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Research and Extension

Kansas Sorghum Management 2022

MF3046 | Crop Production

This publication helps producers manage their sorghum crop as efficiently and profitably as possible under Kansas growing conditions. Recommendations should be considered as guidelines and must be tailored to situations based on the cropping system, soils, and weed populations encountered in that field.

Tillage and Rotations

Uniform residue distribution, effective weed control, proper seed placement, correct planter adjustment, soil testing, and fertilizer management are important for success in conservation-tillage systems. Sorghum grown under no-tillage, when compared with tillage operations, shows a consistent benefit.

Crop sequencing and rotation are important in systems with little or no tillage and greater amounts of surface residue. Long-term research has documented greater yield gains for rotated sorghum versus continuous sorghum in no-till (9 to 16 bushels per acre) compared to conventional tillage (2 bushels per acre).

Hybrid Selection

Base hybrid selection on maturity, resistance to pests (insects and diseases), and stalk strength, but also consider head exertion, seedling vigor, and hybrid performance. Hybrid maturity is related to the probability of entering physiological maturity one to two weeks before the first freeze. A hybrid is physiologically mature when its black layer forms (black line at the grain base), which coincides with the cessation of dry matter accumulation (Figure 1). Use a shorter-season hybrid when late planting occurs, mid-June in north central or northwest Kansas, late June in south central and southwest, or July in eastern Kansas. When planted early, long-season hybrids are recommended for making use of the full length of the growing season (greater yield potential).

Standability is a positive trait. When possible, harvest fields that have stalk strength problems first. Plant so blooming occurs in favorable conditions, avoiding hot/dry weather, but allow time for maturing. To diversify risk, plant hybrids with different maturities to minimize the effect of adverse environments. The full exertion trait is preferred due to improvements in grain set and lower susceptibility to biotic stress (e.g. mold).

Planting Practices

Planting date. Grain sorghum can be planted over a wide range of dates. Time planting so flowering avoids the hottest, driest period of summer but still allows time to mature before frost.

Row width. Row spacing influences productivity when sorghum yields are greater than 70 bushels per acre. Under low-yielding environments, conventional (30-inch) row spacing seems to be the best option.

Clump planting demonstrates a similar but inverse relationship in water-limited conditions. Clump planting shows similar or better yield response than uniformly spaced plants with yields below 80 bushels per acre. Above 80 bushels per acre, the uniform plant arrangement outyields clump planting. Seeding rates for clump planting should be similar to those recommended for uniform spacing.

Figure 1. *Grain moisture dry down across different sorghum hybrids for a study located near Manhattan, Kansas (2019 growing season). Horizontal dashed lines marked the 34% grain moisture at black layer formation and 17% grain moisture around harvest time.*

