



Considerations for Artificial Drying of Soybeans

Prepared by Bill Halfman, Greg Andrews and Bob Cropp, UW Extension Agriculture Agents

This fall's weather may create situations where some growers will be tempted to artificially dry their soybeans. It is not a good situation when growers need to consider artificial drying of soybeans. It presents several challenges in order to keep the soybeans at an acceptable quality level to avoid dockage. Growers will have to weigh the advantages and disadvantages for their own operation to determine what is best for their situation.

Soybeans can be harvested without too much damage up to about 18% moisture. If soybeans are harvested at a moisture content much above 13%, artificial drying is necessary.

There is not much published research on soybean drying. Most of our drying recommendations are based on limited experience or are extrapolated from corn drying recommendations. In most cases, dryers that were designed for corn can be adapted for use with soybeans. Bill Wilke, University of Minnesota Crop Storage and Handling Specialist, offers the following information on artificial drying of soybeans.

Natural-air drying

Using unheated air to dry soybeans usually works well, but it is a slow process (two to six weeks, depending on initial moisture, airflow, and weather). Bins used for natural-air drying should have full-perforated floors and fairly large drying fans. Fan power requirements depend on desired airflow and depth of beans. For example, delivery of 1.0 cfm/bu (cubic feet of air per minute per bushel of beans in the bin) through an 18-ft depth of soybeans would require about 0.6 hp (horsepower) per 1000 bushels of beans in the bin, while delivery of 1.5 cfm/bu through 18 ft of beans would take about 1.6 hp/1000 bu.

Management of natural-air soybean dryers is similar to that for natural-air corn dryers, except that soybean moisture values need to be about two percentage points lower than those recommended for corn. In southern Wisconsin, use an airflow of 1 cfm/bu to dry 17 to 18% moisture beans, 0.75 cfm/bu for 15 to 17% moisture beans, and 0.5 cfm/bu for 13 to 15% moisture beans. In northern Wisconsin, higher airflow is needed since fewer days are available for drying in the fall. In northern areas, use 1.0 cfm/bu to dry soybeans that are 16% moisture or less, 1.25 cfm/bu for 17% moisture beans, and 1.5 cfm/bu for 18% moisture beans. See *Natural-Air Corn Drying in the Upper Midwest, BU-6577*, available from the UofM Distribution Center or *Natural-Air/Low-Temperature Crop Drying, EB-35*, from the NDSU Distribution Center for information on equipping and managing natural-air dryers.

Because natural-air drying is a slow process, it will be difficult to use one bin to dry both beans and corn in the same year. Don't plan on having the beans dry before corn harvest unless the soybeans are only slightly wetter than 13%, or unless you use a shallow drying depth.

Low-temperature drying

Early in the fall, especially in years with warm, dry weather, it is possible to dry soybeans to less than 13% moisture with no supplemental heat. (See previous section on natural-air drying.)

However, late in the fall, or in years with cool, damp weather, soybeans might not dry to 13% and it might be helpful to add a small amount of supplemental heat to the air in natural-air dryers. Do not heat the air more than 3 to 5 degrees F, though, or you will over dry the beans and you might cause an increase in splitting. Research has shown that exposing soybeans to relative humidity values of less than 40% can cause excessive splitting. For every 20 degrees F that you heat air, you cut its relative humidity approximately in half, so it doesn't take very much heat to produce relative humidity values less than 40%.

Some alternatives to adding supplemental heat to natural-air drying bins include:

- Turning off the fan when weather gets cold in the fall, keeping beans cold during winter, and resuming drying when average temperatures climb above freezing in the spring.
- Installing bigger fans so that you can finish drying earlier in the fall when weather is better.
- Using manual or automatic control to turn off the fan during periods of high humidity. Fan control will increase the amount of time required for drying, but it will result in drier beans.

High-temperature drying

Soybeans can be dried in a high temperature dryer, but the plenum temperature needs to be limited to minimize damage to the beans. Many kinds of gas-fired corn dryers can be used to dry soybeans, but be careful. Refer to the manufacturer's recommendations for maximum drying temperature. Typically the maximum drying temperature for non-food soybeans is about 130 degrees. Even at that temperature some skins and beans will be cracked. Soybeans split easily if they are dried too fast or are handled roughly. Set the drying air temperature lower than you would for corn and avoid dryers that recirculate the crop during drying. Column-type dryers can often be operated at 120 to 140 F without causing too much soybean damage, although some trial and error might be required to set dryers properly. Examine beans leaving the dryer carefully and reduce the temperature if you're getting too many splits. If the soybeans will be saved for seed, keep drying temperatures under 110 F to avoid killing the embryo.

Don't forget that crops dried in gas-fired dryers must be cooled within a day or so to remove dryer heat. This can be done in the dryer or in aerated storage bins. Stored beans should be aerated again later in the fall to cool them to 20 to 30 F for winter storage.

Immature, frosted, or green-colored beans

In years when frost kills soybean plants before the seeds are fully mature, make sure you remove as much chaff and green plant material as possible before binning the beans. Immature beans can be stored without significant molding, but concentrations of green chaff can lead to heating in storage. Although it is commonly stated that green soybeans will eventually turn yellow in storage, the color change observed in a U of Minnesota laboratory study was minimal. It might still be worthwhile to store green soybeans for a few months after harvest though, to avoid the high discounts that are applied in years when large quantities of green beans are delivered during harvest. Just make sure that any green beans going into storage are clean, evenly distributed throughout the bin, and cooled as soon as possible after harvest.