

AGRONOMIC

ALERT



Handling, Drying, and Storing Wet Soybeans

Wet soybeans at harvest can occur due to cool and/or wet conditions that delay maturity. Many growers are more familiar with handling wet corn while, wet soybeans are more unusual. To help obtain maximum weight and minimum field loss, optimum harvest moistures for soybeans range from 13 to 15% moisture content. According to Iowa State University, soybeans can generally be harvested any time after the seeds are mature and the foliage is dry. However, when moisture is above 18%, threshing can cause additional loss by crushing or bruising seeds. Artificial drying is necessary when soybeans are harvested with a moisture content much above 13%. In addition, wet soybeans require special attention during storage. As a guideline, Dr. Bill Winkle, Extension Engineer with the University of Minnesota, reports that soybeans in storage tend to act about the same as corn that is 2% greater in moisture content. For example, soybeans at 16% moisture could be expected to act like corn at 18% moisture.

Handling Wet Soybeans

Soybeans are fragile and can split from rough handling. The best options for gentle handling include; belt conveyors, bucket elevators, and drag or mass conveyors. Normal grain augers can be used if they are operated when slow and full. Pneumatic or air-type conveyors can be used if the air to grain ratio is set properly and if lines are laid out with a minimum number of gradual curves.



Avoid long drop heights when handling wet soybeans. This can be achieved by using devices that break long drops into a series of shorter drops, such as adjusting the position of conveyors or by using bean ladders. For food-grade soybeans, a maximum drop height of 10 feet has been reported. Grain spreaders are suitable for commercial soybeans but not soybeans used for seed. When a spreader is not used, accumulated fines can be removed by a process called coring. Coring involves unloading several loads from the center of the bin while simultaneously filling the bin.

Drying Wet Soybeans

In cool, damp years soybeans harvested with higher moisture content will require supplemental drying from either low- or high-temperature drying. Care must be taken not to over dry the soybeans, which can cause them to split. In most cases, dryers that were designed for corn can be adapted for use with soybeans. Nevertheless, dryers that constantly recirculate or stir grain should be avoided. Fans sized for corn drying will produce greater air-flow through soybeans resulting in faster drying. Some guidelines for **low-temperature** drying from Iowa State University, University of Minnesota and North Dakota State follow:

1. Low-temperature dryers should have a full perforated floor and a fan that can push airflow of one to two cfm/bu up through the grain. A drying front will develop near the floor and move slowly upward. Drying time depends on air flow, weather, and initial moisture content but will probably be three to six weeks.
2. If adding supplemental heat to a natural air dryer, do not increase air temperature by more than 3 to 5° F to help

avoid an increase in splitting.

3. Prolonged relative humidity values less than 40% can cause excessive splitting. For every 20° F the air is heated, the relative humidity is cut approximately in half. Consequently, it doesn't take long to reach a relative humidity < 40%.
 - a. Run the fan continuously until the drying front reaches the top layer of the soybeans or until average outdoor temperatures fall below freezing. Turning the fan off when weather is cold will keep the soybeans cold during the winter. If needed, drying can resume when average temperatures climb above freezing in the spring.
 - b. Bigger fans should be installed so that drying can be finished earlier in the fall when weather is better.
 - c. To avoid overdrying and cracking of soybeans, adjust heaters on low-temperature bins for no more than a 20°F temperature rise and use an in-plenum humidistat to shut off the heater when relative humidity of the drying air is below 45%.
 - d. Use manual or automatic controls 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 soybeans.

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Some guidelines for **high-temperature** drying from Iowa State University, University of Minnesota and North Dakota State follow:

1. The same drying equipment may be used for both corn and soybean if temperatures are reduced to 120°-140°F for commercial beans, and 100°-110°F for seed soybeans to avoid killing the embryo.
2. If soybeans are dried too fast or at temperatures that are too high, they may split very easily.
3. Soybeans should be examined as they are leaving the dryer and temperatures should be reduced if too many splits are observed.
4. Avoid dryers that recirculate the crop during drying.
5. The retention time in the heat section of a dryer should be less than 30 minutes.
6. To help avoid excessive moisture differentials from top to bottom in batch-in-bin dryers, shallow batch depths (two to three feet) should be used when drying soybeans. If the bin has the ability to stir, one stir is recommended. For seed soybeans, suggested airflow in batch-in-bin dryings is six to nine cfm/bu. Moisture should be checked frequently as soybeans dry rapidly.
7. Cool soybeans that have been dried in gas-fired dryers within a day or so to remove dryer heat. This can be done in the dryer or in aerated storage bins. Stored soybeans should be aerated again later in the fall to cool them to 20° to 30° F for winter storage.

Storage

As stated earlier, keeping fines or debris out of the bin will help deter mold, disease, and insect invasion during storage. To do this set combines should be set for maximum cleaning or run the seed through a grain cleaner on the way into the bin. As mentioned before, use grain spreaders to fill bins, by frequently moving spouts during bin filling. When spreaders are not used, remove fines by coring bins after they are full.



Storing soybean seed at a moisture content that is too high can also result in rotten seed or decreased germination, all in just a few days. Due to higher moisture content, soybeans are more susceptible to spoilage compared to corn. Consequently, soybeans need to be about two points drier than corn for the same storage period. Iowa State University recommends storing commercial soybeans at 13% moisture content or less and seed soybeans at 12% moisture content or less.

After soybeans have been dried to the proper moisture, it is important to make sure the seed is at the suggested winter storage temperature of 20° to 30° F for the upper Midwest. This can be accomplished with aeration fans. The University of Minnesota believes it is best to cool in 10° to 20° F stages as average temperatures drop in the fall. For example, if beans are harvested at 55° F, you could wait a few weeks until average outdoor temperatures drop to 40° F and run the fans long enough to cool all the beans in the bin to 40° F. Then shut the fan off for a few more weeks and repeat the cycle when average outdoor temperatures fall to about 25° F.

After reaching the desired storage temperature, check the bins every 2 to 4 weeks during the winter. Check for maintained temperature, mold, insects, and crusting. If temperatures fluctuate, the aeration fan can be used during 20° to 30° F weather to adjust the temperature. If keeping the soybeans into the spring, increase the frequency of bin checks to once a week as outdoor temperatures increase. If aeration is needed during the summer run it during the coolest weather available and make sure to keep the soybean temperature less than 60°F.

Sources: Hurburgh Jr., C. 2008. *Soybean Drying and Storage*. Iowa State University Extension Publication PM-1636; Maier, D.E., 1993. Grain Quality Fact Sheet #16, *Drying Soybeans Requires Special Considerations*. Purdue University. September 28, 1993; Wilcke, B., Morey, V., Hellevang, K. 2005. *Soybean Drying, Handling, and Storage*. University of Minnesota and North Dakota State University.

Individual results may vary, and performance may vary from location to location and from year to year. This result may not be an indicator of results you may obtain as local growing, soil and weather conditions may vary. Growers should evaluate data from multiple locations and years whenever possible.

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