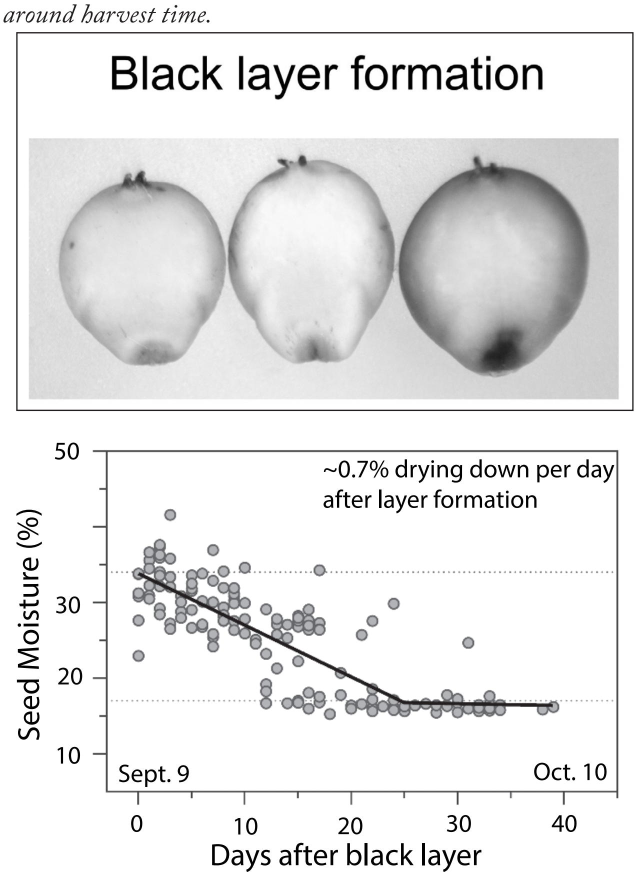


Table 1. *Grain sorghum recommended plant and seed spacings.*

	Average annual rainfall (inches)				
	<20	20–26	26–32	>32	Irrigated
	Target plants per acre (x 1,000)				
	23-27	25–45	35–55	50–90	80-110
	Seeds/acre (x 1,000; 70% emergence)				
	30–35	35–64	50–80	70–125	110-150
Row Spacing	Within-row seed spacing at planting assuming 70% field emergence				
8-inch	26–22	22–12	16–10	11–6	7–5
10-inch	21–18	18–10	13–8	9–5	5–4
15-inch	14–12	12–7	8–5	6–3	4–3
20-inch	10–9	9–5	6–4	4–2	3–2
30-inch	7–6	6–3	4–3	3–2	2–1

Table 2. *Seed size factor, average seed weight and seeds per pound as related to the crop condition.*

Yield Range (bu/a)	Crop Condition	Average Seed Weight (g/1,000)	Seeds Per Pound
<50	Very Poor	24.5	18,520
50-100	Poor	25.5	17,793
100-150	Fair	26.2	17,318
150-200	Good	25.6	17,723
>200	Excellent	25.5	17,793

Seeding rate. When seeding in narrow rows in high-yielding environments, populations 25 to 30% higher than recommended in Table 1 may increase yields. Higher seeding rates should be used with later planting dates because sorghum's vegetative stages grow fewer productive tillers during warmer growing conditions.

Sorghum plants can compensate for differences in stand, with more heads per plant and/or more grains per head. High plant densities produce fewer tillers and thinner stems, increasing susceptibility to drought/lodging.

Nonuniform stands and replanting. Sorghum yields are not reduced unless gaps are at least 9 feet long or a sufficient number of 3-foot to 6-foot gaps reduce stands by 30% or more.

Estimation of yields before harvest. Perform yield estimation three to four weeks after flowering (see examples in inset). Both grain number and weight can change from this point to the end of the season, although estimations will be more precise as the crop matures. The on-farm approach consists of counting the total number of heads in a 17.4-foot length of row (one row for 30-inch, two rows for 15-inch, and four rows for 7.5-inch row spacings). Only heads more than 3 inches in length should be counted. Two more steps need to be added: estimation of the grains per head and grain weight. Total number of grains is the main factor driving yields, while the grain weight is not well correlated with yields (Table 2). Dry and hot conditions greatly affect grains per head, but if conditions improve during grain fill, grain weight can compensate to a limited extent.

Example A: *Good Crop Condition*
((62 heads × 2,500 seeds per head × 1,000) ÷ 17,723) ÷ 56 = 156 bushels per acre

Example B: *Very Poor Crop Condition*
((40 heads × 900 seeds per head × 1,000) ÷ 18,520) ÷ 56 = 35 bushels per acre

Rate of Dry Down in Sorghum before Harvest

Sorghum dry-down rate is similar to corn, at 1% per day. For sorghum, grain water loss can be divided in two phases: i) after black layer formation with linear phase of seed moisture loss and ii) plateau, when seed moisture reached a constant value, close to commercial harvest moisture. Depending on the weather conditions, grain moisture can drop from black layer to commercial harvest in three to four weeks (less than 1% per day). The sorghum dry-down rates are mainly affected by temperature, humidity, and overall water content at black layer formation. These factors should be considered when the time comes to schedule sorghum harvest.

It is expected that the dry-down rate will decrease to less than 0.5% per day for late-planted sorghum to be harvested later in the growing season. A similar decrease is also expected for sorghum that was exposed to late-season stress conditions (e.g., drought, heat, and freeze). Under these conditions, maturity may be reached with high grain-water content and the last stages after black layer formation could face lower temperatures and higher humidity. These main factors should be considered when the time comes to schedule harvest.

Weed Management

Weed control in sorghum is a challenge and best achieved with an integrated approach using crop rotation, good crop production practices, herbicides, and if required, tillage to enhance the ability of sorghum to compete with weeds. Crop rotation is the most effective control method for shattercane, johnsongrass, and sandbur because different crops require different timing and types of herbicides and tillage. Timely herbicide applications that provide good weed control in rotational crops and during fallow periods are essential to reduce the weed seed bank of these species to manageable levels. Rotations with crops that allow the use of preemergence and postemergence grass herbicides can prevent seed production during that growing season. Because seed viability for many grassy weeds is relatively short, controlling grasses for four to five years greatly reduces the grass weed pressure in future growing seasons.

