Issue 910

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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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eUpdate Table of Contents | 06/09/2022 | Issue 910

1. Managing late tillers in wheat

Rains during the past two weeks have resulted in a flush of late, green tillers in the wheat over much of Kansas (Fig. 1). This can create a problem, especially for wheat that is approaching harvest maturity. A question that usually arises when this happens is: Should I wait to start harvesting until most of the green heads have matured, or just start harvesting anyway?

Figure 1. Wheat plants showing later-emerged tillers during the 2022 growing season. Notice the shorter and later heads in the middle to lower portions of the plants. Photo by Luiz Otavio Pradella, K-State Agronomy grad student, near Hays, Kansas.

This question is more relevant this year in south central Kansas, where the wheat is most advanced. In these cases, producers should not delay harvest because of the green tillers. These tillers probably

won't amount to more than 5% or so of the total amount of heads in the field, and won't add much to the final yield anyway. So producers should start harvesting as soon as the bulk of the field is ready. With varieties that tend to shatter easily, producers should start harvesting as soon as the field reaches 15% moisture.

In other regions of Kansas, where the wheat is less developed, the green tillers might add more to the crop's yield potential. Still, unless the green tillers make up more than half the heads in the fields, it's probably best to just start harvesting when the majority of heads are ready to go. Waiting for the green heads to ripen might lead to shattering of the more mature heads.

In north central and northwest Kansas, there is plenty of time to wait and see how the new green shoots develop. In these regions, the new tillers could potentially add significantly to the yield potential, especially in northwest where the yield potential is lower than in north central. If the weather continues to be favorable and the new tillers have time to mature, then producers in northern Kansas may want to wait until the new tillers have ripened before harvesting.

Producers should be aware that the grain in the green heads may cause some storage problems. It's never easy to manage a late flush of green shoots in wheat. There's no clear-cut answer, nor is there one best management strategy to fit all situations, unfortunately.

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2. Effect of heat and drought during grain fill on wheat seed quality

Wheat that has been stressed by drought and extreme heat can have seed quality concerns (Figure 1). Drought conditions were prolonged in many areas of Kansas through most of the winter and spring in 2022, causing stress to plants through early grain filling stages. In addition, extreme heat occurred during the four-day period of May 9-12, which coincided with boot, flowering, pollination, and early grain fill stages depending on the area within Kansas.

Figure 1. Wheat being unloaded after harvesting. Photo by Kansas Wheat.

Drought and heat stresses on wheat, alone or in combination, can cause physiological damage that results in light test weights or small seed size. The extent of the damage depends on the severity of the stress and the stage of reproductive development.

When temperatures are very warm for more than three consecutive days during grain fill and soils are very dry, plants will senesce early and speed through this critical stage. High temperatures during the grain filling stage will slow or stop formation of starch in the kernel, consequently increasing the percentage of protein in the grain. Heat- and/or drought-stressed kernels are usually small and shriveled, resulting in lower kernel weight, lower test weight, and lower yield. The kernels simply will not fill properly.

Will the wheat grown under stressful conditions be suitable to use for seed this fall?

There's no simple answer to this question. First of all, before considering whether to use your own wheat for seed this fall, make sure it's allowable. While most wheat varieties are protected by Plant Variety Protection which allows for keeping seed to plant on your own acreage, additional licensing and/or marketing restrictions may apply to some varieties referred to as Certified Seed Only (CSO), which removes this allowance. Consult your seed dealer for varieties that are not allowed to be planted back.

If plant-back is an option, there are several considerations regarding the use of this year's crop for seed. Where wheat was stressed during critical growth stages and the kernels are small or shriveled, producers should first have the wheat tested for germination, and then cleaned to a test weight of at least 55-56 pounds per bushel if possible. Another germination test after seed cleaning would be warranted to ensure proper germination percentage was achieved.

Wheat with a lighter test weight may emerge just fine -- just look at all the volunteer wheat that emerges from small or shriveled seed that is blown out the back of the combine. But below a test weight of 55-56 lbs/bushel, the plants that emerge are more likely to have problems overcoming any adverse conditions in the fall and surviving the winter. Producers planting light-test-weight seed will also have to be extra cautious not to plant the seed too deeply, since seed vigor will likely be below average. Seedlings from light-test-weight seed will also likely be less competitive than normal against weeds. Knowing this a producer should plan accordingly for weed control.

Seed that is unusually small for a given variety should be tested for germination. Producers should consider having both a standard and an accelerated aging (AA) germination test done on small shriveled wheat before using it as seed. Seed that is unusually small won't necessarily have poor vigor or result in lower forage or grain yields in the subsequent crop, but it should be tested first and conditioned to the largest seed size possible.

Before using this year's wheat for seed, the wheat should be cleaned with a 6/64 screen, if possible. If that cleans out far too much of the wheat, then a 5.5/64, or even a 5/64, screen will do. But no less than that. Cleaning wheat with less than a 5/64 screen will do little or no good.

How much can test weight and kernel size of the seed affect yields?

From 1980-1983 a study was conducted at the Colby Experiment Station (as it was called then) by K-State agronomist Larry Robertson. He tested the effect of seed size and test weight on yield using foundation seed of three varieties, two seeding depths, and two locations. The results showed that seed size and test weight both had an effect on yield of the subsequent crop. Yield differences of 10-15% were measured, with the lowest yields resulting from deep seeding depths (Figure 2, Table 1). Small and/or light seed always yielded less than the control, heavy or large seed, but more so at deeper seeding depths.

