Issue 937

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Extension Agronomy

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. New Wheat Rx publication: Coleoptile length of winter wheat varieties 2022

A new publication is now available in the Wheat Rx series. Wheat Rx is a partnership between Kansas Wheat and K-State Research and Extension to disseminate the latest research recommendations for high-yielding and high-quality wheat to Kansas wheat farmers. This latest publication examines the coleoptiles lengths of many Kansas wheat varieties. Wheat varieties with long coleoptiles are more likely to emerge when planted deep enough to reach soil moisture from past rainfall. This article summarizes information from the publication. The full publication, *MF3612 Coleoptile Length of Winter Wheat Varieties 2022*, is available online at: https://bookstore.ksre.ksu.edu/pubs/MF3612.pdf.

Coleoptile Length

Once a wheat seed starts to absorb water, the seminal roots are the first developmental structure to emerge. After the seminal roots, the coleoptile develops. The coleoptile is a rigid protective structure that covers the emerging shoot to aid it in reaching the soil surface (Figure 1). The coleoptile usually continues to elongate until it breaks the soil surface and reaches sunlight. At this point, it stops growing and the first true leaf emerges through it.

If the seed is sown deeper than the coleoptile's length, the coleoptile is not able to emerge through the soil surface, and consequently, the first true leaf emerges below ground. This causes the first true leaf to take on an accordion-like appearance and the wheat plant typically becomes yellow and dies (Figure 1). To avoid this situation, wheat should never be sown deeper than the coleoptile length of the chosen variety.

Figure 1. Deep-sown wheat demonstrating the potential for coleoptile elongation (yellow arrows point to the end of the coleoptile). In the left, the coleoptile was able to reach the soil surface and the first true leaf emerged above ground, therefore showing normal early development. In the right, the coleoptile's maximum length was shorter than the sowing depth, resulting in the emergence of the first true leaf below the ground level. As the first true leaf does not have the strength to continue pushing upwards when it emerges below ground, it takes on an accordion-like shape and becomes yellow, leading to plant death. Photo by Romulo Lollato, K-State Research and Extension.

In dryland environments typical of western Kansas and eastern Colorado, wheat is often sown on soil moisture accumulated in the last summer rainfall events, which requires growers to sow deep in order to reach moisture. This is less of a concern in central Kansas during most years, where growers can achieve good stands by relying on fall precipitation for good topsoil moisture at sowing time.

To achieve good crop establishment on deep-placed seed, long coleoptile varieties are essential. An additional concern in these regions is that many growers sow their wheat early for grazing, which places sowing time during warmer soil temperatures – which further reduces the coleoptile length.

Depending on variety, this reduction in coleoptile length due to high temperatures may be as much as 60%. For example, a variety that has a 27/8-inch (75 mm) coleoptile at 60 degrees Fahrenheit could have a 15/8-inch (40 mm) coleoptile at 80 degrees Fahrenheit soil temperature. While different varieties have different sensitivities to warm soil conditions, selecting varieties with longer-than-

average coleoptiles could help prevent emergence issues under these conditions.

To help guide variety selection for deep sowing, this publication provides growers with an estimate of average coleoptile length of different winter wheat varieties common to Kansas and the Great Plains.

Description of Procedures

This study was performed under controlled conditions, which differ from field conditions but provide a fair comparison among the different wheat varieties' potential coleoptile lengths.

Seeds were tested from all varieties entered in the 2022 Kansas State University winter wheat variety performance tests, as well as from other seed sources used for agronomic studies during the same crop year. Sixty seeds of each variety were tested. Variety randomization ensured that the experiment was conducted in a randomized complete block design and each variety occurred one time, and that the coleoptile length was measured in 40 plants per variety.

Coleoptile Length of Winter Wheat Varieties

Results from this controlled-environment experiment are shown on Table 1. The longest coleoptile varieties ranged from 23/4 to 31/4 inches (72 to 84 mm) and included LCS Steel AX, TAM 204, Kivari AX, Skydance, KS Dallas, KS Providence, Strad CL Plus, Bob Dole, and DoubleStop CL Plus.

