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Harvest Aids in Sorghum

Charles Stichler and Steve Livingston*

GROWERS OF GRAIN SORGHUM can obtain higher prices and increased profits if their sorghum meets market moisture specifications. To help meet those specifications, growers may apply harvest aids, which are chemicals that bring the grain to a more uniform percentage of moisture at harvest.

Harvest aids may be needed because sorghum is a perennial plant that can live beyond a single season's growth cycle. If its growth is not terminated by chemicals, freezing weather or shredding and tillage, the plant can survive for extended periods, which often causes problems at or beyond harvest.

Grain containing too much moisture can harbor molds and bacteria, causing heating or "souring" and a loss of quality. If the moist grain is stored, the risk increases for aflatoxin, which prevents international trade.

Sorghum that meets the moisture specifications commands higher prices because artificial drying or blending is not required.

If grain moisture levels are too high, producers can uniformly dry the crop, desiccate immature sorghum heads, "suckers," and weeds, and reduce the green vegetation that increases grain moisture as it goes through the combine. Clean, dry grain is easily threshed, which will reduce field losses and increase harvest efficiency.

Causes of uneven moisture

Several factors cause uneven moisture in sorghum at harvest:

- When initial emergence is poor and then a rain causes the dry sorghum seed to sprout, the result is two plant stands of different ages. At harvest, the younger stage will have more moisture than will the older plants.
- Nonuniform heading and variable dry down can occur after the stand is established and drought conditions are followed by a rain.
- Dry and wet spots in the field also cause variable heading.
- Iron chlorotic spots in the field delay maturity.
- Soil texture changes or low spots in parts of the field also cause differing moisture contents.
- Thin stands result in tillering or late "suckers" that delay harvest or result in differences at dry down.
- If weeds are not controlled well, green weeds will enter the threshing process. The moisture from those weeds will be absorbed by the grain.

*Professor and Extension Agronomist, and Professor and Extension Agronomist, The Texas A&M University System

How harvest aids work

When harvest aids are applied properly, harvest is made more efficient and combining is faster, with no reductions in grain weight. Grain from the entire field will have a uniform moisture content, resulting in few "hot" loads and price discounts.

To keep the grain from losing weight, it is critical that growers apply the harvest aids at the proper time, which is once the grain reaches physiological maturity and the average grain moisture drops below 30 percent. If harvest aids are applied prematurely, both yields and grain quality will be reduced.

Sorghum becomes mature and is ready for harvest at about 115 days after planting. Most sorghum varieties reach 50 percent bloom in 65 and 75 days after planting; another 45 days is required for the grain to mature.

At maturity, the embryo is properly developed and the grain has reached its maximum weight. When the seeds reach physiological maturity, additional nutrients and carbohydrates no longer move into the grain. At this time, a black layer forms at the attachment point and seals the seed from the plant.

Determining physiological maturity

Growers can easily determine when grain sorghum is mature: It is when a black layer appears on the sorghum kernels. Pinch several kernels from the head and examine them carefully. When you detach a kernel from the outer glume, you will be able to see a black spot, or black layer, at the base of the kernel.

Sorghum pollinates first at the top of the head and progresses steadily downward to the base of the panicle (or flower cluster) in 4 to 7 days. Seed at the top will mature before that at the bottom of the head.

There are two ways to determine physiological maturity:

- Use a grain moisture tester. Most grain moisture testers register up to 30 percent moisture. By stripping grain off several heads from several areas of the field and testing the moisture, you can easily estimate the moisture content of the sorghum.
- Check the kernels for a black layer, which indicates that the crop is mature. In Figure 1, various kernels of sorghum have been pinched from descending regions of the head.
  Kernel 1 (far left) was selected from the top of the head and is visibly shrunken, as it has dried more than the other kernels. It appears "pinched" at the base and has a fully developed black layer that is clearly visible. Kernels 2, 3 and 4 were taken in descending order.
  Kernel 4 came from the middle of the head and shows the first external signs of the dark layer formation. Kernel 4 shows almost no signs of shrinking and, although physiologically mature, it has a fairly high moisture level. Kernel 5 has no black layer and is just entering the time that the vascular connection between the plant and seed will be terminated. The crop is mature when the kernels look like Kernels 1, 2 or 3 in Figure 1.

With practice, you will be able to disregard the differences in grain color and easily distinguish the black layer to determine the relative maturity of the crop.

Figure 1. Sorghum kernels in various stages of maturity harvested from the same panicle from the most mature (1) to the least mature (5). The black layer is first visible in the second stage and becomes more distinguishable as the seed loses moisture.

Materials available

Only two products are labeled for use as harvest aids: sodium chlorate (containing a fire retardant) and glyphosate. For satisfactory results, good spray coverage is needed for both products. Eight to 10 gallons per acre (GPA) of solution by ground or 3 to 5 GPA by air is recommended.

Sodium chlorate, which can cause fires if it is not mixed with a retardant, is a chemically active salt that desiccates the plant. Growers may apply up to 6 pounds per acre. This product is sold under various trade names and concentrations of active ingredient per gallon. For good desiccation, the weather must be hot and dry.

Glyphosate is a herbicide that kills the plant. Producers may make a single application of up to 2 quarts per acre.

Once it is applied to sorghum, the plants move the glyphosate to the growing point over a 5- to 6-day period. Weeds that are actively growing when the product is applied will also be destroyed.

Use a sprayable grade of ammonium sulfate at a rate of 17 pounds/100 gallons of water or a prepackaged sulfate formulation to condition the water and improve effectiveness. There is a 7-day waiting interval between application and harvest. The crop is usually ready 7 to 10 days after application.

Glyphosate also controls rhizome Johnsongrass, silverleaf nightshade, morning glory, field bindweed and most other perennial weeds.

Crop lodging

If the plant is healthy, growers usually do not need to worry about crop lodging after harvest aid applications. Studies have shown that healthy sorghum treated with harvest aids will stand well for up to 3 weeks after treatment. After 30 days, lodging can be significant. Treat only those acres that can be harvested within 10 days to 2 weeks after application.

To avoid any premature lodging, inspect the field before the application. Look for stalk degradation from diseases such as charcoal rot, which will cause premature lodging during natural dry down or after harvest aids are applied (Figure 2).

To check the plants before treatment, split the stalk lengthwise and look for a hollow stem or black rot just above the root crown. If the stalk is unhealthy, it will generally fall, whether or not it has been treated. Figures 3 and 4 show what to look for in finding charcoal rot and what to expect if an application is made without assessing these risks.

As with all farm chemicals, read and follow label directions carefully before applying the product.

Figure 2. Three increasing levels of charcoal rot (left to right). Infected plants die prematurely before all the grain can be filled. Sorghum heads appear dull and lackluster, and the spikelets may droop, giving the panicle a ragged appearance. Such panicles contain some shriveled grain, with the worst being found at the base of sorghum head, which would have been the last grain to mature.

Figure 3. By the time sorghum begins to lodge, it may be too late to apply glyphosate. When sliced open, the lower 5 to 6 inches of stalk appears gray and is infected with charcoal rot. As prematurely killed plants continue to lose moisture, the stalks will fall rapidly under the weight of their own grain.

Figure 4. Harvest aid applications may accelerate the fall of sorghum infected with charcoal rot. To avoid excessive lodging, harvest promptly. Do not treat more sorghum acres than can be harvested immediately.

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