Issue 854

K-STATE Research and Extension

Extension Agronomy

# eUpdate

*05/13/2021*

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. Possible causes for white heads in wheat

White heads have been appearing in many wheat fields around Kansas. Sometimes the white heads are just single tillers scattered throughout part or all of a field, and sometimes they occur in small-to-large patches. Heads might be completely white starting from the stem, or may just have a few spikelets showing the discoloration.

There are many causes of white heads. Here are some of the most common causes and their diagnosis.

**Freeze injury to stem or crown**. Depending on the stage of growth at the time of a late spring freeze, parts or all of the heads may die and turn white (Figure 1).

In years when the freeze occurs about the boot stage or a little earlier, there can be injury to the lower stem, which then cuts off water and nutrients to the developing head and that stem simply does not develop. In years when the wheat is in the early heading stage at the time of the freeze, the freeze can damage the heads directly.

Often, wheat on north-facing slopes, on ridge tops, or in low-lying areas will be most affected by freeze injury. But freeze injury can also be so severe that it occurs throughout the fields, in no particular pattern. Crown rot is another potential problem that can be traced back to freeze injury.

When the crown is damaged by cold temperatures or a freeze, part or all of the tillers can die. If the tiller from a damaged crown forms a head, this head will almost always be white. The crown will have internal browning, and stands will usually be thinner than normal.

**Figure 1. Freeze-damaged wheat heads. Photos taken by Romulo Lollato, Extension wheat specialist with Kansas State University.**

**Hail**. Hail can cause white head to appear when it breaks the connection between the stem and the head (Figure 2). Occasionally, hail can also damage just a portion of a head and cause that damaged portion to turn white. The hail impact to the heads may also remove spikelets and expose the rachis (Figure 3).

**Figure 2. Wheat field in Sumner county showing a high incidence of white heads due to hail damage. Photo taken May 22, 2019 by Romulo Lollato, K-State Research and Extension.**

**Figure 3. The heads in this photo have had a few spikelets removed due to hail impact and have their rachis exposed. Photo by Romulo Lollato, K-State Research and Extension.**

**Dryland root rot (also known as dryland foot rot)**. This disease, caused by the *Fusarium* fungus, causes white heads and often turns the base of the plants pinkish (Fig. 4). As with take-all, dryland root rot causes all the tillers on an infected plant to have white heads. This disease is usually most common under drought stress conditions, and is often mistaken for either drought stress or take-all.

**Figure 4. White wheat head caused by Fusarium root rot. Detail on the right shows pink discoloration inside the stem typical of the Fusarium pathogen. Photo by Romulo Lollato, K-State Research and Extension.**

**Head scab**. When there are periods of rainy weather while the wheat is flowering, as seen across most of Kansas this growing season, some heads may become infected with Fusarium head blight and turn white. The heads of some red-chaffed varieties turn a darker red when infected with scab, but the heads of most varieties turn white. Symptoms can be restricted to one or few spikelets in the head, but often times the upper half or the entire head might be affected (Figure 5). Head scab is most common where wheat is grown after corn, or after a wheat crop that had head scab the previous year. Head scab can be identified by looking for pink spores of the Fusarium fungi, as well as by a darker discoloration to the rachis of the wheat head. During the current growing season, head scab has been observed in south-central and southeast Kansas, but it is probably still early to see symptoms in central and north-central Kansas as it takes approximately three weeks from flowering

for the first symptoms to appear.

**Figure 5. Wheat heads affected by head scab or Fusarium head blight. Symptoms range from one or few spikelets that turned white, to the upper half or entirety of the head. Photo by Romulo Lollato, K-State Research and Extension.**

**Take-all**. This disease often causes patches of white heads scattered throughout the field. It occurs most frequently in continuous wheat, and where there is a moderate to high level of surface residue. Take-all is also favored by high pH soils, so a recently limed field might also show symptoms. To diagnose take-all, pull up a plant and scrape back the leaf sheaths at the base of a tiller. If the base of the tiller is shiny and either black or dark brown, it is take-all. All tillers on a plant infected with take-all will have white heads. Plants will pull up easily.

**Sharp eyespot**. This disease is common in Kansas, but rarely causes significant yield loss. Sharp eyespot causes lesions with light tan centers and dark brown margins on the lower stems. The ends of the lesions are typically pointed. If the stems are girdled by the fungus, the tiller may be stunted with a white head. Each tiller on a plant may be affected differently.

