Issue 1027

K-STATE Research and Extension

Extension Agronomy

eUpdate

10/31/2024

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. Replanting decisions for winter wheat

As wheat growers evaluate their wheat stand, some may consider replanting fields yet this fall. There are many potential causes of poor or uneven emergence or stand establishment, and they may differ from field to field. The fall of 2024 has been challenging for winter wheat establishment in Kansas and in the US Southern Great Plains. Some regions received precipitation in early September and growers who took advantage of this moisture generally attained good stand establishment. However, it has been extremely dry since, and these stands may be suffering, so these growers are now likely concerned with the drought conditions that followed planting as the wheat plants start to show symptoms of drought stress.

For growers that did not plant around precipitation events – perhaps because it was still too early for their region – fields may be showing some scattered emergence as seeds may have reached moisture in parts of the field but not in other parts. These growers may be considering the replant their crop. If dry soils are the cause of the problem, replanting will not bring many benefits unless the seed has partially germinated and perished before emerging. It is very important to dig into the soil and evaluate the seed to determine the cause of poor emergence. Wheat seeds may still be germinating and emergence may occur in the next few days, depending on temperatures. Thus, if seed are still hard and viable, or if germination started to occur recently and there is a very short coleoptile emerging from the seed (Figure 1), the best advice is to leave the field alone.

Figure 1. Wheat seed with elongating coleoptile visible below ground. Photo by Romulo Lollato, K-State Research and Extension.

When deciding whether to replant wheat fields, it is helpful to consider these factors: stand uniformity, percent stand compared to the target stand, replanting date, weed control, and insurance cutoff date.

Stand uniformity

In fields in which topsoil moisture was variable at the time of planting, some seeds might have germinated and emerged where soil moisture was sufficient, while others might have started the germination process but perished where soil moisture was too low, while others might not have started the germination process at all. This will cause poor and scattered wheat emergence across the field, with sometimes recognizable field patterns associated with the moisture distribution in the soil. In this case, stands might be relatively uniform in poorer-drained areas where moisture might have accumulated but non-existent in better-drained areas, leading to high within-field variability. In this case, growers should check for seed viability in areas with poor emergence. If the seed is still viable, then the field should be left alone. If the seeds imbibed water and started to germinate but perished, then these portions of the field should have top priority for replanting. If a stand is sparse in areas that already emerged, producers should also consider replanting these areas with lower seeding rates to bring final population closer to the desired stand, as discussed below.

Percent stand compared to the goal

In areas with suboptimal and thinner stands than desired, counting the number of emerged plants per row foot and comparing the observed stand to target populations (Table 1) is a good place to start.

The target number of plants per row foot (Table 1) is influenced by seeding rate, seed size, and row spacing, considering 80% emergence. If seed size is unknown, 14,000 to 16,000 seeds per pound can be used for most wheat varieties in Kansas, except those with rather large or small kernels (note: commercial range in seed size may be as variable as 8,000 to 22,000 seeds per pound). To determine the average number of plants per foot of row, several random plant counts across the field should be taken, given a more or less uniform emergence throughout the field. If the average number of plants is about 50 percent or more of normal and the stand is evenly distributed, the recommendation is to keep the stand. Wheat's tillering ability can greatly compensate for poor stand provided soil fertility is adequate, the weather is favorable, and the plants are few but fairly uniformly distributed (large gaps will likely not be compensated). With less than 40 percent of a normal stand, the recommendation is to replant the field. If possible, replanting should be done at a 45-degree angle to the original stand to minimize damage to the existing stand.

Table 1. Target plants per row foot (80% emergence) based on seeding rate, seed size, and row spacing.

		Row spacing (inches)				
		6	7.5	8	10	12
Seeding rate (lb/ac)	**Seed size (seeds/lb)**	Target plants/row foot (80% emergence)				
45	12,000	5	6	7	8	10
	14,000	6	7	8	10	12
	16,000	7	8	9	11	13
	18,000	7	9	10	12	15

60	12,000	7	8	9	11	13
	14,000	8	10	10	13	15
	16,000	9	11	12	15	18
	18,000	10	12	13	17	20
75	12,000	8	10	11	14	17
	14,000	10	12	13	16	19
	16,000	11	14	15	18	22
	18,000	12	15	17	21	25
90	12,000	10	12	13	17	20
	14,000	12	14	15	19	23
	16,000	13	17	18	22	26
	18,000	15	19	20	25	30
120	12,000	13	17	18	22	26
	14,000	15	19	21	26	31
	16,000	18	22	24	29	35
	18,000	20	25	26	33	40

Mechanical Seeding Issues

Occasionally, seeding issues arise with mechanical equipment failure that could result in the seed not being properly placed in the furrow. This could be the result of a plugged opener or a hole in the seed tube. These skips are obvious from a long-distance away, look bad, and depending on the number of plugged openers could significantly reduce yield and be less competitive against weeds. The amount of yield loss will depend on environment, variety, seeding rate, and width of skip. A dryland study comparing row spacing in western NE found 7.5- and 10-inch row spacing consistently had greater yield than 15 or 20" row spacing (~60% yield of narrow row) (Sciencia et al., 2023). If there is a single row skip the neighboring rows can partially compensate for the skip, but if there are multiple row skips than the neighboring rows will not be able to compensate.

Calculating potential yield and gross profit loss:

1. (Number of openers plugged/Total openers) x Yield potential (bu/acre) x Estimated yield loss (%) = **Yield loss (bu/acre)**
2. Yield loss x Price ($/bu) = **Gross profit loss ($/acre)**

Example 1: 1 plugged row on a 30-foot drill with 10" row spacing, 60 bu/acre yield goal, 40% yield loss, and July 2025 futures cash price of $5.55/bu (Figure 2-left):

1. (1/36) x 60 x .4 = 0.67 bu/acre
2. 0.67 x 5.55 = $3.70/acre

Example 2: 2 plugged adjacent rows on a 30-foot drill with 10" row spacing, 60 bu/acre yield goal, 100% yield loss, and July 2025 futures cash price of $5.55/bu (Figure 2-right):

1. (2/36) x 60 x 1 = 3.33 bu/acre
2. 3.33 x 5.55 = $18.48/acre

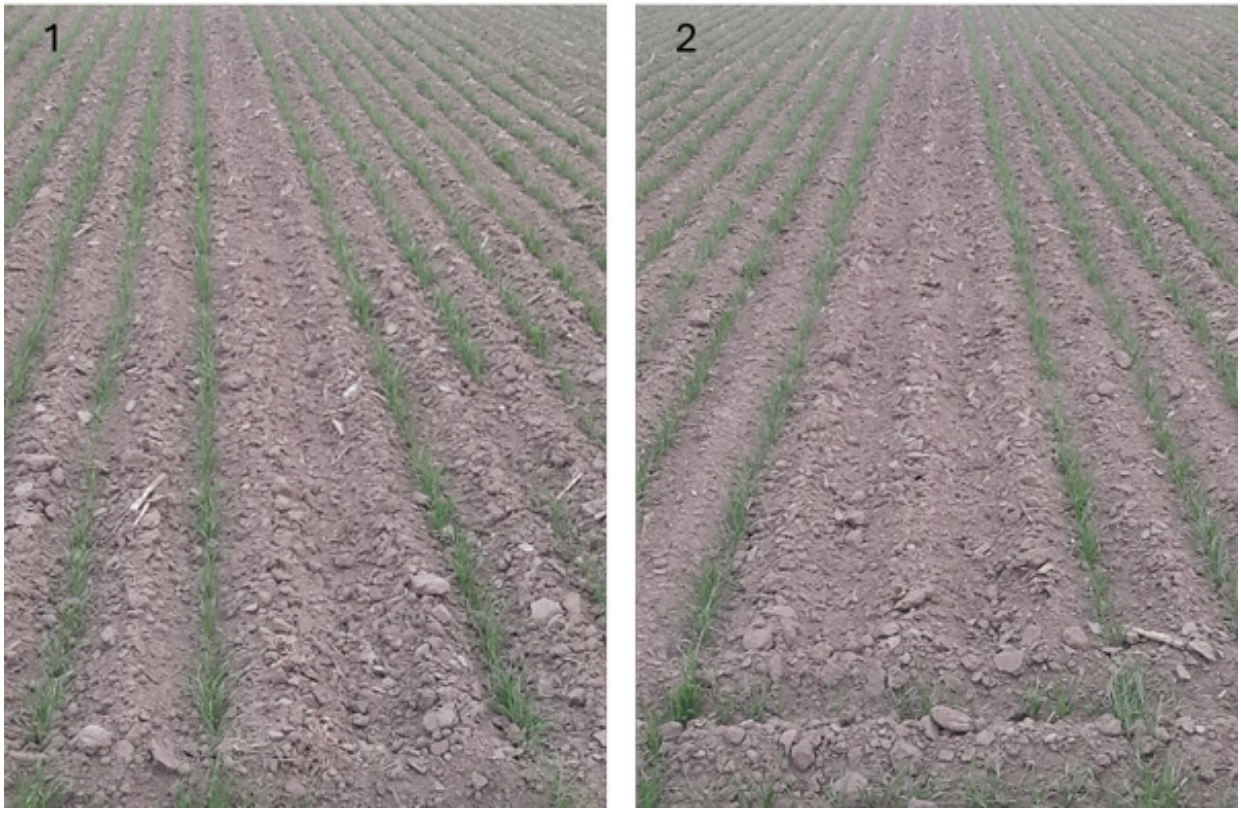

Figure 2. Example 1 photo showing a single row skip (left photo). Example 2 photo showing two adjacent row skips (right photo). Photos by John Holman, K-State Research and Extension.