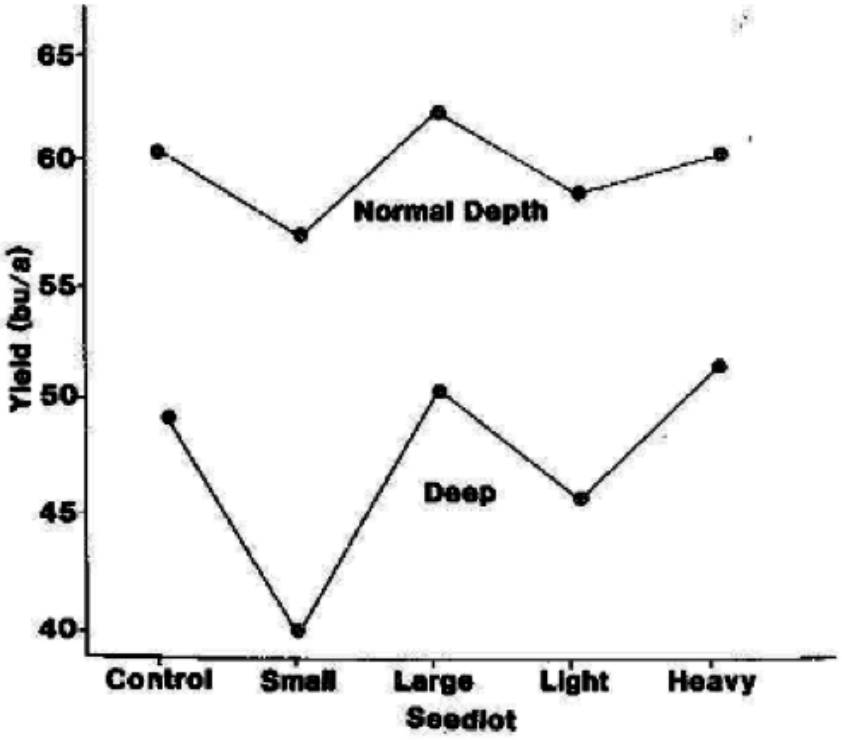

Figure 2. Influence of seedlots and planting depth on yield of winter wheat. Source: "Effect of Seed Size and Density on Winter Wheat Performance", Keeping Up With Research, K-State Research and Extension SRL74

Table 1. Effect of seed size and test weight on wheat yield (average of four years, two locations – Colby and Hays, and two seeding depths (normal and deep)	
Seed lot	Yield (bu/acre)
Control (entire seed lot)	53.6
Small seed fraction (average: 21,200 seeds/lb)	48.1
Large seed fraction (average: 9,150 seeds/lb)	54.4
Light test weight fraction (avg test weight: 57.8 lbs/bu)	50.2
Heavy test weight fraction (avg test weight: 62.2 lbs/bu)	54.0

In addition, in 1990 a study was conducted by Jim Shroyer, Stu Duncan, and Dale Fjell, former K-State Extension specialists, on seed of Arkan wheat from 25 demonstration plots around the state. Yields averaged 2.4 bushels per acre higher with the high-test-weight seed (Table 2).

Table 2. Effect of test weight on yields of Arkan variety	
Test weight	Yield (bu/acre)
Light (54 lbs/bu)	41.5

Heavy (61 lbs/bu)	43.9

The effect of seed test weight on emergence, vigor, and yield potential will vary from year to year. When there is stress on the seedlings or young plants in the fall from freeze or drought or some other factor, the effect of higher test weight seed is often greatest.

Research on how seed size affects yields is a little more variable. Some research on wheat, such as the K-State study in Table 1 above, has found that yields are reduced when using small-sized seed. Bockus and Shroyer also found that sowing large seed produced plants with greater ground cover and increased forage production for producers who graze livestock. This was true especially if the large seed and small seed were sown at the same seed count per acre. There were smaller differences in forage production when the large and small seeds were sown using the same volume of seeds per acre.

More recently, K-State Extension wheat specialist Romulo Lollato and his group conducted tests on 27 environments across three years using the variety SY Monument. Results suggested a consistent yield increase of about 2 bu/acre when the seed was passed through an air screen as compared to no cleaning at all; and another 2 bu/acre when the air-screened seed went through the gravity table (see individual year reports for 2018-19 here and for 2019-20 here). This experiment also suggested a consistent yield advantage of about 1.5 bu/acre by using a fungicide and insecticide seed treatment.

Results from other studies around the country on the effect of seed size on wheat yields have varied, with some showing seed size has no effect on yield and some showing reduced yields with small seed.

Light test weight causes

Possible causes of light test weights include drought stress, heat stress, wheat streak mosaic damage, and rainy weather at harvest. Light test weights caused by rainy weather at harvest will normally not cause seed quality problems. The other causes are more likely to create some issues.

Drought stress is probably the main cause overall of light test weights. Wheat under drought stress reacts in several ways. The plants will normally allocate most of the available nutrients and water to the first kernel or two in the mesh. These kernels may be small, but often have high protein and adequate test weight. The remaining kernels will be denied the necessary nutrients and water, however. If these flowers or kernels were not aborted, then they will be shriveled and have low test weight.

Heat stress during grain fill can cause the plants to shut down deposition of starch in the grain, which can result in low test weights in most kernels on the head. It may even result in premature death of the plant, before the grain has filled. Heat stress would have to occur for several days in a row during early- to mid-grain fill to shut down the plants and reduce test weights significantly. If the period of extreme heat lasts for only 1-3 days, it's unlikely to permanently reduce test weight, although it can

reduce kernel length if it happens during grain elongation. Premature death due to heat stress is one of the most common reasons for light test weights in late-maturing varieties in Kansas.

Small seed size causes

The effect of small seed size on wheat germination, seedling vigor, and yield potential varies considerably, depending in part of the reason for the small size.

Some varieties naturally have a smaller seed size tendency than others. The range in seed sizes of modern hard red winter wheat varieties currently grown in Kansas can go from as low as 8,000 seeds per pound on the large side, to as high as 22,000 seeds per pound on the small side. Most varieties are in the range of 11,000 to 18,000 seeds per pound. Smaller-seeded varieties can have very high yield potential, so small seed size has no effect on performance in that situation.

Also, there is always a small fraction of small seed from screen-outs during the cleaning and conditioning process.

However, if most or all wheat kernels are smaller than normal because of drought stress, heat stress, or freeze damage, then the small seed may have physiological damage. In that case, the small size wheat would likely have reduced seedling vigor and yield potential, and less ability to compete with weed pressure.

Summary

Where wheat was stressed by a combination of drought and heat stress during its reproductive and grain filling stages, the kernels may have suffered physiological damage. As a result, it could have light test weights and/or small seed size. Improved grain filling conditions during the last full week of May could help maintain kernel weight and size. While this may have happened in parts of central, north central, and northwest Kansas, the crop in south central and in southwest had likely limited benefits from the recent rains and cooler temperatures.

The best option in general would be to plant certified seed, which has been cleaned and tested for germination to meet quality standards. That would remove any uncertainties about seed quality. It may be tempting to save the expense of purchasing certified seed, but once the lost yield potential is factored in, the most profitable option may be to plant certified seed. If ordering certified seed, ensure that you are "on the list" fairly early as seed supply is uncertain this year due to crop abandonment and low yields.

If the some of the stressed wheat is saved for seed, in cases where this is allowable, producers should consider having it tested by a professional seed lab for germination (both standard and AA), conditioned to get the highest test weight and largest seed size possible, and possibly treated with a fungicide. That seed should also be planted with special care to make sure it's not too deep and has good seed-soil contact. If small seed from stressed wheat is used, it would be best to increase the seed count per acre even if germination tests are good.

Producers should try their best to plant the best quality seed possible this fall to get good emergence, early season vigor, and yield potential. It makes no sense to plant poor quality seed that will just create more problems next season. Certified seed is the best option.

