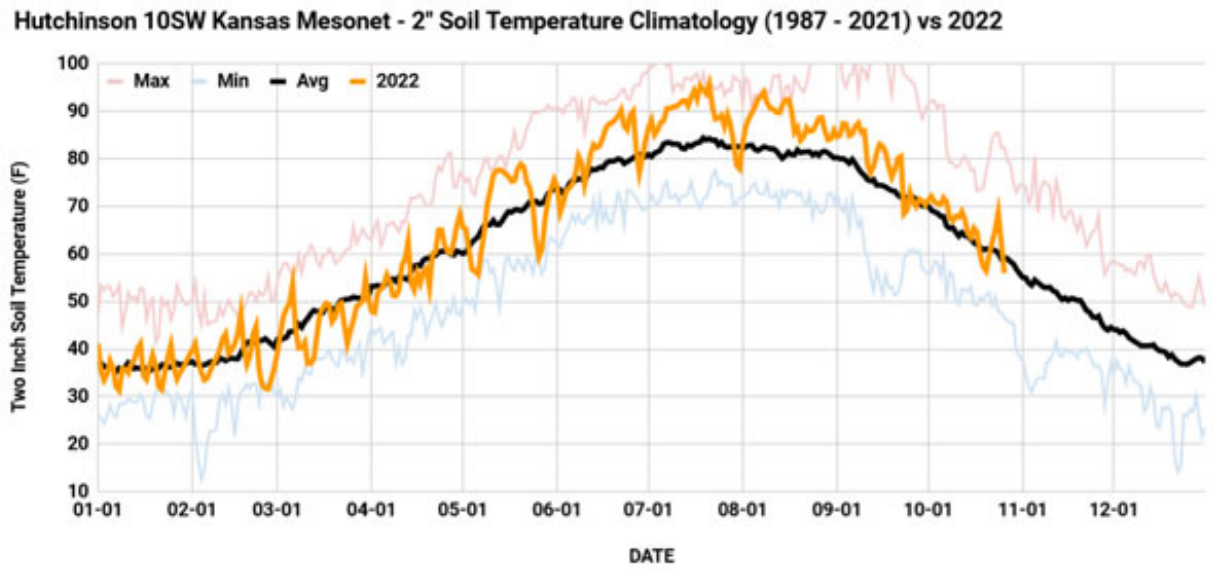

Figure 2. Hutchinson 10SW Mesonet station 2022 2-inch soil temperature compared to climatology under grass cover. Soil temperatures in individual fields in any given area will vary with differences in vegetative cover, soil texture, soil moisture, and other factors. (Kansas Mesonet)

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2. Army cutworm moths in southwest Kansas

Noticeable numbers of army cutworm moths, also called Miller moths, have been observed in a couple locations in western Kansas this year. Army cutworms are late fall and early spring pests of several Kansas crops, especially wheat. These moths begin migrating into Kansas and neighboring states in the fall from their over-summering locations in the Rocky Mountains. This year, moths began showing up in western Kansas during the first week of September. In the last seven weeks, over 2000 moths have been collected in pheromone traps at a location in Finney county (Figure 1). Peak flight in the area occurred during the second week of October and has since been declining.

Figure 1. Army cutworm moths collected in a pheromone trap in southwest Kansas. Photo by Anthony Zukoff, K-State Research and Extension.

Trap counts of 800 or more moths in an area through October may indicate significant caterpillar activity the following spring. Any females still active will be laying eggs on the soil surface of freshly cultivated, weedy, or newly seeded winter wheat fields. Each female can lay up to 1000 eggs or more. After hatching, caterpillars will begin feeding and do so until cold weather forces them below ground. However, it is possible for them to resume feeding on warmer winter days. Caterpillars will complete their growth next spring and then burrow into the soil to pupate. Sexually immature adults emerge in late spring and migrate back to the mountains for summer.

Wheat fields already up and growing should be scouted for window pane damage caused by very small caterpillars. Fields should also be scouted during warm periods between February and April. Fields under stressful conditions, such as the current drought, may suffer economic damage with only 1-2 caterpillars per square foot. Typically, treatment will not be necessary until populations average 4-5 per square foot and well-tillered fields under good growing conditions can tolerate up to 10 per square foot without measurable yield loss.

