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Harvesting Grain Sorghum

Biological and
Agricultural
Engineering

Grain sorghum typically requires more care at harvest than other crops. A capable combine operator can harvest 95 percent of the total yield in a uniformly mature, standing crop. With a properly equipped and maintained combine, an alert operator can reduce gathering and separation losses in grain sorghum.

Grain sorghum is a challenge to an expert combine operator. Separation is the most frequent source of high harvest loss. If gathering is complicated by lodging, uneven ripening or differences in the height of heads, gathering losses become as costly, if not more costly, as separation losses.

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. Lower harvest loss means more profit.

Moisture

Early harvest reduces the risk of grain sorghum loss due to birds, insects, molds, sprouted kernels or lodged heads. Humid weather in Arkansas often delays field drying, especially after grain sorghum reaches 20 percent moisture content. Provisions for drying should be made well before harvest to prevent costly harvest delays. To obtain quality grain and safe storage, plan enough capacity to dry grain sorghum to 12 percent moisture content.

Field and weather conditions are important factors influencing when to begin harvest. Twenty percent moisture content is an excellent time to cut if the heads are uniformly ripe. Field loss and kernel damage are normally low at this moisture level. Cut a sample to adjust the combine and count field loss. If counts reveal that total field loss is below 5 percent of the expected yield, harvest the crop rapidly.

If charcoal rot is evident and lodging is beginning, harvest without delay. Note “Gathering” comments on the following page.

If field loss counts suggest gathering loss is only a few percent of the yield and threshing and separation losses are high, evaluate why. Threshing and separation losses are normally near minimum at 20 percent moisture content. The chaffer sieve can often be overloaded without warning. If the combine is adjusted properly and in good repair, reducing forward speed or delaying harvest are possible options.

Allowing field drying to 17 percent moisture content may prove profitable if a reduction of green leaf on the chaffer sieve is likely. Varietal differences and time of year affect the probable plant-drying rate. Consider the risk of adverse weather; it often

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causes substantial lodging or kernel deterioration. Quality reductions due to sprouted kernels, mold or broken kernels readily lower the grain one grade.

When uneven maturity is evident, it is uncertain whether delaying harvest will improve income. If the stalks are drying and low relative humidity is expected near term, a watchful wait may be profitable. Cut a sample; wait two days and cut another sample. The trend of moisture content and grain loss in several samples should confirm whether to delay another day.

A preharvest desiccant application dries the leaves and weeds, but the effect on grain moisture content can rarely be measured. If a desiccant makes combining easier, proceed on that basis. However, a side effect, stalk deterioration, can contribute to lower yields if grain sorghum is not harvested within a week or, at most, two weeks.

Timing grain sorghum harvest is equally as important as timing rice harvest. Once the moisture content reaches 25 percent, grain sorghum can be harvested with the proper combine adjustments. Greater 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 reaching 14 percent moisture. Harvest capacity, drying facilities/market penalties and varietal characteristics influence this range slightly.

Gathering

Grain sorghum can be harvested with a grain header (rigid cutterbar) with guard extensions. Excellent cutterbar maintenance and adjustment are vital. Cut high to minimize the stalk and leaf entering the combine, even if an occasional immature head isn't gathered. Field loss is often lower if the thresher can separate grain well without excess stalk and leaf.

At the proper reel speed/forward speed combination, heads move smoothly across the cutterbar into the header. Adjust reel speed so the pickup finger speed is 15 to 25 percent faster than forward speed to minimize gathering loss. Excessive reel speed, low reel position and cutting too low contribute to heads flipping over the reel bats. A slow reel speed, relative to travel, allows heads to fall forward over the cutterbar. The reel hub should be positioned slightly ahead of the cutterbar.

Several guard extension attachments are available that fasten to the cutterbar guards. Guard extensions provide support to guide more heads into the header, reducing gathering loss.

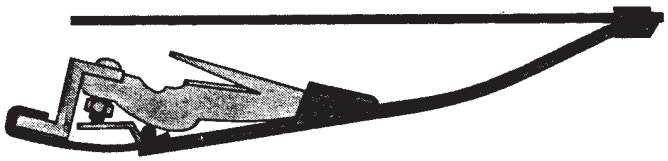

Figure 1. Guard extension for grain sorghum.

John Deere row-crop heads recover more grain sorghum than other options. They are available for 30-, 36-, 38- and 40-inch row spacings. Economic justification of a row-crop head requires harvesting extensive acreage (including soybeans). Their advantage is much greater where lodging occurs.

Threshing

Threshing should be vigorous enough to remove mature kernels from the heads. If possible, use a combine with a rasp-bar cylinder or a threshing rotor for grain sorghum. Threshing rotors and rasp-bar cylinders thresh well without tearing leaves and stems into small pieces. With the proper threshing and separating adjustments, they provide cleaner samples, less grain damage and lower field grain loss. In fact, leaving 1 or 2 percent unthreshed heads may reduce total combine loss by improving separation.