Several variety options were also included in the second and third longest coleoptile groups (namely "Long" and "Medium-long" in Table 1) and could potentially be good options for deep sowing in western environments, as their coleoptile length ranged from 23/8 to 23/4 inches. Alternatively, many varieties had relatively short coleoptiles, falling in the two lowest groups (less than 21/8 inches (55 mm)). These varieties included: AM492, Big Country, TAM 114, AM Cartwright, LCS Link, Tatanka, Kanmark, Gallagher, Duster, MS Maverick, AM 513, AP RoadRunner, KS Hatchett, WB4699, AM514, KS Territory, and LCS Valiant. Use caution when sowing these varieties in deeper than average conditions; and note that seed purity and vigor can influence coleoptile length. Wheat seeds were submitted for testing in the official wheat variety testing program at Kansas State University, there was no effort to ensure all seeds met minimum purity or vigor requirements.

Table 1. Wheat variety grouping based on coleoptile length measured in a controlled environment experiment during the 2022 winter wheat season in Kansas. A total of 40 coleoptiles were measured per variety.

Coleoptile Length					
Very short	Short	Medium short	Medium long	Long	Very long
(1¾ – 2⅛")	(2⅛ – 2¼")	(2⅜ – 2⅝")	(2⅜ – 2⅝")	(2⅝ – 2⅞")	(2⅞ – 3⅜")
(46 – 53 mm)	(53 – 55 mm)	(55 – 62 mm)	(62 – 67 mm)	(67 – 72 mm)	(72 – 84mm)
AM 492	Big Country	Lonerider	WB4595	Guardian	LCS Steel AX
TAM 114	AM Cartwright	Showdown	LCS Runner	AG Icon	TAM 204
LCS Link	Tatanka	Zenda	LCS Revere	WB4401	Kivari AX
Kanmark	Gallagher	LCS Julep	SY Rugged	KS Ahearn	Skydance
Duster	MS Maverick	Joe	WB4303	Whistler	KS Dallas
AM 513	AP Roadrunner	AM 516	Everest	Rock Star	KS Providence
KS Hatchett	WB4699	AM Exp 2105	OK Corral	Canvas	Strad CL Plus
AM 514	KS Territory	Breakthrough	LCS Photon	CP72166AX	Bob Dole
LCS Valiant		AM 530	AG Radical	TAM 115	DoubleStop CL Plus
		SY Wolverine	WB Grainfield	LCS Helix AX	
		WB4422	AP 18AX	Rock Star	
		Langin	Green Hammer		
		AP BigFoot	Uncharted		
		KS Hamilton	KS Western Star		
		Larry	Bakers Ann		
		KS Big Bow	SY Monument		
		AG Golden	WB4792		
		LCS Chrome	KS Silverado		
		AP EverRock	WB4269		
		Paradise	AP Prolific		
		AM 505	Smith's Gold		
		T158			
		CP7017AX			
		High Country			
		CP7907			
		WB4395			

For more information

Dual-purpose Wheat: Management for Forage and Grain Production. K-State Research and Extension publication MF3375

Factors Affecting Wheat Germination and Stand Establishment in Hot Soils, Oklahoma State University Extension Publication PSS-2256.

Wheat Seedling Emergence from Deep Planting Depths and Its Relationship with Coleoptile Length. PLoS One 2013; 8(9): e73314 doi: 10.1371/journal.pone.0073314

Wheat Grain Yield Response to Seed Cleaning and Seed Treatment as Affected by Seeding Rate During the 2018–2019 Growing Season in Kansas. Kansas Agric. Exp. Stat. Res. Report 6(5). 2020.

Wheat Grain Yield Response to Seed Cleaning and Seed Treatment as Affected by Seeding Rate

During the 2019-2020 Growing Season in Kansas. Kansas Agric. Exp. Stat. Res. Report 7(5). 2021.

Wheat Grain Yield Response to Seed Cleaning and Seed Treatment as Affected by Seeding Rate During the 2020-2021 Growing Season in Kansas. Kansas Agric. Exp. Stat. Res. Report 8(4). 2022.

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2. Want more forage? Kill some cedars

Eastern redcedar (*Juniperus virginiana*) is the only evergreen tree native to Kansas, and it was originally found from eastern Canada, south to parts of Florida, and westward to eastern Texas and North Dakota. Before European settlement of the plains, it was believed to be found mainly in eastern Kansas on bluffs, ridges, and extremely steep slopes, or basically places that were difficult for fires to reach and travel through as prairie fires helped form the dominant grassland regions of Kansas.

