Issue 868

K-STATE Research and Extension

Extension Agronomy

eUpdate

08/12/2021

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. Pre-emergence herbicides for wheat

Pre-emergence herbicides with residual activity are an important component of high-yielding cropping systems. They are used less frequently in wheat production compared to other cropping systems in Kansas, but residual herbicides applied prior to wheat emergence can be part of a good weed management system in wheat production. Selected products for this use are described in Table 1.

Most residual herbicides labeled for pre-emergence application in wheat are Group 2 (ALS-inhibiting) herbicides, which are associated with herbicide resistant populations of kochia, marestail (horseweed), bushy wallflower, flixweed, henbit, and brome species in Kansas. Products in Groups 14 (the PPO-inhibiting herbicides) and 15 (the long-chain fatty acid inhibiting herbicides) are also labeled; however, they are generally more dependent on rainfall for activation than the Group 2 herbicides.

Herbicides without residual activity may be applied with or without residual herbicides in the weeks prior to planting wheat. Older products include the Group 2 herbicides Amber, Olympus, and Pre-Pare, as well as Group 4 (plant growth regulating) herbicides like 2,4-D, dicamba, or fluroxypyr. It is especially important to be aware of planting interval restrictions for Group 4 herbicides, which range from 10 to 45 days.

When selecting pre-emergence herbicides for use in wheat production, keep in mind that many of these products are also labeled for use in emerged wheat. Unless using a planned split-application, avoid repeated use of products from the same herbicide group to slow the development of herbicide-resistant weed populations in your fields.

Table 1. Select herbicides for pre-emergence or pre-plant applications in winter wheat.

Trade name	Common name	Herbicide group	Application timing*	Comments
Amber	Triasulfuron	2	BD, PRE or POST	Requires tank mix or sequential application of herbicide from different group
Anthem Flex	Pyroxafulfone + carfentrazone	15 + 14	DPRE	Plant wheat 1 – 1.5″ deep
several	Dicamba	4	BD	Apply at least 45 days before planting wheat
Facet	Quinclorac	4	BD	Plant wheat at least 1″ deep
Finesse	Chlorsulfuron + metsulfuron	2 + 2	PRE, POST	Suppression only of cheat, downy brome, and Japanese brome
Kochiavore	Fluroxypyr + bromoxynil	4 + 6	BD	Apply at least 30 days before planting wheat
Olympus	Propoxycarbazone	2	PRE, POST	Mix with glyphosate for BD
Outrider	Sulfosulfuron	2	PRE, POST	Apply after planting but before wheat emergence; If dry, apply POST

Pixxaro	Fluroxypyr + halauxifen	4 + 4	BD, POST	Do not use multiple applications or in successive years at the same site
Pre-Pare	Flucarbazone	2	BD, PRE	Mix with glyphosate for BD; Rainfall necessary for activation to control PRE
Scorch	Fluroxypyr + dicamba	4 + 4	BD	Apply at least 30 days before planting wheat
Sharpen	Saflufenacil	14	BD, PRE	Rainfall required for activation; Injury may occur to exposed wheat seed
Zidua	Pyroxasulfone	15	DPRE	Rainfall required for activation; Plant wheat 1 – 1.5" deep
several	2,4-D	4	PRE, POST	Apply at least 2 weeks after a 0.5" rainfall before planting wheat

*BD = burndown; PRE = preemergence to wheat and weeds; DPRE = Delayed preemergence application after wheat emergence; POST = postemergence

Field bindweed control

Field bindweed (Figure 1) is a particularly troublesome weed for which a special discussion is justified. In a 12-year experiment conducted at the Agricultural Research Center in Hays, field bindweed reduced wheat yield 2 to 50%. Management of this weed during wheat establishment is important because field bindweed continues to grow until temperatures drop below 20°F.

The herbicides most commonly recommended for field bindweed control include various formulations of 2,4-D, dicamba, and glyphosate. Dicamba tends to provide greater control for fall applications compared to 2,4-D or glyphosate, especially if plants are drought-stressed. Another commonly used product is Facet (quinclorac). It is most effective when applied just before the first killing frost. Other herbicides that are labeled for fall application to control or suppress field bindweed in wheat include Affinity, Aim, and Cimarron.

Satisfactory control of field bindweed will not be achieved with a single herbicide application. It will take multiple years of herbicide applications to deplete the energy stored in the root system and control an established infestation.