Example 3: 1 plugged row and 1 outside row partially plugged on a 30-foot drill with 10" row spacing, 60 bu/acre yield goal, 40% yield loss across, and July 2025 futures cash price of $5.55/bu (Figure 3):

1. (2/36) x 60 x .4 = 1.33 bu/acre
2. 1.33 bushel/acre x $5.55/bushel = $7.40/acre

Figure 3. Photo for Example 3 scenario. Photo by John Holman, K-State Research and Extension.

In the examples above, if one row is not planted correctly (Example 1), the yield and gross profit loss would be negligible. However, if there are two or more adjacent rows that had a skip (Example 2), then it would most likely be best to replant that area. Reseeding over an area of established plants can cause damage to the established seedlings. Reseeding with a 30-foot drill for a 2-foot skip is also not advisable. It would be best to find a narrower (10') double disk drill if it is estimated that the yield loss is significant.

In Example 3, if a 10' drill was used, it would cover both problem rows and two passes the 30-foot drill made with one pass (due to placement of the bad rows). In this case, it might pay to replant this strip across the field. In Example 3, only 10' of every 60' or 1/6th of the field would need to be replanted. If using a 10' drill, the replanting would cost approximately 1/6 x (cost of seeding ($17) + seed cost per acre ($10)) or $4.50/acre. In Example 3, the estimated net return per acre from reseeding could be $3.00/acre. However, reseeding will cause some damage to the established plants, and this needs to be considered. In most cases, the skips will look bad but have little negative impact, and the best thing to do is not replant. However, with less crop competition, plan on a good weed management program.

Replanting date and seeding rate

As of late October, most of the state has passed the optimum sowing date, with maybe the exception

of far south-central or southeast Kansas. For portions of the field with no established stand (the entire stand will need to be replanted), producers should plan to increase their seeding rates by 10-15% every week past the optimum sowing date.

In areas where a partial stand was achieved but for a total of about 50% stand, or parts of the field that did not emerge evenly, or where the seedlings have perished after planting, producers should make the decision about replanting immediately to avoid further compromising the yield potential.

In portions of the field where the stand is below optimum, producers can cross-drill at the rate of 30-40 pounds per acre in western Kansas and 40-60 pounds per acre in central and eastern Kansas, using a double-disc opener drill, if at all possible, to minimize damage to the existing stand. If the replanting is done in November or later, increase the seeding rates to 60-75 pounds per acre in western Kansas and 75-90 pounds per acre in central Kansas. If stands are less than 30 percent of normal, increase these seeding rates by 20-30 pounds per acre. The higher seeding rates are needed because the cool soil temperatures encountered by late-planted wheat will likely slow emergence, favor seedling diseases, and reduce the potential for fall tillering. Using a fungicide seed treatment can reduce the potential for seedling disease and help achieve the target populations.

Weed control – Pay attention to application timing

A thin wheat stand can increase the potential for weed and grass infestations. In fields with a history of severe weed problems, the wheat stand should probably be replanted or thickened. If an herbicide application is preferable to replanting, look for herbicides that contain multiple active ingredients that effectively control the weeds present in the fields. The 2024 Chemical Weed Control Guide (bookstore.ksre.ksu.edu/pubs/SRP1183.pdf) contains information, including rates, recommended adjuvants wheat growth stages for application, and crop rotation restrictions about these herbicides and others.

Also, keep in mind that an uneven wheat stand will likely influence herbicide timing in the spring due to different staging of the crop within the same field. For example, 2,4-D should only be applied after full tiller and before early boot to avoid either reduced tillering or improper head development. More-developed plants during the fall often hold the best yield potential; thus, this factor might be considered if a decision needs to be taken between risking some herbicide injury to more developed plants versus those that emerged late in uneven wheat fields.

Insurance cut-off dates

Finally, some producers might also consider insurance cut-off dates, as they need to ensure their crop is planted prior to this date.

For insurance purposes, crops planted before the final planting dates as specified by the USDA are insured with no reduction in coverage or adjustment to premium. The final plant date is already past for parts of western Kansas, which means that producers replanting after this date will have a reduction in 1% coverage per day until the end of the late-planting period. For wheat, the late-planting period often occurs about 15 days after the final plant date.

Reference:

Sciencia, M., C. Creech, K. Frels, and A. Easterly. 2023. Optimizing agronomic practices for hard winter wheat production in the Great Plains with respect to seeding rate, row spacing, and variety. Agronomy Journal. 115:2964-2978.

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2. First herbicides with ESA-compliant herbicide label approved

We don't often write an eUpdate article when a new herbicide is approved by the Environmental Protection Agency (EPA). However, last week, the EPA issued a final decision to approve Liberty Ultra (glufosinate-P), making it the first herbicide with a label for agronomic crops that follows the principles outlined in the EPA's Herbicide Strategy, which is intended to help herbicide registrations comply with Endangered Species Act requirements. You can learn more about the Herbicide Strategy in this recent War Against Weeds podcast. While this language will vary among products, the Liberty Ultra label provides somewhat of a template for what we should expect going forward. Specifically, the new language pertains to reducing off-target herbicide movement and pesticide use limitation areas (PULAs).

Key aspects of the Liberty Ultra label that pertain to reducing off-target movement are included in Table 1. Changes from the Liberty 280 SL label are indicated in **bold**.

All herbicides will require runoff mitigation points. The number of points required will vary for each herbicide. Mitigation options/practices are described in the EPA's Mitigation Menu. Key aspects of the mitigation menu are summarized in Table 2. The EPA has developed a runoff points calculator that can help determine the number of points earned for practices already in place on your fields, including a 'credit' for certain counties that have relatively less runoff vulnerability. Table 3 lists the runoff mitigation relief points assigned to Kansas counties.

Table 1. Some examples of Liberty Ultra label requirements intended to reduce off-target herbicide movement.

Label Headings	Label Requirements
Mandatory Spray Drift Mitigations for Ground Applications	Do not exceed boom height of 24 in above target or crop canopy
Mandatory Spray Drift Mitigations for Aerial Applications	Spray boom must be mounted to minimize drift caused by wing tip or rotor blade vortices; Boom length must be 75% or less of wingspan and 90% or less of rotor diameter, unless wind is 11 to 15 MPH; If wind is 11 to 15 MPH, boom length must be 65% or less of wing span and 75% or less of rotor diameter; Do not release spray at height greater than 10 ft above crop canopy, unless necessary for pilot safety
Mandatory Spray Drift Mitigations for Aerial *and* Ground Applications	Wind speed and direction must be measured on location[1]; Do not apply when wind speed exceeds 15 MPH; Select nozzle and pressure that deliver medium or coarser droplets; During application, sustained wind speed must be between

	3 and 15 MPH, measured at the release height or higher, in an area free from obstructions; Do not apply during temperature inversions
Mandatory Downwind Spray Drift Buffers[2]	50 ft for aerial application 10 ft for ground application
Ground Boom Spray Drift Buffer Reduction options	Reduced to 0 ft if: use a drift-reducing adjuvant; using a hooded sprayer; a windbreak or shelterbelt is present[3]
Aerial Spray Drift Buffer Reduction options	20% for coarse or coarser droplets; 35% for coarse droplets and a drift-reducing adjuvant; 50 to 75% for windbreak or shelterbelt[4], can be combined with droplet size reductions
Mandatory Runoff Mitigation	Do not apply when soils are saturated or above field capacity; Do not apply during rain; Fields meeting certain criteria may not require mitigation; see Mitigation Menu[5] to determine criteria; If criteria are not met, must achieve a minimum of three points for labeled uses[6]
Additional Runoff/Erosion mitigation	Must search Bulletins Live! Two within 6 months prior to application and follow instructions regarding use in a PULA
Endangered and Threatened Species Protection Requirements	Check Bulletins Live! Two within 6 months prior to application and follow directions and restrictions

[1] Predicted wind speed and direction for the application site should be acquired within 12 hours prior to application and should be reassessed every 15 minutes during the application. Measuring wind speed and direction can be done by: instruments on the application equipment, anemometer, windsock, aircraft smoke system, checking behind spray rig.