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3. Accelerated Aging test on seed for emergence vigor

Beyond the standard germination test, most professional seed testing labs offer an Accelerated Aging (AA) test that will test seed for anticipated emergence vigor.

Figure 1. Wheat seed should be tested for germination. Photo by Kansas Wheat.

This test is very capable of identifying weak seed lots where there are issues with Fusarium head scab; heating in the bin; or smaller, development-stressed seed.

Briefly, in an AA test the seed is subjected to a high temperature (106 degrees F) and high moisture stress for 72 hours before planting. This accelerates the aging process of the seed. The resulting seedlings are then counted the same as with a standard germination test. The weak seed in the population will be pushed beyond the capability of germinating into a normal seedling.

When to test: Because seed vigor will only decline over time, testing close to planting time will give the best prediction of field performance. However, if there are questions about whether there has been stress-related physiological damage to the seed, it might be best to have the AA test done shortly after harvest before investing in storage, cleaning and seed treatments.

What the results mean: Ideally the AA score should be relatively close to the standard germination

score. This would mean the seed lot has the greatest capability of emerging under a wide array of field conditions. While high vigor seed will be more forgiving, it is noteworthy that much of the crop's ultimate success also depends on management practices, such as how the seed is planted, depth of planting, whether the soil gets crusted over by a hard rain before emergence, and other factors beyond seed quality. Even high vigor seed lots may not produce satisfactory stands if field conditions are extreme.

If the seed has an AA germination score considerably lower than the standard germination test, this indicates the seed has reduced vigor and is more at risk when planted. Reduced vigor seed lots may still be planted and are capable of producing adequate stands, however producers must pay extra attention to planting conditions, planting rates and will likely benefit from the protection of a fungicide seed treatment.

The real point is that knowing seed quality is critical and producers need not necessarily dump low vigor seed, nor is high vigor seed guaranteed to make a stand under any conditions. Management practices play a big role in how well the seed performs. Producers just have to pay extra attention to their management practices and have a little extra good luck on their side if they plant seed with low AA scores.

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4. World of Weeds: Jointed goatgrass (Aegilops cylindrica)

Farmers at some recent wheat plot tours noted that jointed goatgrass seems to be more prevalent than usual this spring. This World of Weeds feature will discuss this weedy relative of wheat, also know as joint goatgrass

Ecology

Jointed goatgrass is a winter annual that germinates roughly the same time as winter wheat and the rate of development of the two species is similar throughout the growing season. It is native to southern Europe and is thought to have been introduced in Kansas during the 1900s as a contaminant in imported wheat. It can be found in a variety of habitats, including roadsides, rights of ways, and fields throughout much on the United States, including all of Kansas.

Jointed goatgrass is frequently observed in wheat fields. Research suggests it can cause approximately 27% yield loss when 2 plants per square foot emerge at the same time as wheat, with less yield loss when jointed goatgrass emerges later. Additional research conducted in growth chambers suggests that jointed goatgrass is more competitive than winter wheat in high temperature/low water scenarios, while it is less competitive than wheat under favorable growing conditions. Jointed goatgrass seeds are similar in size to wheat seeds, making it very difficult to separate, and contributing to its spread throughout wheat-producing regions. Jointed goatgrass can also serve as an alternate host for Russian wheat aphids, wheat curl mites, and several fungal diseases that attack winter wheat.

Identification

Jointed goatgrass seedlings have a sparsely hairy leaf blade, with stiff hairs that stick out from the leaf margin, a pubescent sheath margin, a short membraneous ligule, and small auricles (Figure 1).

Figure 1. Jointed goatgrass leaf margin and collar region. Note stiff hairs on the leaf, short ligule, and small auricles. Photo by Sarah Lancaster, K-State Research and Extension.

Mature plants can be up to 24 inches tall. Stems are hairless and have a bend at the lower nodes. Leaf blades are less than 1/4 inch wide and can reach up to 5 inches long. The inflorescence is a narrow spike 2 to 4 inches long. The spike is distinctly segmented into 5 to 10 cylindrical spikelets (also called joints). Each spikelet is about 1/3 to 1/2 inch long and may have an awn that is about 1/4 to 1/3 inch long (Figure 2). One or two seeds can be found in each spikelet, and typically do not thresh free from the chaff. The spikelet can be used to identify small seedlings as they emerge in the spring.

Figure 2. Jointed goatgrass spike. Note cylindrical joints with awns. Photo by Sarah Lancaster, K-State Research and Extension.

Management

Multiple tactics are needed to effectively manage jointed goatgrass. Jointed goatgrass seed longevity is reported to be about 3 to 5 years, so long crop rotations are one cultural practice that can help manage the weed. Research conducted in Kansas, Nebraska, and Wyoming suggests that increasing the seeding rate of wheat can reduce jointed goatgrass seed production in some environments.

Other examples of cultural control that may be effective, especially when combined, include selecting taller cultivars and delaying wheat planting. In addition, because jointed goatgrass seed readily germinates from the soil surface, tillage can be a helpful management tool. Unpublished research from Colorado and Oklahoma suggests that moldboard plowing can result in greater control and less seed production compared to sweep plowing or disking.

Herbicide options for jointed goatgrass control are limited. Glyphosate is effective in fallow periods or in glyphosate-resistant crops. However, herbicide-resistant wheat varieties are the only effective options for jointed goatgrass control in wheat. Imazamox (Beyond) can be used in Clearfield wheat varieties, and quizalofop (Aggressor) can be used in CoAxium wheat varieties.

The use of trade names is for clarity to readers and does not imply endorsement of a particular product, nor does exclusion imply non-approval. Always consult the herbicide label for the most current use requirements. For more detailed information, see the "2022 Chemical Weed Control for Field Crops, Pastures, and Noncropland" guide available online at https://www.bookstore.ksre.ksu.edu/pubs/CHEMWEEDGUIDE.pdf or check with your local K-State Research and Extension office for a paper copy.

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5. Annual Forage Insurance Update and Examples

(Note: This article originally appeared on the June 7, 2022 AgManager.info page from K-State's Department of Agricultural Economics.)

What is Annual Forage Insurance?

Annual Forage (AF) insurance is a rainfall index product similar to Pasture, Rangeland, and Forage Insurance (PRF). Alfalfa and perennial range can be insured under PRF. If you grow annual crops for forage (this includes annual crops used for grazing, haying, grazing/haying, grain/grazing, green chop, grazing/green chop, or silage), AF can be used to help insure against reduced forage yield due to less precipitation than normal during the producer-selected growing season.