Figure 1. Field bindweed growing in a harvested wheat field. Photo by Sarah Lancaster, K-State Research and Extension.

For additional information, see the "2021 Chemical Weed Control for Field Crops, Pastures, and Noncropland" guide available online at https://bookstore.ksre.ksu.edu/pubs/SRP1162.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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2. Nitrate toxicity in drought-stressed corn

Drought-stressed crops such as corn and sorghum tend to accumulate high levels of nitrate in the lower leaves and stalk of the plant. 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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3. Does grazing cover crops impact soil properties?

Introduction

- Integration of cover crops (CCs) into no-till (NT) crop production has been recommended to regenerate soil properties degraded after many years of conventionally tilled, low-intensity cropping systems in the central Great Plains.
- Potential benefits of adopting CCs in NT cropping systems of west central Kansas include improved soil health through increased soil organic carbon, reduced compaction, enhanced soil nutrient cycling, as well as improved structure and water infiltration.
- Subsequent crop yields following CCs have been mixed, with CCs having either no effect or reducing yields in drier years in water-limited environments. This yield penalty presents a major barrier to adoption of CCs in the region.
- Value through grazing CCs may offset losses in subsequent crop yield in order to balance the goals of profitability and maintenance of soil health in dryland cropping.
- Concerns regarding grazing CCs include reduced SOC accrual, increased soil compaction, and degraded soil structure with grazing, especially in NT production systems.

Objective

- To investigate CC grazing impacts on residue return, soil bulk density, aggregate stability, pH, and soil nutrient concentrations on producer fields in west central Kansas.

Procedures

- Field experiments were conducted on two cooperative producer fields, one in central KS and one in western KS during the 2018-19 growing season. The experiment was repeated on a different field in central KS for the 2019-2020 growing season.
- The fields in central KS were managed under a NT rain-fed wheat-wheat-soybean (2018–2019) or wheat-sorghum-soybean (2019–2020) rotation. A winter CC mixture of triticale/rapeseed/radish was planted in the fall following the wheat phase ahead of soybean or sorghum in each rotation. The site in western KS was managed under a NT dryland wheat or triticale-sorghum-fallow rotation.
- The experiments at each study location had two treatments, grazed CCs and non-grazed CCs, in four replicated strips (Figure 1).
- Cover crop grazing at central KS location in the 2018–2019 growing season occurred from December 17, 2018, through February 10, 2019, at a stocking rate of 5.4 animal unit months (AUM) per acre for 55 grazing days. Again, in 2019–2020, heifers grazed CCs from January 9 to February 17, 2020 with a stocking rate of 4.2 AUM/a for a total of 39 grazing days. At the western KS site, CC grazing spanned from August 24 to October 10, 2019, for 48 grazing days using lactating cows at a stocking rate of 5.2 AUM/a.
- Prior to grazing, CC biomass was collected, weighed, and dried to determine dry matter (DM). After termination, grazed and non-grazed CCs were sampled and DM was determined.
- Soil samples were collected for the analysis of soil chemical and physical properties (bulk density, aggregate stability, pH, and available nutrient concentrations) from the grazed and non-grazed CCs in the spring of 2019 and 2020 after termination of CCs. Additional soil samples were taken from adjacent native perennial grass pastures in 2020 to compare soil properties to the CC treatments.

Figure 1. Grazed cover crops (left) and ungrazed cover crops (right). Photo by Logan Simon, K-State Research and Extension.

Results

- In general, CC biomass post-grazing was less than non-grazed CCs. Averaged across sites, pre-grazed CC biomass was not different from post-grazed though both were less than the non-grazed CCs (Figure 2). This occurred because the annual grass CC species used in this study had significant regrowth after grazing, which resulted in additional growth to compensate for biomass removed by cattle consumption and trampling.
- Post-grazed CC biomass averaged 2650 lb/a compared to 3741 lb/a for the non-grazed treatment. This suggests that approximately 71% of the total available CC biomass produced was retained as residue on the soil surface after grazing.
- Soil bulk density under grazed CCs was not different from the non-grazed CC treatment (Table 1). Bulk density was different ($P < 0.001$) among CCs and pasture (Table 1), possibly due to the remnant effects of past tillage operations before conversion to NT, as well as the differences between temporary annual and permanent perennial rooting systems.
- Cattle grazing CCs had no negative effect on soil pH compared to the non-grazed treatment. The SOC concentration was not different between grazed or non-grazed CCs in this study. Across depths, SOC averaged 1.55% for grazed and 1.70% for non-grazed CCs, and both were less than that measured under pasture (Table 1).