**Wheat stem maggot**. Wheat stem maggot damage is common every year in Kansas, but rarely results in significant yield loss. It usually causes a single white head on a tiller, scattered more or less randomly through part or all of a field. One typical symptom of white heads caused by wheat stem maggot is that the flag leaf and lower stem are often green, and only the last internode (peduncle) and head are white. If you can grab the head and pull the stem up easily just above the uppermost node, the tiller has probably been infested with wheat stem maggot. Scout for symptoms of chewing close to the base of the plants, which could indicate that the head has died as function of wheat stem maggot (Figure 6).

**Figure 6. White wheat head due to wheat stem maggot, characterized by a white head and peduncle but with a healthy and green lower stem. Detail on the right shows chewing of the base of the peduncle by the maggot. Photo by Romulo Lollato, K-State Research and Extension.**

**Premature dying** (drowning). As wheat begins to mature, plants in some areas of the field may have an off-white color similar to take-all (Figure 7). This premature dying could be due to drowning, hot dry winds, or some other stress. The pattern of discolored heads will often follow soil types or topography, and may occur in large patches. The grain will be shriveled and have low test weight.

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**Figure 7. Large patches of drowned wheat in central Kansas (upper photo) and south central Kansas (lower photo). Photos taken May 16 and 17, 2017, by Romulo Lollato, K-State Research and Extension.**

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## 2. 2021 Kansas wheat plot tours

After over a year of virtual events, the Department of Agronomy and K-State Research and Extension will host several face-to-face winter wheat variety plot tours in different regions of the state, starting May 10 and going into April. Make plans to attend a plot tour near you to see and learn about the newest available and upcoming wheat varieties, their agronomics, and disease reactions. A preliminary list of plot tour locations, dates, times, and directions is provided below. Stay tuned to the eUpdate in the coming weeks as this list is updated.

