

# 8 - Harvesting Grain Sorghum

Gary Huitink

Grain sorghum challenges a combine operator's skills more than any other grain grown in Arkansas. With a properly equipped and well-maintained combine, an alert operator can reduce grain sorghum gathering and separation losses. A capable combine operator can harvest 95 percent of the total yield in a uniformly-mature, standing crop.

Separation (grain leaving the back of the combine) is the most frequent source of high harvest loss. If gathering is complicated by lodging, uneven ripening or differing head heights, gathering loss may become much more costly than separation loss.

Fine-tuning a combine for grain sorghum can easily provide \$25 to \$50 more income per acre. It does not cost any more to do an expert job. Reducing field loss amounts to more profit.

## Moisture

Early harvest reduces the risk of field loss due to grain shatter or lodged heads or damage due to birds, molds or sprouted kernels. Humid weather often delays field drying in Arkansas, especially after grain sorghum reaches 20 percent moisture content. Grain sorghum requires high temperatures and low ambient air humidity to allow grain moisture to dry in the field; quality may degrade during periods of high moisture.

Market dockage for high grain moisture, crop characteristics and weather conditions are important factors that influence when to begin harvest. Discounts for grain sorghum moisture begin above 14 percent moisture content. Penalties for foreign material, sprouted kernels or mold are factors that may influence harvest timing. In addition, consider your capacity to harvest, handle and dry grain sorghum during a time when other crops may be

maturing and potentially competing for the same harvesting equipment. To prevent costly harvest delays or moisture discounts, provisions for drying grain sorghum should be made well before harvest. Market penalties for high grain moisture may encourage drying grain sorghum on the farm. To obtain quality grain and safe long-term storage, plan enough capacity to dry grain sorghum to 12 percent moisture content.

Twenty percent moisture content is a good recommendation for starting to cut if the heads are uniformly ripe. Field loss and kernel damage are normally lowest at this grain moisture level. Cut a sample to adjust the combine and then count field loss. If counts reveal that total field loss is below 5 percent of the grain yield, harvest that grain sorghum rapidly. Delaying harvest to reduce the cost of drying grain sorghum is likely to be offset by increased field loss and grain quality reduction.

Timing grain sorghum harvest is equally as important as timing rice harvest in Arkansas. The greatest profit will likely result from starting harvest between 17 and 20 percent moisture content. Exposure to weather risks, field loss and kernel damage are compelling reasons to complete grain sorghum harvest before it reaches 14 percent moisture. Harvest capacity, drying facilities/market penalties and varietal characteristics influence this range slightly.

If charcoal rot is evident or lodging is a potential threat, harvest without delay. Wind and storms have caused severe field losses of 22, 39 and, in a bad storm, 53 percent of the grain sorghum yield in experiments. The larger heads are most prone to lodge, should adverse weather occur before harvest is completed. Note the "Gathering" comments in the next section.

If field loss counts indicate that gathering loss is only a few percent of the yield and threshing and separation losses are high, evaluate the reason. Threshing and separation loss typically are near minimum at 20 percent moisture content. However, the chaffer sieve may become overloaded without much warning. If the combine is adjusted properly and is in good repair, reducing forward speed or delaying harvest until the grain dries more are two possible remedies/options.

Allowing a field to dry down to 17 percent moisture has proven profitable if this contributes to a reduction of the green leaf fraction on the chaffer sieve. If uneven grain maturity is evident, it is questionable whether delaying harvest will improve income. If the stalks are drying and “open” weather with low relative humidity is expected near term, it may be profitable to watchfully wait. Cut a sample and wait two or three days and cut another sample. The trend of moisture content and the field grain loss in several samples will confirm whether to delay harvest further.

Fields that have heads well above the flag leaf dry more rapidly. Significant periods of low relative air humidity will hasten grain drying in the field. Weigh the potential for adverse weather that may cause lodging, shatter or kernel deterioration should you delay harvest. During a damp season with heavy dews and some foggy days, grain sorghum weathers and kernels may sprout, potentially penalizing a grower by putting it in “sample” grade. Quality reductions due to sprouted kernels, mold or broken kernels may often lower grain one U.S. Grade Number.