A preemergence herbicide with good grass activity is essential for adequate control of annual grassy weeds in grain sorghum. Sorghum should remain weed free for the first four to five weeks after planting to prevent yield loss from weed competition. Do not plant grain sorghum in fields infested with shattercane, johnsongrass, or sandbur.

Successful control of broadleaf weeds requires planting sorghum into a weed-free environment and implementing other practices that promote sorghum emergence before weed emergence. Timely postemergence applications (about 21 days after planting), following a preemergence herbicide, provide the most effective weed control.

In many cropping systems, grain sorghum is no-till planted into wheat or soybean stubble. In these situations, it is essential to control all actively growing weeds with a burndown herbicide before planting sorghum. A tank mix of glyphosate (Group 9) and 2,4-D (Group 4) or dicamba (Group 4) applied at least one week before planting have historically provided excellent broad-spectrum weed control in wheat stubble. In areas with glyphosate-resistant kochia and pigweed, the use of paraquat (Group 22) has been an effective burndown treatment, provided good spray coverage is achieved. Atrazine (Group 5) plus another residual herbicide applied in late September through November can help control glyphosate-resistant horseweed, as well as winter annual weeds and volunteer wheat to keep the field relatively weed free for no-till sorghum planting the next spring. Add glyphosate if winter annual grasses are present, and 2,4-D or dicamba for adequate winter annual broadleaf weed control, depending on the species present. Fall applications provide better control of henbit, field pansy, and glyphosate-resistant horseweed than spring applications.

Soil-applied preemergence herbicides such as *S*-metolachlor (Dual II Magnum, others), dimethenamid-P (Outlook, others), and acetochlor (Warrant, others) are Group 15 herbicides that can provide excellent residual control of grasses (except johnsongrass, shattercane, and sandbur) and pigweed, but require planting sorghum seed treated with a Concep III safener. These herbicides are most effective when applied with atrazine or herbicides with other sites of action and often are marketed in a premix.

Saflufenacil is a Group 14 herbicide that provides burndown and some residual control of broadleaf weeds. One to 2 ounces per acre of Sharpen (saflufenacil) or 5 to 10 ounces of Verdict (Sharpen + Outlook) may provide one to two weeks residual broadleaf weed control including control of large-seeded broadleaf weeds. If saflufenacil is used to control emerged broadleaf weeds, include methylated seed oil at 1 pint per acre and an ammonium fertilizer (AMS or UAN) to optimize activity. The best control will be observed if saflufenacil is tank mixed with one of the VLCFA/atrazine premixes.

Lumax EZ, Lexar EZ, and Halex GT contain the Group 27 herbicide mesotrione (Callisto, others). The use of these premixes can provide excellent control of grasses and broadleaf weeds, including velvetleaf, pigweed, and kochia. Do not use mesotrione in grain sorghum on sandy soils because of excessive risk of crop injury and stand loss. Do not apply mesotrione to emerged grain sorghum.

Apply postemergence herbicides to small weeds for optimum weed control within 21 days after planting. Bromoxynil (Buctril, Moxy, and others), carfentrazone (Aim and others), Huskie, and atrazine all control weeds through foliar contact and do not readily move through the plant; therefore, weeds may recover even after losing their leaves. This is especially true when larger weeds are treated. Contact herbicides are most effective when applied with higher spray volumes (up to 20 gallons per acre).

Systemic herbicides such as 2,4-D, dicamba, Starane Ultra, Kochiavore, Peak, Permit, Facet L, Ally+2,4-D, and Yukon are translocated from the leaf surface throughout the plant and are most effective on small annual broadleaf weeds and can be effective on perennial weeds. Facet L effectively controls field bindweed. Permit and Yukon are effective at controlling yellow nutsedge. Several generic herbicides contain these active ingredients.

Dicamba (Clarity, generics) and 2,4-D are among the least expensive herbicides for postemergence broadleaf weed control in sorghum. These growth regulator herbicides often cause temporary leaning and brittleness in sorghum, which makes plants more vulnerable to wind and cultivator damage. Use drop nozzles when applying to sorghum taller than 8 inches. Application of 2,4-D or dicamba after sorghum exceeds 15 inches tall may result in sterility and severe yield reduction. Adding AMS to tank mixtures containing dicamba increases the risk of dicamba volatility and reduces the value of the lower volatility formulations.