| Plot | Agent | Date | Time | Directions |
|---|---|---|---|---|
| Pratt Co | Jodi Drake | 5/13 | 5:30 PM | From Hwy's 281 and 54, travel West to 60th Ave, then turn right and go north 1 mile and the plot is on the west side of the road |
| Sumner Co | Randy Rein | 5/17 | 6:00 PM | Meal location — 922 West 140th Ave. North, Conway Springs. Plot location— From Conway Springs, go north to 140 Ave N, East 1 mile, South 1/8 mile, Plots on East side of road |
| Parsons | Gretchen Sassenrath | 5/19 | 8:30 AM | Parsons Research Station |
| Marion | Rickey Roberts | 5/21 | 8:00 AM | Hillsboro plot is located on Hwy 56 about two miles E of town on South side of road where the large grain holding facility was built |
| McPherson | Shad Marston | 5/21 | 11:00 AM | Patrick plot Marquette. North East side of intersection Marquette & Hwy 4 |
| McPherson | Shad Marston | 5/21 | 3:00 PM | Inman plot; 4th Ave and Cheyenne, quarter mile east. |
| McPherson | Shad Marston | 5/21 | 1:00 PM | Galle plot, Moundrige: 1/4 mile north of intersection 23rd Ave and Cheyenne |
| Marion | Rickey Roberts | 5/24 | 8:00 AM | The Tampa plot cooperator is John Hajek. Plot is located on 320th just East of Old Mill Rd intersection, North side of the road. |
| Lorraine | Craig Dinkel | 5/24 | 11:00 AM | From Lorraine, go south 1 mile on 10th road, then 3 miles west on avenue W. Plot is located on the intersection of Ave W & 7th road |
| Barton Co | Stacy Campbell | 5/25 | 8:30 AM | On the ground across from the Expo. Center on HWY. 56 west of Great Bend. |
| Ellis Co | Stacy Campbell | 5/25 | 6:00 PM | From I-70 take Victoria exit, go N. 2.5 miles on Cathedral Rd. turn W. onto Fairground Rd. go 1 mile, turn S. onto 330th Ave. about ¼ mile on E. side of road |
| Post Rock - Smith | Sandra Wick | 5/26 | 10:00 AM | 1/4 mile S of Smith Center right on Hwy. 281 on the west side of the highway. |
| Post Rock - Jewell | Sandra Wick | 5/26 | 10:30 AM | Off of highway 14 in Jewell then east on Hwy 28 to 230 Road (4 mi.), then north ¾ mi. on the east side of the road. |
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| Post Rock - Osborne | Sandra Wick | 5/26 | 1:30 PM | Off of highway 24, south on "Sale Barn Road" or 115th Avenue about ¼ mile on the west side. |
| Post Rock - Lincoln | Sandra Wick | 5/26 | 1:30 PM | ½ mile west of Barnard to 240th Road and then ½ mile north on the east side. |
| Post Rock - Mitchell | Sandra Wick | 5/26 | 4:30 PM | 10 miles south of Beloit on 14, 8 miles east on S road, plots are on the south side of the road |
| Riley | Greg McClure | 5/26 | 6:30 PM | 14401 Bodaville Rd, Randolph, Ks. From Randolph – 4.2 miles west on Green-Randolph Road, turn north on County Road 875 and continue for about 11 miles, then turn east on Bodaville Rd. The Fancy Creek Church is at the corner of Ober Road (875) and Bodaville Rd. The plot is ½ mile east on Bodaville Rd. |
| Walnut Creek - Rush | Chris Long | 5/27 | 8:00 AM | from LaCrosse, go 7 miles west on Hwy 4, then continue another 1 1/2 miles on Road L, on south side |
| Walnut Creek - Ness | Chris Long | 5/27 | 11:00 AM | from Ness City, go 7 miles south on Hwy 283 to 60 Rd, west 7 miles to L Rd, south 1 1/4 lines on east side |
| Walnut Creek - Lane | Chris Long | 5/27 | 5:00 PM | from Dighton, go west on 96 for about 7 miles, turn south, go 2 miles, turn west 1/4 mile, on south side of road |
| Mentor | Jay Wisbey | 5/28 | 8:30 AM | Mentor Location just West of Town (Mentor) on the Northside of the road. 38.74031909188133, -97.60479299765356 |
| Solomon | Jay Wisbey | 5/28 | 11:00 AM | Tom and Pat Ryan Plot: Take old 40 highway West of Solomon then south on N Gypsum Valley Road 2.5 Miles just over the river bridge on the East side of the road. |
| Minneapolis | Jay Wisbey | 5/28 | 2:30 PM | From Minneapolis, take 106 HWY south just past the Salt creek bridge and go west 2 miles to 90th road. North ¼ of a mile west of his irrigation circle. |
| Edwards Co | Marty Gleason | 6/1 | 12:00 PM | From Offerle, 9 1/2 miles north on 20th avenue. Plots are north of intersection with I road. |
| River Valley - Stunkle | Rebecca Zach | 6/1 | 3:30 PM | From Palmer, 5 miles south on Liberty road, then 5 1/2 miles east on Parallel/County Line road, plots on the south side of the intersection of County line Rd and Quivira Rd. |
| River Valley - Ohlde | Rebecca Zach | 6/1 | 5:30 PM | From Linn, go northeast about 3.5 miles on 15 until intersection with 9, turn west on 10th road for a mile until Prairie Rd., go north about 1/2 mile. Plots on the west side of the road. |
| Pawnee | Kyle Grant | 6/1 | 6:00 PM | From Larned go K-19 South to Zook Blacktop east 5 or 6 miles to 70 Ave than north 1 ¼ miles. |
| River Valley - | Rebecca Zach | 6/2 | 1:00 PM | 2 miles west of Belleville, on the north side of |