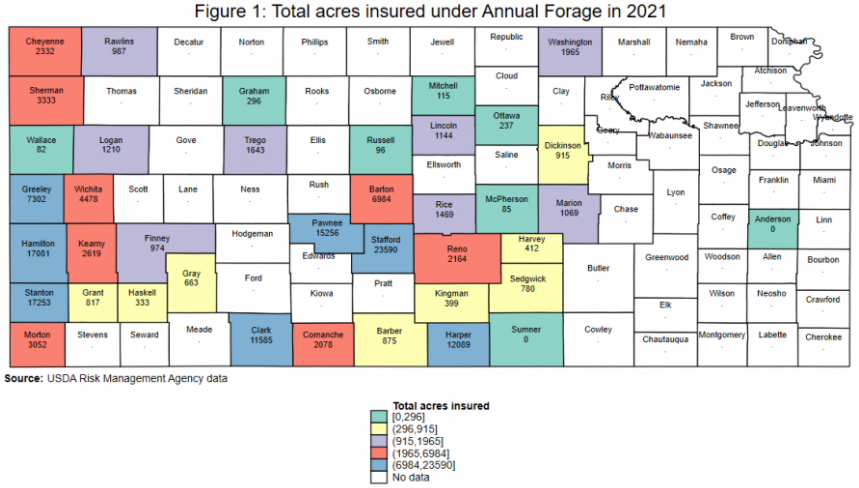
When rainfall falls below a set amount, a payout is provided. These payouts, called indemnities, could be used to cover losses from decreased forage production, including purchasing supplemental feed sources during a drought or future restocking. Precipitation is measured locally, in an approximately 14x16 mile area called a "grid." A producer selects the months, weight (importance) of months, and % precipitation they want to insure for.

Where is Annual Forage Insurance used in Kansas?

In 2021 almost 162,000 acres were covered by AF, up from about 94,000 acres in

2020. Similarly, the total value of production insured (insurance liabilities or guarantee) increased from $16 million in 2020 to $26 million in 2021. In Figure 1, we can see that AF was used in many western and south-central Kansas counties in 2021, but not in the eastern third of the state. Annual forage insurance has only been used in Kansas since 2014.

Figure 1: Total acres insured under Annual Forage in 2021

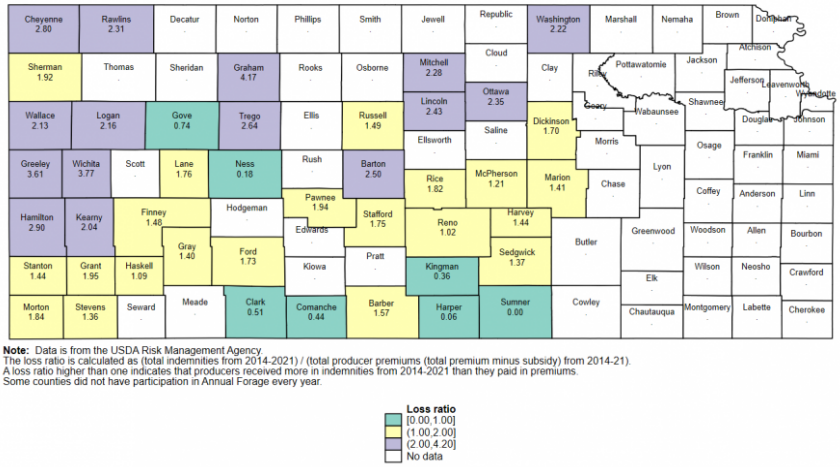


Does it pay?

Annual Forage insurance pays out indemnities when the level of rainfall relative to the historic average within the producer's grid is lower than the (producer-selected) coverage level. For example, if rainfall is 80% of the historic level and the producer selects an 85% coverage level, there would be indemnity. However, a 75% coverage level would not receive an indemnity. Coverage levels can range from 70 to 90%; the higher the coverage level, the higher the premium and the higher the likelihood and size of a payout. The Federal government provides a premium subsidy or shares in the cost of AF premium.

From 2014-present, Kansas producers have paid nearly $11 million in AF premiums and received over $22 million in indemnities. The highest level of indemnities (relative to premium) was paid in 2018 and the lowest in 2019. In Figure 2, we report the aggregate producer loss ratio from 2014-2021 across Kansas counties.

Figure 2: Annual Forage producer loss ratio: 2014-2021



Note: Data is from the USDA Risk Management Agency.
The loss ratio is calculated as (total indemnities from 2014-2021) / (total producer premiums (total premium minus subsidy) from 2014-21).
A loss ratio higher than one indicates that producers received more in indemnities from 2014-2021 than they paid in premiums.
Some counties did not have participation in Annual Forage every year.

Most counties experienced a producer loss ratio greater than one or received more in indemnities than was paid in premiums. However, the experience varies across counties, with northwest counties having higher producer loss ratios. These patterns suggest that south central Kansas may have been relatively wet from 2014-21, while northwestern Kansas was relatively dry.

The coverage period, or growing season, as discussed in the next section, may also influence payouts.

What are the key producer decisions?

The producer must select a coverage level of 70-90% and productivity factor of 60-150%, which influences the level of local rainfall necessary to trigger a payout and the value of payouts, respectively. Similar to PRF, producers must also select what months to use AF. However, these months, or intervals, are somewhat less flexiblethan PRF.

The producer must first select one or more of 4 'growing seasons':

(1) September to March,

(2) December to June,

(3) March to September or

(4) June to November.

The forage crop must be planted between early and final planting dates, similar to other crop insurance policies. The early and final planting dates are unique to each growing season, with the early planting typically 1.5 months before the beginning month of the growing season and late planting 1.5 months after the beginning month of the growing seasons.

For example, earliest planting date for growing season 1 is July 16 and the final planting date is Oct. 15. Next, 3 2-month intervals within the 7-month 'growing season' must be selected and assigned weights (for example, 30%, 30%, and 40%). No single month can be insured twice (overlap) within 1 of the 4 'growing seasons.' No period can have a weight higher than 40%, so 3 2-month periods must be selected within a 'growing season.' Other key decisions, including grid selection, can be discussed with an insurance agent or by visiting the AF decision support tool at http://af.agforceusa.com/ri.

Examples of AF Growing Seasons Insured:

1. A producer planted winter wheat for dual-purpose use (graze plus grain) in

September 2020 in Clark County (grid 20521) and used AF in Growing Season 1: September (2020)-March (2021). Wheat grown for dual-purpose is insurable, but at a 60% lower county base value (see more details below). They selected a coverage level of 80% and a productivity factor of 100%. Since fall growth is most important for dual-purpose, they selected the Oct-Nov interval at the highest rate possible at 40% weight, the Dec-Jan interval at a 40% weight, and the Feb-Mar interval at 20% weight.

The producer would have paid a premium of $7 per acre and received no indemnities. The premium is relatively lower than the examples below because the base value, or the value of the insured forage crop, is 60% lowerunder the dual-purpose option.