- Soil fertility indicators including N, P, Fe, Mn, Zn, and Cu concentrations were unaffected by cattle grazing CCs compared to the non-grazed treatment.

Table 1. Soil physical and chemical properties in the 0- to 6-in. soil depth as influenced by cover crop management: no-till grain-based cropping systems with grazed cover crops, non-grazed cover crops, and perennial pasture

Soil property	Cover crop management					
	Grazed cover crops		Non-grazed over crops		Pasture	
pH	5.62	b[†]	5.76	b	6.71	a
Bulk density (g cm^{-3})	1.35	a	1.31	a	1.20	b
Total N (%)	0.15	c	0.17	b	0.23	a
SOC (%)	1.55	b	1.70	b	2.36	a
NO_3-N (ppm)	7.1	a	6.1	a	1.1	b
NH_4-N (ppm)	13.8	a	18.0	a	11.4	a
P (ppm)	48.2	a	46.6	a	13.4	b
Zn (ppm)	0.79	a	0.95	a	1.18	a
Fe (ppm)	56.8	a	53.3	a	33.4	b
Mn (ppm)	60.8	a	58.4	a	37.9	b
Cu (ppm)	1.3	a	1.3	a	1.0	b
Large macroaggregate (%)	29.2	b	32.2	b	68.9	a
Small macroaggregate (%)	43.1	a	43.4	a	21.8	b
Microaggregates (%)	27.7	a	24.5	a	9.3	b
MWD (inch)	0.050	b	0.051	b	0.148	a

[†]Means in a row followed by different letters indicate significant differences among cover crop management treatments at $\alpha < 0.05$.