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| Belleville | | | | the road at the KSU experiment field. |
| River Valley - Peyton Frybarger | Rebecca Zach | 6/2 | 4:00 PM | 2330 Elm Road, Munden, KS |
| River Valley - Polansky | Rebecca Zach | 6/2 | 6:00 PM | 2 miles west of Belleville on 36, 1.25 miles south on 15. Plot is on the west side of the road. |
| Kingman | Kallie Turner | 6/3 | 9:00 AM | 7681 SW 80th Avenue, Kingman KS. Plot is on the north side. |
| Phillips-Rooks | Cody Miller | 6/3 | TBD | From Phillipsburg- Travel North on HWY 183 to E. Osage, Turn East and travel about 1/16 of a mile. Plot is on the South side of the road |
| Phillips-Rooks | Cody Miller | 6/3 | TBD | From Stockton- Travel North on HWY 183 to E. Road, Turn East and travel to 21 Road. The plot is on E. Road about ½ a mile East of 21 Road on the North Side of the Road. (If you get to Riffels mailbox you have gone too far.) |
| Abilene | Rickey Roberts | TBD | TBD | The third plot is with Steve Hoover. That plot is located on Hwy 15 N of Abilene at the intersection of Hwy 15 & 18. |
| Ford Co - Dodge City | Andrea Burns | TBD | TBD | Highway 50 Bypass & 116 Road Across from Koch Nitrogen Plant, Dodge City |
| Thomas Co | Emily Bennigsdorf | TBD | TBD | Solomon Creek Farms located 4 1/2 miles south of Levant/I-70 Interchange on County Road 11 |
| Sunflower | Jeanne Faulk Jones | TBD | TBD | TBD |
| Sunflower | Jeanne Faulk Jones | TBD | TBD | TBD |
| Sunflower | Jeanne Faulk Jones | TBD | TBD | TBD |
| Sunflower | Jeanne Faulk Jones | TBD | TBD | TBD |
| Twin Creeks | Keith VanSkike | TBD | TBD | From Dresden, KS travel South on 23 then at the #9 and 23 intersection go east on #9 to 2000th Road on the North side of the road. GPS: 39.568082, -100.36731 |
| Twin Creeks | Keith VanSkike | TBD | TBD | Travel on HWY 36 west of Oberlin, KS about 2.5 miles. GPS coordinates: 39.828330, -100.584228 |
| River Valley - LeClair | Rebecca Zach | NA | NA | From Clifton, 6 1/4 miles north on Eagle road, plots on the west side of the road north of 6th. |
| Barber Co (Isabel) | Justin Goodno | Virtual | Virtual | Intersection of Main St and Hwy 42 on Isabel. |
| Barber Co (Kiowa) | Justin Goodno | Virtual | Virtual | HYW 281 / HWY 2 intersection on the north side of Molz shop and grain bins. |
| Wild West District | Ron Honig | NA | NA | SE 17-31-34. Go 6 miles NE of Hugoton on Hwy 56 to Rd V (County RD 16), then east 12 miles to Rd B, then 5 miles north and then 1/2 mile |

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|---|---|---|---|---|
| | | | | east on field road. |

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## 3. Crop residue decomposition and nutrient release rates

Crop residue is often considered to be a valuable source of nutrients, especially when the residue is from a nitrogen-fixing legume. The nitrogen (N) and other nutrients released from plant residues can be available for use by subsequent crops. However, crop residue can also tie up nutrients – N, in particular – as it is decomposed by soil microorganisms.

**What is the carbon-to-nitrogen ratio?**

Before the N present in crop residue is available to a subsequent crop, the residue must be decomposed and the N mineralized, or converted to ammonium (an inorganic form of N that crops can use). How quickly crop residue decomposes depends on the residue's ratio of carbon to nitrogen (C:N). The C:N ratio can vary greatly between different crop residues (Table 1). This ratio is really a measure of the %N in the residue since the proportion of C in crop residues averages around 40%.

The C:N ratio of crops can change depending on the growth stage due to differences in the %N in the plant tissue. Information collected by Tom Roth, soil scientist with USDA-NRCS, showed a large difference the C:N ratio of cereal rye clipped in mid-March (~12:1) compared to termination in late April (~24:1). Decomposition will proceed more rapidly for crop residues that have smaller (more narrow) C:N ratios. Depending on the goal of your cover crop, a quicker rate of decomposition may not be desirable.

**Table 1. Typical C:N Ratios for Different Crop Residues and Organic Materials**

| **Crop Residue** | **C:N Ratio** |
|---|---|
| Alfalfa | 13:1 |
| Soybean | 15:1 |
| Corn | 60:1 |
| Wheat | 80:1 |
| Grain sorghum | 80:1 |
| **Cover Crops** | |
| Cereal rye at flower | 37:1 |
| Cereal rye early vegetative | 26:1 |
| Radish | 17:1 |
| Crimson clover | 18:1 |
| **Other Organic Materials** | |
| Microorganisms | 8:1 |
| Soil organic matter | 10:1 |
| Barnyard manure | 20:1 |
| Sawdust | 400:1 |

What determines how and when the N in crop residue, from either a cash crop or a cover crop will be released into the soil?

The C:N ratio of the residue is the key factor to look at when determining the timing of N tie-up and release from residue decomposition.

**Scenario 1 -** In residue a C:N ratio of less than 20:1, soil microorganisms have enough N available in the residue to do their work and residue decomposition proceeds quickly. In that case, organic N is mineralized or released, fairly quickly to the soil inorganic pool (plant available). Most residue with a C:N ratio of less than 20:1 is either a legume or young, lush vegetation, such as wheat prior to jointing.