Postemergence options for grass control in sorghum are limited. Inzen and igrowth sorghum are two herbicide-resistance traits that allow the use of specific ALS-inhibiting (Group 2) herbicides in grain sorghum. Inzen hybrids allow postemergence application of Zest (nicosulfuron), which is effective on some key grass species. igrowth hybrids allow the either pre-emergence or postemergence application of IMIFLEX (imazamox), which will control some key grass and broadleaf weeds. Neither Zest nor IMIFLEX will control ALS-resistant weeds. In addition, care should be taken to ensure that Inzen and igrowth hybrids do not cross-pollinate with johnsongrass or shattercane to slow the development of ALS-resistance in these species. Do not apply Zest to non-Inzen sorghum or IMIFLEX to non-igrowth sorghum, as these herbicides will kill sorghum that is not resistant. Do not plant sorghum of any type for 18 months following a Zest application. DoubleTeam grain sorghum hybrids allow postemergence application of the herbicide FirstAct (quizalofop, Group 1). FirstAct will control many grass species, but, similar to Zest and IMIFLEX, FirstAct is not labeled for control of johnsongrass or shattercane. In addition, FirstAct will not control any broadleaf weeds, so additional herbicides will be needed to control pigweeds, or other broadleaf species. However, grass control by FirstAct is reduced by many tank mix combinations.

All postemergence herbicide applications in sorghum benefit from inclusion of a Group 15 herbicide to provide a layered residual until the grain sorghum achieves canopy cover.

See K-State's *2022 Chemical Weed Control of Field Crops, Pastures, Rangeland, and Noncropland, SRP1169* for more herbicide and weed control recommendations (*bookstore.ksre.ksu.edu/pubs/chemweedguide.pdf*).

Irrigation Management

Grain sorghum peaked in popularity as an irrigated crop in the early to mid-1980s but remains as one of the top five irrigated crops in Kansas. About 3% of the 3 million irrigated acres in Kansas are planted to irrigated grain sorghum annually.

The statewide average yield of grain sorghum has been increasing at about 0.6 bushels per acre since 1974, reaching a statewide average of 100 bushels per acre for irrigated production. In 2014, the highest yields in the K-State irrigated grain sorghum performance tests at the Colby, Garden City, and Tribune test sites were 226, 193, and 209 bushels per acre; the average test yields of the tests were 184, 146, and 163 bushels per acre respectively. From 2008 through 2014, the average bushel per acre yield of the top five performing varieties for each of the locations was 181 at Colby, 150 at Garden City, and 175 at Tribune.

Grain sorghum uses about 18 to 26 inches of water to produce a normal yield in the western part of Kansas. Requirements are less in the eastern part of the state due to higher relative humidity and lower wind speeds. The amount of irrigation needed depends on the season and the amount of soil water stored in the root zone. Dry-year-irrigation estimates for grain sorghum range from about 15 inches in southwest Kansas to less than 7 inches in southeast Kansas. Irrigation estimates for years with average rainfall are from about 13 inches in the west to 4 inches in the east. These estimates are for well-watered conditions.

Factors determining water requirements include planting date and maturity length. Grain sorghum is generally one of the later-planted summer crops. Average peak water-use rates are about 0.3 inch per day, although occasionally a single-day peak use might approach 0.5 inch, similar to the peak use rate of any field crop at full cover and active growing conditions.

A crop-production study conducted at Garden City from 2006 to 2012 examined multiple crop rotations including grain sorghum following wheat. The precipitation varied over the years, including above-average years in 2007 and 2009 and drought years in 2011 and 2012. The data show that about 6 inches of water are needed to initiate grain yield and yield increases linearly with water use at a rate of about 10 bushels per inch of water use. The amount of irrigation water needed to achieve various yield levels is seasonally dependent, as shown in Figure 2. Note, in wetter years, close to maximum yields were achieved with 7 or 8 inches of irrigation water, while during drought years around twice as much irrigation was needed to achieve the same

Figure 2. *Yield response of grain sorghum at various levels of crop water use at Garden City, KS shown by years.*