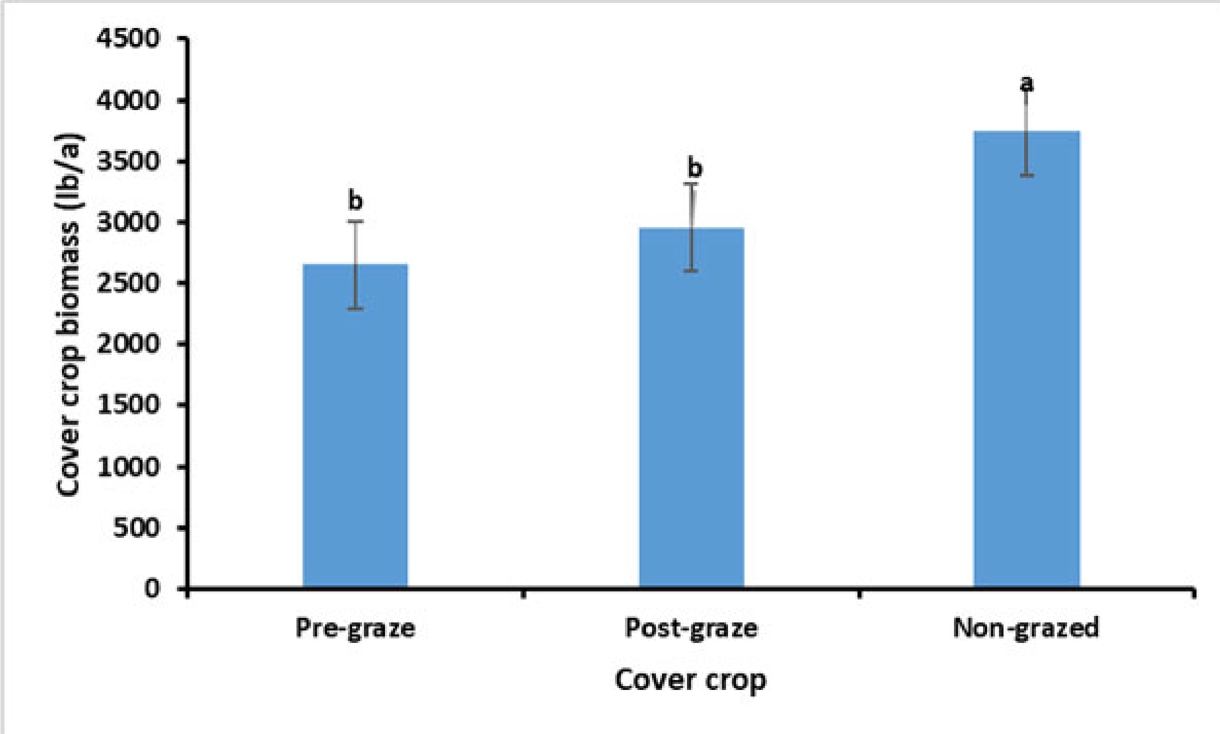

Figure 2. Cover crop productivity pre-grazing, post-grazing, and non-grazed, averaged across site-years. Means across are averaged across 4 replications and 3 sites (n = 12). Different letters atop bars indicate significant differences among pre-graze, post-graze, and non-grazed cover crop biomass at α < 0.05. Error bars represent standard error.

Take-home message

- Careful grazing of CCs as done in this study could leave adequate residue cover to protect the soil and meet soil health goals.
- Grazing of CCs is a viable management option to intensify NT crop production to improve soil health and maintain or increase overall system profitability.
- Further research will be needed to determine the long-term effects of CC grazing in NT production systems.

For more information on this study, please see the 2021 Kansas Field Research report:

Obour, A. K.; Simon, L. M.; Holman, J. D.; and Johnson, S. K. (2021) "Does Grazing Cover Crops Impact Soil Properties?," Kansas Agricultural Experiment Station Research Reports: Vol. 7: Iss. 5. https://doi.org/10.4148/2378-5977.8078

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4. First reports of sugarcane aphid on grain sorghum in Kansas

The sugarcane aphid has been reported in three counties in Kansas (Harper, Sedgwick, and Sumner). Only Sedgwick County is shown in Figure 1. The other two counties will be added and an updated map will be available at the myFields website. Grain sorghum producers in Kansas should be scouting their fields on a routine basis.

