Issue 739

K-STATE Research and Extension

Extension Agronomy

eUpdate

03/29/2019

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. Pay attention to growth stage for spring herbicide decisions on wheat

Most areas of Kansas had plenty of rain and snow last fall and through the winter, which complicated wheat planting and other management plans, including weed control. The early-planted wheat fields have good stands and advanced stages of growth, but many fields didn't get planted until fairly late, and thus have limited tillering coming into spring. Additionally, all the moisture has resulted in a pretty good flush of weeds in many fields. Producers should pay close attention to the growth stage of their wheat before making their herbicide applications.

Dicamba can be applied to wheat between the 2-leaf and jointing stages of wheat. Application of dicamba after wheat reaches the jointing stage of growth causes severe prostrate growth of wheat and significant risk of yield loss. Dicamba is effective for control of kochia, Russian thistle, and wild buckwheat, but is not good for control of mustard species. Kochia, Russian thistle, and wild buckwheat are summer annual weeds that may emerge before or after wheat starts to joint, so timing of dicamba for control of these weeds can sometimes be difficult. Fortunately, dicamba provides some residual control of these weeds following application.

Other herbicides that must be applied prior to jointing include Agility SG, Olympus, PowerFlex HL, Pulsar, and Rave. Beyond should be applied to 1 gene Clearfield wheats after tiller initiation and prior to jointing, but can be applied to 2-gene Clearfield wheats until the second node is detected at the soil surface.

MCPA and 2,4-D have different application guidelines. In general, MCPA is safer on wheat than 2,4-D, especially when applied prior to tillering. We recommend that 2,4-D not be applied to wheat until it is well-tillered in the spring. Application of 2,4-D prior to tillering hinders the tillering process, causes general stunting and can result in significant yield loss.

Figure 1. Stunting from an application of 2,4-D to wheat prior to tillering. Photo by Dallas Peterson, K-State Research and Extension.

2,4-D is labeled for application to wheat from the full-tiller stage until prior to the boot stage of growth, but is probably safest between full-tiller and jointing stages of growth. Wheat will sometimes exhibit prostrate growth from 2,4-D applications applied in the jointing stage of growth, but yields generally are not significantly affected if applied before the boot stage of growth.

MCPA is relatively safe on young wheat and can be applied after the wheat is in the three-leaf stage (may vary by product label) until it reaches the boot stage of growth. Consequently, MCPA would be preferred over 2,4-D if spraying before wheat is well-tillered. Neither herbicide should be applied once the wheat is near or reaches the boot stage of growth, as application at that time can result in malformed heads, sterility, and significant yield loss (Figure 2).

Figure 2. Malformed heads from an application of 2,4-D at boot stage. Photo by Dallas Peterson, K-State Research and Extension.

Both 2,4-D and MCPA are available in ester or amine formulations. Ester formulations generally provide a little better weed control than amine formulations at the same application rates, but also are more susceptible to vapor drift. However, the potential for vapor drift damage in early spring is minimal. Ester formulations generally are compatible for use with fertilizer carriers, while amine formulations often have physical compatibility problems when mixed with liquid fertilizer.

Other herbicides used in the spring on wheat can be applied up to the time the flag leaf is visible, or later. Affinity BroadSpec, Affinity TankMix, Ally Extra SG, Express, Harmony, Harmony Extra, Huskie, Quelex, Talinor, and Supremacy must be applied before the flag leaf is visible. Huskie, Weld, and WideMatch can be applied through the flag leaf stage. Herbicides that can be applied later in the spring – prior to the boot stage -- include Ally + 2,4-D, Amber, Finesse, Starane Ultra, and Starane Plus Salvo. Starane is a better choice than dicamba products for control of kochia after wheat moves into the jointing stage of growth. Remember that weeds are most susceptible at early growth stages and coverage becomes difficult as the wheat canopy develops, so the earliest practical and labelled applications generally result in the best weed control.

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2. First hollow stem update: March 27, 2019

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.

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 27 of 36 wheat varieties sown mid-September 2018 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). Varieties that already passed first hollow stem

are highlighted.