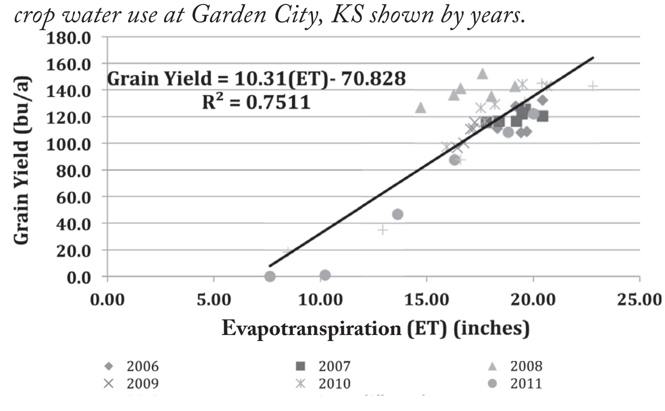
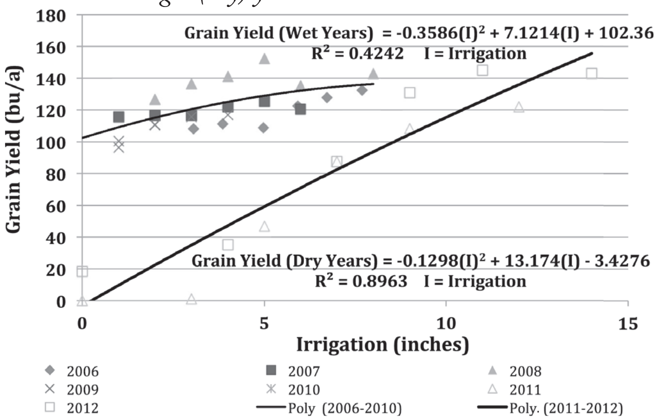


Table 3. *Average water use and grain yield (2001–2008) of grain sorghum as affected by irrigation amount, Southwest Research–Extension Center – Tribune Unit.*

Irrigation Amount (acre-inches)	Seasonal Water Use (inches)	Yield (bu/a)	Water Use Efficiency (lb inch)
5	19.09	94	276
10	22.40	111	278
15	25.44	123	271

Figure 3. *Yield response of grain sorghum at various levels of irrigation at Garden City, KS shown by years. Years 2006 – 2010 are near average or above precipitation (wet) years. 2011 –2012 are drought (dry) years.*



yield levels (Figure 3). The year-to-year and in-season variability indicates the need for an irrigation scheduling procedure for effective water management. Grain sorghum's low water use requirement for yield initiation, and its ability to maintain water productivity under limited irrigation (see Table 3) makes this crop a good option for irrigators with low-capacity wells or limited water.

Fertilizer Requirements

Sorghum is considered extremely efficient in using nutrients from the soil because of its large, fibrous root system; however, profitable responses to fertilization can be expected on many soils. Total nutrient uptake by sorghum is similar to that of corn at comparable yields. Nutrient removal when harvesting only the grain at maturity is lower compared to harvesting the entire crop for silage or forage (Table 4).

Fertilizer and lime requirements can best be determined by soil tests with supporting experience and field-history information. Accurate soil tests can generate crucial information allowing for significant savings on fertilizer, resulting in a substantial increase in profitability, given the current record high fertilizer prices.

Nitrogen is the most frequently lacking nutrient. Nitrogen recommendations vary with expected yield, soil texture, and cropping sequence.

To use accumulated available soil nitrogen, use a *profile nitrogen* soil test to adjust fertilizer nitrogen. Take profile samples at a depth of 2 feet. The profile nitrogen test can be particularly useful during drought conditions when potentially large amounts of residual nitrogen can be present in the soil from previous crops. Nitrogen uptake can be limited for failed crops or crops with low yield and growth. Nitrogen not taken up by the crop will likely remain in the soil and can be available for subsequent crops. If plant growth was nearly normal, however, most of the nitrogen may be in the biomass and not in the soil. In this case, nitrogen will be released after residue decomposition. Cropping sequence is important in determining the optimum nitrogen rate. Legumes grown in rotation with sorghum can provide *nitrogen credits*. For example, alfalfa can contribute up to 120 pounds of nitrogen per acre depending on stand age and condition.