Today, it has been introduced or has spread into most all regions of Kansas from shelterbelt introductions or from the lack of prescribed fires on pastures and rangelands into ecological sites where it originally did not occupy. It has adapted to most soils found throughout the state, from moist, deep loamy riparian soils to dry and clayey upland soils, but is especially adapted to dry, coarse, and calcareous soils.

Kansas has undergone a great spread of cedar trees over the last 50 years, and the expansion appears to be increasing rapidly. The Rangeland Analysis Platform (RAP) (https://rangelands.app/), a website that evaluates vegetation presence and production based on satellite imagery, shows that Kansas has seen a wave of expansion of trees and brush on areas that at one time were predominately grasslands. Tree cover on these grasslands has nearly doubled in the last 20 years, going from a cover of nearly 4% to just over 8% according to the RAP data.

Eastern redcedar is a major component of this wave of woody plant expansion. Even some upland pasture areas of watershed regions well west of the I-135/81 corridor showed a rapid expansion during this 20-year time period, so the encroachment of woody plants onto grasslands is no longer just an eastern Kansas occurrence (Fig. 1).

Figure 1. Eastern redcedar trees in a pasture 100 miles west of the I-135/81 corridor in Trego County, in August of 2022. The dark green trees stood out in the drought stricken and dormant brown grass that would typically be shades of green at that time of year. Photo by Keith Harmoney, K-State Research and Extension.

The amount of accumulated forage lost over the years due to this woody expansion is staggering. The estimated amounts of annual forage from grasslands lost to tree expansion in just 2019 range from 0% in the western counties, to 1-7% in the central counties, and up to 30% in some eastern counties. The amount of estimated forage lost in each Kansas county, also called the grassland yield gap, can be viewed at https://www.wlfw.org/yieldgap/Kansas/index.html.

For instance, Stafford County, the center of which is nearly 80 miles west of I-135, lost just under 14 million pounds of forage in 2019 alone due to past tree expansion into its grasslands, equivalent to nearly 100,000 cow grazing days on rangeland at a moderate stocking rate. Decatur County, further north in the state and even further west, about 120 miles west of the I-135/81 corridor, lost nearly 3,000 cow grazing days to tree expansion during the same 2019 time frame. The number of lost grazing days will surely increase, even in western Kansas, without efforts to slow cedar expansion, and 2022 has shown us that grazing days are extremely valuable.

Eastern redcedar is a nonsprouting tree, meaning that it does not spread or propagate from its root system, even if the above ground part of the tree is killed or the trunk is cut off, but rather it is spread by trees being transplanted or by the release of seed into the landscape. Small, pea sized bluish green berries are produced only on female trees, and a single tree can produce thousands of berries,

with each berry usually containing 1-3 seeds. A female tree will be able to produce berries by approximately 10 years of age. Meanwhile, male trees only produce pollen from small cones that look like bulged, dry leaf scales on leaf tips.

The sight of a single cedar tree in a pasture usually doesn't result in rapid concern, but, knowing that a single female tree can produce thousands of seeds, the sight of this single tree means that many smaller trees could be establishing within the vicinity. This, of course, should raise concern that woody expansion is already well underway. Expansion usually occurs within 200 yards of the female tree, but birds and other wildlife may also carry the seed further distances. Cedar trees can often be seen establishing under powerlines, pasture fences, dead trees, and any other objects that serve as perches for birds that eat the berries.

Over time, these newly established seedlings can grow 1 foot per year or more, depending on rainfall and the soil where the trees are growing. Eventually, these trees develop enough canopy that the tree itself intercepts small amounts of precipitation, keeping it from reaching the soil, or uses moisture that does reach the soil that could otherwise have been used by grasslands for forage production. This tree canopy also produces shading, which further keeps the grasslands from converting sunlight into pasture forage.