Variety	Hollow stem length (cm)
	(3/27/2019)
SY Achieve CL2	**3.80**
AM Eastwood	**3.30**
Spirit Rider	**3.28**
WB4303	**3.25**
SY Benefit	**3.16**
Ruby Lee	**2.38**
WB4792	**1.96**
Stardust	**1.91**
WB4595	**1.90**
Gallagher	**1.87**
Langin	**1.80**
SY Grit	**1.65**
Byrd	**1.57**
Green Hammer	**1.56**
Smith's Gold	**1.56**
TAM 204	**1.54**
WB4269	**1.50**
Zenda	1.47
EXP	1.44
Iba	1.39
Bob Dole	1.35
Tatanka	1.34
WB4515	1.25
Paradise	1.16
EXP 40-1	1.14
NE10478-1	1.10
Lonerider	1.03
Doublestop CL Plus	1.00
Bentley	0.97
Whistler	0.94
Larry	0.90
Showdown	0.88
WB-Grainfield	0.84
SY Rugged	0.83
WB4699	0.74
Joe	0.56

As of March 27, 2019, the varieties WB4303, SY Benefit, Spirit Rider, AM Eastwood, SY Achieve CL 2, SY Benefit, Ruby Lee, WB4792, Stardust, WB4595, Gallagher, Langin, SY Grit, Byrd, Green Hammer, Smith's Gold, TAM 204, and WB4269 had already reached first hollow stem (Table 1), and all varieties had started to show minor stem elongation. 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.

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3. Winter observations for the 2019 canola crop

The 2018-2019 fall crop season has been one to remember for wheat and canola growers. From persistent precipitation to wet fields to fluctuating temperatures, one would think that the deck is stacked against this year's winter crops. Despite the abnormally wet weather, recent observations have revealed a canola crop that is poised for solid yields if a few more pieces fall into place this spring. Winter survival is better than expected in canola trials from north central Oklahoma through central Kansas. If producers were able to get across fields to address spring fertility needs, then we expect to see excellent yield potential develop as we enter the reproductive stages of the winter canola life cycle.

The 2018-2019 growing season

To better understand what is being observed in trials across Kansas, we need to remember what establishment conditions were like last September. For a large portion of the state, soil moisture was in surplus after heavy rains fell in early September. This set the stage for ideal soil moisture in the seeding zone during the optimum planting window for canola. Producers who were able to take advantage of these conditions had little problem getting a fall stand. Producers who were delayed by these rains did not fare as well and may have poorer stands as a result, or they had to abandon the idea of planting canola all together.

Overall, canola fields and trials that were planted on time, in between major rainfall events in September and October, are faring quite well. Minimal winterkill has been observed in this situation (Figure 1). Actually, damage from running or standing water has been more prevalent than winterkill in some cases. Where fall stands were poorer, we are seeing more signs of winter stand losses.

Figure 1. National Winter Canola Variety Trial at Kiowa, KS. Photo by Mike Stamm, K-State Research and Extension.

What has allowed the 2018-2019 crop to survive these challenging field conditions? Certainly a little luck played into seeding time, but even some of the later-planted canola had adequate survival even though some thinning has been observed. Figure 2 shows the National Winter Canola Variety Trial at the South Central Kansas Experiment Field near Hutchinson, KS. The trial was planted about a week later than normal on September 28, 2019 and plants were smaller than normal going into the winter months. If problems with winter survival were expected, they would have been observed here. Some of the reasons for better survival might be excellent soil moisture conditions over the winter and snow cover during colder stretches.

Figure 2. The National Winter Canola Variety Trial at the South Central Kansas Experiment Field. The plot was planted about a week later than normal on September 28, 2018. Photo by Mike Stamm, K-State Research and Extension.

Compared to last year when we saw low temperatures (below 0 degrees F) and dry conditions, low temperatures and wet conditions are better for winter survival as wetter soils hold more heat. Overall, plant size was optimal for survival across the state, with most of the canola crop achieving the 6 to 10 inches of top growth and 6 to 8 true leaves needed. The crop was neither too small nor too big going into the winter. In northern Kansas, snow cover aided with survival in providing a layer of insulation. Further south where they maybe didn't have as much snow, temperatures were more moderate, and this will often lead to less winterkill.