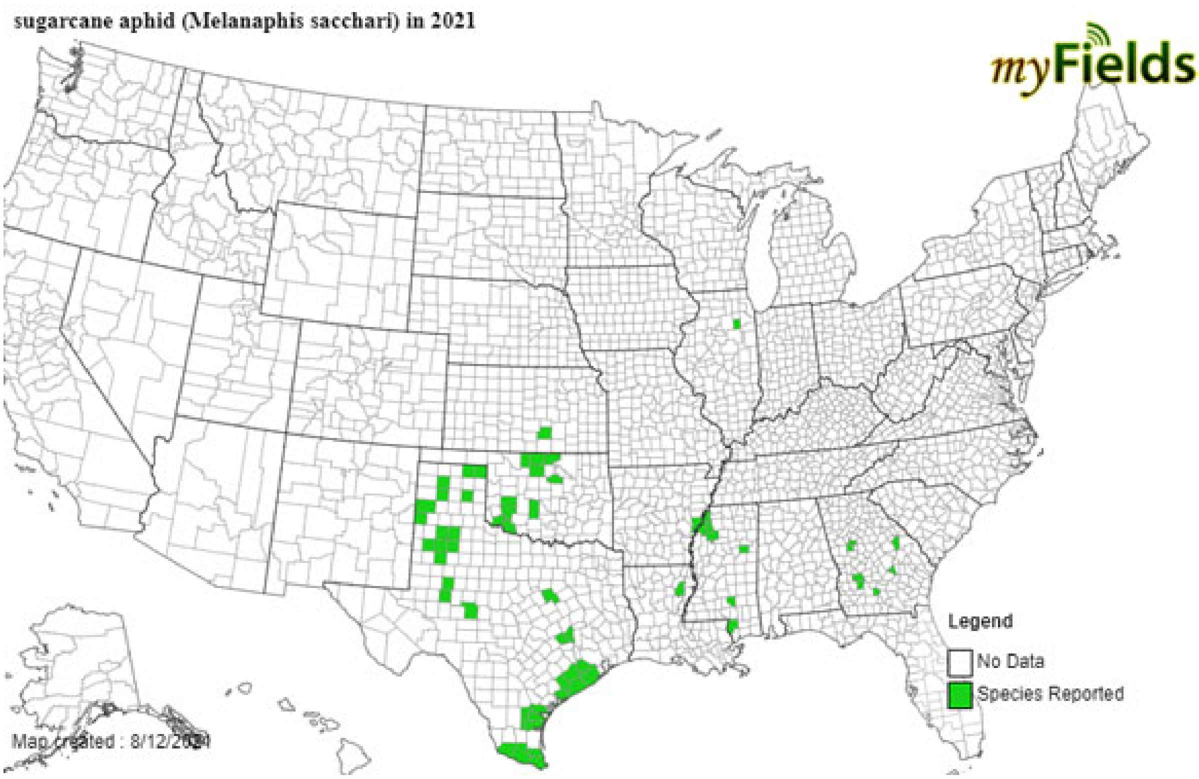

Figure 1. Current status of the SCA (two counties are missing from this map at time of this publication). The map indicates only the counties in which the SCA has been found, and does not indicate how many or how few aphids were found in that county.
Source: https://www.myfields.info/pests/sugarcane-aphid

Corn leaf aphids have been in corn and sorghum in easily detected numbers since the whorl stage of corn (mid-June) and are still relatively abundant in whorl stage sorghum on August 11 (Figure 2-left panel). Corn leaf aphids rarely occur in densities to cause a negative impact on many plants. However, they do provide a good source of food for beneficials. This beneficial buildup may aid greatly in controlling sugarcane aphids just starting to colonize sorghum in southcentral Kansas (Figure 2-right panel). Hopefully, with healthy populations of beneficials, these sugarcane aphids will be kept under treatment thresholds. As south winds continue, however, expect sugarcane aphids to continue to migrate into southern counties and then north throughout the state. Thus, monitoring and early detection are important.

Figure 2. LEFT: corn leaf aphids on sorghum, RIGHT: sugarcane aphids in sorghum. Photos by K-State Research and Extension.

Scouting time for SCA

Early detection is key to the management of this pest, but treatments should be based on established thresholds. One heavily infested plant does not equal a yield loss. Applying insecticides too soon can result in repeated applications.

Plants are vulnerable to infestation by SCA at any growth stage, but Kansas sorghum is most at risk from boot stage onward. The ability of sugarcane aphid to overwinter on Johnsongrass and re-sprouting sorghum stubble represents challenges to the management of this pest in more southerly regions.

Issues arising from SCA in Kansas are likely to become increasingly uncommon with each passing year. It is best practice to scout late-planted fields, as these are more susceptible to yield loss and aphids and this a bigger window for aphids to build to damaging levels later in the season.

Sampling method

- Once a week, walk 25 feet into the field and examine plants along 50 feet of row:
- If honeydew is present, look for SCA on the underside of a leaf above the honeydew.
- Inspect the underside of leaves from the upper and lower canopy from 15–20 plants per location.
- Sample each side of the field as well as sites near Johnsongrass and tall mutant plants.

- Check at least 4 locations per field for a total 4 locations per field for a total of 60-80 plants.

If no SCA are present, or only a few wingless/winged aphids are on upper leaves, repeat this sampling method once a week thereafter.

If SCA are found on lower or mid-canopy leaves, begin twice-a-week scouting. Use the same sampling method, but be sure to include % plants with honeydew. Estimate the % of infested plants with large amounts of SCA honeydew (shiny, sticky substance on leaf surface) to help time foliar insecticides for SCA control on sorghum (Table 1).

Table 1. SCA Thresholds

Growth Stage	Threshold
Pre-Boot	20% plants infested with localized area of heavy honeydew and established aphid colonies
Boot	20% plants infested with localized area of heavy honeydew and established aphid colonies
Soft dough	30% plants infested with localized area of heavy honeydew and established aphid colonies
Dough	30% plants infested with localized area of heavy honeydew and established aphid colonies
Black Layer	Heavy honeydew and established aphid colonies in head *only treat to prevent harvest problems **observe pre-harvest intervals

You can download a free sugarcane aphid scouting guide here:
https://www.myfields.info/sites/default/files/page/ScoutCard%20KSU%20v05312017.pdf

For ongoing current information on SCA in Kansas, check out the myFields web site often in the coming weeks and months: https://www.myfields.info/pests/sugarcane-aphid

Please email R. Max Dunlap (xammax@ksu.edu) with counties to add to the map!!

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5. Field day to showcase cover crop management for livestock producers - August 24

Kansas State University research scientists and extension specialists will host a field day event on Tuesday, August 24, to discuss and demonstrate cover crop management options for soil health and water quality benefits in livestock operations.

The program begins at 9:30 a.m. and ends at 2 p.m. The event is free, and lunch will be provided. Interested individuals can register for the event by emailing sedgett@ksu.edu. The event is being held near Marquette, KS (from Kannapolis reservoir: 1 mile south on KS-141 and 1.25 miles east on Avenue T).