2. A producer in Morton County (grid 20813) planted winter triticale in late October 2020 and used AF in Growing Season 2: December (2020) - June(2021). They selected a coverage level of 90% and a productivity factor of 100%. They insured all periods equally: Dec-Jan interval at a 33% weight, Feb-Mar interval at a 33% weight, and Apr-May interval at a 34%weight.

The producer would have paid a premium of $25 per acre and received an indemnity of $63 per acre for lower-than-normal rainfall in the Feb-March and Apr-May intervals. Rainfall was much lower than average in the late winter and early spring, so indemnities were relatively high.

3. A producer plants corn silage in April 2020 in Harper County (grid 20227) for Growing Season 3.

They insure using the following weights: Mar-Apr at 40%, May-Jun at 40%, Jul-Aug at 20%. They select a coverage level of 90% and a productivity factor of 125%.

The producer would pay a premium of $27 per acre and receive an indemnity of $50 per acre, due to a rainfall index of 48.6 during the May-June interval. In other words, rainfall during May-June interval was 48.6% of the historic average.

4. A producer plants forage sorghum in June 2020 in Hodgeman County (grid 22021) during Growing Season 4. The producer wants to ensure good growth early in the growing season and will harvest in October, so insures Jun-July at 40%, Aug-Sep at 40%, and Oct-Nov at 20%. They select a coverage level of 75% and a productivity factor of 80%. The producer would pay a premium of $6 per acre and receive an indemnity of

$4 per acre, for lower-than-average rainfall during the Oct-Novinterval.

These examples were estimated using the AF Decision Support Tool at http://af.agforceusa.com/ri and are for demonstration purposes only. Some insurance agents have their own decision support software; only an insurance agent can provide official premium estimates.

What are some advantages and disadvantages of using Annual Forage insurance?

The primary disadvantage of AF is that it doesn't cover low moisture on your farm or fields, it covers low moisture in your area or grid. Before using AF, a producer needs to understand this risk: they might receive a payment when they have sufficient moisture or not get a payment when they experience low rainfall. Also it could be extremely dry for a two-month insurance period (interval), resulting in low forage yield, yet a large rainfall event on the last day of the period could make the period ineligible for a payment.

An advantage of AF is that payments are calculated automatically based on actual precipitation and made relatively quickly. Unlike grain crops that typically have scale tickets, forage may be harvested and used by the grower themselves without good yield documentation or the forage might be grazed. Thus this program makes reporting much simpler. Further, a producer gets to select what months they want coverage in and how much coverage they want. While some learning is required with any insurance product and AF requires an initial time investment, it is a relatively simple insurance product. This is especially likely after the first year or two of participation; a good relationship with your insurance agent can also make a big difference here.

What else should be considered?

• The sign-up deadline is July 15, with premium billing a year later, around August. Annual forage can be purchased from a local crop or livestock insurance agent: https://www.rma.usda.gov/informationtools/agentlocator

• Premiums vary based on location, growing season, coverage leverage, and productivity factor; a producer could pay from $3-50 per acre. Higher premiums reflect a higher likelihood and value of a

payout.

• Acreage reporting dates are on the "final planting date" for each growing season, which is approximately 3 months after the earliest planting date for each growing season. Acreage reporting is an important deadline — if the acreage isn't used for annual forage or if other conditions are not met, then the policy may not "attach": no payouts are made, and the producer doesn't pay a premium. A producer using AF should discuss and stay in touch with their insurance agent about acreage reporting deadlines

.• There is a "dual use option" for small grains used for both grazing and grain production, see the RMA or Texas A&M fact sheets for more information. This option is available for growing season 1 only and the county base value is decreased to 40% of the full county base value. This lowers the insurance guarantee, or both the premium and potential payouts. The dual option would be used when the crop is grazed out the winter and harvested in the summer; the producer would also purchase a separate multi-peril crop insurance policy (i.e. a revenue protection (RP) policy for wheat).

• Indemnities are based on changes from normal or average precipitation. If certain months are typically dry, they would have to be even drier for an indemnity to be triggered.

• A producer may want tolook at historic grid precipitation indices and compare them to their individual precipitation and forage yield and quality experience. Annual Forage uses the same grids as PRF; historical grid indices are available at https://prodwebnlb.rma.usda.gov/apps/prf# on the 'Historical Indices' tab.

• The productivity factor can be used to adjust the county base value, or a county-level estimate of the average local value of annual forage production, upwards or downwards. Producers who have higher value crops or want more protection can select a higher productivity factor and vice versa for a lower productivity factor. The value of indemnities is based on the county base value and productivity factor, in addition to the level of actual rainfall relative to the coverage level.

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6. Considerations for late planting (or re-planted) soybeans

By early June 2022, more than 60% of soybeans had been planted and less than half of all soybeans had emerged in Kansas (USDA Kansas Crop Progress and Report Condition, 2022). Not only do producers still have more than one-third of the soybean acreage to be planted, but some of the planted acres will need to be replanted after an initial assessment based on potential issues caused by the recent hail and flooding conditions in some areas of the state.

Figure 1. Soybeans planted late (early June) into adequate soil temperature and moisture conditions. Photo by Ignacio A. Ciampitti, K-State Research and Extension.

Planting progress overview

Kansas farmers have been planting soybeans slightly earlier in recent years -- at the rate of about one-third day earlier every year (Figure 2). Statewide, in the past five growing seasons (2017-21), the "50% planting date" mark was achieved between the end of May (for the most recent decade) and the first of June (in the 1980's). The earliest date achieving half of the beans planted was May 12 in 2014, while the largest delay was June 28 in 1982.

Following the latest USDA Crop Progress and Condition report (June 6, 2022), soybean planting is progress is equal to the 2017-2021 average.