Review your operator's manual for initial settings, and fine tune the thresher speed as grain moisture fluctuates during the day. Thresher speed can be reduced with drier grain. Grain sorghum kernels are damaged if the thresher is operated too fast. Worn threshing components can also contribute simultaneously to grain damage and poor threshing.

The manufacturer's recommendation for concave clearance, wire configuration, etc., is the place to start. Concave positioning isn't delicate unless wear on threshing components or concave adjustment linkage reduces threshing aggressiveness. It is simpler to obtain the proper concave gap first. 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 relatively 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.

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 material.

Good 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 does not have a grain loss monitor, watch the sieves closely for indications of matting when gathering green material. More air or improved air distribution is the best remedy for matting. Overthreshing or excessive forward speed (overloading the sieve) contributes to sieve blockage and excessive grain separation loss.

If stemmy material pokes into the sieve, other residue may rapidly 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.

Grain sorghum usually has foreign material mixed with the grain. We advise precleaning grain before putting it into a drying bin.

Combine Loss Monitors

Grain loss monitors are helpful for fine tuning operating adjustments and combine forward speed. The "area-based" systems with compensation for forward speed provide the most useful signals. The sensors must be properly installed in the straw and chaffer discharge to intercept kernels that leave the combine. The sensitivity must be adjusted so sensors are triggered only by grain and not stalk segments. The only way to calibrate a monitor is to determine separation loss on the ground. Validate the grain sorghum set point and check occasionally that separation losses are proportional to the signal in the cab.

Field Losses

A field loss count is useful to determine if any corrective steps 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 signals. The procedure is:

Step 1.

Determine **total field loss** by counting kernels in a 10 square foot area across the cutting width behind the combine (Figure 2). Depending on the seed size, 16 to 21 seed per square foot represent a loss of 1 bushel per acre. Note whether hulls have a kernel before counting. Grain sorghum leaf and stalk residue is difficult to sort through, but counting is the best way to estimate 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, up to one-third of the crop may be lost. Proceed to step 2 if the source of loss needs to be identified.

Step 2.

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

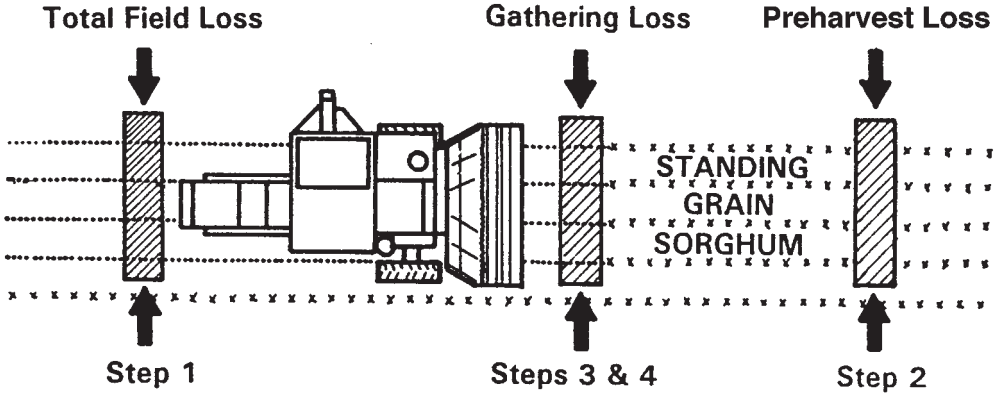

Figure 2. Measuring grain sorghum field loss.

Step 3.

Back the combine at least 5 feet away from the standing crop. Mark off a l0 square foot area ahead of the cutterbar to count grain.

Step 4.

To determine **gathering loss**, subtract preharvest loss (Step 2) from the loss value counted across the width of the combine in Step 3.

Step 5.

Threshing and separation loss is the portion of the total field loss not attributable to gathering or preharvest loss. Subtract both preharvest and gathering loss (Step 3) from total field loss (Step 1). Threshing and separation loss may be costly, but a practical goal is 2 or 3 percent of the expected yield.

Highlights

1. **Harvest grain sorghum early, beginning when the moisture content reaches 17 to 20 percent.**
2. **A preharvest desiccant may make combining easier; begin combining one week after spraying to avoid field loss due to stalk deterioration.**
3. **Attach guard extensions to cutterbar headers to save more sorghum heads. Row-crop heads may reduce gathering losses further.**
4. **Cut grain sorghum as high as possible to reduce leaf and stalk load inside the combine.**
5. **Set the pickup finger speed on the reel 15 to 25 percent faster than forward speed.**
6. **Threshing rotors and rasp-bar cylinders are better threshing options for grain sorghum. Refer to your operator's manual for initial settings.**
7. **Maintain high air velocity below the sieves. Set the loss monitor to warn the operator of grain passing over the chaffer sieve, or check frequently to detect impending leaf accumulation.**
8. **Examine field loss frequently. If the grain is spread uniformly over the field, 21 small kernels or 16 large kernels equal 1 bushel per acre. Maintaining field loss at 5 percent or less of the yield is usually a realistic goal.**

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