Table 4. *Nutrient content of 140 bushel per acre grain sorghum crop.*

Plant Part	Nitrogen lb	Phosphorus lb P_2O_5	Potassium lb K_2O	Sulfur lb
Grain	120	60	30	14
Stover	80	16	120	12
Total	200	76	150	26

Field comparisons of *nitrogen sources* indicate little agronomic difference between sources when properly applied. For no-till or reduced-till systems that leave almost a complete residue cover, inject materials containing urea below the residue to minimize volatilization and immobilization losses. If urea or urea-containing nitrogen is surface applied and not incorporated — or it does not receive more than 0.25 inch of rainfall or irrigation — ammonia loss might occur. Enough ammonia loss to reduce crop yields can occur when urea or UAN is applied to a warm, moist soil heavily covered with crop residue. Base the nitrogen source on application cost, availability, adaptability to farm operation, and dealer services.

Various *nitrogen application timings* can have equal results for grain sorghum on most soils. Time the applications so nitrogen is available when needed for the rapid growth between the five-leaf and boot stages. Preplant nitrogen applications can be made in late fall or spring (except on sandy soils) with little leaching loss. On sandy soils, delay preplant nitrogen applications until spring, sidedress, or split (spring and sidedressed). Make sidedress nitrogen applications no later than shortly after the five-leaf stage.

Active optical sensing systems used at 35 to 45 days after planting can provide more accurate nitrogen recommendations. Producers may want to apply a base level of nitrogen at planting followed by a side-dressed application determined by sensor readings.

Base phosphorus applications on a soil test. Consistent responses to phosphorus fertilization generally occur on soils testing very low or low in available phosphorus where yield potential is not restricted by low rainfall. With medium-testing soils, responses have been erratic and normally small. Phosphorus applications are recommended on medium-testing soils for their potential yield response and to maintain a highly productive soil. Phosphorus recommendations are shown in Table 5.

Phosphorus can be applied using several *placement methods*: preplant-broadcast, preplant-knifed, or banded at seeding. Starter applications are most efficient when small amounts are applied on soils low in soil test phosphorus. Starter applications can be placed in direct contact with the seed or placed to the side and below the seed. If placed in contact, the starter material should contain no more than 10 pounds of nitrogen plus potash per acre to prevent reductions in germination (for 30-inch row spacing). Do not place urea or ammonium thiosulfate in direct contact with seeds.

As with phosphorus, a soil test is the best guide to assess potassium needs (Table 6). Consider additional *potassium* in cropping sequences including forage sorghum. Potassium deficiencies are most likely to be found in soils with shallow rooting depths and on sandy soils.

Potassium placements include preplant-broadcast, preplant-knifed, or banded at seeding. The most common potassium source is muriate of potash (potassium chloride); however, potassium sources differ little in potassium availability. Base the selection on cost, availability, and adaptability to the farm operation.

Adequate potassium is essential for sturdy stalks. Research shows potassium fertilization reduces lodging on medium- to low-testing soils. Recent research shows adequate chloride may be as important as potassium in stalk strength. Potassium chloride at 30 to 40 pounds per acre supplies adequate chloride.

Table 5. *Phosphorus sufficiency recommendations for grain sorghum.*

	Yield Goal, bu/a				
Soil Test P	40	80	120	160	200
(ppm)	lb P_2O_5/a				
0-5	50	55	60	65	70
5-10	35	40	45	45	50
10-15	20	25	25	30	30
15-20	15	15	15	15	15
20+	0	0	0	0	0
Crop Removal	16	32	48	64	80

Table 6. *Potassium sufficiency recommendations for grain sorghum.*

	Yield Goal, bu/a				
Soil Test K	40	80	120	160	200
(ppm)	Lb K_2O/a				
0-40	75	80	85	90	95
40-80	45	50	55	60	60
80-120	20	20	25	25	25
120-130	15	15	15	15	15
130+	0	0	0	0	0
Crop Removal	10	21	31	42	52

Do not apply high rates of potassium for insurance against lodging. With proper levels of all nutrients, fertilization and good crop-management practices are the best way to minimize lodging.

For many grain crops, *chloride* has been reported to suppress plant disease organisms or improve overall plant health, allowing the plant to withstand infection. Chloride responses have been noted even in absence of disease, suggesting some soils may not be able to supply needed amounts of chloride. Soil test calibration experiments have shown that when soil profile test chloride levels (0 to 24 inches) are less than 45 pounds per acre, responses to applied chloride are likely and may require some chloride fertilizer. Chloride is mobile in soils, similar to nitrogen.