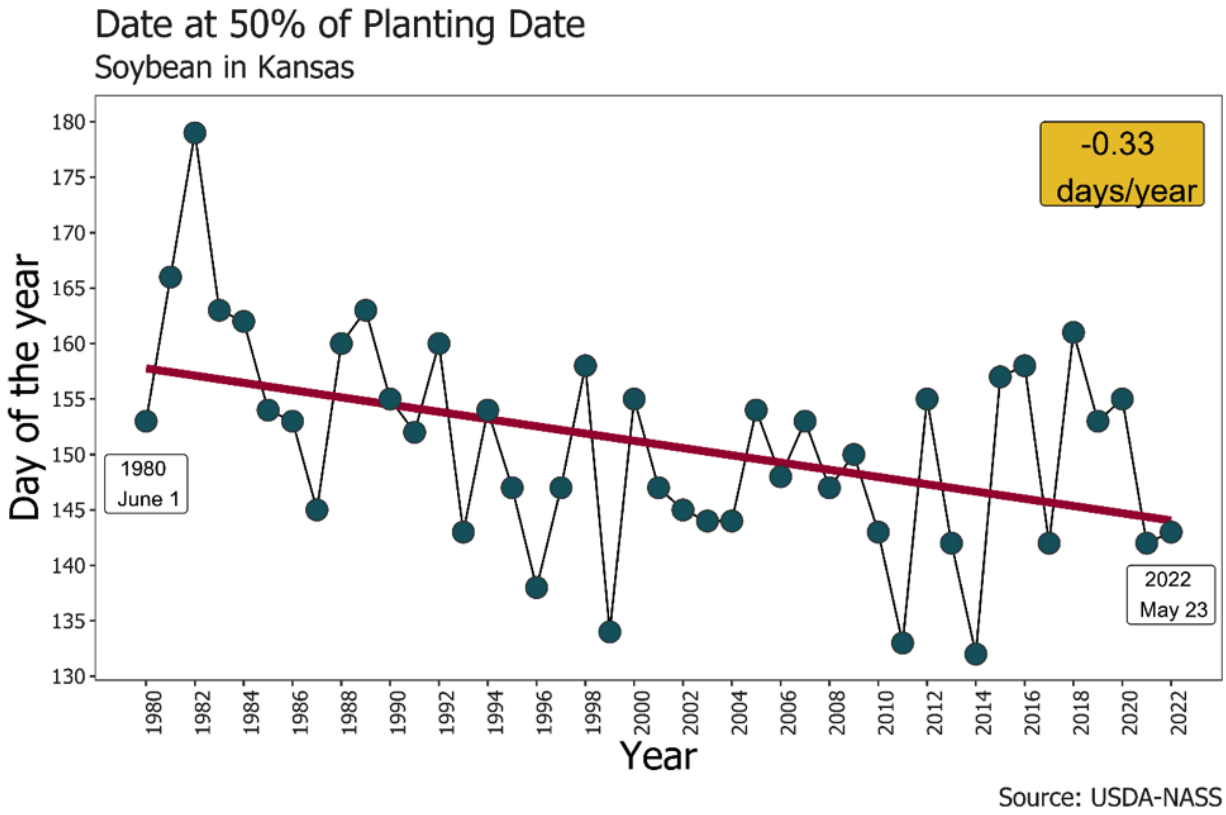


Figure 2. Trend in the date at which 50% of planting progress was achieved for soybean from 1980 to 2022 in Kansas (the last four decades of soybean progress in Kansas). Source: USDA-NASS.

Considerations for Late Planting

Where soybean planting has been delayed (or in double crop soybean systems), producers should consider a few key management practices. Planting soybeans in the right soil conditions is essential for establishing an adequate soybean canopy and improving chances to increased yield potential.

Planting date and maturity group

By planting in early June, soybeans are expected to bloom and fill seed from mid-August to-mid-September, when nights are cooler, and the worst of heat and drought stress is usually over.

From mid-April to mid-July, maximum soybean yield in Kansas is reduced by 0.3 bu/a per day of delay past mid-April, from yield levels about 80-90 bu/a to ~50 bu/a (Figure 3). On the other hand, the yield variability-range is expected to narrow down as planting date is delayed, which may result in an improved yield "stability" for late-planted soybeans (although achieving a lower maximum yield). More information related to this topic available at https://eupdate.agronomy.ksu.edu/article_new/soybean-planting-date-and-maturity-group-selection-490

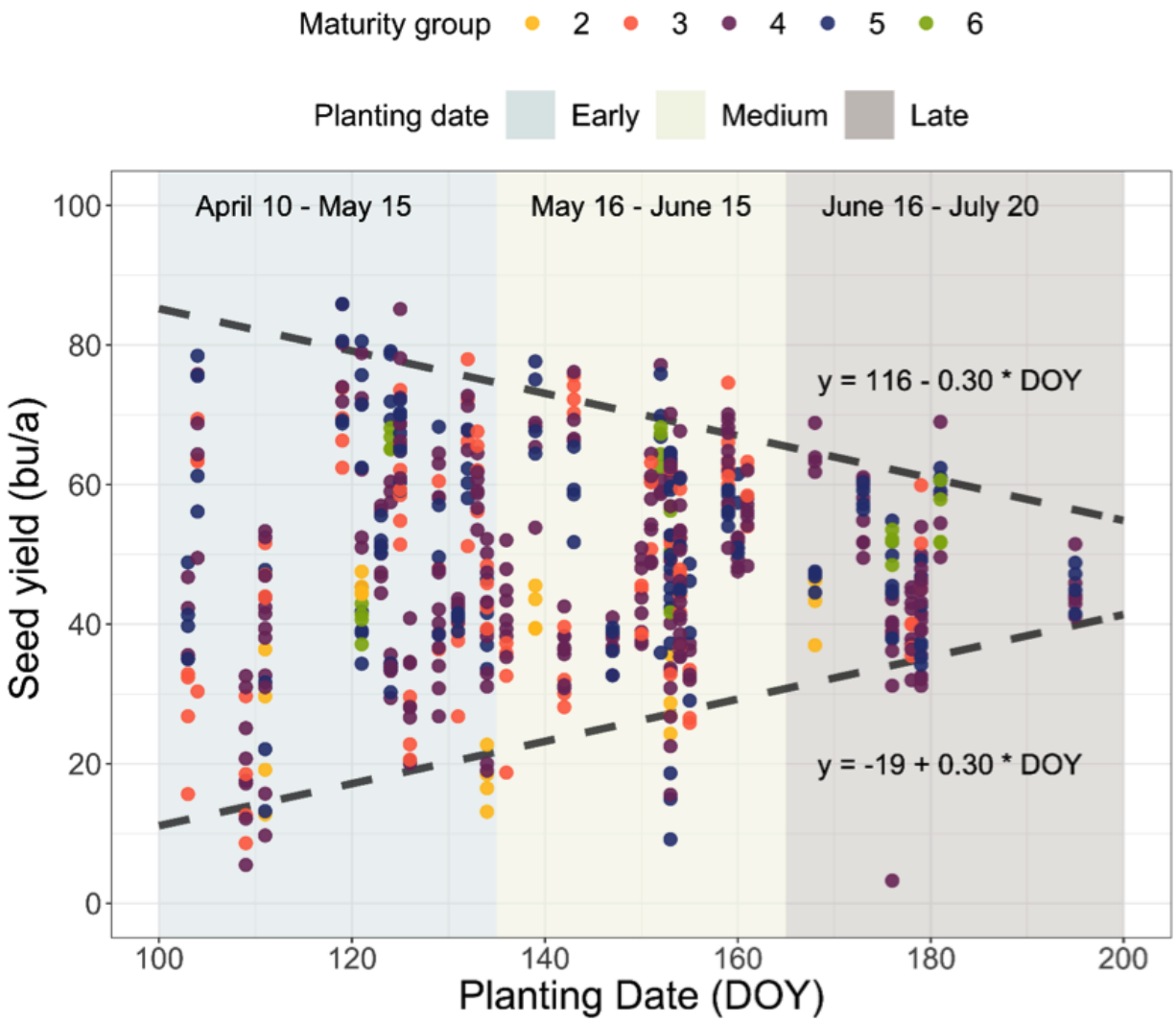


Figure 3. Soybean seed yields as a function of planting date from Early (mid-April to mid-May) to Medium (mid-May to mid-June) to Late (mid-June to mid-July) for a diverse set of maturity groups (from Maturity Group 2 to 6).

