

GRAIN SORGHUM: HARVESTING, DRYING AND STORING

Paul E. Sumner, Extension Engineer

Grain sorghum matures physiologically when the moisture in the grain drops to about 30 percent. However, the seed are usually too soft for harvesting at moisture contents exceeding 25 percent. Attempts to harvest above 25 percent moisture will usually produce either unthreshed heads or cracked grain.

Field drying is possible during a dry fall season. Early harvest is advisable in Georgia due to the possibility of mold growth in the field during rainy periods. Delayed harvest may also cause shattering and lodging.

Standing grain sorghum can be harvested using a combine with a conventional header. The header should be raised high enough to harvest only the grain heads of the plant. Pick-up type guards are recommended if the heads are drooping.

Row crop attachments can be added to most combine headers to help pick up the plants if lodging is a problem. These attachments fit in front of the grain header cutter bar with gathering chains and kicker wheels similar to a forage harvester. Vertical finger cylinders and spiral gathering cones are sometimes used in row-crop attachments.

Narrow row spacings help discourage lodging which is caused by adjacent plants supporting the broken stalks. Consequently a 30-inch row spacing is more desirable than a 40-inch row spacing.

Combine header losses are usually minimal at a field speed of 2.5 to 3 miles per hour. However, this may exceed the capacity of the rack and shoe if the stand is dense. In this case, it may become desirable to take a partial swath to prevent overloading and yet maintain field speed.

Combine reel bat speed should be about 25 percent faster than ground speed and set high enough to avoid catching under and throwing the heads. Wide reel bats may be needed if plant height varies greatly.

Combine cylinder and concave should be set to separate the seed from the head without over-threshing. The cylinder speed should be even less than for wheat, and some combine manufacturers recommend removing the concave bars. Concave clearance should be about $\frac{1}{2}$ inch in front and about $\frac{3}{16}$ inch at the rear. The combine instruction manual gives details for such adjustments.

Grain sorghum stalks contain more moisture and are smaller than most corn stalks. Grain sorghum stalks are therefore more likely to be chopped up and carried to the grain tank, Pieces of stalk returned to the cylinder in the tailings will be further ground into fines. The chaffer extension can be closed preventing this material from entering the tailings conveyor. Sorghum stems often catch and choke the straw walkers, causing inconvenience and time loss. Some manufacturers make straw walker covers containing smaller holes to catch stems while allowing the grain to drop through.

Sieves should be inspected often during operation to detect matting or sealing of the sieve. The upper sieve should be set $\frac{1}{2}$ - $\frac{2}{3}$ open with the lower sieve $\frac{1}{3}$ - $\frac{1}{2}$ open.

Harvesting losses can be measured by counting kernels on the ground. Seventeen kernels per square foot represents a loss of one bushel per acre.

Determine pre-harvest loss by counting the kernels on the ground on an area equal to the combine header width and one foot along the row. If the loss averages 17 kernels per square foot, one bushel per acre has been lost ; prior to harvest. The header loss can be measured by stopping the combine in the row and backing up several feet to allow counting the fallen kernels across the header width in the stubble. The header loss can be determined by subtracting the pre-harvest loss. The threshing and separating losses can be measured behind the combine by subtracting the pre-harvest and header losses.

If harvest losses exceed 10 percent, they are excessive and adjustments should be made to reduce losses. Threshing and separation losses should not exceed 2 percent with header losses not to exceed 8 percent of the crop.

DRYING

Sorghum has more trash mixed in the grain after combining than any other common crop. If harvested prior to frost, pieces of green stems and foliage are usually mixed in with the grain. This foreign matter is difficult to remove before drying even though growers try to clean sorghum both before and after drying. Trash in the dryer can be a fire hazard and offers resistance to air movement. Dryers should be inspected to make sure all parts unload properly and should not be allowed to run unattended for long periods of time. Trash pulled into the air intake causes many fires. Once in the air intake, the trash is carried through the flame and deposited, still glowing, in the plenum chamber and possibly in the grain. This can be prevented by keeping the ground clean near the air intake. The intake may also be shielded with a screen which prevents trash entrance. The screen should not be finer than $\frac{1}{4}$ inch mesh or restriction of air movement may occur.

Trash can be blown under bin drying floors and sift through perforated floors creating a fire hazard.

Trash is usually removed by sifting the grain through a screen or sieve. The seed fall through while trash remains on top. Most cleaners are designed to retain the seed and drop the fines. This removal of the fines often leads to, overloading the take-away conveyors when cleaning sorghum. With rotary screens, the grain falls through and trash is retained, requiring a means to catch that portion which would be the fines in a normal cleaning operation.

Dryers will not force air through grain sorghum as easily as through corn because the smaller grains have less void space for air movement. This air resistance allows grain sorghum to dry about $\frac{2}{3}$ to $\frac{3}{4}$ as fast as corn under the same drying conditions; that is, grain depth and air temperature.

Any method used for drying shelled corn should also work for sorghum. The drying time should be the same for sorghum as for corn, if the capacity is reduced 25 to 40 percent.

Drying temperature should be limited to 110°F if grain sorghum is to be used for seed. If used for feed grain, sorghum can be dried at 140°F or less for batch-in-bin systems using air flows of 10 to 25 cubic feet of air per minute per bushel (cfm/bu.). Batch or continuous flow dryers using air flows of 100 to 200 cfm/bu. can successfully dry sorghum at temperatures up to 200°F. Drying in deep layers should be avoided due to the risk of molding in the top layers. Sorghum which is to be held in storage for 12 months should be dried to 11 percent in North Georgia and 10 percent in South Georgia.

HOLDING HIGH-MOISTURE SORGHUM AHEAD OF DRYER

Operators with no previous experience should be extremely cautious in holding high-moisture grain sorghum ahead of the dryer. Be sure all high moisture grain has been removed before refilling.

Since high-moisture sorghum packs tighter than high-moisture corn, air circulation is inhibited and heating problems may result. Safety margins are thin if the sorghum is near 25 percent moisture and grain temperature is 80 to 90°F. These conditions are ideal for heating, molding and sprouting. Aeration in wet holding bins at the rate of $\frac{1}{2}$ cfm per bushel can be beneficial if nighttime temperatures drop 10 to 20°F below daytime averages. However, if the temperature does not drop, little benefit, other than a slight amount of evaporative cooling will result.

STORING GRAIN SORGHUM

Sorghum placed into dry storage should be cleaned and spread mechanically to distribute the dust and fines as well as any trash which may remain. Aeration is essential for safe storage. The aeration rate should be about $1/10$ cfm/bu. Air flow should be increased slightly if aeration systems are designed for shelled corn or soybeans. Though air flow here is not as critical as in drying, it is reason for more frequent inspection.

The University of Georgia and Ft. Valley State College, the U.S. Department of Agriculture and Counties of the state Cooperating. The Cooperative Extension Service offers educational programs, assistance and materials to all people without regard to race, color, national origin, age sex or disability.

An Equal Opportunity/affirmative Action Organization Committed to a Diverse Work Force

ENGINEERING

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, The University of Georgia College of Agriculture and the U. S. Department of Agriculture cooperating.

Gale A. Buchanan, Dean and Director