The best way to stop woody tree expansion in Kansas pastures and rangelands is to prevent tree seedlings from establishing in the first place. A prescribed burning regimen, from a range of burning even once every 10-15 years in very western Kansas to once every 3 years in eastern Kansas, could significantly reduce the number of pastures with encroaching cedar trees. Pastures with enough fuel for a 10-mph wind to move the fire across the pasture is typically enough fuel to support a fire that can consume 3-4-foot-tall cedar trees (Fig. 2).

Figure 2. A 4-foot-tall cedar tree that was killed by the heat of a spring burn in Ellis County. Notice the dried leaves still on the tree, which indicates the fire did not consume and burn the tree in flames, but rather the heat of the fire was able to damage and kill the tree. Photo by Keith Harmoney, K-State Research and Extension.

Otherwise, when first spotted as a small sapling, a small shears or tree snip can kill trees when cut at ground level. It's much easier to kill and remove trees through burning or cutting when very small rather than prolonging management of the trees until later years. For trees that are 4 foot tall or larger, cutting the tree off below the lowest branch with a chain saw or other motorized shear also will kill the tree, but pastures may need to be burned or trees may need to be stacked and burned in order to reduce creating perches for birds.

When the above ground parts of the tree are killed by fire or cutting, the below ground portions will

also die because the tree doesn't have sprouting buds below the soil surface. Once an area is cedar tree free, be diligent in keeping the area tree free and incrementally expand the tree free zone to include surrounding lands. Areas near established cedar shelterbelts and prior existing high populations of trees will need extra attention as viable seed could be lingering in those areas for years.

During drought years, rangeland grasses may stop growing, turn brown, and go dormant during the usual growing season. However, cedar trees are highly capable of capturing soil water from great distances and often stay green during drought. In a summer such as 2022, encroaching cedar trees were often more evident, with their dark green color contrasting with dormant grass in pastures. A sobering yet one of the few positive outcomes of this past dry season is that it should have helped indicate pastures that need attention for some form of cedar tree control. Once cedar trees have been significantly reduced or eliminated in a pasture, be vigilant in continuing to control these trees and keep them from robbing rangeland grasses of the sunlight and water they need for growth. In a summer drought such as 2022, and in drought years to come, our pasture grasses can use every drop of water they can get.

Editor's note: This article originally appeared in the January 2023 edition of the "Beef Tips" newsletter. You can subscribe to this newsletter at https://enewsletters.k-state.edu/beeftips/.

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3. K-State 2023 Chemical Weed Control Guide now available online

One of the most popular K-State Extension and Research publications is here!

This publication provides suggestions for chemical weed control in several major crops. Herbicides, when properly used, are one component of an effective weed management program. Tillage, crop competition, cropping rotation, mowing, and fire are additional weed control methods that may be used alone or in combinations. Available time, labor, equipment, and other costs as well as types of weeds and areas infested need to be considered when planning a weed control program. Crop and soil management practices such as planting high-quality seed, planting at the optimum rate and date, and maintaining optimum soil fertility should also be considered. Contact your local Extension agent to answer questions not addressed in the guide.

The 2023 Chemical Weed Control Guide is available online at:

https://bookstore.ksre.ksu.edu/pubs/SRP1176.pdf

When viewing online file in a web browser or in Adobe, there is access to bookmarks that will guide you to the first page of every section (options vary per program settings and device type).

Hard copies of the books will be available in January. Orders can be placed at https://bookstore.ksre.ksu.edu/Item.aspx?catId=236&pubId=25002

