Issue 788

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eUpdate

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These e-Updates are a regular weekly item from K-State Extension Agronomy and Kathy Gehl, Agronomy eUpdate Editor. All of the Research and Extension faculty in Agronomy will be involved as sources from time to time. If you have any questions or suggestions for topics you'd like to have us address in this weekly update, contact Kathy Gehl, 785-532-3354 kgehl@ksu.edu, or Dalas Peterson, Extension Agronomy State Leader and Weed Management Specialist 785-532-0405 dpeterso@ksu.edu.

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1. Fertilization of tall fescue and smooth bromegrass pastures and hayfields

Much of the nitrogen (N) applied to tall fescue and smooth bromegrass hay meadows and pastures goes on in January or February in eastern Kansas, but there is still time to apply it now even though temperatures late this winter have been warm and the cool season grasses are greening up rapidly. The amount and timing of N depends on whether the field is hayed or grazed; how much, if any N was applied in the fall; the price of N and hay; and the growing conditions since last fall.

Nitrogen fertilization for hay production

Normal N fertilization rates for established fescue and bromegrass hay fields are 90 to 120 pounds actual N per acre, or about 30 pounds of N per ton of expected yield. A summary of K-State N response data shows the average yields for unfertilized brome and fescue were about 1.4 tons of hay per acre, while maximum yields averaged 3.2 tons of hay with 140 pounds of N (Figure 1).