[2]Spray drift buffers can include: Agricultural fields, roads, mowed grassy areas, bare ground, man-made structures with walls and/or a roof, vegetative filter strips, hedgerows, CRP lands, other items on the mitigation menu, provided herbicide does not degrade CRP habitat, managed wetlands, on-farm irrigation water resources not connected to adjacent water bodies.

[3]Windbreak or shelterbelt for 100% reduction with ground application must: run the full length of the treated area with no significant breaks; be sufficiently dense such that the non-managed area is not visible at the time of application; be planted according to conservation program standards and not include federal noxious species

[4]Windbreak of shelterbelt for 50% reduction with aerial application must: meet criteria for ground application plus: trees must be the same height or above the release height of the application; have a minimum of 1 row of trees/shrubs or a 4 ft wide strip of non-woody vegetation. A semi-permeable manmade structure can also be used.

Windbreak or shelterbelt for 75% reduction must: meet criteria for ground application plus: be at least twice as high as the release height of the application; have a minimum of 2 rows of trees/shrubs or at least 8 ft of non-woody vegetation.

[5]Runoff mitigation is not required if the field has: a perimeter berm system, an irrigation tailwater return system, subsurface or tile drains with a water control structure and controlled outlet; or if the application is: an injection, applied subsurface or under plastic mulch, a spot treatment, less than 1/10 of an acre; or if all areas within 1,000 ft down-slope are managed.
[6]Points assigned to various mitigation options are listed in Table 2. The number of points required will vary for each herbicide.

Table 1. Summary of Runoff/erosion mitigation measures and associated points. Applicators will be required to document how needed points are accrued for each application.

Mitigation Measures	Points
County-based mitigation relief[7]	0 – high vulnerability 2 – medium vulnerability 3 – low vulnerability 6 – very low vulnerability
Field characteristics	
Slope $\leq$ 3%	Mitigation not required
Sandy soils	Mitigation not required
Farm management practices	
Tracking mitigation practices	1
Follow recommendation from a runoff/erosion specialist[8] or Participate in a qualifying conservation program	1 or 2
Application parameters	
Use an annual application lower than the maximum (but at least the minimum labeled rate)	1 – 10 to 29% reduction 2 – 30 to 59% reduction 3 – $\geq$60% reduction
Reduce the treated portion of the field	2 – 10 to 29% reduction 3 – 30 to 59% reduction 4 – $\geq$60% reduction
Soil incorporation (if not recommended on the label)	1
Measures applied in-field	
Conservation tillage	2 – Reduced till 3 – No till
Contour farming	2

Vegetative strips	2
Terraces	2
Cover crops/ground cover	1 – with tillage 2 – short term, no tillage 3 – long term, no tillage
Erosion barriers	2
Irrigation management	2 to 3
Measures applied adjacent to the field	
Grass waterway	2
Vegetative filter strips	1 – 20 to 29 ft wide 2 – 30 to 59 ft wide 3 – ≥60 ft wide
Vegetated ditch	1
Riparian area	1 – 20 to 29 ft wide 2 – 30 to 59 ft wide 3 – ≥60 ft wide
Wetlands	3
Habitat improvement area	1 – 20 to 29 ft wide 2 – 30 to 59 ft wide 3 – ≥60 ft wide
Filtering devices	1 or 3
Water retention systems	2
Subsurface drainage	1
One point is earned for using measures from more than one of: in-field measures, field-adjacent measures, water retention measures	

[7]County-based mitigation relief points for Kansas counties are listed in Table 3. National information is available online in a list or map format.

[8]A runoff/erosion specialist is someone who has technical training, education, and/or experience in an agricultural discipline, water or soil conservation, or another relevant discipline that provides training and practice in the area of runoff or erosion mitigation and participates in continued education or training in those areas and has experience advising on conservation measures listed on the EPA's mitigation website. Includes NRCS staff, Certified TSPs CCAs, CPAg, NAICC members, and Extension agents

Table 3. Runoff and erosion mitigation points assigned to Kansas counties based on runoff/erosion vulnerability.

County	Points	County	Points	County	Points

Allen	0	Hamilton	3	Pottawatomie	0
Anderson	0	Harper	2	Pratt	2
Atchison	0	Harvey	0	Rawlins	3
Barber	2	Haskell	3	Reno	2
Barton	2	Hodgeman	2	Republic	2
Bourbon	0	Jackson	0	Rice	2
Brown	0	Jefferson	0	Riley	0
Butler	0	Jewell	2	Rooks	2
Chase	0	Johnson	0	Rush	2
Chautauqua	0	Kearny	3	Russell	2
Cherokee	0	Kingman	2	Saline	2
Cheyenne	3	Kiowa	2	Scott	3
Clark	3	Labette	0	Sedgwick	0
Clay	0	Lane	3	Seward	3
Cloud	2	Leavenworth	0	Shawnee	0
Coffey	0	Lincoln	2	Sheridan	3
Comanche	2	Linn	0	Sherman	3
Cowley	0	Logan	3	Smith	2
Crawford	0	Lyon	0	Stafford	2
Decatur	2	Marion	0	Stanton	3
Dickinson	0	Marshall	0	Stevens	3
Doniphan	0	McPherson	0	Sumner	0
Douglas	0	Meade	3	Thomas	3
Edwards	2	Miami	0	Trego	2
Elk	0	Mitchell	2	Wabaunsee	0
Ellis	2	Montgomery	0	Wallace	3
Ellsworth	2	Morris	0	Washington	0
Finney	3	Morton	3	Wichita	3
Ford	3	Nemaha	0	Wilson	0
Franklin	0	Neosho	0	Woodson	0
Geary	0	Ness	3	Wyandotte	0
Gove	3	Norton	3		
Graham	3	Osage	0		
Grant	3	Osborne	2		
Gray	2	Ottawa	2		
Greeley	3	Pawnee	2		
Greenwood	0	Phillips	2		

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3. K-State launches site to make crop performance data more quickly available to farmers

Kansas State University agronomists have tapped the powerful world of digital technology to make more than four decades worth of crop information almost instantly available to farmers via their phones or home computers.

Cropping systems agronomist Ignacio Ciampitti and the director for research for the Institute of Digital Agriculture and Advanced Analytics (ID3A), says this new site means that yield and other valuable information may now be available within hours of university researchers harvesting crops from Kansas fields. Farmers decide what hybrids to plant the following year during or right after this year's harvest. A problem we've had in the past is that the results of K-State's crop performance tests have not been made available for two or three months until data was processed and all publications were printed. There was a need to transform how the data was shared so that the information is available immediately, easier for farmers to digest, and more visual.

The Kansas State University Institute of Digital Agriculture and Advanced Analytics, integrated with Dr. Ciampitti's research lab (led by Pedro Cisdeli), has created a website called Analysis and Visualization of Crop Yield Trials – or **AVYield** – that will pack 40 years of K-State crop performance tests and other information into easy-to-read formats for farmers. **The online tool is located at https://www.avyield.com.**

Jane Lingenfelser, an assistant agronomist and coordinator of the university's crop performance tests each year, said she routinely advises producers to research as many data sources as possible when making decisions on crop varieties to plant. But we haven't provided the tools for them to do that fully until now. There's no cost or risk to researching all production options. Using this new tool, switching between crops in a specific growing location is very easy. For example, it is possible to immediately see how canola performed overall and which hybrid performed the best in south central Kansas, without devoting the land or expense to a new enterprise.

K-State's database makes more than 40 years of data available for most crops – including canola, corn, sorghum, soybean, sunflower, and wheat. With a few on-screen clicks, farmers can find information based on variety, rainfed versus irrigated production, and geographic location within the state. This online resource is available at no cost to producers and researchers.

This website can serve as a resource for such 'big picture' issues as water and irrigation rights, climate trends, agriculture insurance policies, development and degradation of disease and insect resistance traits, and more. At the same time, it's more timely and still the unbiased information that K-State has provided for counties across the state.