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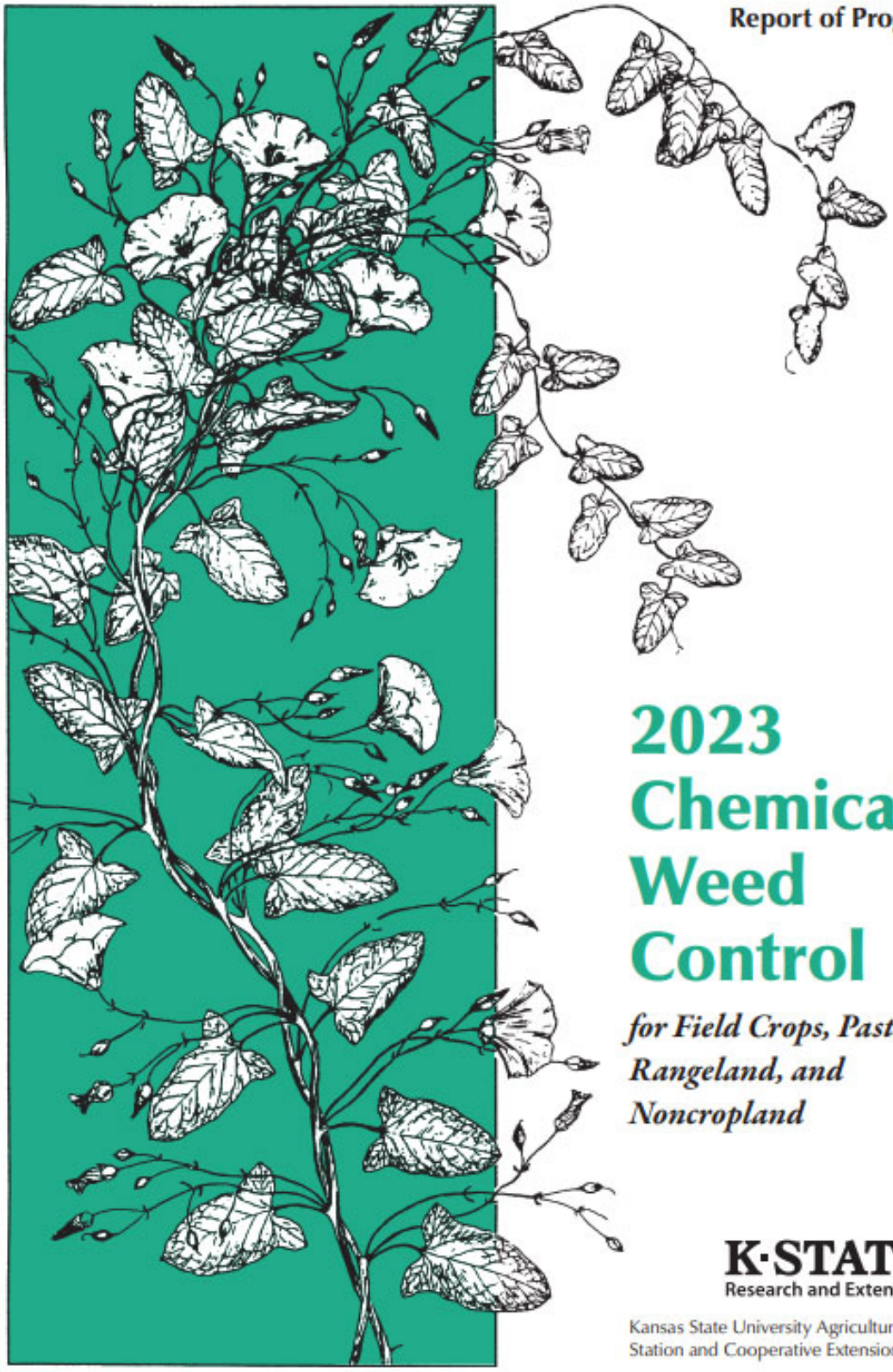

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2023 Chemical Weed Control

for Field Crops, Pastures, Rangeland, and Noncropland

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4. Cover Your Acres Winter Conference, January 17-18 in Oberlin

K-State Research and Extension will host the 20th annual Cover Your Acres Winter Conference for crop producers and consultants on January 17 and 18. The conference will take place in the traditional in-person format at the Gateway Civic Center in Oberlin, KS.

Cover Your Acres is a producer-driven meeting focused on new ideas and research-based updates in crop production in northwest Kansas and the Central High Plains region.

The conference, which typically draws more than 400 attendees from Kansas and other states, highlights the latest technology, methods, and conservation practices to improve crop production in the region. This year's conference will feature university specialists and industry representatives discussing what's driving profitability in northwest Kansas farms. Session topics and speakers are listed below.