This field day will showcase how growers can use over crops to improve soil health and protect water quality by the reduction of sediment and nutrient losses. Participants will also hear about how K-State researchers have been evaluating cover crop management options in water-limited environments, a concern for growers in central and western Kansas.

Speakers at the event will include local producers and landowners, Kansas State University researchers and extension agents, and representatives from the Ellsworth County conservation district.

Evaluating management options in water-limited environments

Tuesday, August 24

9:30 a.m. - 2 p.m. (*Lunch provided*)

RSVP to sedgett@ksu.edu

Location: Marquette, KS

Directions from Kannapolis reservoir: 1 mile south on KS-141 and 1.25 miles east on Avenue T

Growing cover crops to enhance soil health and nutrient cycling, suppress weeds, provide supplemental forage are increasingly considered by producers as part of a wheat-based production system. Additionally, cover crops can be grown to improve water quality.

Topics at this free event will include:

- ***using cover crops in livestock operations***
- ***mangement options for soil health***
- ***cover crops and water quality***
- ***NRCS cover crop programs***
- ***water infiltration demonstration***

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Kansas State University Agricultural Experiment Station and Cooperative Extension Service

This project has been funded in part through the Section 319 of the Clean Water Act.

6. Flickner Innovation Farm Field Day - August 31

The Flickner Innovation Farm in Moundridge will host a field day event on Tuesday, August 31, highlighting current work by local producers, industry members, and Kansas State University researchers to conserve water use while improving water quality and soil health. The event will begin at 8 a.m. and conclude at 1:30 p.m. The Flickner Innovation Farm is located at 1923 Arrowhead, Moundridge, Kansas. Lunch will be provided and interested individuals are asked to register for the event at: https://kscorn.com/event/moundridge-field-day/

The program will include the following topics:

- Automated drone technology to identify crop conditions
- Soil health and carbon studies
- Using an interseeder to plant cover crops
- Visit with industry partners to learn about new and current technologies
- Mobile and sub-surface drip irrigation systems and soil and plant moisture monitoring technology

The Flickner Innovation Farm is a site where agronomists, watershed specialists, and industry leaders can conduct studies on a large-farm setting to identify the most efficient technologies and techniques for Kansas producers to use on their own farms. This long-term project will be studying the effects of various precision agriculture techniques and comparing different types of imagery to identify crop conditions.

For questions about the event, please contact kstatekcare@ksu.edu

SAVE the DATE

Join local producers, researchers and industry leaders on August 31 for a field day at the Flickner Innovation Farm.

- Automated drone technology to identify crop conditions
- Soil health and carbon studies
- Using an interseeder to plant cover crops
- Visit with industry partners to learn about new and current technologies
- Mobile and sub-surface drip irrigation systems, soil and plant moisture monitoring technology

8 a.m. - 1:30 p.m.

1923 Arrowhead
Moundridge, Kansas

Lunch provided

More details to follow.
Questions? Contact *kstatekcare@ksu.edu*

FLICKNER INNOVATION FARM

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

7. Soil Health Field Day - September 2

The Department of Agronomy at K-State, in conjunction with Kansas Corn, is hosting a Soil Health Field Day on September 2 from 4:00 to 6:30 p.m. The event will take place at the Knopf Farms, 6229 S Kipp Road, Gypsum, KS 67448.

A delicious BBQ dinner will be provided. Interested individuals can register for the event at https://kscorn.com/tour/

Program topics:

- **Soil Health Principles and carbon markets**
- **On-farm soil health data**
- **Soil Fertility for healthy soils**
- **Crop intensification and cover crops root demonstration**
- **Knopf Farms Soil Health Management Strategies**
- **Farmers Panel**

For questions about this event, please email carlospires@ksu.edu or events@ksgrains.com


Soil Health
Field Day - Summer Tour 2021
9/2/2021
4-6:30 PM
- Kansas Soil Health Partnership Update
- Soil Health Principles
- Carbon Markets
- Crop Intensification
- Cover Crop Root Demo
- Soil Fertility
- Farmers Panel
- Dinner provided by KS Corn
KNOPF FARMS
6229 S Kipp Road, GYPSUM, KS 67448
REGISTER AT KSCORN.COM/TOUR
or carlospires@ksu.edu
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