K-State canola breeder Mike Stamm has also made available the results of the National Winter Canola Variety trials, which his program coordinates at 30 locations in the United States. The collection dates back to the mid-1990s. "We live in an information-rich society, and we are used to having the information immediately available," Stamm said. "Sometimes, some of the most important work we do is not readily available because it takes time to analyze, write, review, and publish. We still need to publish our results, to show progress in our programs…but easier and more immediate access to the results will drive impact on our farms."

Kansas Corn provided funding to build AVYield, in collaboration with the Institute of Digital Agriculture and Advanced Analytics, which was introduced in late September during Celebrate Ag

Day at K-State's home football game against Oklahoma State.

"We are one of the first groups in the country to introduce these types of tools," Ciampitti said. "The beauty of it is that much of the research information we produce related to crop production doesn't take too long to get to farmers. Now, they can make their final decisions on planting crops based on information and visualization coming from this tool."

Editor's note: This article is slightly modified from a news release written by Pat Melgares of K-State Research and Extension. The full news release is available at https://ksre-learn.com/crop-yield-analysis-tool.

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4. New wheat x triticale hybrid confirmed in Kansas

A new hybrid plant has emerged in Kansas wheat fields. Through genetic and cytogenetic testing, it was determined to be a hybrid derived from wheat and triticale. This hybrid was confirmed in three locations in Kansas this year.

The mysterious hybrid was observed by Kansas Crop Improvement Association (KCIA) inspectors in Dickinson County (Fig. 1A) and Marion County (Fig. 1B). In addition, a producer from south-central Kansas also found the same hybrid (Fig. 1C).

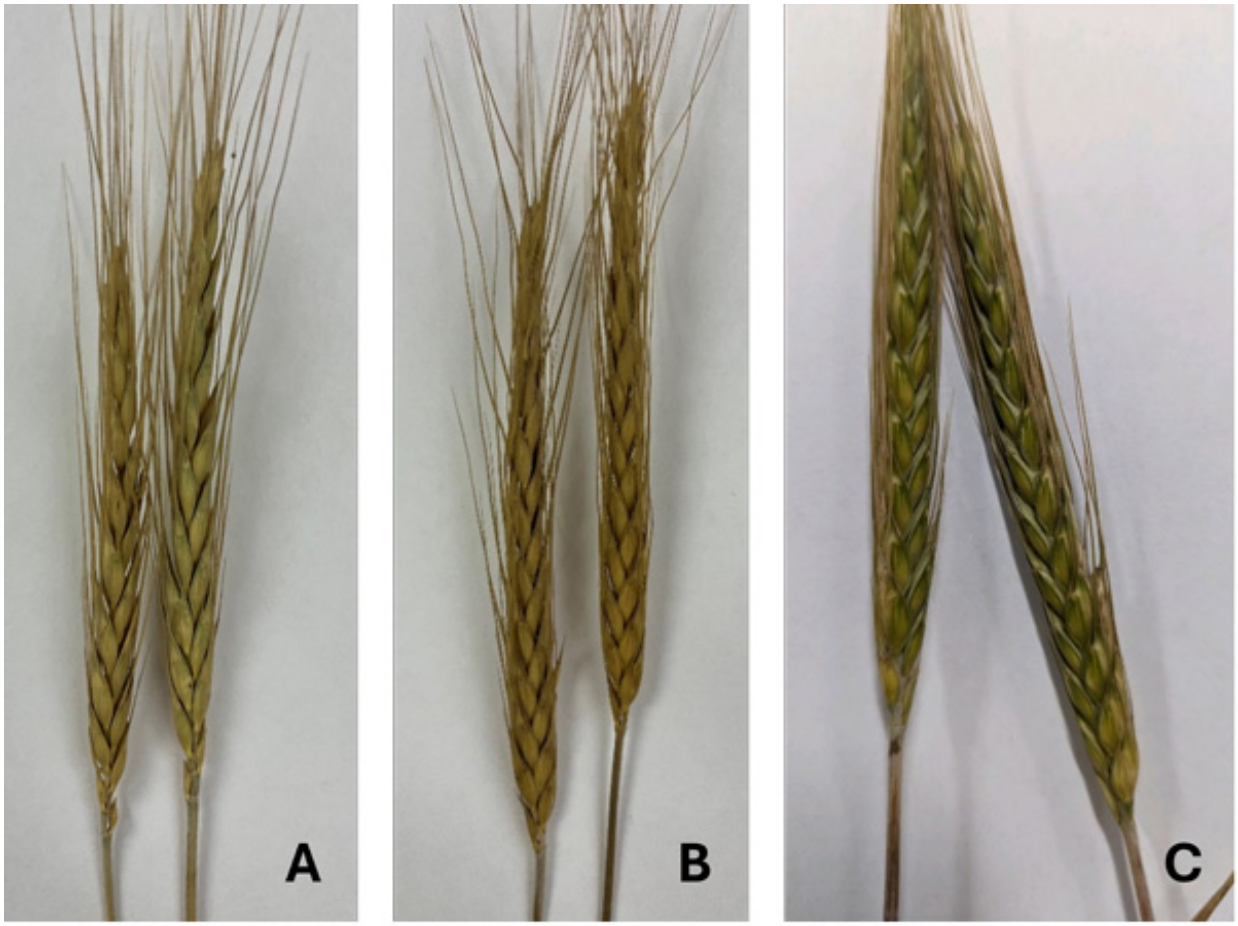

Figure 1. A) Dried spike samples from Dickinson County; B) Dried spike samples from Marion County; C) Green spike samples from a producer in south central Kansas.

Samples from all three locations were sent to the National Agricultural Genotyping Center (NAGC) in North Dakota. The NAGC targeted both the *rbcL* gene and the ITS2 region in their DNA tests of the stem material. They confirmed all three samples were identical. The NAGC used the NCBI public database and searched for a match using the BLAST algorithm. Based on the database results, they reported that the ITS2 region suggested the samples contained nuclear genomes of *Secale* and a

Triticum species.

The Wheat Genetic Resource Center (WGRC) at Kansas State University provided further testing through a cytogenetic analysis of the seeds produced by the hybrid. Cytogenetics is a branch of genetics that involves the study of chromosomes. The cytogenetic analysis determined that the hybrid plant had 48 chromosomes: 41 wheat and 7 rye (Figure 2). The rye chromosomes were labeled with red color and wheat chromosomes were stained with blue color. The result indicated that the hybrid plant is likely derived from natural hybridization between hexaploid wheat (AABBDD) and octoploid triticale (AABBDDRR).

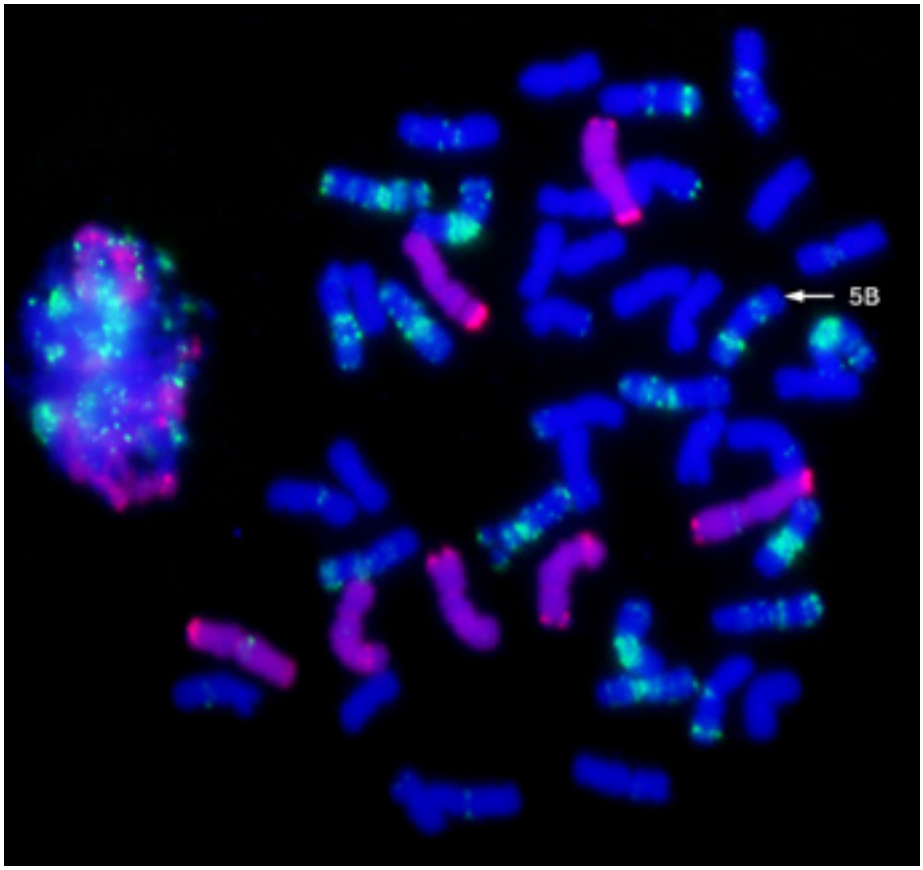

Figure 2. Cytogenetic characterization of wheat-triticale hybrid. Rye chromosomes were painted in red and wheat chromosomes were stained with blue. GAA-FISH revealed the presence of only one 5B chromosome (arrow).