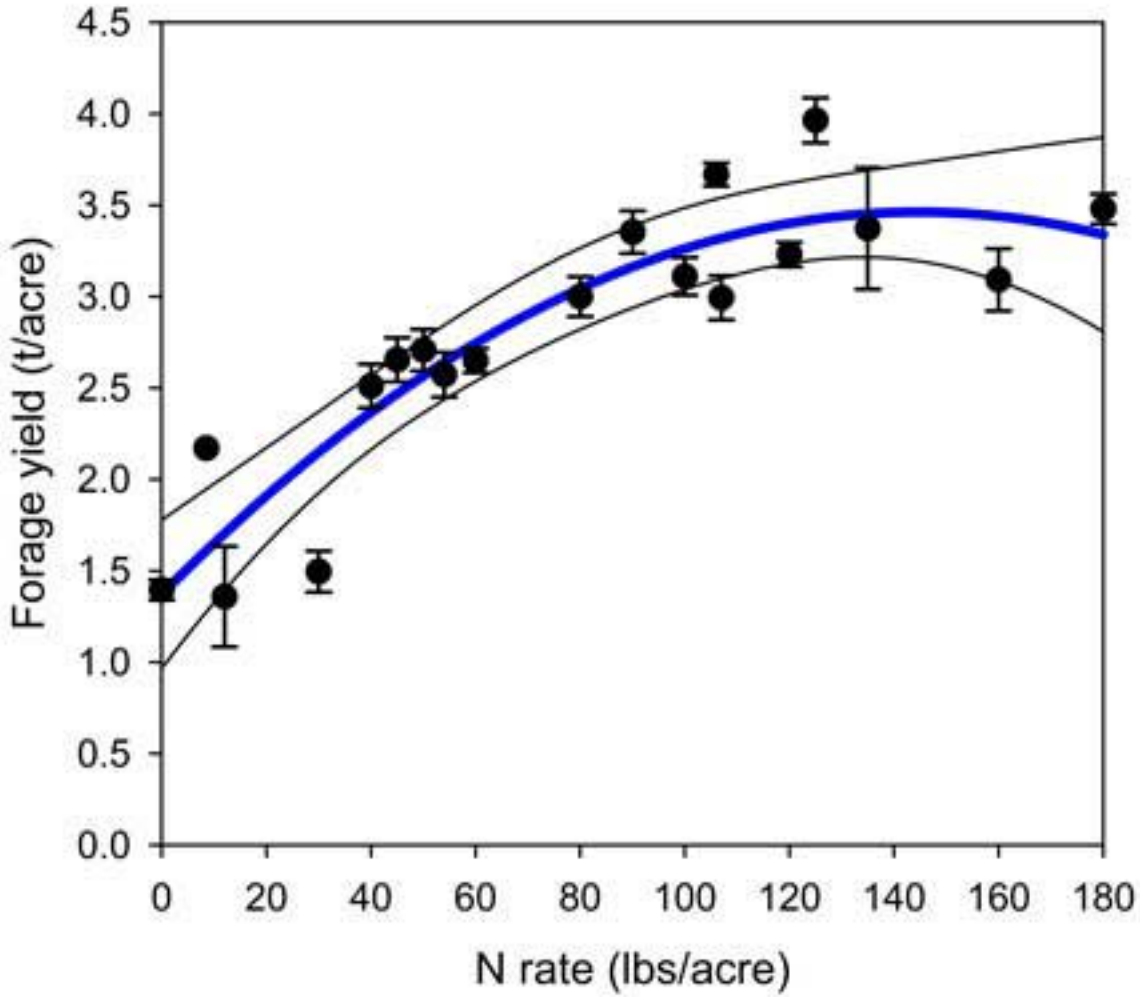

Figure 1. Forage response to nitrogen fertilizer application across multiple years in Kansas. Graph provided by Dorivar Ruiz Diaz, K-State Research and Extension.

Protein levels will also be increased at the higher N fertilizer rates, assuming timely harvest. In cases where producers are relying on high-quality hay as their primary protein source, they will want to push N rates to the upper end of the recommended range.

Timing of N application is another factor to consider. While most growers apply all the N and any needed P and K for hay production in a single application in the spring, research in Kansas has shown that applying all the fertilizer in the fall will normally result in slightly higher yields, though the protein values will normally be slightly lower. Prior K-State research indicates that smooth brome responded to spring applications as late as April without effects on tonnage of dry matter produced and significantly greater crude protein levels than fall applications. Fall applications of N and P stimulate root growth and produce more tiller buds, resulting in more stems the following spring.

Nitrogen fertilization for pastures

Under normal conditions, tall fescue and smooth bromegrass pastures that are grazed in both spring and fall should receive about 100 pounds total N per acre, with 60% applied in the winter or early spring and 40% of the N along with any needed P and K in late August or early September. So producers should plan on applying 60 to 70 lbs N per acre in late winter or early spring, starting as early as January in southeast Kansas or February in the central and northern parts of the state.

P and K fertilization

Both smooth bromegrass and fescue are efficient users of soil P and K. One of the reasons for this is the dense root system -- two to three times more roots per unit of soil volume than corn or soybeans. As a result, these crops can grow and thrive at lower soil test levels than other crops commonly grown in Kansas. But both smooth bromegrass and fescue do remove about 12 pounds of P_2O_5 and 40 pounds of K_2O per ton of hay, which will lower soil test values. Thus, these grasses will respond to P and K fertilization on soils with low or very low soil test levels. Recent work in northeast Kansas has shown response to applied P at soil test levels below 12-15 ppm. P and K application rates should be based on soil tests, as with most crops.

In any type of fertilizer management program for tall fescue and smooth bromegrass, whether for hay production or grazing, needed phosphorus and potash should be applied in the late summer or fall for best results, along with a light application of N. Research with smooth bromegrass and fescue production has shown that fall applications of N and P, while these cool-season grasses are still actively growing, will help the grass develop a good root system for the winter, and develop buds for new tillers the next spring. P and K applied in late winter or early spring won't provide the same benefits.

One option for hay production not widely used is to apply all the N, P, and K needed for the following year in late fall, rather than early spring. Research has shown that the yields from a late- fall application are actually higher than from an early spring application, but the protein levels in the hay are slightly lower (a dilution of the N due to higher biomass production). The increased production from a late fall application is due to the stimulation of root growth and production of additional tiller

buds.

Sulfur fertilization

One additional nutrient producers should be aware of for tall fescue and smooth bromegrass pastures or hayfields is sulfur (S). If the pasture or hayfield is receiving adequate nutrients and precipitation, but is dropping off in production, it could be deficient in S. Sulfur deficiency will cause a general reduction in forage production long before it results in visual deficiency symptoms. An application of S to a tall fescue or smooth bromegrass pasture or hayfield that is deficient in S can result in forage yield increases up to 500 to 800 lbs per acre.

Sulfur is taken up by plants as sulfate. If a sulfur application is needed to correct a deficiency in a growing crop, a sulfate-S source should be used, such as ammonium sulfate or gypsum. Elemental sulfur sources can be used if applied far enough in advance of crop uptake needs to allow soil organisms to oxidize the S to sulfate. This will normally take several weeks to months, depending on soil temperature and moisture.