**Scenario 2 -** With a C:N ratio above 25:1, N becomes a limiting factor for decomposition. The population of soil microorganisms needed to decompose the residue increases rapidly while consuming N from the soil in the process, if it is available. This uptake of available inorganic N to decompose the residue is called *immobilization*, or N tie-up. This is a temporary process, and some N may become available during the growing season depending on the residue. The higher the C:N ratio, the longer the N will be tied up. Corn or wheat residue will take longer to decompose as compared to soybean, alfalfa or other legume residues. When the available C or energy begins to run out, the population of soil organisms using the residue as energy will die back, releasing N back to the inorganic pool (mineralization).

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## 4. Kansas Ag-Climate Update for April 2021

The Kansas Ag-Climate Update is a joint effort between our climate and extension specialists. Every month the update includes a brief summary of that month, agronomic impacts, relevant maps and graphs, 1-month temperature and precipitation outlooks, monthly extremes, and notable highlights.

**April 2021: Cool, dry conditions challenge wheat in April**

April was much drier than normal. It ranked as the 23rd driest April since 1895. All divisions were drier than normal. As a percent of normal, the Southwest was the driest with 0.29 inches, 18 percent of normal. The East Central was the wettest at 3.06 inches, 86 percent of normal. This resulted in expanding drought conditions across the state.

Cooler than normal temperatures dominate April. The statewide average for April was 1.6 degrees cooler than normal, ranking it as the 37th coolest April of record. Not many individual records were set in either the maximum or minimum temperatures. There were 23 new record daily high maximums, and 13 new record high daily minimums. There were also 28 new record low maximums and 8 record low minimums. Severe weather season continued in April with the report of zero tornadoes, 22 hail events, and five damaging wind events. The most significant event during April was the extreme cold that occurred mid-month, coupled with snow (Figure 1).


**Figure 1. Snowfall in Colby, KS on April 17, 2021. Photo by Lucas Haag, K-State Research and Extension.**

View the entire April Ag-Climate Update, including the accompanying maps and graphics (not shown in this short article), at http://climate.k-state.edu/ag/updates/.

## 5. Spring Crops Field Day in Parsons on May 19

After months of hosting educational events virtually because of COVID-19, K-State Research and Extension will host its Spring Crops Field Day in person on Wednesday, May 19 at the Southeast Research and Extension Center, 25092 Ness Road in Parsons.

Registration is 8:30-9 a.m. for the program, which includes:

- Tour of Wheat Variety Plots (41 varieties) – Allan Fritz, K-State wheat breeder, Lonnie Mengarelli, K-State research assistant, and seed company representatives.
- Fusarium Head Blight Control: Timing and Formulation – Kelsey Andersen Onofre, K-State plant pathologist.
- Cover Crops, Soil Health, and Weed Control – Anita Dille, K-State weed ecologist.
- Pasture Fertility and Weed Control – Bruno Pedreira, K-State regional agronomist.

Numerous sponsors will have displays and representatives available to answer questions about products and services. A sack lunch will be served after the field tours.

In case of rain, the program will be held indoors. More information and advance registration is available by contacting the K-State Wildcat Extension District Altamont office at 620-784-5337 or the Southeast Research and Extension Center at 620-820-6131.

# Spring Crops Field Day

# MAY 19

**KSU Southeast Research and Extension Center**
**25092 Ness Road, Parsons, KS**

**Registration 8:30-9:00 a.m.**

## TOUR OF WHEAT VARIETY PLOTS (41 VARIETIES)

Dr. Allan Fritz, Wheat Breeder
Lonnie Mengarelli, Research Assistant, Southeast Res & Ext.
Seed Company Representatives

## FUSARIUM HEAD BLIGHT CONTROL: TIMING AND FORMULATION

Dr. Kelsey Andersen Onofre, Plant Pathologist

## COVER CROPS, SOIL HEALTH, AND WEED CONTROL

Dr. Anita Dille, Weed Ecologist

## PASTURE FERTILITY AND WEED CONTROL

Dr. Bruno Pedreira, Regional Agronomist

**IN CASE OF RAIN, THE PROGRAM WILL BE HELD INSIDE**

## Lunch provided by sponsors:

MID-WEST FERTILIZER
PRAIRIELAND PARTNERS
FRONTIER FARM CREDIT
BARTLETT COOP
McCune Coop
Producers Coop
Delange Seed
Beachner GRAIN, INC.
AgChoice Farm Credit
THOMAS
WHEAT ALLIANCE

**For more information or to register, please contact K-State Research and Extension Wildcat District Altamont Office at (620) 784-5337 or the KSU Southeast Research and Extension Center at (620) 820-6131**

K-STATE Research and Extension