Issue 882

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eUpdate

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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. Crop residues: Nutritive value and options for grazing

The five-year average of corn acres harvested reported by NASS leads to an estimate of approximately 5.5 million acres of corn and 200,000 tons of residue produced annually in Kansas. In addition, 2.8 million acres of grain sorghum and 70,000 tons of residue were produced. While not all acres are suitable for grazing, this represents a tremendous resource for the state. Residue yield and nutrient contents are dependent on grain yield, fertility, harvest date, and conditions at harvest. Nutrient content of residues is additionally impacted by duration and timing of grazing initiation.

Figure 1. Cattle grazing crop residue. Photo submitted by Sandy Johnson, K-State Research and Extension.

The amount of grain left in the field has been reduced considerably compared to historical levels through varietal and harvest equipment improvements. However, weather conditions can result in significant ear drop or plant lodging. Before grazing, scout fields to look for piles of grain on the ground and determine if there is over 8-10 bushels of grain on the ground. If so, management steps should be taken to remove these piles prior to turning out cattle on the residue. Directions to estimate ear drop and head drop can be found here. While sorghum grain is always processed prior to feeding to crack its tough shell coat, cattle can still founder on downed grain sorghum heads.

Nutritive value of corn and sorghum residues

A nutritional evaluation of grazed Kansas corn and sorghum crop residues was conducted with the help of numerous producers and county agents across the state. Table 1 summarizes values from that survey.

Table 1. Range of crude protein (CP), acid detergent fiber (ADF; higher values reflect lower digestibility), neutral detergent fiber (NDF; higher values reflect animal intake), and total digestible nutrients (TDN) in corn and sorghum residue from Kansas samples.

	Leaves				Stem			
	CP	ADF	NDF	TDN	CP	ADF	NDF	TDN
Corn Nov.	4.6 – 6.0	46.7 – 48.2	75.6 - 81	51- 52	3.3 - 4.4	55.9 – 60.6	79.0 – 79.7	41 - 45
Corn Dec.	4.9 – 5.7	48.4 – 53.5	75.2 - 77.3	47 - 51	3.9 - 4.6	55.3 – 59.1	78.7 – 80.3	42 - 45
Sorghum	8.3 – 11.7	40.3 – 46.1	58.5 – 65.7	53 - 57	5.3 - 4.9	46.3 – 50.4	66.2 -73.5	49 - 52

A more detailed look at plant components indicate any grain available would have the highest CP content followed by the leaves. The cob has the lowest protein and energy value. The stalk and husks have similar crude protein content, but more energy is available from the husks than the stalks due to the lower lignin content. In general, leaves from sorghum residue have higher CP content than corn leaves. The stalks of corn and sorghum are similar in CP, but digestibility is somewhat higher in sorghum than corn. More details on nutrient concentrations of crop residues can be viewed in this UNL publication.

Duration of grazing

To ensure adequate residue remains on the field after grazing, we can use animal weight and grain yield to determine the amount of grazing available. Cattle will readily remove approximately 15% of the residue (leaves and husk), but can be forced to remove more if desired. The goal should be to leave at least ½ of the total amount of residue on the field.

If an irrigated corn yield is 180 bu/acre, a rule of thumb is to divide by 3.5 to get grazing days for a 1200-pound cow. In this case, 180 bu/acre corn residue should provide approximately 51 days of grazing (180/3.5 = 51) for a 1200 lb cow. The harvest index (grain production/total biomass) is similar for both corn and grain sorghum (1.6%). So, an 85 bus/acre dryland sorghum divided by 3.5, would provide approximately 24 days of grazing (85/3.5 = 24). A lactating cow or a heavier cow will consume more dry matter and the days of grazing would be adjusted downward. A spreadsheet is available to calculate stocking rate based on animal body weight and grain yield.

Selective grazing

Cattle will selectively graze the crop residue, eating the highest quality portions first, grain then leaves and husks. Depending on the stalking rate, amount of grain available, and nutrient demands of the cows, no energy or protein supplementation may be needed early in the grazing period for dry cows with a body condition score of 5 or more and grazing as described above. Weathering and trampling will decrease quality over time and this loss is greater with moisture and high humidity.