Lime recommendations should maintain productive soils. Sorghum is not the most responsive crop to lime but remember to lime acidic soils. Although yield increases may be small, very low pH levels can cause aluminum toxicity. Lime is recommended for sorghum on soils with a pH below 6.4 in southeast Kansas and pH 5.8 or less in central and western Kansas.

Research demonstrates a need for some *secondary nutrients* and *micronutrients* (e.g. zinc and iron) in some situations, but others are typically not yield-limiting. Calcium and magnesium are relatively abundant in most Kansas soils. Liming acidic soils supplies sufficient calcium, and a deficiency of this element would not be expected. Research with boron, copper, and manganese has not revealed consistent responses.

Sulfur may be lacking on sandy soils low in organic matter (less than 1.5%). On irrigated sandy soils, sulfur would be of concern only when irrigation water is low in sulfur. Much of the irrigation water in the central Great Plains contains an appreciable amount of sulfur. Corroborate levels with a lab test. Current sulfur soil tests, when used alone, are poor predictors of sulfur deficiency. In sandy soils with low organic matter and a low sulfate soil test, try sulfur to ascertain the likelihood of a sulfur response.

See K-State Research and Extension publication *Soil Test Interpretations and Fertilizer Recommendations, MF2586, (bookstore.ksre.ksu.edu/pubs/MF2586.pdf)* for more fertilizer recommendations.

Diseases

Grain sorghum diseases vary in severity from year to year and from one locality or field to another, depending on the environment, pathogens present, and hybrid susceptibility. Estimates of annual sorghum yield losses to disease in Kansas average less than 10%.

The eradication of diseases is not economically feasible, so try to minimize losses using an integrated pest management approach. Planting resistant hybrids, providing adequate fertility, and rotating crops help minimize disease losses.

Sorghum diseases of concern in Kansas are listed in Table 7. Of the foliar diseases caused by fungi in Kansas, only sooty stripe and rust cause occasional economic yield loss. Management relies on selecting resistant hybrids and using cultural practices such as crop rotation and the incorporation of residue where no-till is not practiced. Fungicides are available for use on sorghum, but results from university trials have been inconsistent.

Bacterial leaf diseases have not been shown to cause yield losses in Kansas, but they are generally present in some fields every year, particularly under cool, wet conditions. The presence of bacterial stripe caused by *Burkholderia andropogonis*, can cause phytosanitary certification problems for grain that may be destined for export to certain trade partners.

In addition to sooty stripe and rust, only seedling blights, stalk rots, and grain molds are likely to cause economic yield losses. Crazy top downy mildew and sorghum downy mildew occasionally cause significant yield loss in individual fields or small areas of a field in years with excessive moisture early in the season. Sorghum ergot infection is rare in Kansas except in hybrid seed production fields and occasionally forage sorghum fields. When it does occur, it can cause significant harvesting problems because the sticky honeydew produced can bind up combines, forage cutters, and augers.

Sorghum also is susceptible to many physiological leaf spots. These can be confused with other commonly occurring foliar diseases, so use caution when making a diagnosis. University plant disease diagnostic laboratories can help make positive disease identifications.

See *Stalk Rots of Corn and Sorghum, www.plantpath.k-state.edu/extension/publications/field-crops/corn-sorghum-stalk-rot-L741.pdf; Diagnosing Sorghum Production Problems in Kansas, S125, www.bookstore.ksre.ksu.edu/pubs/S125.pdf; and Sooty Stripe of Sorghum, www.plantpath.k-state.edu/extension/publications/field-crops/sorghum/sooty-stripe-of-sorghum.pdf* for specific sorghum disease information and descriptions.

Table 7. *Grain sorghum diseases.*

Seed Rots and Seedling Blights	Pythium Blight Fusarium Blight
Stalk Rots	Fusarium Stalk Rot Charcoal Rot
Foliar Fungal Diseases	Sooty Stripe Northern Corn Leaf Blight Rust Gray Leaf Spot Rough Spot
Foliar Bacterial Diseases	Bacterial Stripe Bacterial Streak
Other	Sorghum Downy Mildew Crazy Top Downy Mildew Sorghum Ergot Grain Molds

Insects

Sorghum insect pests vary from year to year, from different times within the year, during different plant developmental stages, and throughout the state.