Soil testing

To determine whether P, K, S, and lime are needed on tall fescue and smooth bromegrass fields, producers should consider soil sampling. The best time to sample is in the fall, prior to fertilizer application. However, soil testing can be done in the spring. Samples for a P and K soil test should be taken to a 6-inch depth. A profile S test to a depth of 24 inches should be used to evaluate S needs. Detailed information on collecting a representative soil sample from pasture/hay fields can be found in a previous eUpdate article: Issue 771, October 25, 2019 – "Fall testing of hay fields and pastures".

Dorivar Ruiz Diaz, Nutrient Management Specialist
ruizdiaz@ksu.edu

Stu Duncan, Northeast Area Crops and Soils Specialist
sduncan@ksu.edu

2. First hollow stem update: March 2, 2020

Cattle should be removed from wheat pastures when the crop reaches first hollow stem (FHS). Grazing past this stage can severely affect wheat yields (for a full explanation, please refer to the eUpdate article "Optimal time to remove cattle from wheat pastures: First hollow stem").

First hollow stem update

In order to screen for FHS during this important time in the growing season, the K-State Extension Wheat and Forages crew measures FHS on a weekly basis in 36 different commonly grown wheat varieties in Kansas. The varieties are in a September-sown replicated trial at the South Central Experiment Field near Hutchinson.

Ten stems are split open per variety per replication (Figure 1), for a total of 40 stems monitored per variety. The average length of hollow stem is reported for each variety in Table 1. As of March 2, 2020, none of the varieties had yet reached first hollow stem but all varieties had started to show minor stem elongation.

Figure 1. Ten main wheat stems were split open per replication per variety to estimate first hollow stem for this report, for a total of 40 stems split per variety. Photo by Romulo Lollato, K-State Research and Extension.

Table 1. Length of hollow stem measured March 2, 2020 of 28 wheat varieties sown mid-September 2019 at the South Central Experiment Field near Hutchinson. The critical FHS length is 1.5 cm (about a half-inch or the diameter of a dime). The least significant difference for varieties to be considered statistically different was 0.04 cm.

Variety	Hollow stem length (cm)	
	2/25/2020	3/2/2020
09BC308-14-16	0.07	0.25
AM Cartwright	0.23	0.31
AM Eastwood	0.11	0.19
Bentley	0.11	0.34
Bob Dole	0.06	0.15
Doublestop CL Plus	0.06	0.22
Gallagher	0.14	0.33
Green Hammer	0.05	0.16
Guardian	0.04	0.18
KS Dallas	0.11	0.29
KS Silverado	0.12	0.26
KS Western Star	0.11	0.29
LCS Valiant	0.07	0.29
Long Branch	0.28	0.43
Paradise	0.08	0.34
Rock Star	0.08	0.27
Showdown	0.12	0.32
Smith's Gold	0.11	0.28
SY Achieve CL2	0.12	0.28
SY Wolverine	0.14	0.23
TAM205	0.08	0.29
WB4269	0.10	0.22
WB4303	0.09	0.21
WB4595	0.21	0.33
WB4699	0.01	0.21
WB4792	0.11	0.36
Whistler	0.06	0.32
Zenda	0.08	0.28

While none of the varieties had yet reached first hollow stem as of March 2, there were statistical differences among the varieties evaluated and these differences tend to increase over time. Thus, we will report first hollow stem during the next few weeks again until all varieties are past this stage. Additionally, first hollow stem is generally achieved within a few days from when the stem starts to elongate, so we advise producers to closely monitor their wheat pastures at this time.

The intention of this report is to provide producers an update on the progress of first hollow stem development in different wheat varieties. Producers should use this information as a guide, but it is extremely important to monitor FHS from an ungrazed portion of each individual wheat pasture to

take the decision of removing cattle from wheat pastures.

Contact author:

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

Co-authors:

Kavan Mark, Undergraduate hourly student

Rebecca Rebesquini, Visiting Assistant Scientist

Renan Oliveira Batista, Visiting Assistant Scientist

Marcos Feliciano, Visiting Assistant Scientist

3. Army cutworms in wheat, alfalfa, and winter canola

Army cutworms return to Kansas every year in the fall. Generally, the weather most conducive to army cutworm survival is a dry summer followed by a wet fall. Currently, even though it is still early, significant populations of army cutworm larvae have been reported (Figure 1).

Figure 1. Various sizes of army cutworm larvae collected on March 4, 2020 (left photo). Close-up of cutworm larvae (right photo). Photos by Cayden Wyckoff, K-State Research and Extension.