The samples KCIA gathered were collected while the spikes were still green and immature. An average of twenty sample spikes shows that each spike has approximately sixteen spikelets. However, most spikes have no seed fill. The samples tested by KCIA had between 0-3 seeds per spike. The KCIA seed lab performed a germination test with ten seeds. Six of the ten planted seeds produced healthy seedlings under normal wheat germination conditions (Figure 3).

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Figure 3. KCIA germination test showing 60% viable hybrid.

In summary, the mystery plant found in Kansas wheat fields has been identified as a wheat x triticale hybrid. To my knowledge, this is the first time this specific hybrid has been found and identified. Over the course of my investigations, I grew tired of referring to it as "the wheat x triticale hybrid," so I've informally started calling it "quadrotriticale" because it has both the *Secale* and *Triticum* species and to distinguish it from commercial triticale.

While the "quadrotriticale" has an overall low fertility, it may show up more in areas where a lot of triticale cover crops are being used. In addition, it may also appear if a farmer saves seed from a wheat field that was grown next to a triticale field. The "quadrotriticale" plants were discovered due to the careful field inspection procedures required for Certified seed production. The "quadrotiticale" plants found by KCIA inspectors grew a little taller than the wheat, making them easy to spot. Like its parents, the hybrid is a bunch-type plant that can be pulled easily if it is found in any production field. Now that this hybrid has been identified, KCIA growers can easily locate it and rogue it out of

their Certified seed fields. KCIA's excellent seed growers and our superior Certified seed standards are more than up to the task of dealing with this new hybrid and continuing to produce high-quality wheat seed.

Acknowledgments

- The cytogenetic analysis was done by WGRC at KSU. Thank you to Dr. Dal-Hoe Koo.
- The DNA sequencing was done by NAGC, ND. Thank you to Megan O'Neil and Zack Bateson.
- The seed germination test was done by KCIA Seed Lab. Thank you to Rayshell Colson.
- Thanks to Dr. Allan Fritz for his overall assistance with this project and help networking.

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Temperature summary

Temperatures began the period above normal, continuing a stretch of warmth that began on the 17th. Highs on the 24th across the Kansas Mesonet averaged 86°, the first of three days during the period in which statewide average highs were at least 20 degrees above normal. There was a brief cooldown with near-normal temperatures on the 25th and 26th. About half of the Mesonet sites recorded a freeze on the morning of the 26th, with the Osborne County site the coldest at 26°. The 26th was the first below-normal day in 10 days, but the cooler conditions were short-lived, as warmer temperatures returned on the 27th and lasted through the end of the period. Highs on the 28th and 29th averaged in the mid-80s. Over 75 new daily record highs were set during the week, including at Liberal (93°), El Dorado (92°), and Coldwater (91°) on the 24th. Ashland (94°, 97°) and Topeka (92°, 86°) both set daily records on the 24th and 28th, as did Wichita (93°, 90°), where the latter now stands as the latest 90-degree reading in the fall, besting the previous latest of October 26th, 2014. In addition, over 50 record-high minimum temperatures were set on the 29th or 30th as strong southerly winds kept overnight lows at unseasonably warm levels.

The statewide average low on the 29th was 62°, and a few locations failed to fall below 70°, resulting in new records for the latest fall 70-degree low temperature at Topeka (72°, the old record for the latest was Oct. 24), Chanute (71°, Oct. 26) and Emporia (71°, Oct. 17). The 69° lows at Concordia, Salina, and Wichita were also new marks for warmest so late into the fall season. Normal lows at these three locations are 38°, 39°, and 42°, respectively. The statewide 7-day average temperature was 60.3° or 8.5° above normal (Figure 1). All nine divisions were well above normal; divisional departures ranged from +7.4° in northwest to +10.7° in southeast Kansas. The average temperature this month through the 29th is 62.5°, or 6.1° above normal. If the average remains at this value at month's end, it will be the 4th warmest October on record and the warmest October in Kansas since 1963.

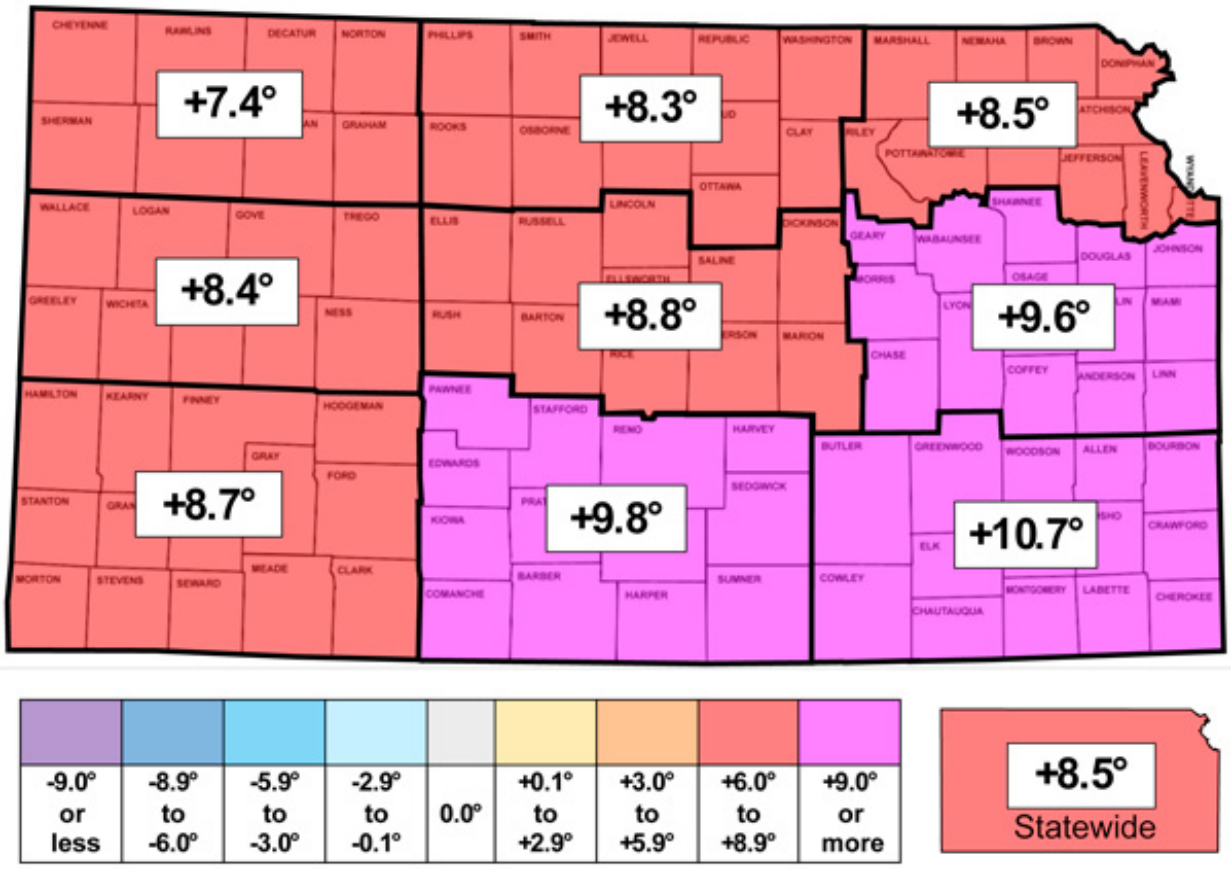
Precipitation summary

The main precipitation event during the period impacted eastern and south central Kansas on the evening of the 24th. A line of storms rapidly formed before sunset and tracked east across these areas, exiting the state shortly after midnight. Some of the storms were severe; there were twelve reports of severe wind gusts of 58 mph or greater, the highest of which was 71 mph in Atchison County south of Lancaster. Four reports of 1" diameter hail were also received from Atchison, Jefferson, and Pottawatomie Counties. CoCoRaHS observers measured rainfall totals of over one inch in four counties: Shawnee, Jefferson, Leavenworth, and Atchison. The highest total was 1.60" south-southwest of Leavenworth. Topeka's official total was 1.39", their highest 1-day amount since July 4th. Parts of Harvey and Cowley Counties picked up between one-half and three-quarters of an inch of rainfall. In between the two, Wichita-Eisenhower only managed 0.10" from the storms, an example of the variation in intensity of the storms within the line. In western Kansas, it was another dry week for most areas, with no precipitation noted in Dodge City, Garden City, and Colby.