Applying a pre-harvest desiccant application dries the leaves and weeds but the effect on grain moisture content can rarely be measured. If using a desiccant reduces the green foliage (weeds or grain sorghum leaves) that will enter the combine and speeds your combine, apply a labeled desiccant on that basis. However, stalk deterioration begins when the desiccant is applied. The grain sorghum acreage that is treated should match your harvest capacity. This is due to the potential for stalk deterioration to increase grain shatter and lodging, if the treated field isn’t harvested within a week or, at most, two weeks after desiccation. Expecting a desiccant to accelerate field grain drying is unrealistic with typical Arkansas weather.

## Gathering

Grain sorghum can be harvested with a grain header (rigid cutterbar), preferably with guard extensions (Figure 8-1). Typically, guard extensions are attached to every other guard in standing grain sorghum. Guard extensions provide support to guide more heads into the header in order to reduce gathering loss. Excellent cutterbar maintenance and adjustments are vital. Cut just below the heads to minimize the stem and leaf entering the combine, even if an occasional head isn’t gathered. Total field loss is typically lower if the thresher can separate the grain well without excess foliage entering the combine. Constantly adjust the cutterbar height to avoid overloading the combine separator with flag leaves; thus, restricting its capacity to harvest grain sorghum. Grain sorghum heads that extend well above the foliage are the biggest factor in maintaining a high proportion of grain in the separator. But an excellent operator must constantly adjust the header height in grain sorghum with variable head heights.



**Figure 8-1. Guard extension, usually attached to every other guard, for grain sorghum.**

At the proper reel speed/forward speed ratio, heads move smoothly across the cutterbar into the platform. Adjust reel speed so the pickup finger speed is 15 to 25 percent faster than the forward speed in order to minimize gathering loss. A slow reel speed, relative to travel, allows heads to fall forward over the cutterbar. Excessive reel speed, low reel position and cutting too low contribute to heads flipping over the reel bats. If the grain heads vary throughout a wide height range, fastening a “baffle” or extension above the reel bats may help to control the taller heads and reduce the loss of dropped heads. The reel hub should be positioned slightly ahead of the cutterbar. Draper headers work very well for grain sorghum.

John Deere Row-Crop Heads™ recover more grain sorghum than other options. Headers with 30-, 36-, 38- and 40-inch row spacing were sold. The Row-Crop Head™ advantage is much greater where lodging occurs. Several other attachments, including Britten Crop Savers or Roll-A-Cone attachments are advised for grain sorghum that has significant proportions of lodged heads or fields that are blown

flat. Economic justification of these header purchases depends on the grain sorghum market value and how much additional grain sorghum can be retrieved compared to your rigid cutterbar header.

## Threshing

Threshing should be vigorous enough to remove mature kernels from the heads. If possible, use a combine with a threshing rotor or a rasp-bar cylinder for grain sorghum. Threshing rotors and rasp-bar cylinders thresh well without pulverizing leaves and stems into small pieces. Either of these options, with the proper threshing and separating adjustments, provide a cleaner grain sample, less grain damage and lower field loss. In fact, leaving a few random immature heads partially threshed will reduce total combine loss by improving separation.

Review your operator's manual for initial settings and fine-tune thresher speed as your field dictates and as grain moisture changes. Areas of the field with drier grain may justify a slower thresher speed.

Grain sorghum kernels are easily damaged if the thresher is operated too fast. Worn threshing components can also contribute to damaged kernels, as well as severely reducing harvesting capacity.

Start with the manufacturer's recommendation for concave clearance, wire configuration, rotor transport vanes, grates, etc. Concave positioning isn't delicate unless wear on threshing components reduces threshing aggressiveness. It is simpler to obtain the proper concave gap first, setting it as narrow as practical. After this, make thresher speed adjustments to accommodate moisture and field conditions to maintain excellent harvesting throughout the day.

## Separation

Grain sorghum stalks are normally relatively green at harvest. When heads are above the flag leaf, effective separation is fairly easy, if proper header height is maintained. Good separation can only be obtained after properly setting the other combine adjustments, including threshing. Always make only one adjustment at a time.

Ample air velocity tumbles the material on the cleaning and chaffer sieves to improve separation.

Adjust the fan to tumble the material well at the front of the sieve and keep the material "floating" over the sieves. If your combine has a grain loss monitor, adjust it to warn you of excessive loss over the sieves. If your combine does not have a grain loss monitor, check the sieves frequently to assure they aren't "matting over" with green material. More air or improved air distribution is the best remedy for matting.

Over threshing or excessive forward speed (overloading the sieve) both contribute to sieve blockage and excessive grain separation loss. If stems poke into the sieve, other residue may accumulate on the sieve. First, close the chaffer extension if it catches there. Or close sieve openings slightly, if this is where the stems collect. If these steps fail, reduce threshing aggressiveness. Sometimes the concave/thresher gap is too large and narrowing it will allow a slower thresher rotation.