- **Are you able to help your neighbor?**
  Rachel Clews and Sandra Utter – KSU and Select Sires Beef Inc.
- **Cover Crops, Grazing, and Soil Health in Western KS**
  Augustine Obour - KSU
- **Current Financial Status of NW Kansas Farms**
  Mark Wood - KSU
- **Dryland and Limited Irrigation Row Crop Decisions**
  Lucas Haag - KSU
- **Grain Markey Outlook: Local and Global Factors**
  Dan O'Brien - KSU
- **Make Your Plan: Weed Management 2023**
  Sarah Lancaster - KSU
- **Nutrient Management Strategies**
  Lucas Haag - KSU
- **Oils, and Surfactants, and Drift Agents, Oh My!**
  Greg Dahl – WinField United
- **Weather Outlooks and Mesonet Tools**
  Matthew Sittel – KSU
- **Wheat: The Crop with 9 Lives**
  Romulo Lollato - KSU
- **Panel Discussion: When to Hold Them, When to Trade Them?**

The same programs will be offered both days of the conference (program schedule posted below). Participants attending both days will find it easier to catch most, or all of the programs. Registration will begin at 7:45 a.m. with educational sessions ending at 5:00 p.m. The sessions are followed by a social on Tuesday evening where attendees can visit with industry representatives and conference speakers while enjoying hor d'oeurves.

Online registration is due by January 10. The fee is $55 for Tuesday, January 17, $60 for Wednesday, January 18, or $80 for both days. Beginning January 11, the cost is $80 per day. The conference fee includes lunch, morning and afternoon refreshments, and educational materials. The program offers a total of 10 continuing education unit (CEU) credits for Certified Crop Advisors and 2 CEUs for Commercial Applicators.

To view the conference details, lodging accommodations, and online registration, visit www.northwest.ksu.edu/coveryouracres. For questions, call 785-462-6281.

Major sponsors of this year's conference include AKRS Equipment Solutions, Great Plains Manufacturing, Hoxie Implement, SurePoint Ag Systems, Lang Diesel, 4G Farm and Sales, and Double Team by Sorghum Partners.

Cover Your Acres Winter Conference

January 17 and 18, 2023
The Gateway, Oberlin, KS

Register Online at www.northwest.ksu.edu/CoverYourAcres

		Room 1	Room 2	Room 3	Room 4
7:45	8:15	Registration			
8:15	8:20	Welcome			
8:30	9:20	Current Financial Status of NW KS Farms[1] (M. Wood)	Wheat: The crop with 9 lives[1] (R. Lollato)	Dryland and Limited Irr. Row-Crop Decisions?[1] (L. Haag)	Industry Sponsored Session (TBD)
9:30	10:20	Are you able to help your neighbor?[1] (R. Clews / S. Utter)	Weather Outlook and Mesonet Tools[1] (M. Sittel / C. Redmond)	Nutrient Management Strategies[1] (L. Haag)	Industry Sponsored Session (TBD)
10:20	10:50	View Exhibits			
10:50	11:40	Oils, and Surfactants, and Drift Agents, Oh my![1,2] (G. Dahl)	Grain Market Outlook: Local and Global Factors[1] (D. O'Brien)	Cover Crops, Grazing, and Soil Health in Western KS[1] (A. Obour)	Industry Sponsored Session (TBD)
11:50	12:40	Make Your Plan: Weed Management 2023[1,2] (S. Lancaster)	Nutrient Management Strategies[1] (L. Haag)	Lunch	
12:50	1:40	Dryland and Limited Irr. Row-Crop Decisions?[1] (L. Haag)	Oils, and Surfactants, and Drift Agents, Oh my![1,2] (G. Dahl)		
1:50	2:40	Grain Market Outlook: Local and Global Factors[1] (D. O'Brien)	Are you able to help your neighbor?[1] (R. Clews / S. Utter)	Make Your Plan: Weed Management 2023[1,2] (S. Lancaster)	Industry Sponsored Session (TBD)
2:40	3:10	View Exhibits			
3:10	4:00	When to hold them, when to trade them? Panel Discussion on Machinery Management	Cover Crops, Grazing, and Soil Health in Western KS[1] (A. Obour)	Wheat: The crop with 9 lives[1] (R. Lollato)	Industry Sponsored Session (TBD)
4:10	5:00	Weather Outlook and Mesonet Tools[1] (M. Sittel / C. Redmond)	Current Financial Status of NW KS Farms[1] (M. Wood)		

Tuesday: Social hour with hors d'oeurves begins at 5:00

[1] CCA CEUs applied for.
[2] Commercial Applicator CEUs applied for.

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