Soil compaction considerations

Cattle will cause soil compaction in paths leading to and around a water source. These compacted areas will only be surface compaction in the top 2-inches of soil. These compacted areas can be remedied by shallow tillage. Results on soil compaction from grazing have shown mixed results. A study near Bushland, TX found surface compaction in a no-till system reduced crop yield after several years of grazing. While grazing studies from Nebraska found no increase in compaction and increased crop yield. Studies from western Kansas found compaction to only occur in the top two inches when grazing occurred on wet soils and shallow tillage removed any compaction. Compaction will be less on frozen, dry, sandy soils. It is best to remove cattle from the field to a nearby perennial pasture if the field is wet and not frozen. Also, the producer should be open to using shallow tillage should compaction occur.

Nutrient removal from grazing

Another common concern about grazing residue is nutrient removal. Nutrient removal will vary by the type of animal, with a growing calf requiring more nitrogen than a mature dry cow. Dry cows will typically be used to graze residue, which will remove between 1 and 2 lbs of N per acre (depending on crop yield) and few other nutrients. Crop residue is low in phosphorus (P); thus, producers will likely supply a free-choice mineral, resulting in an increase in the amount of P and calcium left in the field. Wind will blow leaves and husks off fields, but manure remains in place.

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2. Calculating the value of poultry litter and proper storage considerations

The use of poultry litter can contribute to reducing the cost of fertilizer inputs for many operations, depending on the price and transportation cost of the litter. For many farmers, the use of poultry litter may represent significant savings particularly in times of high fertilizer prices. However, for many producers there is a "hassle factor" with using poultry litter. Reliable delivery, storage site location, uniform application, access to application equipment, and odor can all be additional challenges to producers unfamiliar with its use and should be a consideration.

Calculating poultry litter value

How valuable is poultry manure? This may not be a straightforward answer and depends on several factors, including the nutrient(s) required for a specific field. Here is one example using the average nutrient analysis values from southeast Kansas of 56-53-46 (N-P_2O_5-K_2O lb per ton) :

Year 1

- 35% of N is inorganic (all available) = 19.6 lb N/ton litter
- 65% of N is organic (25% is available in year 1) = 9.1 lb N/ton litter
    - Total N available in year 1 = 28.7 lb N/ton litter
    - Total value of N available in year 1 (@ $0.85/lb N) = $24.40/ton litter
- P is 50% available in year 1 = 26.5 lb P2O5/ton litter
    - Total value of P in year 1 (@ $0.85/lb P2O5) = $22.52/ton litter
- K is 100% available in year 1 = 47.0 lb K2O/ton litter
    - Total value of K in year 1 (@ $0.39/lb K2O) = $18.33/ton litter

- **Total in year 1 = $65.25/ton litter**
- **Residual N and P = $45.73/ton litter**

More information on nutrient availability in poultry manure is available online in eUpdate Issue 881 at https://bit.ly/3wHffD8. In addition to the N, P, and K, poultry litter also contains sulfur, micronutrients, and organic matter which adds additional value to the poultry litter.

Storage considerations

Proper storage of manure is important to prevent runoff contamination of water and odor problems. The following practices should be utilized:

- Avoid stockpiling litter near homes, public roadways, and drainage ditches.
- Stockpile litter at least 200 feet away from "Waters of the State."
- Use tarps on litter piles to keep litter dry, reduce odor, and reduce N losses from volatilization.
- Create an earthen berm around piles to allow time for water and nutrients running off the pile to infiltrate.

Additional considerations when selecting a suitable storage site

- Locate stockpiles in areas with minimal slope.
- Avoid sites that slope toward waterways and receive extraneous drainage.
- Locate sites in areas surrounded by grass that can serve as a buffer.
- Avoid sensitive groundwater areas and sites in close proximity to wells.

Figure 1. Poultry litter stockpiles. Photo by Dan Donnert, K-State Research and Extension.

If poultry litter is a regular part of your operation's fertility program, consider constructing improved poultry litter storage sites that include a storage pad built out of lime screenings, all-weather truck access, and a grass or cropland buffer to trap nutrients leaving the storage site. K-State Research and Extension Watershed Specialists may be able to help in identifying suitable storage locations and/or designing improved temporary storage sites that poses the least possible environmental risk from runoff for the area.