Seeding rate and plant density

Increasing the seeding rate of late-planted soybeans by 10-20% as compared to the optimal seeding rate can help compensate for the shortened growing conditions. The same soybean cultivar planted early in the planting window, under normal conditions, will develop nearly 50% more productive nodes than when planted in late June: 19-25 nodes when planted early vs. 13-16 nodes when planted late.

Soybean emergence could be delayed or compromised where there has been an excessive amount of rainfall in recent weeks. Replanting soybeans should be reserved only for exceptional cases where

the stand counts and the uniformity look seriously affected. Otherwise the cost of replanting is unlikely to pay off. Initial assessments should be done by the cotyledon stage (VC) and a week or so after the initial damage to assess the overall condition of plants and potential issues related to lack of uniformity, which could be a problem when stands are severely reduced.

It is crucial to ensure final plant populations are not too far from the optimal levels. In medium and high yield environments, yields begin to decline at stands of less than ~100,000 plants per acre. In low yield environments, however, yields may begin to decline at stands of less than ~125,000 plants per acre. At optimal planting dates, yields can be reduced by up to 15% with a stand of 80,000 plants per acre. This may be exacerbated under late planting dates due to the reduced capacity of the plants to produce compensatory yield growth, for example via branches.

For more on this topic, check this our eUpdate article on "adjusting seeding rates for soybeans"

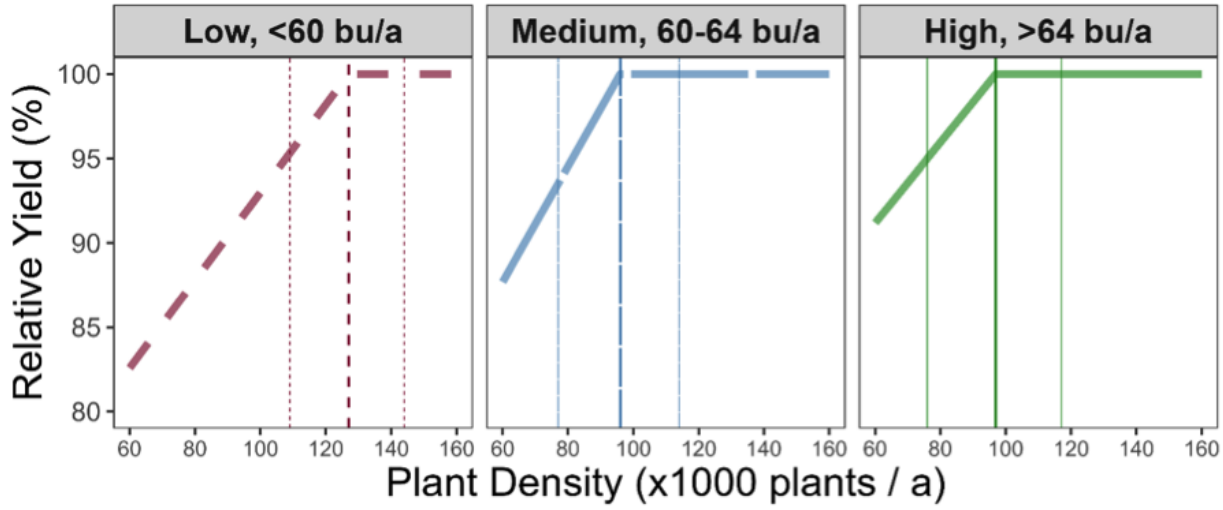


Figure 4. Expected soybean relative yield (%) with respect to the optimal plant density by yield environment. Vertical lines indicate expected optimal plant densities (Low: 127,000 plants/a; Medium: 96,000 plants/a; High: 97,000 plants/a) and their corresponding uncertainty (95% intervals). Adapted from Carciochi et al. (2018).

Row spacing

Information on late-planted soybeans across multiple row spacing suggests that narrow rows (e.g. 7" or 15" vs. 30") can hasten canopy closure, increasing season-long light interception, weed suppression, and potentially improving biomass and final yield. The likelihood of a positive yield response to narrow rows increases as the yield environment lowers (Figure 5), for example with delayed planting. For more details on this topic, check our eUpdate article on "soybean row spacing".