One of the bigger benefits to this crop was a lengthened winter hardening period. Typically, winter canola hardens off as temperatures approach freezing over a number of days, and it is important to have a few days with low temperatures around 28 degrees F to induce hardiness. A slow, sustained drop in temperatures is critical in preparing a canola crop for overwintering.

The 2018-2019 season versus previous seasons

Winter survival is a complex trait that can be influenced by many factors. Looking back at the recent history of canola production, winterkill has been caused by different weather patterns. We have

observed winterkill caused by bitterly cold temperatures for extended periods of time (2013-2014), extreme temperature fluctuations on an inadequately cold-acclimated crop (2014-2015), too much fall growth causing severe crown and stem damage as cold temperatures set in (2016-2017), and cold winter temperatures coupled with dry soils (2017-2018).

In 2018-2019, the canola crop had adequate time to harden off for a sustained winter, and November is the critical month for this to occur. As measured by the Manhattan Mesonet station, the number of November days at or below 28 degrees F were 19, 7, and 3 for 2018, 2017, and 2016, respectively. The greater number of hardening days had a huge impact on the crops ability to survive, compared to years like 2016 when cold temperatures set in on a poorly acclimated crop (too few hardening days). Over the past five years, November 2018 had the most days with temperatures at or below 28 degrees F (19 days) since 2014 (17 days).

The coldest November temperature was observed on the 13th (12.4 degrees F), which was lower than the coldest December day (12.6 degrees F) on the 29th. Actually, warmer December temperatures induced regrowth of leaf tissue in Manhattan. Canola has the ability to lose and regain winter hardiness, which may or may not be detrimental to survival. In 2018-2019, it was a benefit and a gradual cool down occurred, following the warm period, which enabled the crop to regain some hardiness. Typically, canola will not regain hardiness to the level that it once had, but this did not negatively affect the crop in 2018-2019.

What is the impact for 2018-2019?

Even though cold temperatures may not cause winterkill, cold temperatures can have unseen negative consequences on crop growth and development. Freezing and thawing, like we saw repeatedly in 2018-2019, cause cracking in the crown or root, allowing fungi to enter that create root decay. Plants may appear to regrow normally in the spring, but after some time, the severely damaged plants will wilt, turn bluish-gray, and eventually die (Figure 3). We are starting to see this in a few fields and research trials. Other affected plants may continue to grow normally and never show any signs of damage, but could have weakened stems which may eventually lead to lodging.

Figure 3. The plant in the center is losing leaf area and wilting as a result of severe crown damage over the winter. Photo by Mike Stamm, K-State Research and Extension.

In addition, canola can compensate for a thin stand because it is an indeterminate crop, producing more flower buds than it can actually support. Canola will branch out and fill in gaps in the field when stands are reduced, much like a soybean plant will in a reduced stand. Having adequate fertility levels and soil moisture are critical for inducing this compensatory effect. Mild temperatures to generate more plant biomass will go a long way toward helping the crop to compensate for a poor stand. Before tearing up a spring stand of canola, evaluate the final plant population. Spring stands of 4 to 8 plants per square foot are ideal, but we have seen stands of 1 plant per square foot produce harvestable yields if the remaining plants are evenly distributed across the field.

There are some positives to this narrative:

1. Differential winterkill did occur at a few locations adding to our database of winter survival information, meaning we have useable ratings for many commercial varieties.
2. We know the adaption limits of many varieties and we can make better variety recommendations for Kansas canola growers. This is important information for us to make winter canola consistent and profitable.
3. Survival appears to be better than expected and the crop is poised for a good spring.

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4. 2017 Census of Agriculture results to be released April 11

With information provided by farmers and ranchers across Kansas and the rest of the United States, the United States Department of Agriculture will soon release results of the 2017 Census of Agriculture. County, state, and national results will be made public on Thursday, April 11, at 11:00 a.m. (CT).

Over the course of the next few months, additional information will be available by Congressional District, Watershed, and Zip Code. Find results at www.nass.usda.gov.