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3. Final ruling from the EPA on the insecticide chlorpyrifos

A final ruling made by the EPA in August will remove the organophosphate insecticide chlorpyrifos as an option for agricultural pest control nationwide. This final rule was effective as of October 29, 2021, and the tolerances for all commodities will expire on February 28, 2022. In explaining how the EPA arrived at the conclusion to revoke all tolerances, they provided the following information.

"Based on currently available data and taking into consideration all currently registered uses for chlorpyrifos, the EPA cannot determine that there is a reasonable certainty of no harm from aggregate exposure to chlorpyrifos. The agency's evaluation indicates that currently registered uses of chlorpyrifos result in exposures exceeding the safe levels of exposure, and thus have the potential to result in adverse effects. The final rule revokes tolerances and will reduce risks to our most vulnerable populations, including children, by reducing chlorpyrifos exposure via food and drinking water."

After the tolerances are revoked, sale and distribution of chlorpyrifos products labeled for use on food crops would be considered mislabeled, making it a violation of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) to sell and distribute those products. Additionally, new applications of chlorpyrifos will result in any food or feed that is treated to be considered adulterated and unfit to be distributed.

Chlorpyrifos, known to many as Lorsban, is a broad-spectrum insecticide which kills insects upon contact by disrupting the function of the nervous system. Nationally, the use of this pesticide has been declining for the last decade and in 2020, Corteva Agriscience announced it would end production of the chemical. In Kansas, chlorpyrifos has been used to control insect pests in all major agricultural commodities.

Alternative insecticides

Aside from various pyrethroid insecticides, there are other effective chemicals with different modes of action that will be available to control the pests that chlorpyrifos once did (Table 1). Chlorantraniliprole (Prevathon), indoxacarb (Steward), flupyradifurone (Sivanto), sulfoxaflor (Transform) and afidopyropen (Sefina) are more selective and have less impact on beneficial insects such as pollinators and those that are important for keeping pest populations in check. Please refer to the most recent KSRE Insect Management Guides for specific control information. Most importantly, in order to maintain the efficacy of these products, be sure to practice proper rotation, as repeated use of one product or the same mode of action will ultimately lead to the development of resistance in our pest populations. Be sure to follow all directions on the labels for proper use of any chemical.

Table 1. Additional registered products to include in rotations with existing organophosphate and pyrethroid insecticides for pest control in Kansas crops. For more specific information relative to any insecticide, always refer to the actual label on the product. *FIFRA 2(ee) valid until 2026 or until withdrawn. **supplemental label expires July 1, 2022 ***supplemental label expires October 31, 2023

Chemical Name	Trade Name	Mode of Action Class	Crop	Pests Controlled (see labels for details)
chlorantraniliprole	Prevathon	28	alfalfa	army cutworm, grasshoppers
				alfalfa caterpillar, beet armyworm, fall armyworm*
			corn	true armyworm, European corn borer, southwestern corn borer, fall armyworm, western bean cutworm
			cotton	
			sorghum	grasshoppers
				bollworm
			soybean	corn earworm, fall armyworm
			sunflower	sorghum webworm, grasshoppers
			wheat	corn earworm, green cloverworm
				saltmarsh caterpillar, grasshoppers
				sunflower moth, grasshoppers
				true armyworm, fall armyworm
				grasshoppers
indoxacarb	Steward	22	alfalfa	alfalfa weevil, alfalfa caterpillar, beet armyworm, grasshoppers
			corn	

			cotton soybean	true armyworm, corn rootworm adults, European corn borer, southwestern corn borer, fall armyworm, western bean cutworm, grasshoppers fleahopper, bollworm corn earworm, green cloverworm, grasshoppers
flupyradifurone	Sivanto	4D	alfalfa sorghum soybean	aphids, potato leafhopper sugarcane aphid, greenbug soybean aphid
sulfoxaflor	Transform	4C	alfalfa sorghum soybean wheat	aphids** sugarcane aphid soybean aphid greenbug, Russian wheat aphid
afidopyropen	Sefina	9D	cotton sorghum soybean	whitefly, aphids aphids*** soybean aphid

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4. K-State/KARA Crop Production Update - Dec. 1 & 2 in Lindsborg, KS

The 2021 Crop Production Update, hosted by the Kansas Agribusiness Retailers Association (KARA) and in cooperation with K-State Research and Extension, will be offered in-person this year. The two-day event will take place on December 1 and 2 at the Sundstrom Conference Center in Lindsborg, KS. This course has been approved for four 1A hours, 1 core hour, and 11 CCA CEUs.