In addition to wheat, alfalfa is at risk from army cutworm feeding. Damage can occur between the end of January into April. Foliar damage can impact the yield of the first cutting on established stands, but seedling alfalfa faces a higher risk; two caterpillars per square foot may warrant treatment. Treatment of older fields is warranted when four or more caterpillars are found per square foot. More information regarding control options for this pest in wheat and alfalfa can be found in the following K-State Research and Extension Insect Management Guides.

Wheat Insect Management
http://www.bookstore.ksre.ksu.edu/pubs/mf745.pdf

Alfalfa Insect Management
http://www.bookstore.ksre.ksu.edu/pubs/MF809.PDF

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3. Free Soybean Cyst Nematode testing is available through KSU Plant Disease Diagnostic Lab

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.

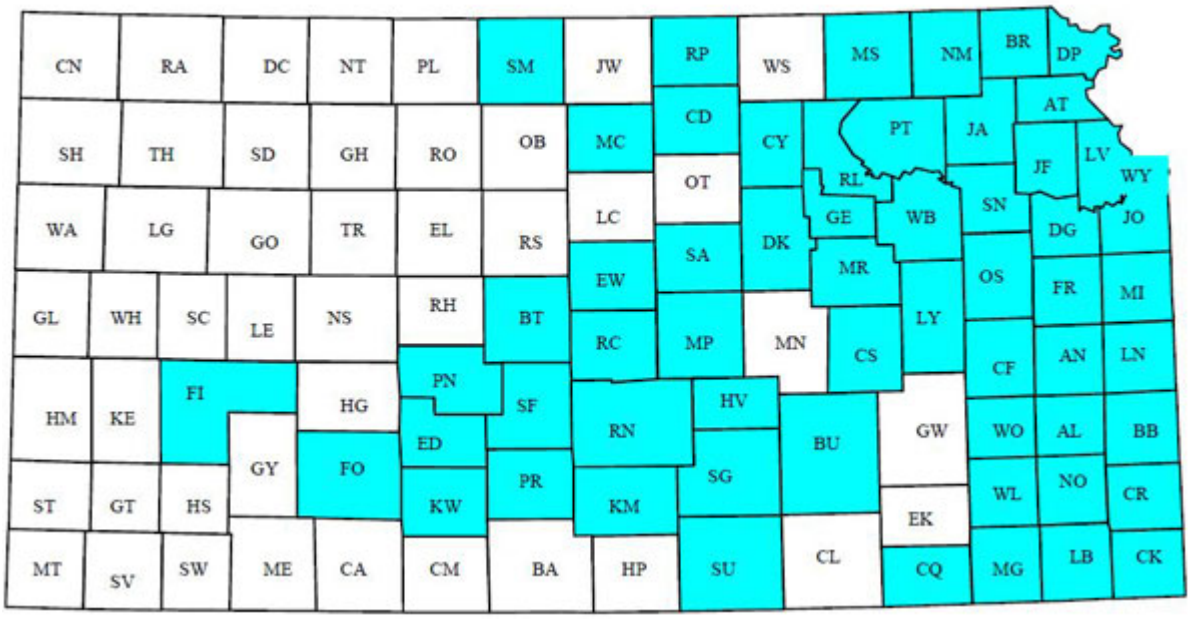

Figure 1. As of January 1, 2020, SCN was identified in 59 Kansas counties that produce >85% of Kansas soybeans. Graphic courtesy of Timothy Todd.

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

To make that process easier, the K-State Plant Disease Diagnostic Lab is now offering free SCN testing for Kansas producers. This program is facilitated by a grant received from the SCN Coalition. Below is some additional information about SCN and details about collecting and shipping a good sample.

To collect a SCN sample you will need:

1. A soil probe (or sharpshooter spade)
2. A bucket
3. A labeled bag. 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 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 a different soil type 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 any minor variation between cores. After mixing, collect 1 pint of soil, approximately 2 cups, in a labeled plastic bag and seal.