The statewide average precipitation for the 7-day period was just 0.08", or 17% of the normal weekly amount of 0.48" (Figure 1). All divisions were below normal, with four divisions averaging zero: northwest, north central, west central, and southwest, with just 0.01" in central Kansas. Northeast (0.27") and east central (0.25") were the two wettest divisions. The average precipitation for October is 0.35", which would be the 4th driest October on record and the driest since 1995 should this amount end up as the monthly statewide average. The forecast suggests this is very unlikely, with

precipitation expected before the end of the month.

Since April 1, the average precipitation across Kansas is 18.76", or 77% of the normal amount of 23.95", a departure of -5.66". Southeast Kansas is the division with the largest departure from normal (-7.33"), followed by central (-6.93") and north central (-6.65") Kansas. Divisional percents of normal range from 71% in central and north central Kansas to 93% in southwest Kansas. A total of 87% of the state is running below normal for the growing season. Since January 1st, the average statewide precipitation is 22.03". This amount is 78% of normal or a departure of -6.14". All divisions remain below normal for the year; departures from normal range from -7.86" in southeast to -1.61" in southwest Kansas. A total of 87% of the state is below normal for the year.



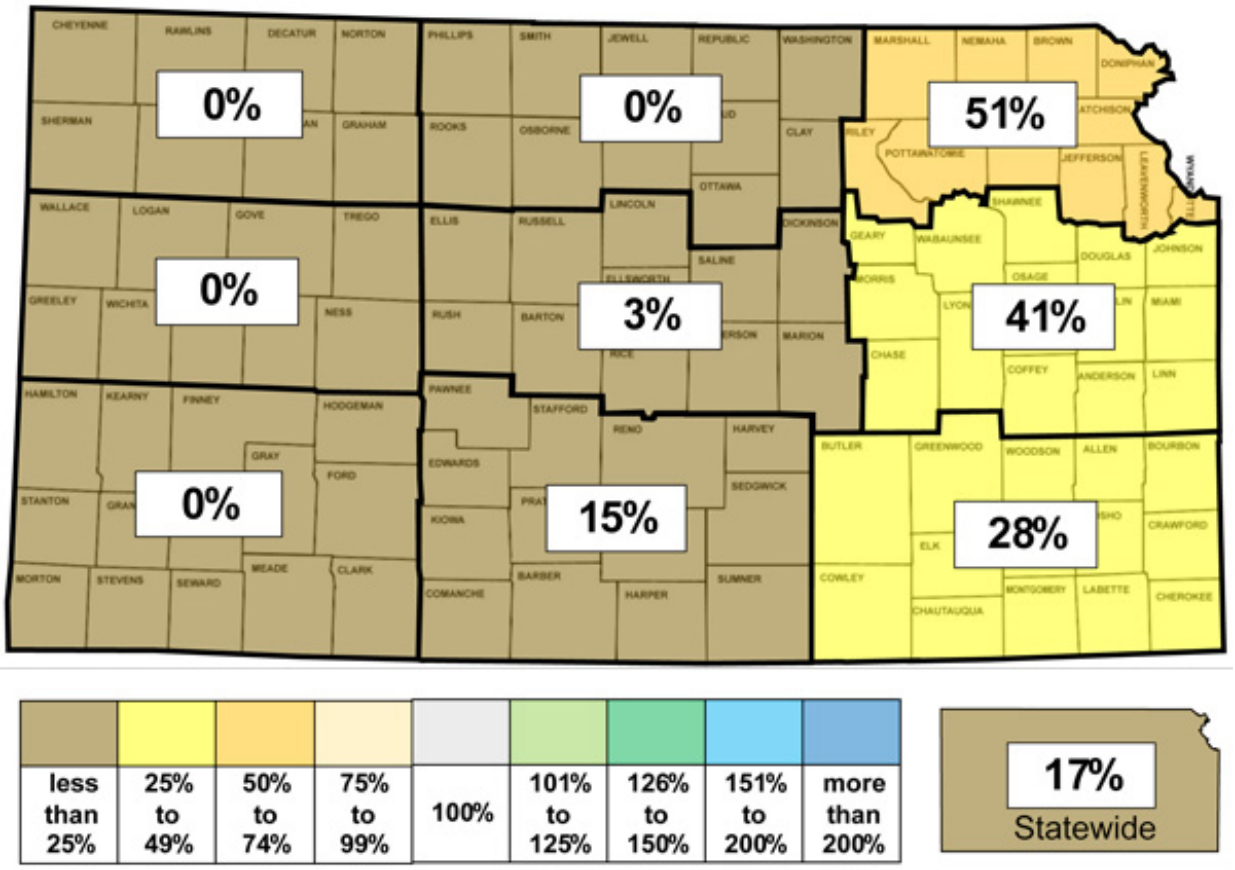


Figure 1. This week's departure from normal temperature (°F, top) and percent of normal precipitation (bottom) by Kansas climate division. Source: MRCC.

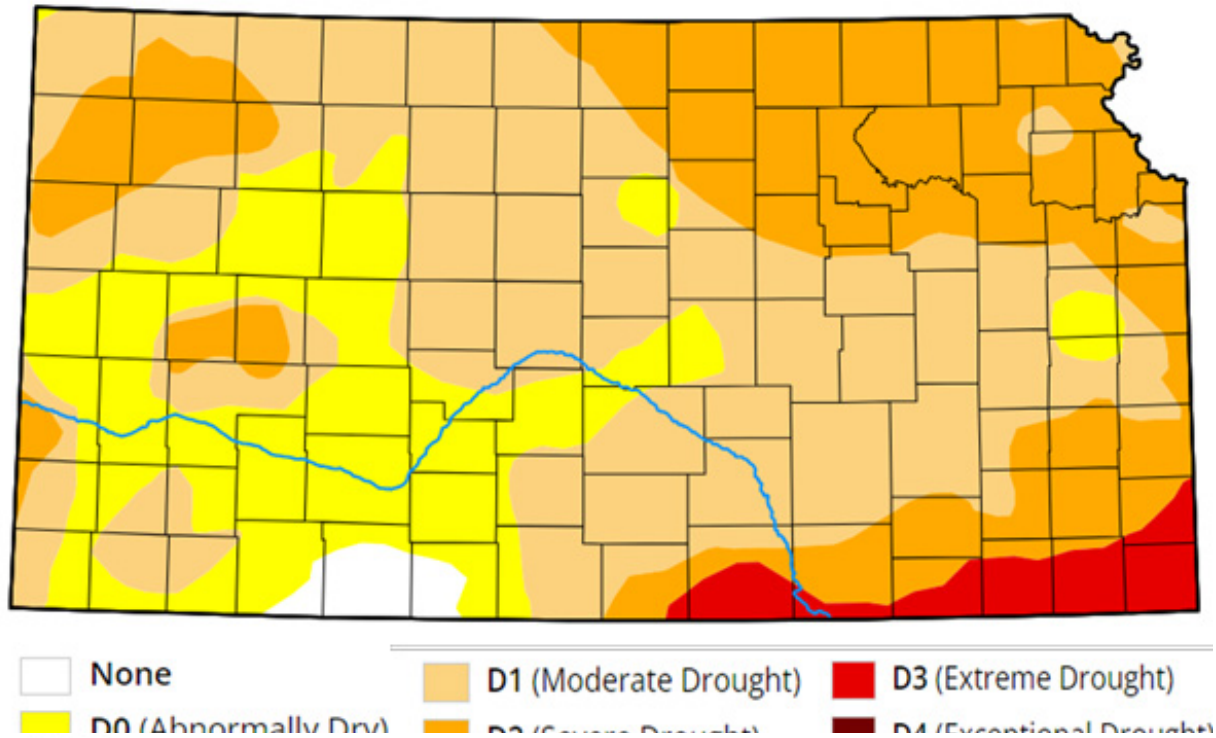
Growing degree days, evapotranspiration, and soil temperatures

There was an average of 101 growing degree days across the state this past week, or 43 above the normal amount of 58. Divisional totals ranged from 84 in northwest to 114 in southeast Kansas. Departures ranged from +32 in northwest to +51 in northeast and southeast Kansas. Since April 1st, there has been an average of 4,091 growing degree days in Kansas or 244 above normal. There was an average of 4 corn stress degree days across the state this past week; normal is zero, as temperatures above 86° are uncommon this late in the fall. The average evapotranspiration for grass across the state for the week was 1.04". This is much above the normal of 0.61" for the 7-day period. Divisional averages ranged from 0.85" in northwest to 1.22" in south central Kansas. The statewide average 2" soil temperature across the Kansas Mesonet fell 0.7° this week to 60.4°. This average is 4.9° above the normal of 55.5° for the 7-day period.