The two crops most affected are alfalfa and wheat, but canola can also be significantly affected. Alfalfa and wheat are vulnerable because these crops have green, succulent plants during the fall when the moths are ovipositing. However, late-planted wheat fields may escape infestation if plants hadn't germinated when the moths were flying around seeking oviposition sites. Each female can produce 1000-2000 eggs, which hatch in the fall. The small larvae then start feeding on any nearby leaf tissue, and will do so all winter anytime the temperature is over 45 degrees F.

The easiest way to detect an army cutworm infestation early is to take notice of any feeding by animals (birds, skunks, possums, etc.) in wheat or alfalfa fields. Next, go out to that area and dig around the base of the plants looking for the dusky, soil-colored, usually curled up, small cutworms that have faint lateral stripes. These larvae feed on the above-ground portion of plants (Figure 2), and consume more and more plant tissue as they grow.

Figure 2. Army cutworm feeding damage. Red arrows point to the distinctive "windowpaning" feature. Photo by Cayden Wyckoff, K-State Research and Extension.

This feeding will probably continue for another month or two, depending upon the weather. The larvae will then pupate, emerge as adult moths (often called "Miller moths"), then migrate back to the Rocky Mountains for over-summering until heading back to the Plains next fall to start the cycle all over again.

Treatment recommendations

Under good growing conditions treatments should not be necessary unless there are 4-5 larvae/sq ft in wheat-- even more if the wheat is growing well and is well tillered. In seedling alfalfa, probably 1-2 larvae/sq ft may justify treatment but it will take probably at least 4-5 larvae/sq ft in established fields.

For treatment information, please refer to the following KSRE publications:

MF809 Alfalfa Insect Management - https://bookstore.ksre.ksu.edu/pubs/MF809.pdf

MF745 Wheat Insect Management - https://bookstore.ksre.ksu.edu/pubs/MF745.pdf

Jeff Whitworth, Extension Entomology
jwhitwor@ksu.edu

4. Learn the difference between fire weather watches and red flag warnings

Winter forecasts often include winter storm or blizzard warnings. Lately, the National Weather Service (NWS) weather forecasts have included a different type of warning: Red Flag Warnings and Fire Weather Watches.

A **Red Flag Warning** is issued for critical fire danger, and signifies that those weather conditions are occurring, or will occur shortly. These critical weather conditions consist of a combination of strong winds, low relative humidity, and warm temperatures – all which make fire suppression very challenging. Thresholds for these warnings vary by your local associated NWS forecast office (see Table 1).

A **Fire Weather Watch** is issued in advance of critical fire danger. These Watches signify the forecasted possibility of critical fire weather occurring in the next 24-48 hours. Some offices issue these more than others. These Watches are meant to provide you advance notice so that you can take proper precautions and/or make better decisions based upon these forecasts.

Table 1. Red Flag thresholds by National Weather Service Forecast Office

Red Flag Warning Thresholds		
Forecast Office	**Relative Humidity**	**Wind Speeds/Gusts**
Goodland	15%	Gusts 25 mph or greater
Dodge City	15%	Gusts 25 mph or greater
Hastings, NE	20%	Sustained winds 20mph/gusts 25 mph
Wichita	Extreme Grassland Fire Danger Index	
Topeka	20%	Sustained winds 20mph/gusts 25 mph
Pleasant Hill, MO	25%	Gusts 25 mph or greater
Springfield, MO	25%	Gusts 25 mph or greater

Generally, these weather conditions create an atmosphere with explosive fire growth potential. Any spark has the potential to create a large fire that will resist typical suppression efforts. Use appropriate caution, such as avoiding outdoor burning, watching for hot exhaust systems over grass, and extra care with welding or anything that might create sparks.

Note that these Warnings/Watches only occur when fuels (material that burns such as grass, leaves, cedars, etc.) are able to efficiently carry fire. During the winter, our grasses are dormant and dead. This provides an ample fuel for fire to easily carry. Therefore, most often these alerts occur between the months of October – May (Figure 1), until the spring rains arrive to drive grass growth again. This doesn't mean that the fire weather potential isn't there the remaining months. During periods of drought, grasses can become dormant and carry fire. These particular situations are more difficult to forecast in advance. Reports of fire carrying exceptionally well and being difficult to suppress are critical to the forecast process. If you feel these conditions are occurring, don't hesitate to contact your local office and spread that information.