Two insects have historically caused the most concern to sorghum producers, chinch bugs and greenbugs. Both are usually more problematic to sorghum early in the season, but they can be detrimental later, before harvest, especially under less than ideal growing conditions. A more recent pest management concern in Kansas is sugarcane aphids, which can reduce yields when aphid populations are high, fields are untreated and there are no beneficials to help regulate aphid populations.

Sugarcane aphids. These aphids are whitish or yellowish with black cornicles and feet. They were first detected in Kansas in August 2014. Migration started early in July 2015, and many fields required insecticide applications in July, August, and September, mainly in south central Kansas. These aphids expanded through much of Kansas in 2016 requiring many acres to be treated. However, since 2017, sugarcane aphid populations have been much less significant. Fields treated for sorghum headworms often had the most significant sugarcane aphid infestations because most insecticides used for headworms also significantly reduce sugarcane aphid natural enemies.

Chinch bugs. Adults: black with white wings that form an "X" on their back. Nymphs: reddish orange early, turning gray before molting to an adult. Nymphs have a characteristic transverse white bar across the middle of the body, although it is less distinct in late instars because of the growing wing pads. These insects cause problems annually in Kansas, most often as they suck plant juices from seedling plants when they migrate from senescing wheat to adjacent sorghum fields. Later-season infestations may weaken stalks and reduce berry size and number, especially under dry growing conditions, which occurred in much of north central Kansas in 2018, but better growing conditions in 2020 and 2021 negated most chinch bug feeding.

Greenbugs. Very small light green aphids with a darker stripe down the middle of the back and antennae as long as their bodies. These aphids are always present in wheat and sorghum fields but have not been problematic in the past 20 years. Beneficial insects, i.e. lady beetles, lacewings, and parasitic wasps are important in limiting all aphid populations.

Sugarcane rootstock weevils. Adult weevils are small, shiny, and black, while larvae are small white grubs. Weevils oviposit in seedling stems; larvae tunnel interiorly around nodes and vertically in the stems, which weakens the seedlings, especially in dry conditions. Good early growing conditions mitigate this feeding damage. Early stalk feeding and later infection by stalk rots may result in lodging before harvest.

Ragworms. This is a general term for foliage-feeding caterpillars, which usually occur at or close to the whorl stage. These can be armyworms, fall armyworms, corn earworms, or cattail caterpillars. Leaf feeding can cause concern; however, plants normally recover, and no economic consequences are evident.

Headworms. This is a general term for caterpillars feeding in the head and on the berries from flowering to soft dough. Often, they are corn earworms, but also may be fall armyworms, armyworms, or any combination of these. This head feeding generally results in a 5% loss per worm per head.

Corn leaf aphids. These dark, blue-green aphids are usually noticed during the whorl stage if populations are sufficient to produce enough sticky honeydew to retard head extension. They have been common since 2019, but not problematic.

Sorghum midge. Larvae are small orange or reddish maggots feeding directly in the seed between the bracts. Adults are tiny, gnat-like flies that cause concern every year in southeast Kansas and occasionally in south central Kansas. Maggot feeding results in “blasted” head appearance. Much “blasted” sorghum has occurred occasionally throughout Kansas due to a variety of causes, but it has not been as problematic since 2018.For more complete sorghum insect management considerations, consult the K-State Research and Extension publications, *Sorghum Insect Management, MF742: www.bookstore.ksre.ksu.edu/pubs/MF742.pdf* and *Crop Insects of Kansas, S152*.

Preharvest Desiccants

Because grain sorghum is a perennial species, preharvest desiccation can have several advantages over natural crop drying.

Several chemical desiccants are available for preharvest use. If applied when the grain is physiologically mature, at 25% to 35% moisture (black layer), sorghum yields are not adversely affected.

Glyphosate can be used as a defoliant in sorghum grown for feed but not for seed. Glyphosate acts less rapidly than diquat or sodium chlorate but is translocated, thus more effective in killing the plant. Sorghum seed treated with diquat cannot be used for food or livestock feed.

Following a glyphosate application, there is a minimum seven-day waiting period between application and harvest, but two to three weeks often pass before the plants die. Research shows that application of 0.75 pound acid equivalent per acre of glyphosate reduced sorghum grain moisture content 10% (two to three weeks after treatment) compared to grain dried under natural conditions. Care must be taken to make sure the crop is harvested in a timely manner, however. If not, the desiccant could increase lodging potential. If applied at the proper time, a desiccant will probably have little or no effect on sorghum yields.

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