Drought update

In this week's US Drought Monitor update, there were once again no areas of improvement made anywhere in the state (Figure 2). The predominantly dry week across the state was reflected in numerous but small areas of one-category degradations added around the state. Communities

within the areas of degradation include Fort Scott, Wellington, Marysville, Scott City, and Elkhart. The area of D3 along the Oklahoma and Missouri borders was expanded further north and west and has nearly doubled in size since last week, now encompassing 3.9% of the state. Just 1.6% of the state remains free of any drought status. 32% of the state is in D2 or worse status, up 6% since last week. The statewide Drought Severity and Coverage Index (DSCI) rose for the fifth consecutive week. The DSCI increased by 9 points and now stands at 211, the highest DSCI since late October of 2023.



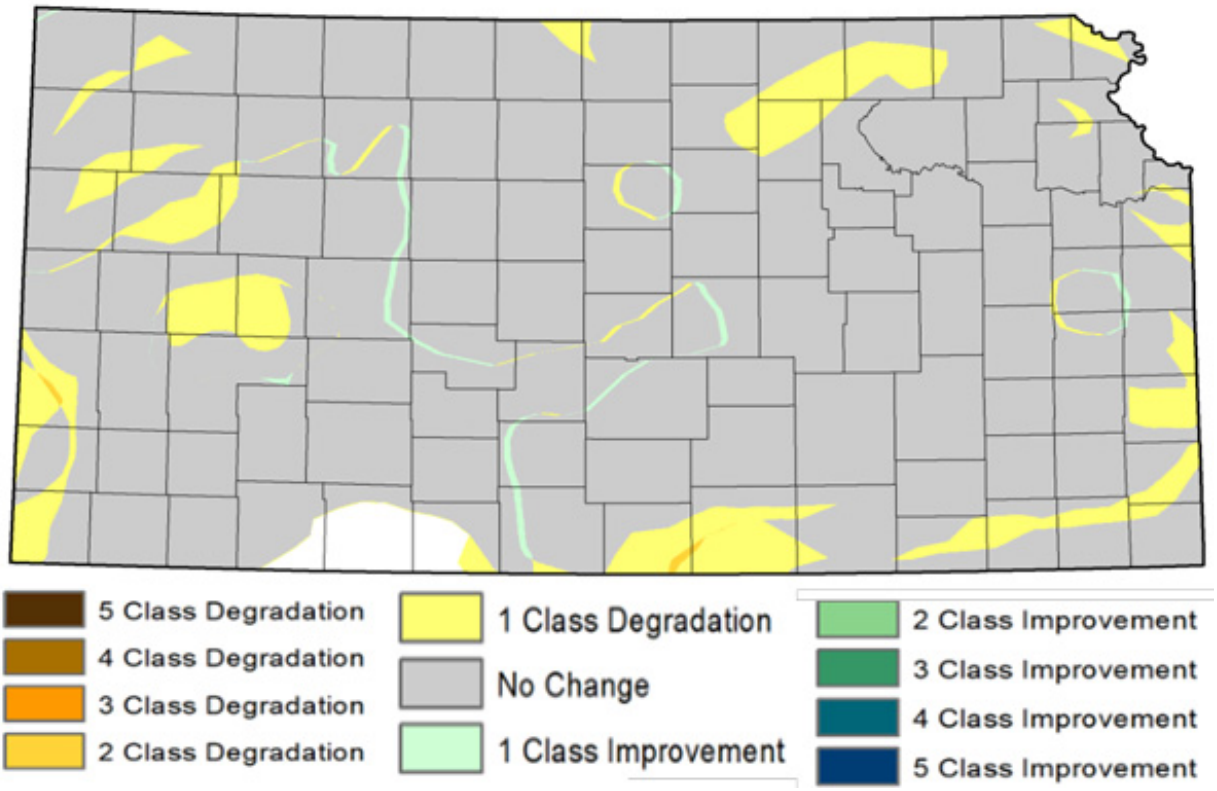


Figure 2. Current weekly drought status (top) and change in drought category over the past week (bottom). Source: UNL Drought Monitor.

Weather outlooks

The Weather Prediction Center's 7-day precipitation forecast, valid for October 30 through November 5, forecasts precipitation for all of Kansas, with above-normal precipitation expected in all but western Kansas (Figure 3). In the state's eastern half, heavy rain of 2 inches or more is forecast. More than 5 inches of rain is possible south and east of a line from Atchison to Topeka to Wichita. An event of this magnitude is rare, particularly this time of year. It has been 26 years in Wichita since a 7-day event exceeding 5 inches occurred entirely or partly within November. It last happened in 1998 when 8.74" of precipitation fell between October 28th and November 3rd. The same event brought 5.71" of rain to Topeka, and an average of 4.13" fell across Kansas. This led to November 1998 ending up as the 2nd wettest November in Kansas, behind only 1909. By comparison, the average precipitation across Kansas for November averages just 1.30", with southeast Kansas the wettest division on average at 2.33". Thus, the forecast weekly amounts could be two to three times the monthly average. Temperatures during the forecast period are expected to remain very mild, averaging from 5 to 10 degrees above normal. The average daily high and low across Kansas for this period are 62° and 36°. Average 7-day precipitation is 0.24" in western Kansas, 0.36" in central Kansas, and 0.57" in eastern Kansas.

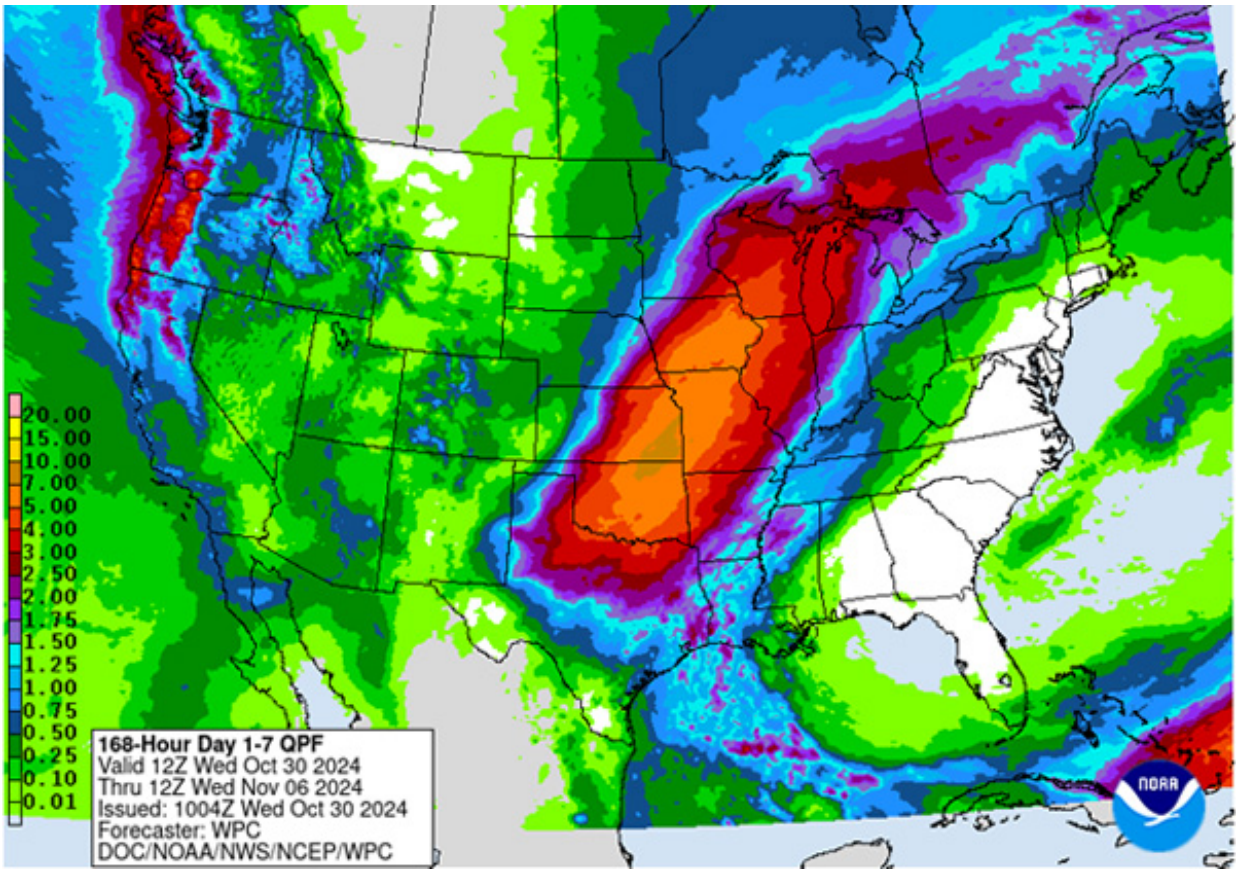


Figure 3. The National Weather Service Weather Prediction Center's (NWS-WPC) 7-day precipitation forecast (Oct. 30 – Nov. 6, 2024).