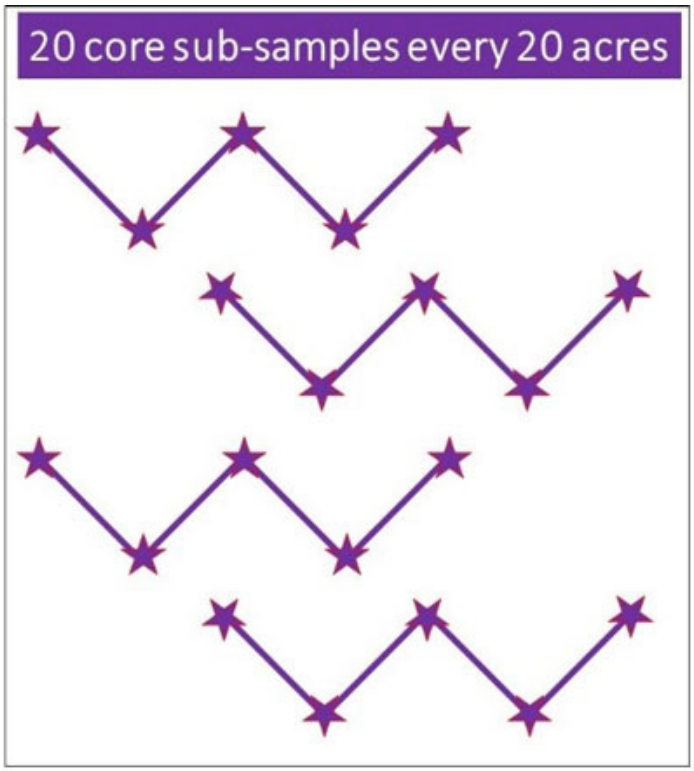

Figure 2. Example of a good sampling pattern for collecting soil to test for SCN.

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

1. Send 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. You can find 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

Remember, your results will only be as good as the sample that 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.

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4. World of Weeds - Prickly lettuce

Prickly lettuce (*Lactuca serriola*), also called wild lettuce, can be found in some wheat fields across Kansas. Similar to horseweed and mustard species, fall and early spring are good times to look for prickly lettuce, as it will be best controlled at those times.

Ecology of prickly lettuce

Prickly lettuce is winter annual or biennial plant that is a member of the Asteraceae (sunflower) family. Prickly lettuce originated in the Mediterranean region. It is thought to have been introduced to the United States in the late 1800s as a seed containment and has become wide-spread throughout North America. It is commonly found in many sites across the Great Plains, including roadsides, pastures, and cultivated fields. The adoption of no-till and reduced tillage farming practices increased the occurrence of prickly lettuce in crops.

Identification

Prickly lettuce seedlings have oblong cotyledons with a base that tapers into a short stalk and slightly intended tips. Seedlings can emerge when the temperature is as low as 40 F and as high as 95˚ F. The plant initially forms a basal rosette. True leaves are two to ten inches long, egg- to club-shaped with toothed, wavy, lobed, or spiny edges. The upper leaf surface is smooth, but stiff bristles are found on the midvein the lower leaf surface (Figure 1). These bristles are a key feature that distinguish a prickly lettuce rosette from dandelion. Another difference is that the lobes on dandelion leaves point inwards toward the center of the rosette, unlike the lobes on prickly lettuce leaves.

Figure 1. Example of spines on underside of prickly lettuce leaf on the lower midvein. Photo by Anita Dille, K-State Department of Agronomy.

Prickly lettuce will bolt prior to flowering (Figure 2), producing an upright stem that can reach up to 6-1/2 feet in height. Leaves on the stem are alternate, clasping, and usually lobed. They also have the characteristic bristles along the midvein on the lower leaf surface. The lower portion of the stem may be smooth or have bristly hairs. Prickly lettuce stems are hollow and contain a milky sap.

Pale-yellow flowers form throughout the summer. Flowers are approximately 1/8 to 1/3 inch in diameter and found at the ends of many branches at the top of the plant. Sowthistles also have small yellow flowers at the top of the plant; however, they are generally larger (1/4 inch to 2 inches in diameter, depending on the species).

Figure 2. Example of bolted prickly lettuce. Photos by Anita Dille, K-State Department of Agronomy.

Prickly lettuce seeds are approximately 1/10 of an inch in length with barbed ribs and are attached to a stalk with a tuft of fine hairs that facilitate wind dispersal. Prickly lettuce can produce up to 46,000 seeds per plant. Seeds can germinate immediately or survive up to three years in soil.

Management

Prickly lettuce is drought tolerant and competes with crops for water. Recent research from Ontario suggests that densities up to about 200 plants per square foot did not reduce wheat yield, but did

reduce soybean yields up to 80%. In the same experiment, prickly lettuce produced 2,200 to 67,000 seeds per plant in soybeans but up to 200,000 seeds in field borders.