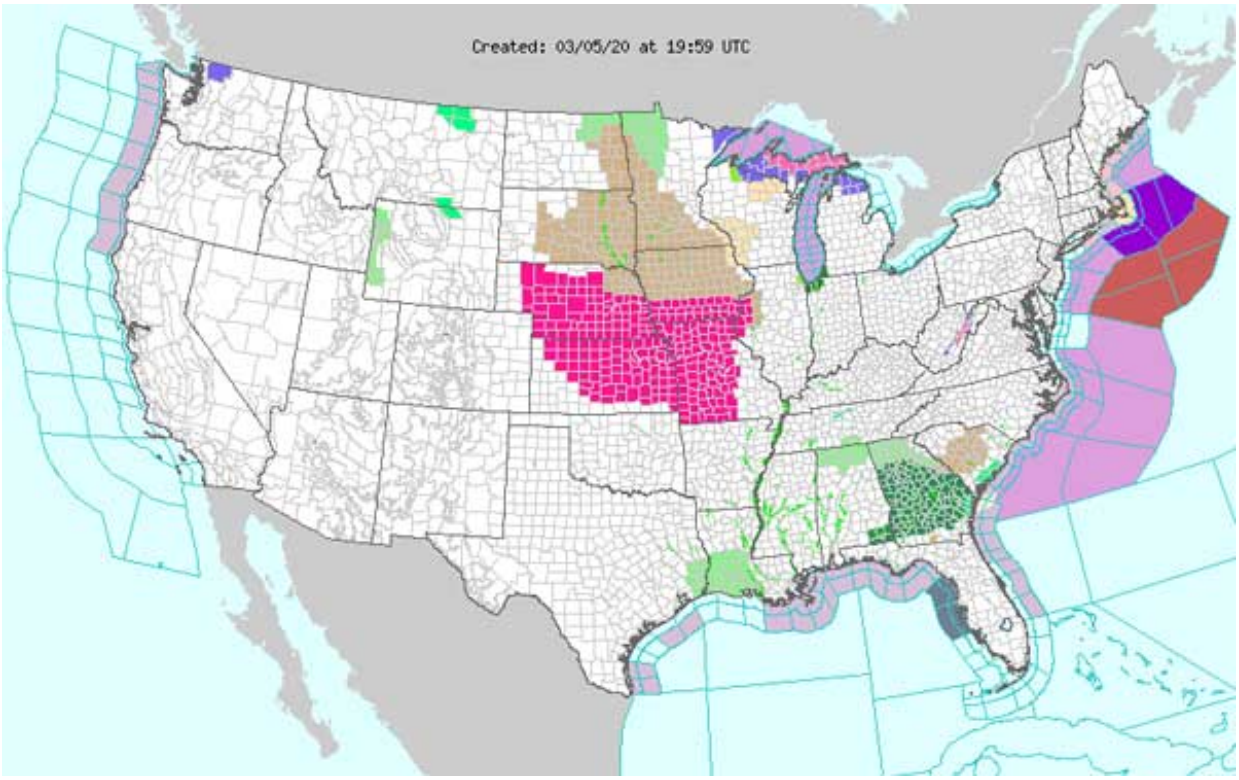

Figure 1. Red flag warnings (bright pink) on February 5, 2020. Source: National Weather Service

Mary Knapp, Weather Data Library
Mknapp@ksu.edu

Christopher Redmond, Kansas Mesonet
Christopherredmond@ksu.edu

Jason Hartman, State Forester - Kansas Forest Service
hartmanj@ksu.edu

5. Ag-Climate Update for February 2020

The 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.

February 2020: Dry – north and Wet – south, but soil moisture still dry in western KS

With respect to climate, February was middle-of-the-road. It ranked as the 33rd wettest February due to the pushing precipitation south by polar vortexes. It ranked as the 66th warmest, right in the middle of the distribution. Atwood set a new record high temperature for the month, with 84 °F on the 3rd. Across the state, 48 new daily record high temperatures were recorded, all on either the February 2nd or 3rd. Despite that warm start, the month averaged slightly cooler than normal.

Statewide precipitation averaged slightly above normal, with a distinct gradient north to south. All three northern climate divisions were below normal, while all three southern climate divisions were much above normal. Severe weather was limited, and confined to winter weather conditions. There were no reports of tornadoes, hail, or damaging wind.

Winter wheat is beginning to emerge from dormancy, and monitoring the first hollow stem development is important in dual-purpose wheat production systems (Figure 1).

Figure 1. First hollow stem K-State test plots. Photo by Romulo Lollato, K-State Research and

Extension.

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