The 8 to 14-day outlook, valid for the period November 6th through the 12th, slightly favors above-normal temperatures in the east and central areas, with near-normal temperatures favored in the southwest (Figure 4). The maximum probability for above-normal temperatures is 40% in far northeastern Kansas. Above normal precipitation is favored in all areas, with probabilities ranging from 38% in the northwest to 45% in the southeast.

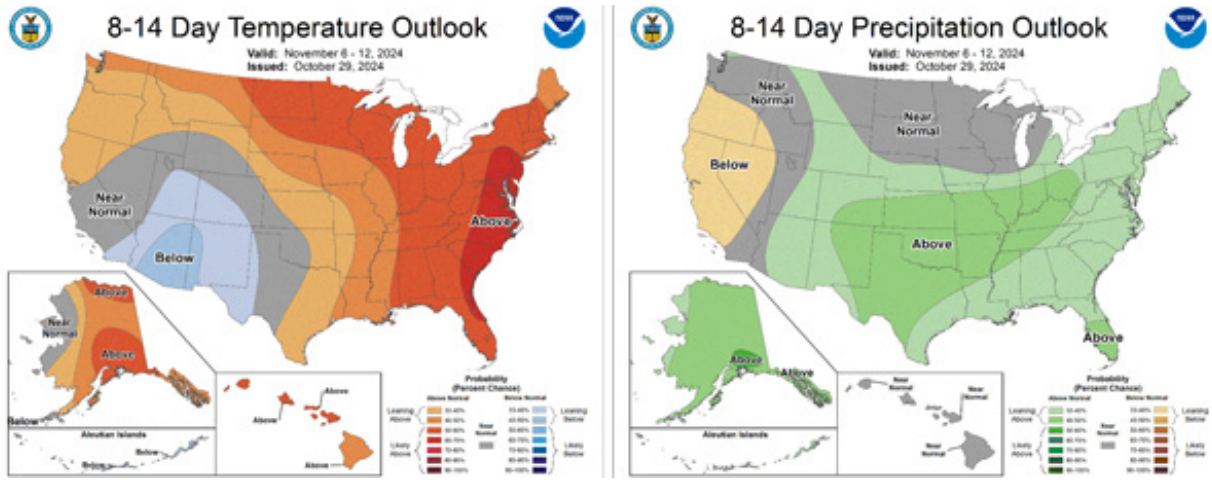


Figure 4.The National Weather Service Climate Prediction Center's (NWS-CPC) 8 to 14-day temperature (left) and precipitation (right) outlooks.

Looking even further ahead, the Climate Prediction Center's weeks 3 and 4 outlook (Figure 5), valid for the 14-day period from November 9th through the 22nd, slightly favors above-normal temperatures (50-55% probability) in the far southwest, with equal chances of above-normal and below-normal temperatures elsewhere. There are also equal chances of above-normal and below-normal precipitation forecast for the entire state.

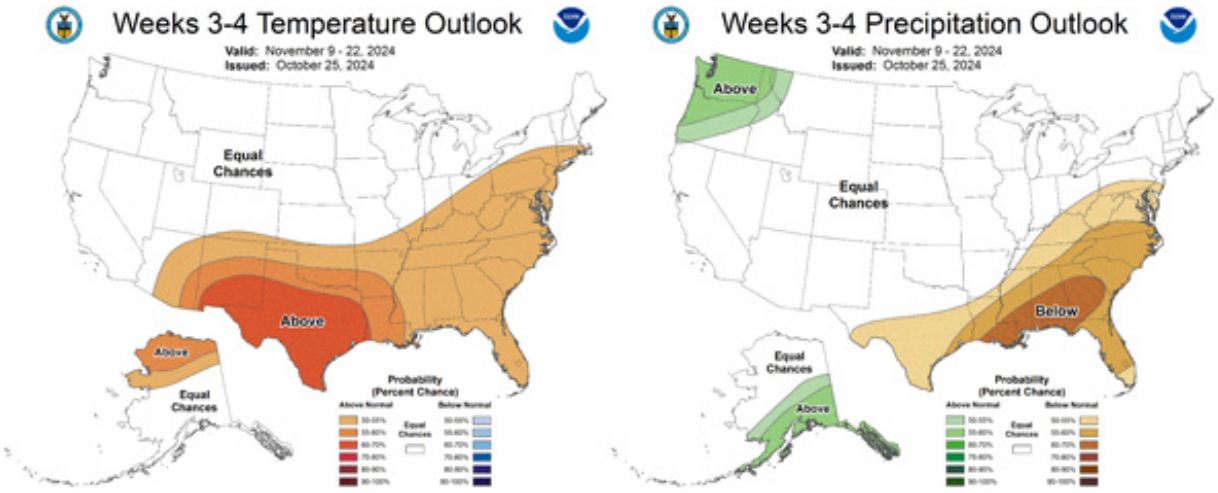


Figure 5.The Climate Prediction Center's weeks 3 and 4 outlooks for temperature (left) and precipitation (right).

This article is a shortened version of the weekly Kansas Drought Update and Climate Report**.** If you would like to receive the full report delivered to your email each week, please send a request to Matt at msittel@ksu.edu. He will add you to his distribution list.

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msittel@ksu.edu

6. Registration is open for the K-State/KARA Crop Production Update on Dec. 4-5

Don't miss out on the 2024 Crop Production Update, hosted by the Kansas Agribusiness Retailers Association (KARA) and in cooperation with K-State Research and Extension. The two-day event is set for December 4 and 5 at the Bluemont Hotel, Manhattan, KS. There will be 13 CCA CEUs offered and 3 Commercial Applicator credits.

This training provides the latest research and technological advances in weed and insect control, fertilizer and chemical recommendations, crop production, water management, soil fertility, and more.

Speakers and Topics

December 4 – Wednesday

- Soil conservation and carbon intensity scores – Peter Tomlinson and Kathy Gehl
- Sustainable wheat value chain – Romulo Lollato
- Farm data layers and management zones – Gaurva Jha
- Crop diseases as biosecurity threats – Giovana Cruppe
- Recent advances in AI – Pascal Hitzler
- Wind erosion – DeAnn Presley
- Research update on disease management in wheat – Kelsey A. Onofre

December 5 – Thursday

- Biological products in crop production – Brian Arnall
- Cotton production in the High Plains – Logan Simon
- Irrigation management for main crops – Tina Sullivan
- Fertility management of row crops – Dorivar Ruiz Diaz
- Weed control in summer crops – Sarah Lancaster
- Variable rate technology in precision ag – Deepak Joshi

You can register for the conference by visiting https://www.ksagretailers.org/events-training/crop-production-update/. The cost breakdown is available by clicking on the registration button.

Romulo Lollato – Wheat and Forages Specialist
lollato@ksu.edu

Clay Fagan, Kansas Agribusiness Retailers Association – Director of Member Investment and Training
clay@kansasag.org

2024 KARA Crop Production Update

Kansas Agribusiness Retailers Association
K-State Research and Extension

9:20 a.m. – 4:40 p.m. December 4 and
8:30 a.m. – 2:50 p.m. December 5
Bluemont Hotel, 1212 Bluemont Ave., Manhattan, KS

Topics

- Conservation and carbon intensity scores
- Sustainable wheat value chains
- Farm data layers and management zones
- Crop diseases as biosecurity threats
- Recent advances in AI in Agriculture
- Wind erosion
- Research update on wheat diseases
- Biological products in crop production
- Cotton production in the High Plains
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Register online at https://www.ksagretailers.org/events-training/crop-production-update/
For registration questions, please contact Clay Fagan at clay@kansasag.org or 785-234-0461.
Prices differ depending on membership status and program selected.

Coffee breaks and lunch are included with registration and will be provided both days.

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KARA
Kansas Agribusiness Retailers Association