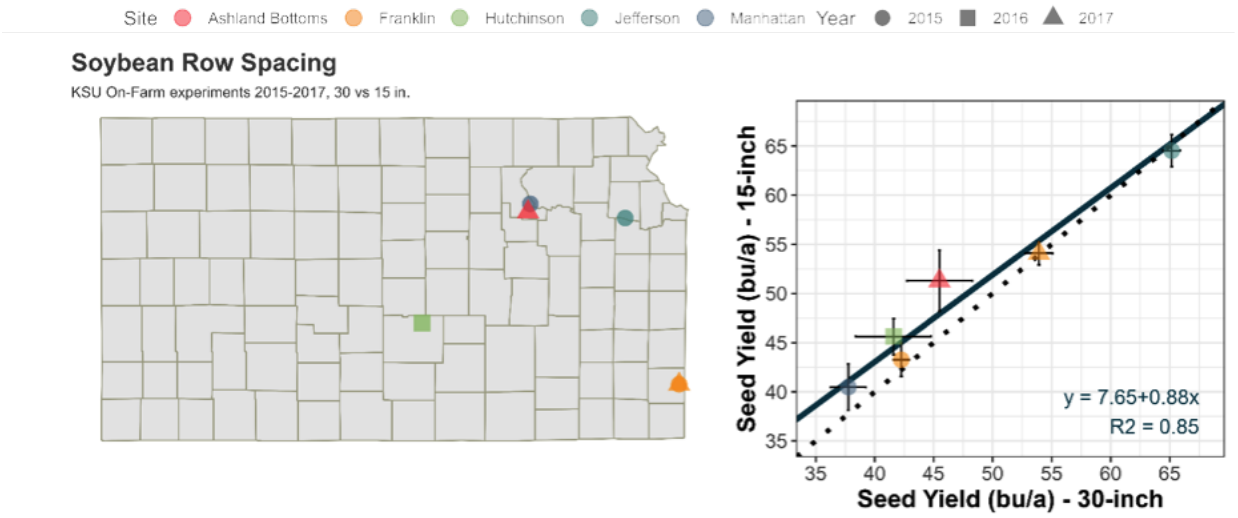
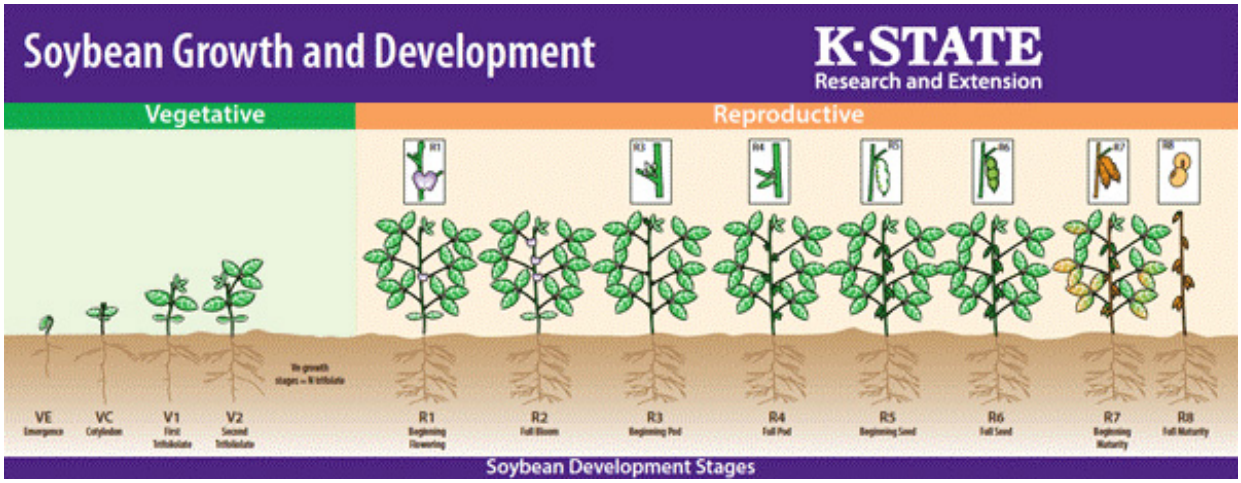


Figure 5. On-farm experiments on soybean row spacing comparing conventional (30-inch) vs. narrow rows (15-inch). Collaborators: Kansas State University, United Soybean Board, North Central Soybean Research Program.

Finally, proper identification of soybean growth stages can make a difference in yield. Consult our soybean growth and development chart at:

https://www.bookstore.ksre.ksu.edu/pubs/MF3339.pdf



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7. Control options for roughleaf dogwood and smooth sumac

Two common brush species native to Kansas and widely spread across the state are roughleaf dogwood (*Cornus drummondii*) and smooth sumac (*Rhus glabra*).

Roughleaf dogwood is a shrub that can reach 15 feet in height. Flat-topped clusters of white flowers usually appear in late May to early June. The round white fruits appear in September to October. Roughleaf dogwood occurs in fencerows, edge of woods, along streams, and open prairies. It provides cover for wildlife and nesting birds.

Smooth sumac will grow to a height of 5-7 feet and produces an open milo-like head in early June Leaves are odd-pinnately compound and turn to bright red in the fall. The round red fruits are produced by August to September. It grows on rocky soils in pastures and along fencerows. Some birds will eat the seed and the plants provide cover for birds and mammals.

These shrubs can produce clumps that will shade out and reduce forage production. Cattle generally do not browse on these species. Sheep and goats are more likely to utilize these woody plants.

Be on the lookout for roughleaf dogwood and smooth sumac and implement a control plan if needed.

Roughleaf dogwood control

Roughleaf dogwood is rarely grazed and invades grassland in the absence of prescribed burning. Pastures that are frequently burned usually do not have a roughleaf dogwood problem. A Konza Prairie study near Manhattan indicated that roughleaf dogwood increases dramatically on grazed or ungrazed watersheds with a burning frequency of 4 years, compared to annual burning. Once established, roughleaf dogwood is difficult to remove with fire alone as the plant usually leafs out after the burning season. Long-term late-spring burning may gradually reduce stands of roughleaf dogwood.

The optimum time to spray roughleaf dogwood is between the flower bud state and early seed production (Figure 1). A number of foliar-applied herbicides including triclopyr (Remedy Ultra), dicamba (Banvel), and picloram (Tordon 22K) used alone or in combination with 2,4-D will defoliate roughleaf dogwood, but actual mortality is usually less than 25%.

Roughleaf dogwood can be difficult to control. High-volume treatments providing greater than 50% mortality include 0.5-1% PastureGard HL (triclopyr + fluroxypyr), 1% Surmount (picloram + fluroxypyr), and 1% Grazon P+D + 0.5% Remedy Ultra (picloram + 2,4-D + triclopyr). All these herbicides are applied with water. Adding a 0.25 to 0.5% v/v non-ionic surfactant may enhance control. Aerial applications should be applied in a minimum 3 gallons per acre total spray solution to insure adequate coverage.

A single application of any herbicide does not completely eliminate roughleaf dogwood, but may open up the stand enough to carry a fire. In subsequent years, a combination of prescribed burning in the late spring followed by a herbicide application 4-6 weeks post burning should provide good control.

Figure 1. Roughleaf dogwood in full bloom. Photo by Walt Fick, K-State Research & Extension

Smooth sumac control

Late-spring burning will keep smooth sumac shorter in stature, but generally increases stem density. The optimum time to spray smooth sumac is between the flower bud stage and early seed production (Figure 2). Smooth sumac is among the easiest woody plants to control with herbicides if applied at the proper time. Smooth sumac is controlled with 2-3 pint/acre 2,4-D with ground or aerial application.

Figure 2. Smooth sumac in early seed production stage. Photo by Walt Fick, K-State Research & Extension

Measures that can mitigate both roughleaf dogwood and smooth sumac

Soil-applied materials such as Spike 20P (tebuthiuron) and Pronone Power Pellets (hexazinone) can provide control of roughleaf dogwood and smooth sumac. Spike 20P should be applied during the dormant season at 0.75 ounces product per 100 square feet. This is equivalent to 20 pounds of product per acre. Pronone Power Pellets should be applied when the soil is moist and rainfall is expected within 2 weeks of application. For plants 3-6 feet tall apply 2-4 pellets at the base of the plant. Expect to see grass damage following use of Pronone Power Pellets. These dry soil-applied products may be useful in areas where spray drift may cause considerable non-target damage.

Growing season burns, e.g. in August, have the potential to reduce stands of roughleaf dogwood and smooth sumac.

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