Monitor your combine's performance regularly in the field. Exceeding the combine's grain sorghum capacity often causes very high loss over the sieve. Count separation loss behind the combine and check the clean grain for trash content. Use a fairly narrow sieve opening that permits grain to pass through; this aids movement of residue over the sieves. Check the tailings return to maintain less than half of the content as broken plant portions.

Periodically validate the set point if you have a grain loss monitor, to assure that kernels lost over the sieve are proportional to the signal on the dial. Use the grain loss monitor to "fine-tune" the threshing and separation adjustments within each field. Changing fields may involve a change in the variety planted, date of planting, etc., so this is an important time to reassess all the combine adjustments.

Grain sorghum may have foreign material mixed with the grain. If so, consider passing grain through a pre-cleaner before drying it or unloading it into a bin.

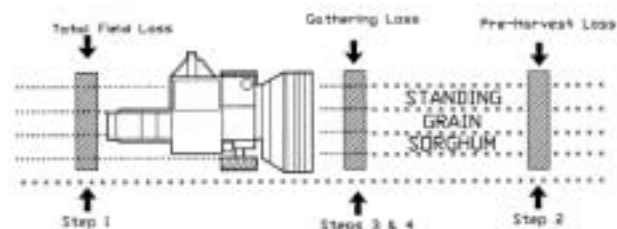
## Field Loss

A field loss count helps to determine if any corrective combine adjustments are worthwhile. Counting grain sorghum remaining in the field helps manage the harvest. If your combine has a grain loss monitor, a count helps interpret the monitor signals. The procedure is:

### Step 1.

Determine the total field loss by counting kernels in a 10-square foot area across the cutting width behind the combine (Figure 8-2). Depending on the seed size, 16 to 21 seed per square foot represent a loss of 1 bushel per acre. Note whether a hull contains a kernel before counting it. Grain sorghum leaf and stalk residue is difficult to sort through, but counting is the best estimate of field loss. If counts indicate total field loss is 5 percent of yield or less, resume harvesting. Loss of less than 5 percent is considered expert management. When lodging occurs, more than one-third of the crop may be lost. Follow step 2 if the source of loss needs to be identified.

**Figure 8-2. Diagram showing locations to measure grain sorghum field loss.**



### Step 2.

Determine pre-harvest loss by counting kernels in a 10-square foot area in standing grain sorghum (ahead of the combine). Be alert for kernels caught on leaves. This count may help to determine when to harvest in order to prevent excessive pre-harvest loss.

### Step 3.

Back the combine about 10 feet away from the standing crop. Mark off a 10-square foot area ahead of the cutterbar to count grain loss. One 10-inch tall head dropped from the cutterbar in this area is estimated to be roughly equal to a bushel per acre loss.

### Step 4.

To determine gathering loss, subtract pre-harvest loss (Step 2) from the loss value counted across the width of the combine in step 3.

### Step 5.

Threshing and separating loss is the portion of the total field loss not attributable to gathering or pre-harvest loss. Subtract both pre-harvest and gathering loss (Step 3) from total field loss (Step 1). Threshing and separation loss may be costly but a practical goal in good crop conditions is to keep loss at 2 or 3 percent of the expected yield.

## Highlights

- Harvest grain sorghum early, beginning when the grain moisture content reaches 17 to 20 percent.
- Applying a pre-harvest desiccant should make combining easier; however, begin combining one week after spraying to avoid stalk deterioration that is likely to increase field loss.
- Attach guard extensions to every other guard on cutterbar headers to recover more sorghum heads. Row-Crop Heads™ typically reduce gathering losses.
- Cut grain sorghum as high as possible to reduce leaf and stalk loading in the combine.
- Keep the pickup finger speed on the reel synchronized with forward speed, i.e. 15 to 25 percent faster.
- Threshing rotors and rasp-bar cylinders are better threshing options for grain sorghum. Refer to your operator's manual for initial settings.
- Maintain high air velocity through the sieves. Set the grain loss monitor to warn the operator of grain loss over the chaffer sieve or check frequently to detect impending leaf accumulation.
- Examine field loss regularly. If the grain is spread uniformly over the field, 21 small kernels or 16 large kernels per square foot equal 1 bushel per acre. Maintaining field loss at 5 percent or less of the yield is usually a realistic goal.