Fall or early spring tillage controls prickly lettuce seedlings and rosettes in conventional-till systems. In no-till systems, fall or early spring herbicide applications can control prickly lettuce. Application timing is important, because once plants bolt, control can decrease rapidly. It is best to control prior to the plant reaching 3 inches.

Fall applications of glyphosate (Roundup, others), glufosinate (Liberty, others), or paraquat (Gramoxone, others), can control rosettes. Preemergence applications containing atrazine (Aatrex, others), metribuzin (Tricor, others), or chlorosulfuron (Glean, others) are generally effective in controlling emerging seedlings. Postemergence applications of glyphosate, glufosinate, 2,4-D, clopyralid (Stinger, others), dicamba (Clarity, others), MCPA, chlorsulfuron, metsulfuron (Ally, others), tribenuron (Express, others), thifensulfuron (Harmony, others), pyrosulfotole (Huskie products), bromoxynil (Moxy, others), or metribuzin can control prickly lettuce rosettes.

Prickly lettuce populations resistant to chlorosulfuron, mestsulfuron, triasulfuron, 2,4-D, dicamaba, and MCPA have been identified in the Pacific Northwest region of the United States.

For more information, see the "2022 Chemical Weed Control for Field Crops, Pastures, and Noncropland" guide available online at https://bookstore.ksre.ksu.edu/pubs/SRP1169.pdf or check with your local K-State Research and Extension office for a paper copy.

The use of trade names is for clarity to readers and does not imply endorsement of a particular product, nor does exclusion imply non-approval. Always consult the herbicide label for the most current use requirements.

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5. Feedback requested about the War Against Weeds podcast

Have you listened to any episodes of the War Against Weeds podcast? If so, we want to hear from you! The survey takes about 5 minutes to complete and will provide feedback to help us make improvements for the future.

https://kstate.qualtrics.com/jfe/form/SV_eQz80kVErxhSafY

This podcast is an outreach effort from Sarah Lancaster, K-State Extension Weed Science Specialist, Mandy Bish, Extension Weed Scientist at the University of Missouri, and Joe Ikely, Extension Weed Scientist at North Dakota State. There are more than 50 full-length episodes available. Season four officially started on September 7.

Episodes are approximately 30 minutes long and free to access. They are posted at https://waragainstweeds.libsyn.com/ in addition to being available on Spotify, iTunes, and Google Podcasts.

Sarah Lancaster, Extension Weed Science Specialist
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6. Save the date for the 2022 Crop Pest Management Schools

Save the date to attend one of the 2022 Crop Pest Management Schools. This year, two schools will be offered in the traditional, in-person format on November 30 in Beloit and December 1 in Grainfield.

Each school will start at 7:50 am with registration and conclude at 5:00 pm. A lunch will be provided to all participants. The cost to attend either of the events is $50 if registered by November 22. After November 22 and at the door, the cost will be $75.

Each school will feature a variety of topics on weed control, insects, and diseases. Detailed agendas are still being finalized and will be shared in a future eUpdate article.

The dates and locations of each school are:

November 30 –Beloit, KS
Beloit First United Methodist Church
801 N. Bell St.
Beloit, KS 67420

December 1 – Grainfield, KS
St. Agnes Catholic Church
242 Cedar St.
Grainfield, KS 67737

Please register at northwest.k-state.edu/events/

Continuing Education Credits have been applied for and include:
1A Commercial Applicators: 7 credits and 1 core hour
Certified Crop Advisor: 8 pest management credits

For questions, please contact the Northwest Area Research and Extension office at 785-462-6281 or email Jeanne Falk Jones at jfalkjones@ksu.edu

SAVE THE DATE!

K-STATE Research and Extension

CROP PEST MANAGEMENT SCHOOLS

Join us at one of our two locations!

Wednesday, November 30th:
Beloit First United Methodist Church
801 N. Bell St., Beloit, KS 67420

Thursday, December 1st:
St. Agnes Catholic Church
242 Cedar St., Grainfield, KS 67737

Cost is $50 if registered by November 22.
After Nov. 22 & at the door, cost is $75
Register at: www.northwest.ksu.edu/events

Credits:
1A Commercial Applicators: 7 credits and 1 core hour have been applied for
Certified Crop Advisors: 8 pest management credits have been applied for

Schedules for each school: www.northwest.ksu.edu/events

For any questions please contact your local Extension Agent

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