This training provides the latest research and technological advances in weed and insect control, fertilizer and chemical recommendations, soil fertility, and much more. The agendas for each day are shown below.

Wednesday, Dec. 1, 2021

8:30 Registration

9:10 Welcome and Introduction

9:20 Herbicide application date and GPA on residuals

10:10 Current research on wheat production

11:00 Market outlook and 2021 crop budgets in Kansas

11:50 Lunch

1:00 Core hour

1:50 Planning and conducting a prescribed burn

2:40 Break

3:00 Nutrient management in forage systems

3:50 Questions/Adjourn

Thursday, Dec. 2, 2021

8:30 Soil health: concepts and recent research in Kansas

9:20 Advancing science-based stewardship in corn

10:10 Break

10:30 Nutrient management in corn and wheat

11:20 Wheat disease management

12:10 Lunch

1:10 Corn and soybean disease management

2:00 Cover crops, soil heath, and water quality

2:50 Wrap-Up/Adjourn

Don't delay - get registered today! Registration information and cost options can be found here: https://www.ksagretailers.org/events-training/crop-production-update/

5. 2021 Crop Pest Management Schools - December 8, 9, and 21

Be sure to get registered to attend one of the 2021 Crop Pest Management Schools scheduled in December. This year, two schools will be offered in the traditional, in-person format. A third school will be delivered in a virtual format.

Each school will start at 7:50 am with registration and conclude at 5:00 pm. A lunch will be provided to all participants that attend an in-person school. The cost to attend either of the in-person events is $50 if registered by Dec. 1. After Dec. 1, the cost will be $75. The virtual school fee is $75 and you must be registered by Dec. 17.

Each school will feature a variety of topics on weed control, insects, and diseases. Detailed agendas for each school can be viewed at: https://www.sunflower.k-state.edu/agronomy/

The dates and locations of each school are:

December 8 –Colby, KS
City Limits Convention Center
2227 S. Range Ave.

December 9 – Great Bend, KS
Knights of Columbus Hall
723 Main St.

For the in-person schools, please register by December 1 at https://www.sunflower.k-state.edu/agronomy/ . After December 1, you can register at the door.

December 21 – Virtual Program

If you choose to attend virtually, you will need an internet-connected device, such as a laptop, desktop, or tablet at your home and/or at your workplace.

The following is required:

- only one person per computer
- good internet connection
- audio (from the computer speakers, microphone port, or via telephone)
- downloaded application of Zoom on your device (to download, visit https://zoom.us/)

For the virtual school, please register by December 17 at https://www.sunflower.k-state.edu/agronomy/ .

Commercial applicator and Certified Crop Advisor credits have been applied for.

K-State Crop Pest Management Schools

December 8 – Colby
City Limits Convention Center
2227 S Range Ave

December 9 – Great Bend
Knights of Columbus Hall
723 Main Street

December 21 – Virtual

Register at www.sunflower.ksu.edu/agronomy
December 8 and 9 Schools
Cost is $50, if registered by December 1. After Dec 1, cost is $75 and register at the door
December 21 School
Cost is $75

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

Topics and Speakers

Getting the Most from Your Herbicide Application	Dr. Sarah Lancaster
Identifying and Controlling Common Corn Insects	Anthony Zukoff
Combatting Corn Diseases	Dr. Rodrigo Onofre
Weed Research Update	Dr. Vipan Kumar
Common Weeds – Identification and Characteristics	Jeanne Falk Jones
Wheat Diseases And their Prevention/Control	Dr. Kelsey Andersen Onofre
Research Update on Herbicide Applications	Dr. Ajay Sharda
Kansas Regulations	KDA Representative

Schedules for each school:
www.sunflower.ksu.edu/agronomy

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